Appendix A

PAVEMENT CONDITION SUMMARY

Colorado Springs Airport

Prepared by:

Applied Pavement Technology, Inc.

Date:

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COLORADO SPRINGS AIRPORT

Pavement Condition Summary

Introduction

As part of the Colorado Division of Aeronautics' (CDOA) continuing pavement management activities, Applied Pavement Technology, Inc. (APTech) conducted an evaluation of the condition of the pavements at Colorado Springs Airport in August 2009. The results of this evaluation are presented in this document.

Pavement Inventory

Colorado Springs Airport has approximately 16,632,000 square feet of pavement. Figure 1 shows the area of the pavement system broken out by pavement use (runway, taxiway, and apron). This figure also shows the area-weighted age of the pavements, as measured from the last time major rehabilitation or reconstruction was performed on the pavements.

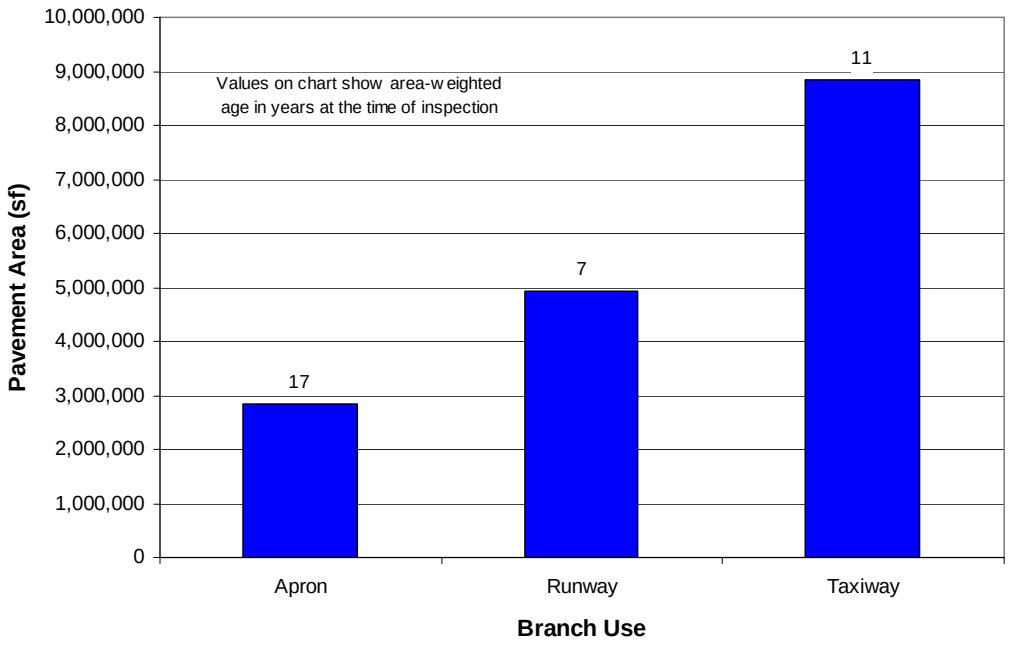


Figure 1. Pavement inventory.

Figure 2 summarizes the area of the pavement system broken out by pavement surface type. The surface types identified at Colorado Springs Airport are defined as follows:

AC: Asphalt concrete pavements.

AAC: AC pavements with one or more AC overlays.

PCC: Portland cement concrete pavements.

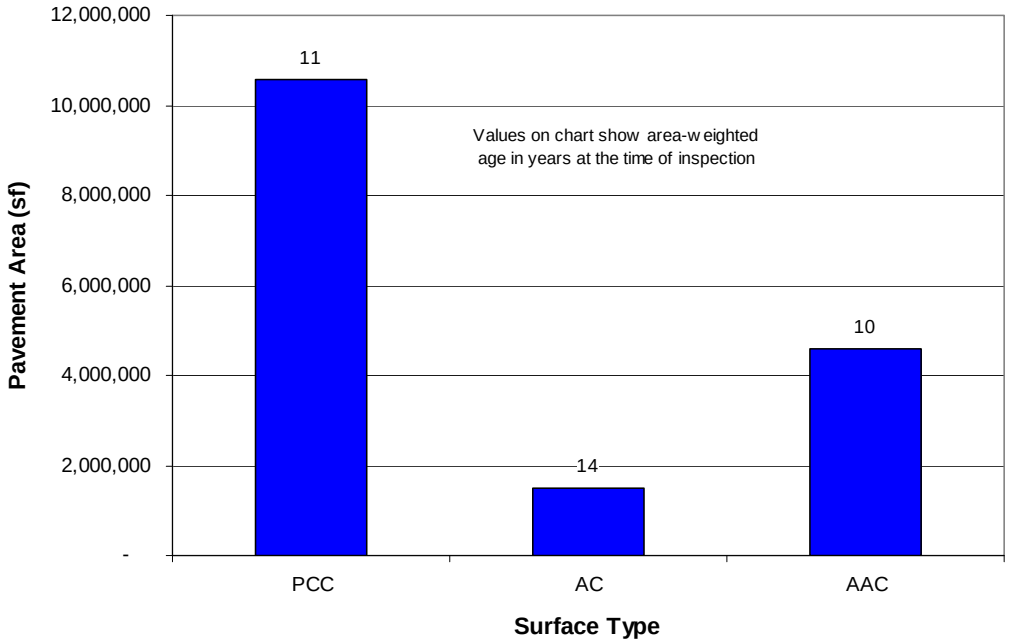


Figure 2. Pavement inventory by surface type.

Pavement Condition Inspections

Detailed pavement condition inspections were conducted at Colorado Springs Airport during August 2009. The runway, taxiway, and apron sections that are maintained by the Airport were inspected. The Pavement Condition Index (PCI) procedure is the standard used by the aviation industry to visually assess pavement condition. An APTech engineer, trained and experienced in the conduct of PCI surveys, led the inspections and was assisted by CDOA personnel.

Pavement Condition Index Procedure

The PCI procedure is used to identify distress types and to rate severity levels. The PCI procedure provides a consistent and systematic methodology to identify and rate distresses on the pavement surface and to report pavement condition. The 2009 PCI inspection was conducted following the procedure documented in the following publications:

> The U.S. Federal Aviation Administration's (FAA's) Advisory Circular 150/5380-6B, *Guidelines and Procedures for Maintenance of Airport Pavements.*
>
> The American Society for Testing and Material's (ASTM's) Standard D5340-04e1, *Standard Test Method for Airport Pavement Condition Index Surveys*.

In accordance with the PCI procedure, the network of pavements is defined by several branches, subdivided into sections, and further defined by sample units. In an airport setting, each branch (or facility) consists of a distinct pavement area, such as a runway, taxiway, or apron. Each branch may be further divided into sections, defined as parts of the facility that share common attributes, such as cross section, construction history, traffic, and performance. The third

subdivision or level is called a sample unit. Sample units are randomly selected for inspection to obtain representative conditions for each pavement section.

The PCI procedure was developed to provide a numerical indication of overall pavement condition. During a PCI survey, visible signs of deterioration within a selected sample unit are recorded and analyzed. Distress type, severity, and quantity are all identified and recorded. This information is then used to develop a composite index (PCI number) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent).

In general terms, pavements above a PCI of 65 that are not exhibiting significant load-related distress will benefit from preventive maintenance actions, such as crack sealing and surface treatments. Pavements with a PCI of 40 to 65 may require major rehabilitation, such as an overlay. Often, when the PCI is less than 40, reconstruction is the only viable alternative due to the substantial damage to the pavement structure. This concept, along with the PCI rating scale, is illustrated in figure 4.

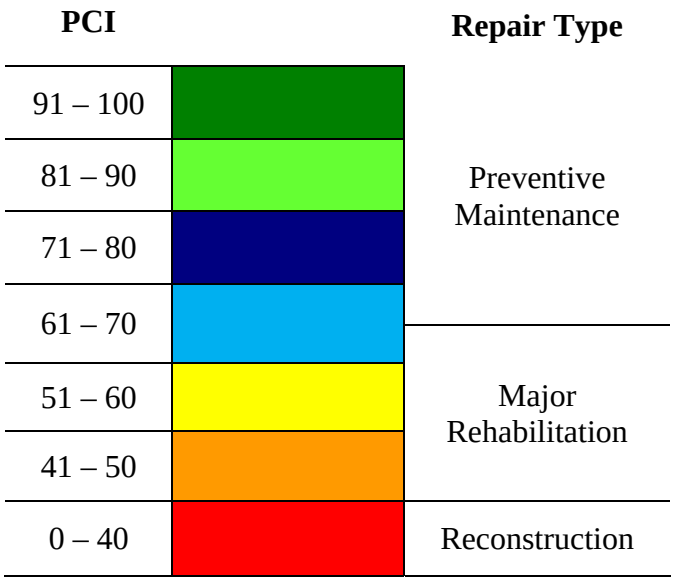


Figure 4. PCI rating scale and recommended repair action.

The types of distress identified during the PCI inspection provide insight into the cause of pavement deterioration. PCI distress types are characterized as load-related, climate/durability-related, and other (distress types that cannot be attributed solely to load or climate/durability). Each of the distress types and their associated primary cause of distress are identified in table 1. By knowing the causes of the pavement deterioration, more appropriate repair and rehabilitation alternatives can be identified. Tables 2 and 3 provide additional information on the likely cause of each distress type and feasible maintenance strategies for addressing each distress type for AC and PCC pavements.

Table 1. Distress types and primary distress categories for AC and PCC pavements.

Pavement Type	**Pavement Distress Category**		
	Load-Related	**Climate-Related**	**Other**
AC-Surfaced Pavements	Fatigue (Alligator) Cracking Rutting*	Block Cracking Joint Reflection Cracking Longitudinal and Transverse Cracking Patching Raveling and Weathering	Bleeding Corrugation Depression Jet Blast Oil Spillage Polished Aggregate Shoving Slippage Swelling
PCC Pavements	Corner Break Linear Cracking Shattered Slab	Blow-up Durability Cracking Joint Seal Damage	Small/Large Patch Popouts Pumping Scaling, Map Cracking, and Crazing Faulting/Settlement Shrinkage Cracking Spalling, Joint/Corner

Table 2. Likely cause(s) of AC pavement distresses and feasible maintenance strategies.

Distress Type	Probable Cause of Distress	Feasible Maintenance Strategies
Alligator Cracking	Fatigue failure of the asphalt concrete surface under repeated traffic loading	If localized, partial- or full-depth asphalt patch. If extensive, major rehabilitation needed.
Bleeding	Excessive amounts of asphalt cement or tars in the mix and/or low air void content	Spread heated sand, roll, and sweep. Another option is to plane excess asphalt. Or, remove and replace.
Block Cracking	Shrinkage of the asphalt concrete and daily temperature cycling; it is not load associated	At low severity levels, crack seal and/or surface treatment. At higher severities, consider overlay.
Corrugation	Traffic action combined with an unstable pavement layer	If localized, mill. If extensive, remove and replace.
Depression	Settlement of the foundation soil or can be "built up" during construction	Patch.
Jet Blast	Bituminous binder has been burned or carbonized	Patch.
Joint Reflection	Movement of the concrete slab beneath the asphalt concrete surface because of thermal and moisture changes	At low and medium severities, crack seal. At higher severities, especially if extensive, consider overlay.
Longitudinal and Transverse Cracking	Cracks may be caused by 1) poorly constructed paving lane joint, 2) shrinkage of the AC surface due to low temperatures or hardening of the asphalt, or 3) reflective crack caused by cracks in an underlying PCC[1] slab	At low and medium severity levels, crack seal. At higher severities, especially if extensive, consider overlay options.
Oil Spillage	Deterioration or softening of the pavement surface caused by the spilling of oil, fuel, or other solvents	Patch.
Patching	N/A	Replace patch if deteriorated.
Polished Aggregate	Repeated traffic applications	Aggregate seal coat is one option. Could also groove or mill. Overlay is another option.
Raveling and Weathering	Asphalt binder may have hardened significantly	Patch if isolated. If low-severity, consider surface treatment if extensive. At medium and high severity levels, consider major rehabilitation if extensive.
Rutting	Usually caused by consolidation or lateral movement of the materials due to traffic loads	Patch medium and high severity levels if localized. If extensive, consider major rehabilitation.
Shoving	Where PCC pavements adjoin flexible pavements, PCC "growth" may shove the asphalt pavement	Mill and patch as needed.
Slippage Cracking	Low strength surface mix or poor bond between the surface and next layer of pavement structure	Partial- or full-depth patch.
Swelling	Usually caused by frost action or by swelling soil	Patch if localized. Major rehabilitation if extensive.

Table 3. Likely cause(s) of PCC pavement distresses and feasible maintenance strategies.

Distress Type	Probable Cause of Distress	Feasible Maintenance Strategies
Blow-Up	Incompressibles in joints	Partial- or full-depth patch. Slab replacement.
Corner Break	Load repetition combined with loss of support and curling stresses	Seal cracks at low severity. Full-depth patch.
Cracks	Combination of load repetition, curling stresses, and shrinkage stresses	Seal cracks. At high severity, may need full-depth patch or slab replacement.
Durability Cracking	Concrete's inability to withstand environmental factors such as freeze-thaw cycles	Full-depth patch if present on small amount of slab. At higher severity levels, once it has appeared on most of slab, slab replacement.
Joint Seal Damage	Stripping of joint sealant, extrusion of joint sealant, weed growth, hardening of the filler (oxidation, loss of bond to the slab edges, or absence of sealant in joint	Replace joint seal.
Patching (Small and Large)	N/A	Replace patches if deteriorated.
Popouts	Freeze-thaw action in combination with expansive aggregates	Monitor.
Pumping	Poor drainage, poor joint sealant	Seal cracks and joints. Underseal is an option if voids have developed. Establish good drainage.
Map Cracking/ Scaling	Overfinishing of concrete, deicing salts, improper construction, freeze-thaw cycles, poor aggregate, and alkali-silica reactivity	At low severity levels, do nothing. At medium and high severity levels, partial-depth patches or slab replacement.
Settlement	Upheaval or consolidation	At higher severity levels, leveling patch or grind to restore smooth ride.
Shattered Slab	Load repetition	Replace slab.
Shrinkage	Setting and curing of the concrete	Monitor.
Spalling (Joint and Corner)	Excessive stresses at the joint caused by infiltration of incompressible materials or traffic loads; weak concrete at joint combined with traffic loads	Partial-depth patch.

The loss in PCI over time (i.e., the pavement's rate of deterioration) is another factor that is of interest in evaluating the performance of a pavement. Pavements that are exhibiting high deterioration rates should be closely examined to determine the reason for such high deterioration rates.

Although the PCI results give a general indication of the overall condition of the pavement, the specific maintenance or rehabilitation needs of a pavement are often obscured by such an index. For example, while the PCI results may indicate load-related deterioration, the actual structural improvement required is not determined by the procedure.

During the condition surveys, the survey crew also took photographs of distresses observed on the pavement, both to record typical conditions and to highlight areas of concern. Some of these photographs are provided in Appendix A of this report.

Pavement Condition Index Results

The 2009 overall area-weighted PCI for Colorado Springs Airport is 82, with conditions ranging from 7 to 100. Figure 5 provides a summary of the overall condition of the pavements by area at Colorado Springs Airport. Figures 6 and 7 summarize the area-weighted conditions by pavement use and surface type, respectively. The results of the PCI survey, along with percent deduct values for each section, are presented in table 4, which also presents a detailed list of the distress types and severities present in each section. PCI results are also summarized in figure 8.

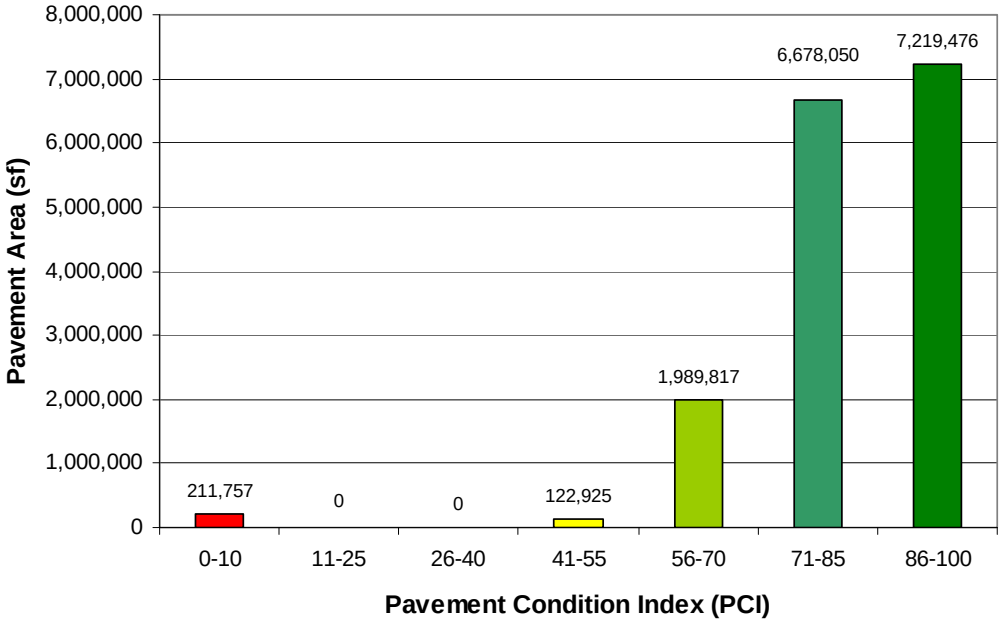


Figure 5. Condition distribution.

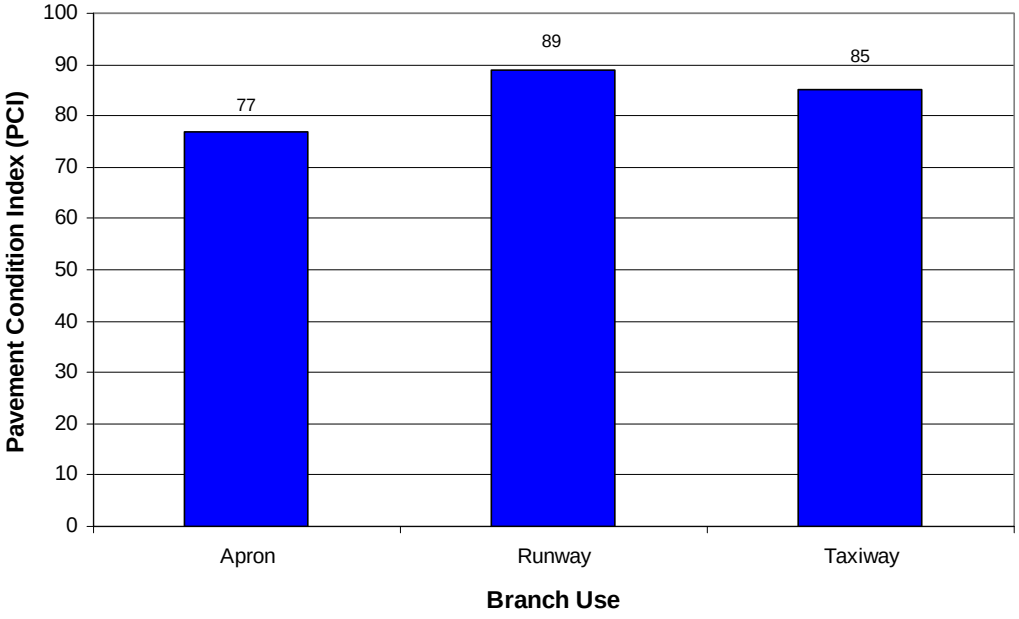


Figure 6. Condition by use.

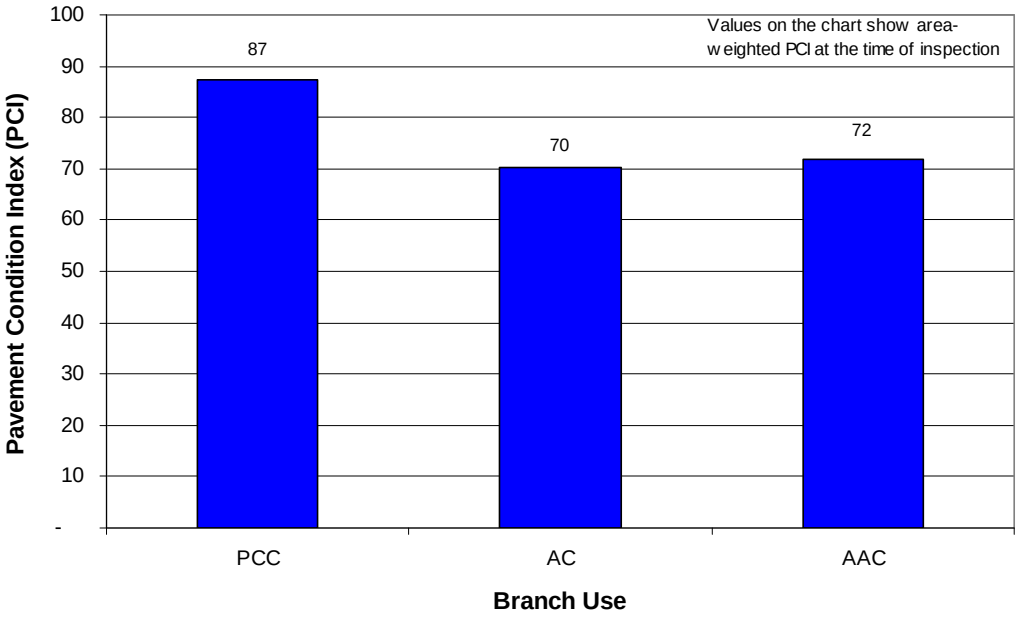
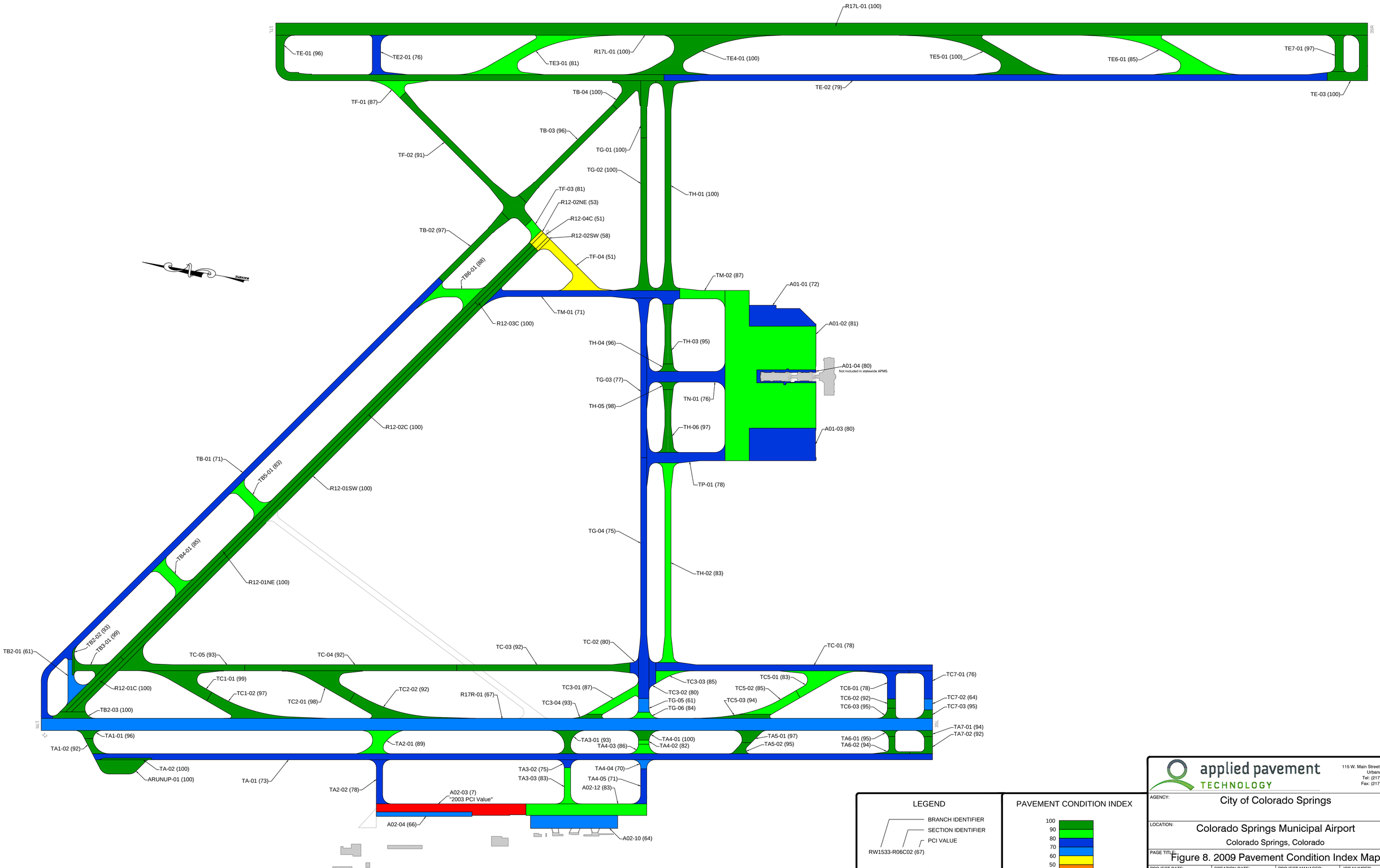


Figure 7. Condition by surface type.



Note: This map was obtained from the 2009 Colorado Statewide Airport Pavement Maintenance System Update.

LEGEND

BRANCH IDENTIFIER
SECTION IDENTIFIER
PCI VALUE
RW1533-R06C02 (67)
SECTION BREAK LINE

PAVEMENT CONDITION INDEX

100
90
80
70
60
50
40
0

applied pavement TECHNOLOGY
115 W. Main Street, Suite 400
Urbana, IL 61801
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AGENCY: City of Colorado Springs			
LOCATION: Colorado Springs Municipal Airport, Colorado Springs, Colorado			
PAGE TITLE: Figure 8. 2009 Pavement Condition Index Map			
PROJECT DATE: Oct 2010	CREATION DATE: May 2003	PROJECT MANAGER: JB	JOB NUMBER:
DRAWING SCALE: 1:500	LAST MODIFIED DATE: Nov 2010	REVISED BY: CVT	DRAWN BY: KAC
FILENAME: Colorado Springs.dwg		LAYOUT NAME/NUMBER: PCI	PAGE NUMBER: 9

Table 4. Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To:			Distress Types (Severity)
							Load	Climate	Other	
A01CS	1	PCC	174,282.00	12/1/1996	8/19/2009	72	4	61	35	Corner Spalling (M,H), Small Patch (M), D-Cracking (M), Joint Spalling (L,H), Corner Break (M), Large Patch/Utility Cut (L), Popouts, Joint Seal Damage (M), Shrinkage Cracking
A01CS	2	PCC	1,553,447.00	5/1/1993	8/18/2009	81	7	47	46	LTD Cracking (M), D-Cracking (M), Corner Break (L,H), Corner Spalling (L,M), Joint Spalling (L), Map Cracking/Scaling/Crazing (M), Large Patch/Utility Cut (L), Small Patch (M), Shrinkage Cracking, Joint Seal Damage (L,M,H), Pumping, Faulting/Settlement (L,H)
A01CS	3	PCC	330,480.00	7/1/1995	8/17/2009	80	6	35	59	Joint Spalling (H), Shrinkage Cracking, Pumping, Popouts, Large Patch/Utility Cut (L), D-Cracking (L), Small Patch (M), Corner Spalling (L,H), Joint Seal Damage (M,H), LTD Cracking (L,M)

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
A01CS	4	PCC	40,421.00	1/1/1995	8/17/2009	80	59	29	12	LTD Cracking (M), Joint Seal Damage (L,M), D-Cracking (L), Large Patch/Utility Cut (L), Map Cracking/Scaling/Crazing (L), Shrinkage Cracking, Corner Spalling (L)
A02CS	3	AC	211,757.00	6/1/1967	8/13/2003	7	47	53	0	Alligator Cracking (L,M), Rutting (M), Block Cracking (M), L&T Cracking (L,M), Weathering and Raveling (L,M,H)
A02CS	4	AAC	65,036.00	6/1/2003	8/3/2009	66	52	48	0	L&T Cracking (L,M), Alligator Cracking (M)
A02CS	10	PCC	172,320.00	6/1/1986	8/3/2009	64	3	47	50	Corner Spalling (H), Large Patch/Utility Cut (H), Small Patch (M), D-Cracking (M,H), LTD Cracking (L), Joint Spalling (M), Pumping, Shrinkage Cracking, Joint Seal Damage (H), Corner Break (L,H)
A02CS	12	AAC	213,483.00	6/1/1999	8/3/2009	83	0	100	0	L&T Cracking (L)
ARUNUPCS	1	AC	87,716.00	6/1/2004	8/3/2009	100	0	0	0	No Distresses
R12CS	01C	AAC	46,865.00	6/1/1993	7/18/2006	56	69	31	0	L&T Cracking (L,M), Alligator Cracking (L,M)
R12CS	01NE	AAC	409,452.00	6/1/1993	7/18/2006	76	0	100	0	L&T Cracking (L,M)
R12CS	01SW	AAC	409,510.00	6/1/1993	7/18/2006	77	0	100	0	L&T Cracking (L,M)
R12CS	02C	AAC	310,000.00	6/1/1993	7/18/2006	44	68	32	0	Alligator Cracking (M), Weathering and Raveling (H), L&T Cracking (L,M)

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
R12CS	02NE	PCC	7,734.00	6/1/1992	8/4/2009	53	14	68	18	LTD Cracking (L), Joint Spalling (M), D-Cracking (L), Small Patch (L), Corner Spalling (L,M), Corner Break (L)
R12CS	02SW	PCC	7,734.00	6/1/1992	8/4/2009	58	0	72	28	D-Cracking (M), Small Patch (L,M), Joint Spalling (L,H)
R12CS	03C	AAC	50,000.00	6/1/1993	7/18/2006	58	54	46	0	L&T Cracking (M), Alligator Cracking (L,M), Weathering and Raveling (L,M)
R12CS	04C	PCC	15,469.00	6/1/1992	8/4/2009	51	0	88	12	D-Cracking (L), Small Patch (L,M), Corner Spalling (L), Joint Seal Damage (L)
R17LCS	1	PCC	2,025,000.00	9/1/2006	8/3/2009	100	0	0	0	No Distresses
R17RCS	1	AAC	1,653,150.00	6/1/2002	8/3/2009	67	56	44	0	Alligator Cracking (L), L&T Cracking (L,M)
TA1CS	1	AAC	16,493.00	6/1/2002	8/3/2009	96	0	100	0	L&T Cracking (L)
TA1CS	2	AC	18,452.00	6/1/1997	8/3/2009	91	0	100	0	L&T Cracking (L)
TA2CS	1	AAC	68,342.00	6/1/2002	8/3/2009	89	0	100	0	L&T Cracking (L,M)
TA2CS	2	AAC	48,649.00	6/1/1998	8/3/2009	78	22	78	0	Alligator Cracking (L), L&T Cracking (L,M)
TA3CS	1	AAC	40,944.00	6/1/2002	8/3/2009	93	0	100	0	L&T Cracking (L,M)
TA3CS	2	AAC	12,062.00	6/1/1998	8/3/2009	75	21	79	0	L&T Cracking (M), Alligator Cracking (L)
TA3CS	3	AAC	40,590.00	6/1/1998	8/3/2009	83	0	100	0	L&T Cracking (L,M)
TA4CS	1	AAC	22,814.00	6/1/2002	8/3/2009	100	0	0	0	No Distresses
TA4CS	2	AC	6,546.00	6/1/1992	8/3/2009	82	0	100	0	L&T Cracking (L,M)
TA4CS	3	AAC	22,187.00	6/1/1998	8/3/2009	87	0	100	0	L&T Cracking (L,M)

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
TA4CS	4	AAC	12,692.00	6/1/1998	8/3/2009	70	54	46	0	Bleeding, L&T Cracking (L,M), Alligator Cracking (L)
TA4CS	5	AAC	35,324.00	6/1/1998	8/3/2009	71	26	74	0	Alligator Cracking (L), L&T Cracking (L,M)
TA5CS	1	AAC	31,468.00	6/1/2002	8/3/2009	97	0	100	0	L&T Cracking (L)
TA5CS	2	AC	18,277.00	6/1/1998	8/3/2009	95	0	100	0	L&T Cracking (L)
TA6CS	1	AAC	9,344.00	6/1/2002	8/3/2009	95	0	100	0	L&T Cracking (L)
TA6CS	2	AC	18,791.00	6/1/1998	8/3/2009	94	0	100	0	L&T Cracking (L)
TA7CS	1	AAC	10,682.00	6/1/2002	8/3/2009	94	0	100	0	L&T Cracking (L)
TA7CS	2	AAC	22,682.00	6/1/1998	8/3/2009	92	0	100	0	L&T Cracking (L,M)
TACS	1	AC	765,231.00	6/1/1997	8/3/2009	73	33	67	0	Alligator Cracking (L), L&T Cracking (L,M), Patching (L)
TACS	2	AC	12,450.00	6/1/2004	8/3/2009	100	0	0	0	No Distresses
TB2CS	1	AAC	50,069.00	6/1/1993	8/3/2009	61	0	100	0	Patching (M), L&T Cracking (L,M), Block Cracking (L)
TB2CS	2	AAC	7,518.00	1/1/2004	8/3/2009	93	0	100	0	L&T Cracking (L)
TB2CS	3	AAC	32,146.00	6/1/2002	7/19/2006	98	0	100	0	L&T Cracking (L)
TB3CS	1	AC	35,994.00	6/1/2004	8/3/2009	99	0	100	0	L&T Cracking (L)
TB4CS	1	AAC	64,983.00	6/1/2000	8/3/2009	85	0	100	0	L&T Cracking (L,M)
TB5CS	1	AAC	64,062.00	6/1/2000	8/3/2009	83	0	100	0	L&T Cracking (M), Patching (L,M)
TB6CS	1	AAC	82,818.00	6/1/2000	8/3/2009	89	59	41	0	L&T Cracking (L), Alligator Cracking (L,M), Rutting (L)
TBCS	1	AAC	567,983.00	6/1/2000	8/3/2009	71	51	49	0	Bleeding, Alligator Cracking (M), L&T Cracking (L), Weathering and Raveling (L,M)

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
TBCS	2	PCC	91,717.00	6/1/2000	8/4/2009	97	0	65	35	Joint Seal Damage (L), Shrinkage Cracking, Small Patch (L), Map Cracking/Scaling (L), D-Cracking (L)
TBCS	3	PCC	145,538.00	6/1/2000	8/4/2009	96	0	61	39	Small Patch (L), Joint Seal Damage (L), Joint Spalling (L), D-Cracking (L), Shrinkage Cracking
TBCS	4	PCC	98,901.00	3/1/2009	3/1/2009	100	0	0	0	No Distresses
TC1CS	1	PCC	113,259.00	6/1/2005	8/4/2009	99	0	0	100	Corner Spalling (L), Joint Spalling (L), Small Patch (L), Shrinkage Cracking
TC1CS	2	AC	103,912.00	6/1/2005	8/3/2009	97	0	100	0	L&T Cracking (L)
TC2CS	1	PCC	116,276.00	6/1/2003	8/4/2009	98	0	0	100	Shrinkage Cracking, Small Patch (L), Joint Spalling (L,M)
TC2CS	2	AC	102,521.00	6/1/2002	8/3/2009	92	0	100	0	L&T Cracking (L)
TC3CS	1	AAC	64,147.00	7/1/2002	8/3/2009	87	0	100	0	L&T Cracking (L)
TC3CS	2	PCC	25,866.00	6/1/1997	8/4/2009	80	0	99	1	D-Cracking (L), Joint Seal Damage (L), Small Patch (L)
TC3CS	3	PCC	24,604.00	6/1/1997	8/4/2009	85	0	96	4	D-Cracking (L), Joint Seal Damage (M), Shrinkage Cracking
TC3CS	4	AAC	13,022.00	6/1/2002	8/3/2009	93	0	100	0	L&T Cracking (L)
TC5CS	1	PCC	93,550.00	6/1/1997	8/4/2009	83	0	91	9	Small Patch (L), Map Cracking/Scaling/Crazing (L), Joint Seal Damage (L), D-Cracking (L)

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
TC5CS	2	AC	60,412.00	7/1/1997	8/3/2009	85	0	100	0	L&T Cracking (L)
TC5CS	3	AAC	28,657.00	6/1/2002	8/3/2009	94	0	100	0	L&T Cracking (L)
TC6CS	1	PCC	48,514.00	6/1/1997	8/4/2009	78	0	95	5	Joint Seal Damage (L), Shrinkage Cracking, D-Cracking (L,M), Small Patch (L)
TC6CS	2	AC	11,788.00	6/1/1997	8/3/2009	92	0	100	0	L&T Cracking (L)
TC6CS	3	AAC	16,702.00	6/1/2002	8/3/2009	95	0	100	0	L&T Cracking (L)
TC7CS	1	PCC	42,313.00	6/1/1997	8/4/2009	76	0	82	18	Corner Spalling (L), Joint Spalling (M), Shrinkage Cracking, Map Cracking/Scaling/Crazing (L), Joint Seal Damage (L,M), D-Cracking (L)
TC7CS	2	AC	13,848.00	6/1/1997	8/3/2009	64	52	48	0	L&T Cracking (L), Alligator Cracking (L,M)
TC7CS	3	AAC	14,105.00	6/1/2002	8/3/2009	95	0	100	0	L&T Cracking (L)
TCCS	1	PCC	267,611.00	6/1/1997	8/4/2009	78	0	86	14	Joint Seal Damage (L), Large Patch/Utility Cut (L), D-Cracking (L), Small Patch (L,M)
TCCS	2	PCC	16,702.00	6/1/1997	8/4/2009	80	0	100	0	Joint Seal Damage (L), D-Cracking (L)
TCCS	3	PCC	166,155.00	6/1/2001	8/4/2009	92	0	25	75	Shrinkage Cracking, Map Cracking/Scaling/Crazing (L), Joint Seal Damage (L)
TCCS	4	PCC	196,598.00	6/1/2003	8/4/2009	92	0	25	75	Joint Seal Damage (L), Shrinkage Cracking

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
TCCS	5	PCC	147,281.00	6/1/2005	8/4/2009	93	0	44	56	Shrinkage Cracking, D-Cracking (L), Joint Seal Damage (L), Small Patch (L), Map Cracking/Scaling/Crazing (L)
TE2CS	1	PCC	61,959.00	6/1/1991	8/3/2009	76	0	90	10	Shrinkage Cracking, Small Patch (L), Joint Seal Damage (L), Joint Spalling (L), D-Cracking (L,M)
TE3CS	1	PCC	191,344.00	6/1/1991	8/3/2009	81	0	88	12	Joint Seal Damage (L), Small Patch (L,M), D-Cracking (L), Joint Spalling (M), Large Patch/Utility Cut (L)
TE4CS	1	PCC	244,269.00	9/1/2009	9/1/2009	100	0	0	0	No Distresses
TE5CS	1	PCC	191,611.00	9/1/2009	9/1/2009	100	0	0	0	No Distresses
TE6CS	1	PCC	191,611.00	6/1/1991	8/3/2009	85	0	79	21	Small Patch (L), D-Cracking (L), Corner Spalling (M), Joint Spalling (L,M), Shrinkage Cracking, Joint Seal Damage (L)
TE7CS	1	PCC	51,428.00	9/1/2006	8/3/2009	97	0	0	100	Small Patch (L), Shrinkage Cracking
TECS	1	PCC	30,314.00	3/1/2009	3/1/2009	100	0	0	0	No Distresses
TECS	2	PCC	1,000,827.00	6/1/1991	8/3/2009	79	0	88	12	Shrinkage Cracking, Corner Spalling (M), Joint Seal Damage (L), Small Patch (M), D-Cracking (L,M)

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
TECS	3	PCC	105,293.00	9/1/2006	8/3/2009	96	0	0	100	Shrinkage Cracking, Small Patch (L), Joint Spalling (L)
TFCS	1	PCC	46,428.00	6/1/1992	8/4/2009	87	0	61	39	Joint Seal Damage (L), Large Patch/Utility Cut (L), Small Patch (M), Shrinkage Cracking, D-Cracking (L,M), Joint Spalling (L)
TFCS	2	PCC	227,337.00	6/1/1992	8/4/2009	91	0	79	21	D-Cracking (L), Joint Spalling (L), Joint Seal Damage (L), Small Patch (L)
TFCS	3	PCC	22,881.00	6/1/1992	8/4/2009	81	0	97	3	Joint Seal Damage (M), Small Patch (L), Corner Spalling (L), D-Cracking (L,M)
TFCS	4	PCC	122,925.00	6/1/1992	8/4/2009	51	0	99	1	D-Cracking (M), Joint Seal Damage (L), Small Patch (L)
TGCS	1	PCC	98,901.00	4/1/2009	4/1/2009	100	0	0	0	No Distresses
TGCS	2	PCC	259,383.00	9/1/2009	9/1/2009	100	0	0	0	No Distresses
TGCS	3	PCC	163,275.00	6/1/1992	8/4/2009	77	0	88	12	Large Patch/Utility Cut (L), Joint Seal Damage (L), Small Patch (L,M), Joint Spalling (L,M), D-Cracking (L,M), Corner Spalling (M)
TGCS	4	PCC	258,653.00	6/1/1992	8/4/2009	75	0	88	12	Corner Spalling (M), Small Patch (L), D-Cracking (L,M), Joint Seal Damage (L,M,H), Shrinkage Cracking

Table 4 (continued). Summary of 2009 PCI results.

Branch ID	Section ID	Surface Type	Section Area, SF	LCD	Inspection Date	PCI	Percent Deducts Due To: Load	Climate	Other	Distress Types (Severity)
TGCS	5	AC	22,702.00	6/1/1992	8/3/2009	61	64	36	0	Alligator Cracking (L,M), L&T Cracking (L,M)
TGCS	6	AAC	16,114.00	6/1/2002	8/3/2009	84	29	71	0	L&T Cracking (L), Alligator Cracking (L,M)
THCS	1	PCC	239,122.00	9/1/2009	9/1/2009	100	0	0	0	No Distresses
THCS	2	PCC	214,760.00	6/1/1992	8/4/2009	83	0	93	7	Small Patch (L), D-Cracking (L,M), Corner Spalling (L), Joint Seal Damage (L)
THCS	3	PCC	84,436.00	6/1/2005	8/4/2009	95	0	0	100	Shrinkage Cracking, Small Patch (L)
THCS	4	PCC	98,901.00	6/1/1992	8/4/2009	96	0	50	50	D-Cracking (L), Shrinkage Cracking, Small Patch (L)
THCS	5	PCC	98,901.00	6/1/1992	8/4/2009	98	0	63	37	D-Cracking (L), Small Patch (L)
THCS	6	PCC	94,861.00	6/1/2005	8/4/2009	97	0	0	100	Shrinkage Cracking, Small Patch (L)
TMCS	1	PCC	205,244.00	6/1/1992	8/4/2009	71	0	92	8	Joint Seal Damage (L,H), Small Patch (L), D-Cracking (L,M), Shrinkage Cracking, Corner Spalling (L,M)
TMCS	2	PCC	64,114.00	6/1/1992	8/4/2009	87	0	84	16	Small Patch (M), D-Cracking (L), Joint Spalling (M), Joint Seal Damage (L)
TNCS	1	PCC	147,158.00	6/1/1992	8/4/2009	76	0	100	0	D-Cracking (L,M)
TPCS	1	PCC	130,310.00	6/1/1991	8/4/2009	78	0	75	25	Large Patch/Utility Cut (M), Small Patch (L,M), Joint Seal Damage (L), D-Cracking (L), Corner Spalling (M,H)

Data obtained from 2009 Colorado statewide APMS update.

Additional Inspection Comments

Several sections on the airfield were not inspected in 2009, either due to poor condition or pending construction:

> Runway 12-30 was expected to be resurfaced in 2009, so it was not inspected during the 2009 inspections. Additionally, the section of Taxiway B2 adjacent to the runway (Section 3) was not inspected because it was expected to be resurfaced with the runway.
>
> Two of the high-speed taxiway connectors to Runway 17L-35R, Taxiways E4 and E5, were not inspected because of planned reconstruction.
>
> Taxiway G, section 1 not inspected because of planned reconstruction.
>
> Taxiway H, section 1, was not inspected because of planned reconstruction.
>
> Section 3 of the General Aviation Apron (Apron 2) was not inspected (per the DOT's request) in 2009 (or 2006) because of its extremely poor condition. This section had a PCI of 7 in 2003, has not been inspected since then, and has not received any maintenance or rehabilitation work in many years.

A project-level inspection was performed on the Terminal Apron (Apron 1) during August 2009. The project-level evaluation included a PCI inspection of 100 percent of the apron pavement. These results are used in the pavement condition summary (as opposed to network-level survey results). The project-level inspection also involved mapping the observed distresses and conducting a materials-related distress (MRD) survey.

The MRD procedure was developed to help identify where MRD issues are affecting performance and future maintenance and rehabilitation needs before those needs become evident from a PCI survey. The MRD rating (MRDR) generated during this evaluation can also be used to monitor performance of the apron over time. In particular, the MRD procedure will help to differentiate the performance of areas that are exhibiting signs of deterioration due to materials problems. Different MRDRs will help to determine the extent and severity of this problem.

Within the procedure, the MRDR weighting factors have been calibrated to assist with controlling possible FOD risk: MRDR values below 25 are not critical, but warrant monitoring. A point of 25 is set for the initiation of maintenance activities to preserve the pavement in a low FOD risk condition, and a value of 100 has been established to indicate that significant action, such as major rehabilitation or reconstruction, is needed because of the increased risk from FOD (IPRF 2009). These two points are illustrated in figure 8, which also shows a typical PCI performance curve and the traditional PCI decision point.

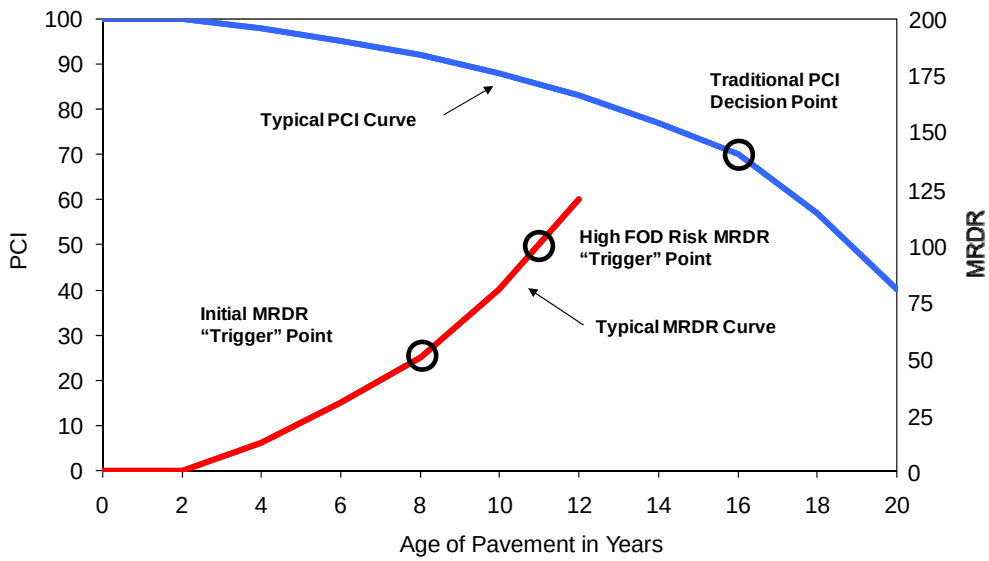

Figure 8. Conceptualization of relationship between PCI and MRDR (IPRF 2009).

The average MRDR for the Terminal Apron are summarized in table 3. Section 2 is subdivided into three sections (north, east, and west) because the northern portion of the apron was much worse than the east and west portions of the section.

Table 3. Summary of 2009 MRDR.

Pavement Section	MRDR
A01-01	88
A01-02 – north	135
A01-02 – east	52
A01-02 – west	83
A01-03	54

The MRD results indicate the northern portion of the apron has passed the threshold for major rehabilitation, while the west portion of Section 2 and the east expansion of the apron (Section 1) are approaching that threshold. Distresses similar to those observed on the Terminal Apron are present on other PCC pavements around the airport. Additionally, Runway 17L-35R was recently reconstructed, with MRD of the original pavement an underlying reason.

Summary

This document presents the results of the pavement condition evaluations conducted at Colorado Springs Airport. During visual inspections of the pavements in August 2009, it was found that the overall area-weighted PCI of the pavement network is 82, with section PCIs ranging from 7 to 100. Additional project-level evaluations conducted at the airport indicate that MRD is occuring in some of the PCC pavements and needs to be considered in addition to PCI results in determining pavement repair needs.

APPENDIX A. PHOTOGRAPHS

Figure 1. A01CS-01 Joint Spall

Figure 2. A01CS-01 Overview

Figure 3. A01CS-02 Overview

Figure 4. A01CS-03 Joint Spall

Figure 5. A01CS-03 Overview

Figure 6. A02CS-04 Alligator Cracking

Figure 7. A02CS-04 Overview

Figure 8. A02CS-10 Joint Seal Damage

Figure 9. A02CS-10 Overview

Figure 10. A02CS-10 Small Patch

Figure 11. A02CS-12 Overview

Figure 12. ARUNUPCS-01 Overview

Figure 13. R12CS-02NE Overview

Figure 14. R12CS-02SW Overview

Figure 15. R12CS-04C Overview

Figure 16. R17LCS-01 Overview

Figure 17. R17RCS-01 Alligator Cracking

Figure 18. R17RCS-01 Overview

Figure 19. TA1CS-01 Overview

Figure 20. TA1CS-02 Overview

Figure 21. TA2CS-01 Overview

Figure 22. TA2CS-02 Overview

Figure 23. TA3CS-01 Overview

Figure 24. TA3CS-02 Overview

Figure 25. TA3CS-03 Overview

Figure 26. TA4CS-01 Overview

Figure 27. TA4CS-02 Overview

Figure 28. TA4CS-03 Overview

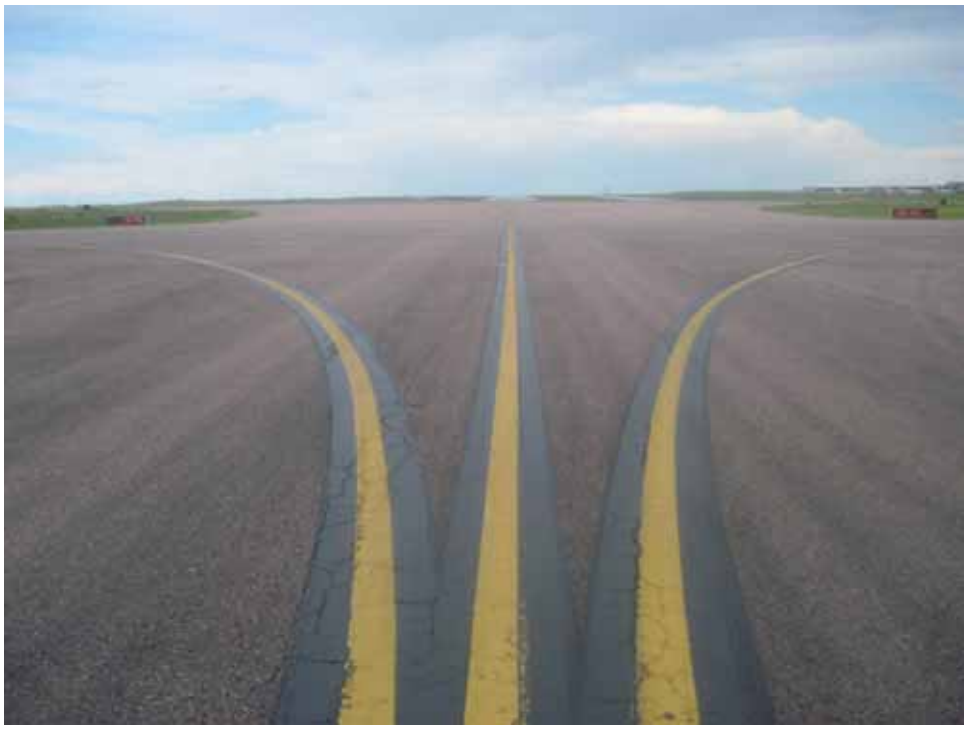

Figure 29. TA4CS-04 Overview

Figure 30. TA4CS-05 Overview

Figure 31. TA5CS-01 Overview

Figure 32. TA5CS-02 Overview

Figure 33. TA6CS-01 Overview

Figure 34. TA6CS-02 Overview

Figure 35. TA7CS-01 Overview

Figure 36. TA7CS-02 Overview

Figure 37. TACS-01 Alligator Cracking

Figure 38. TACS-01 Overview

Figure 39. TACS-02 Overview

Figure 40. TB2CS-01 Overview

Figure 41. TB2CS-02 Overview

Figure 42. TB3CS-01 Overview (1)

Figure 43. TB3CS-01 Overview (2)

Figure 44. TB4CS-01 Overview

Figure 45. TB5CS-01 Overview

Figure 46. TB6CS-01 Alligator Cracking

Figure 47. TB6CS-01 Overview

Figure 48. TBCS-01 Alligator Cracking

Figure 49. TBCS-01 Overview

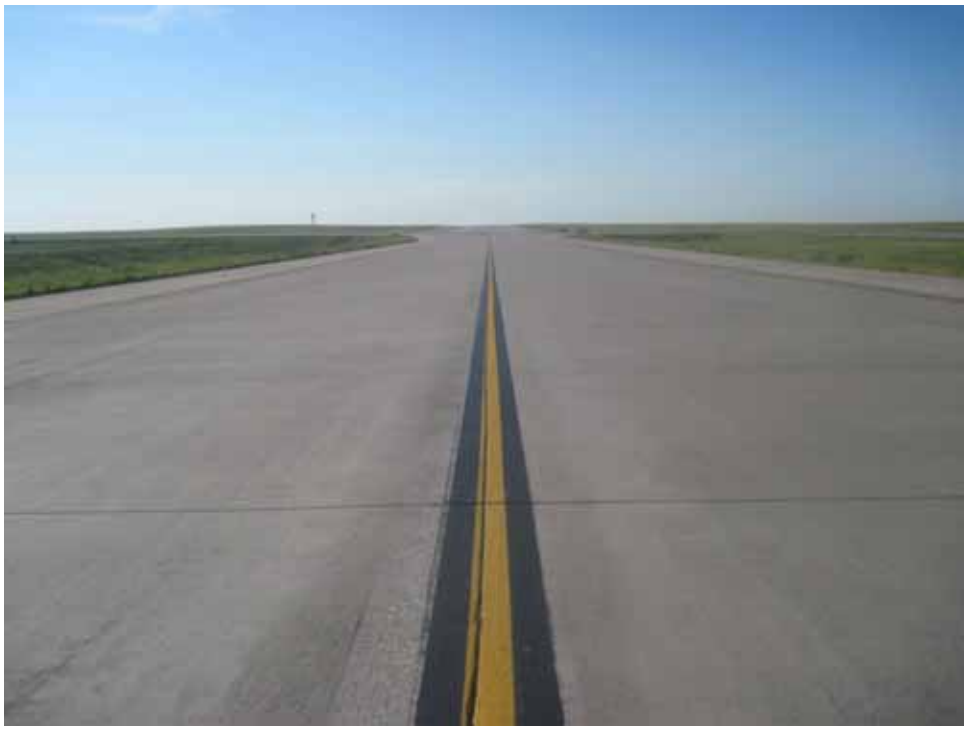

Figure 50. TBCS-02 Overview (1)

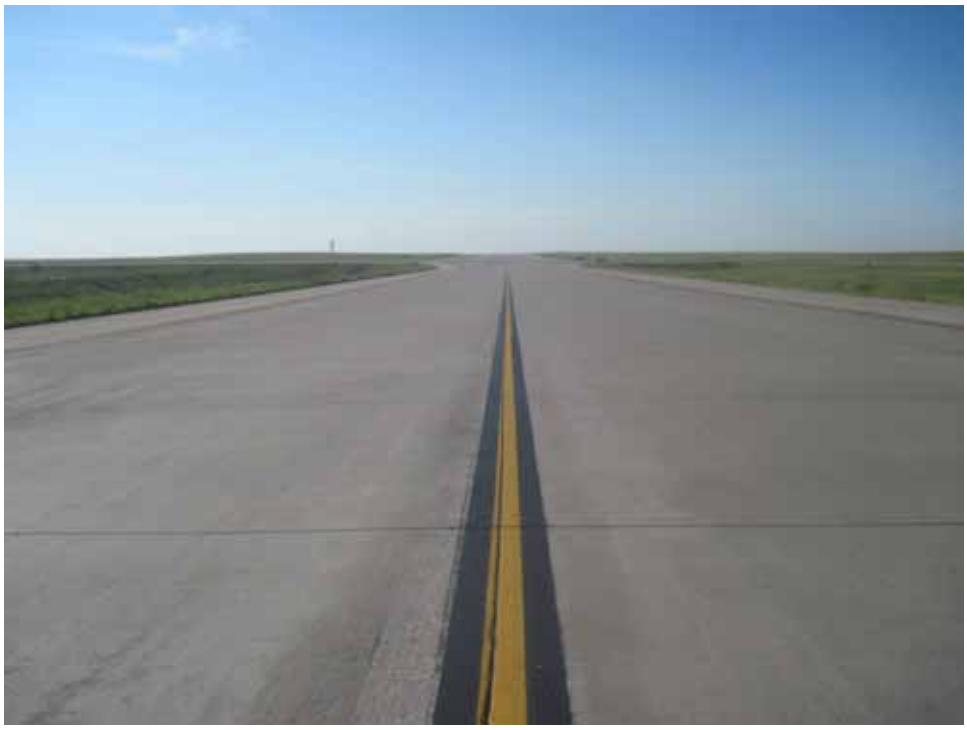

Figure 51. TBCS-02 Overview (2)

Figure 52. TBCS-03 Overview

Figure 53. TBCS-04 Overview

Figure 54. TC1CS-01 Overview

Figure 55. TC1CS-02 Overview

Figure 56. TC2CS-01 Overview

Figure 57. TC2CS-02 Overview

Figure 58. TC3CS-01 Overview

Figure 59. TC3CS-02 Durability Cracking

Figure 60. TC3CS-02 Overview

Figure 61. TC3CS-03 Overview

Figure 62. TC3CS-04 Overview

Figure 63. TC5CS-01 Durability Cracking

Figure 64. TC5CS-01 Overview

Figure 65. TC5CS-02 Overview

Figure 66. TC5CS-03 Overview

Figure 67. TC6CS-01 Durability Cracking

Figure 68. TC6CS-01 Overview

Figure 69. TC7CS-01 Durability Cracking

Figure 70. TC7CS-01 Overview

Figure 71. TC7CS-02 Alligator Cracking (1)

Figure 72. TC7CS-02 Alligator Cracking (2)

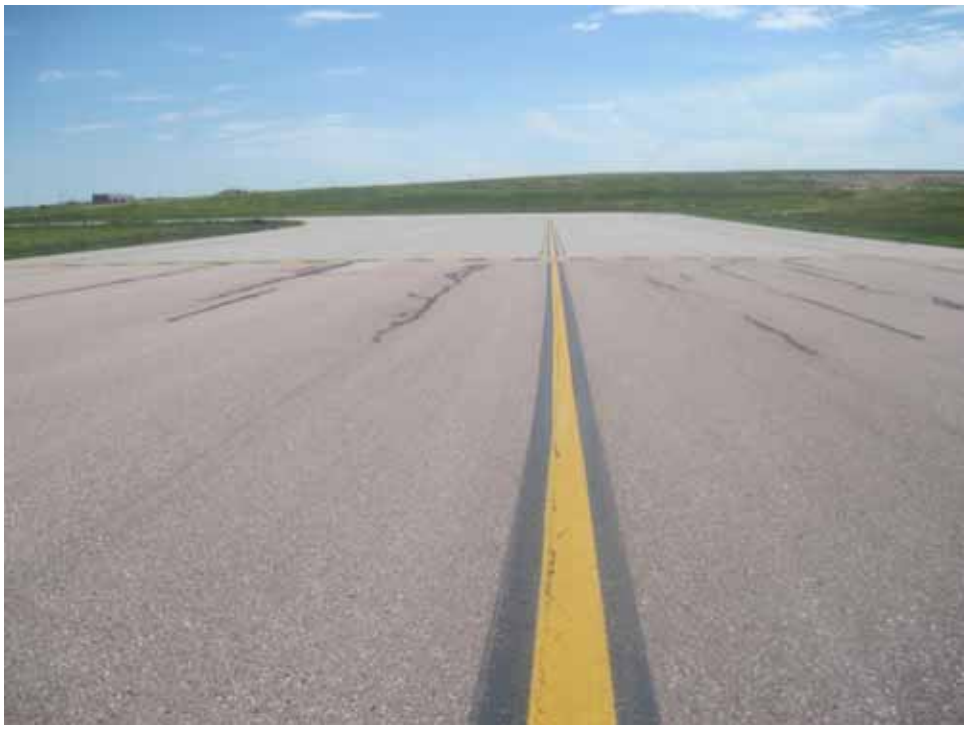

Figure 73. TC7CS-02 Overview

Figure 74. TCCS-01 Overview

Figure 75. TCCS-02 Overview

Figure 76. TCCS-03 Overview

Figure 77. TCCS-04 Overview

Figure 78. TCCS-05 Overview

Figure 79. TE2CS-01 Durability Cracking

Figure 80. TE2CS-01 Overview

Figure 81. TE3CS-01 Durability Cracking

Figure 82. TE3CS-01 Overview

Figure 83. TE6CS-01 Durability Cracking

Figure 84. TE6CS-01 Joint Spall

Figure 85. TE6CS-01 Overview

Figure 86. TE6CS-01 Repair

Figure 87. TE7CS-01 Overview

Figure 88. TECS-01 Overview

Figure 89. TECS-02 Durability Cracking

Figure 90. TECS-02 Overview

Figure 91. TECS-02 Small Patch

Figure 92. TECS-03 Overview

Figure 93. TFCS-01 Joint Spall (fraying)

Figure 94. TFCS-01 Large Patch

Figure 95. TFCS-01 Overview

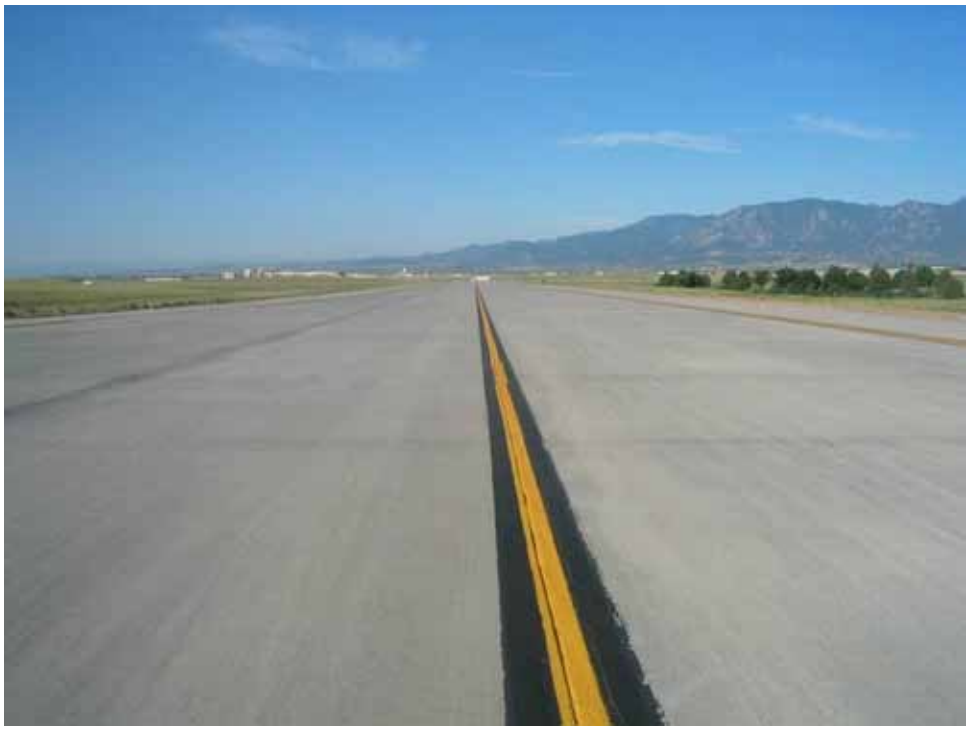

Figure 96. TFCS-02 Overview

Figure 97. TFCS-03 Durability Cracking

Figure 98. TFCS-03 Overview

Figure 99. TFCS-04 Durability Cracking

Figure 100. TFCS-04 Overview

Figure 101. TGCS-01 Overview

Figure 102. TGCS-02 To Be Rehabilitated

Figure 103. TGCS-03 Durability Cracking

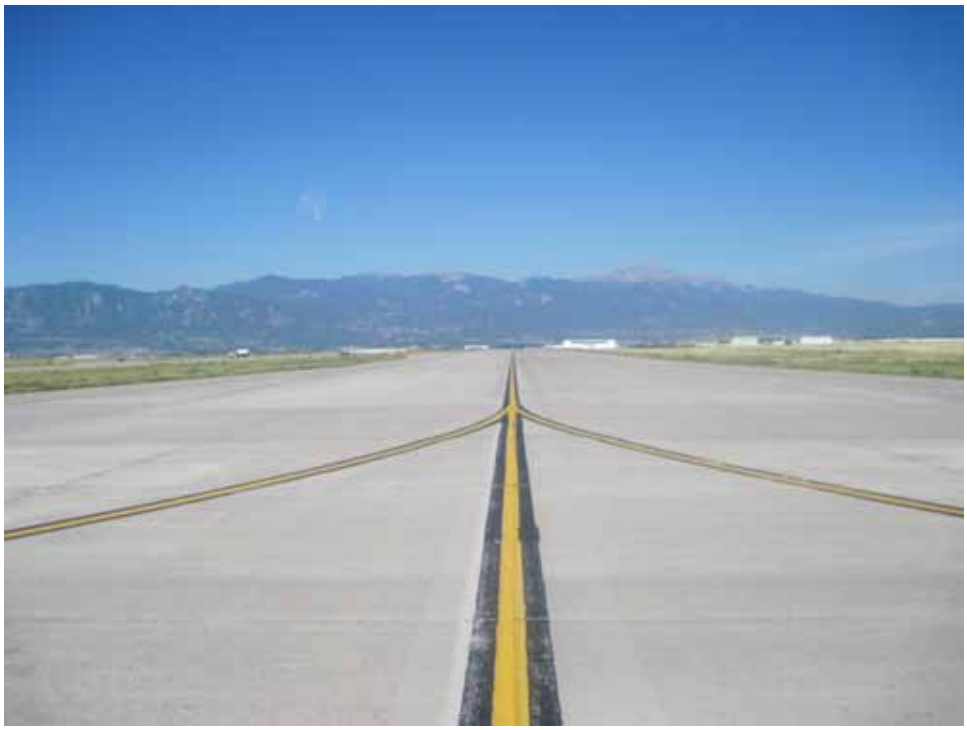

Figure 104. TGCS-03 Overview

Figure 105. TGCS-04 Overview

Figure 106. TGCS-05 Alligator Cracking

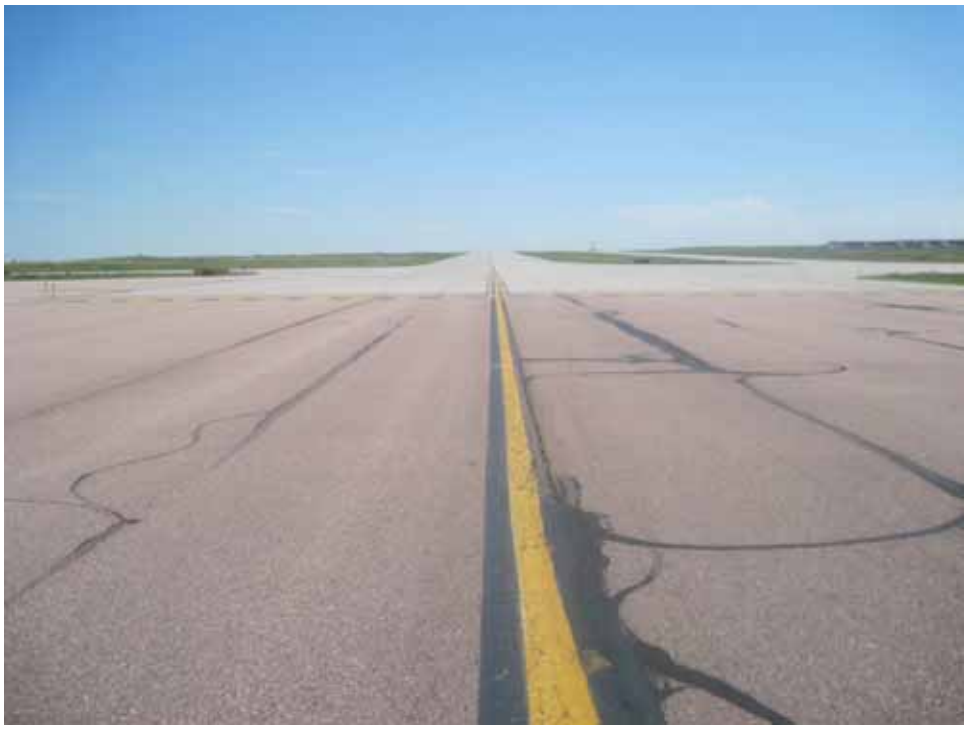

Figure 107. TGCS-05 Overview

Figure 108. TGCS-06 Overview

Figure 109. THCS-01 To Be Rehabilitated

Figure 110. THCS-02 Durability Cracking

Figure 111. THCS-02 Overview

Figure 112. THCS-03 Overview

Figure 113. THCS-04 Overview

Figure 114. THCS-05 Overview

Figure 115. THCS-06 Overview

Figure 116. TMCS-01 Durability Cracking

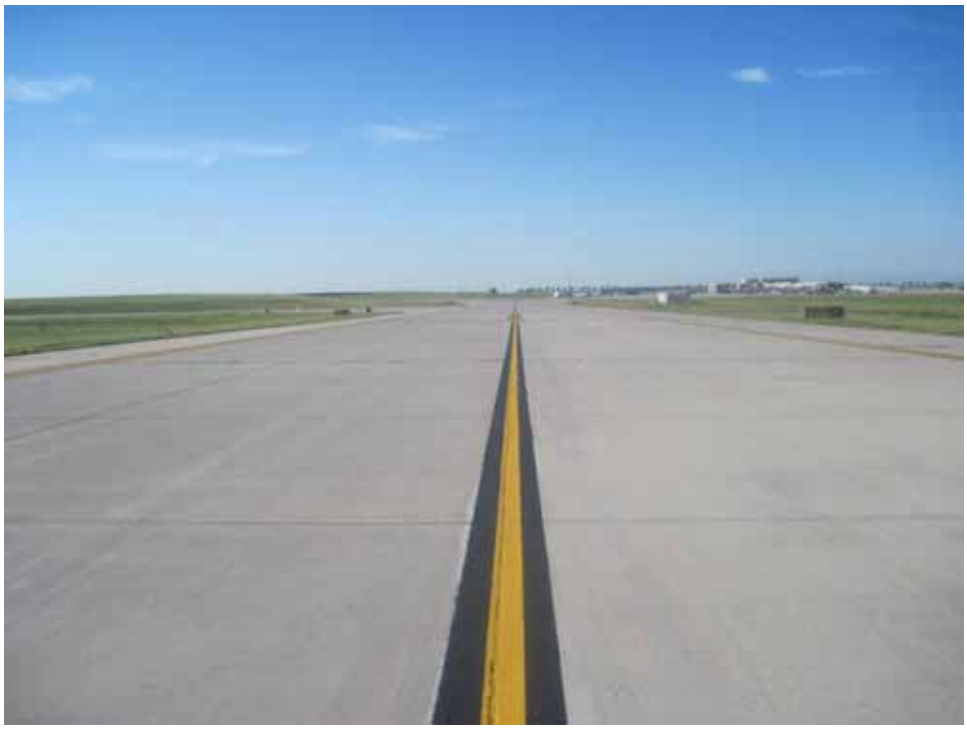

Figure 117. TMCS-01 Overview

Figure 118. TMCS-02 Overview

Figure 119. TNCS-01 Overview

Figure 120. TPCS-01 Overview

Appendix B

FORECAST UPDATE

Colorado Springs Airport

Prepared by:

LeighFisher, Inc.

Date:

July 2013

Appendix B

FORECAST UPDATE

Colorado Springs Airport

The purpose of this appendix is to document the forecast update for Colorado Springs Airport (COS) prepared in June 2013 after the planning was completed but by prior to the publication of this Technical Report. The previous forecast was prepared in the summer of 2010 and approved by FAA on September 23, 2010. In the fall of 2012, the FAA requested that airport management prepare a forecast update given the forecast approval was more than two years past. Airport management agreed that a forecast update was warranted given significant changes in air service at the Airport since the original forecast was prepared. The FAA approved the forecast update on August 16, 2013. A copy of the letter is included as the last page of this appendix.

ENPLANED PASSENGERS

Figure B-1 presents a chart showing annual enplaned passengers at COS—actuals for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033, compared with the FAA 2013 Terminal Area Forecast (TAF) for the Airport.

The enplaned passenger forecasts are substantially lower than the TAF in 2013 and all subsequent years. The primary reason is a projected 20% decline in enplanements in 2013 due largely to the termination of service in April by Frontier Airlines.[1] Because of the 20% decline in 2013 enplanements, 2013 was adopted as the base year of the passenger forecast presented herein.[2]

The enplaned passenger average growth rate of 1.8% per year from 2013 to 2033 is somewhat lower than the increase forecast by the FAA in its TAF for the Airport—an average of 2.1% per year from Federal Fiscal Year (FFY) 2013 to FFY 2033.[3] The forecast update growth rate is lower as it is based on a "bottom-up" forecast of aviation demand. In other words, the Airport has prepared this forecast evaluating the individual airlines serving Colorado Springs, the markets they serve, and the characteristics of the local and regional economy. A more detailed comparison of the enplaned passenger forecast and the FAA TAF is presented later in this appendix.

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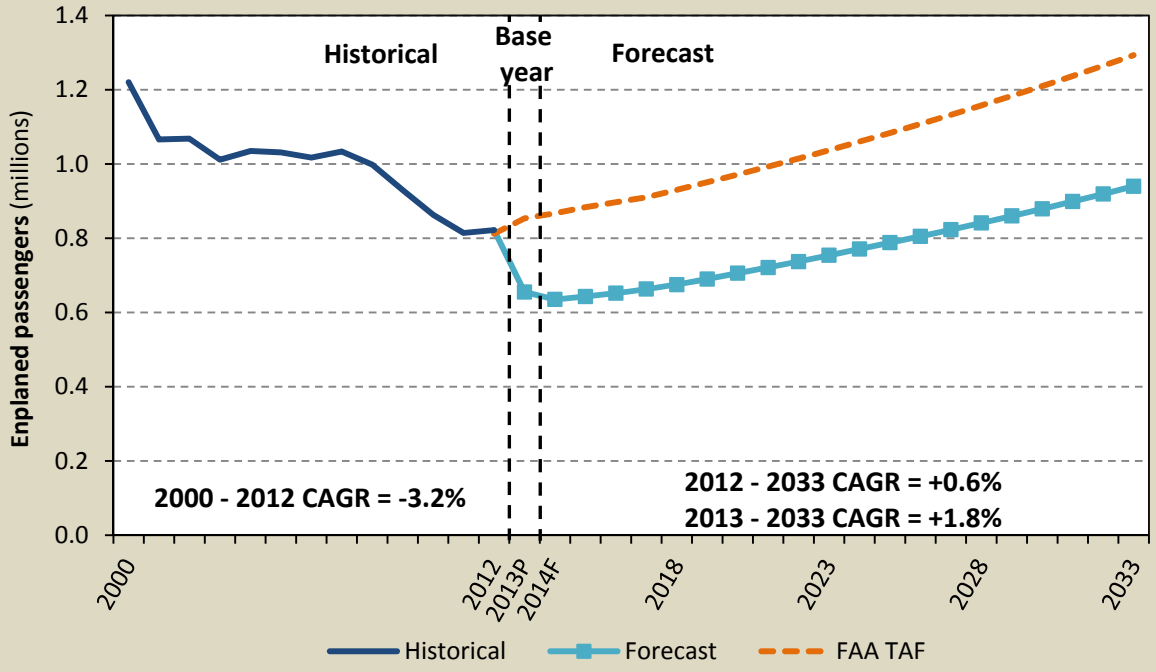
[1] This forecast update was prepared in advance of the Alaska Airlines announcement of their intention to operate a nonstop flights between Colorado Springs and Seattle beginning in November 2013. Accordingly, the estimate for 2013 does not include the increase that may be expected as a result of this new service offering.

[2] The year 2013 was selected as the base year for the forecast as a more reasonable starting point for future activity given the 20% decline is expected to result in approximately 167 thousand fewer enplanements in 2013 relative to 2012.

[3] The Federal Fiscal Year begins on October 1 and ends on September 30.

Figure B-1
COMPARISON OF ENPLANED PASSENGER FORECASTS
Colorado Springs Airport

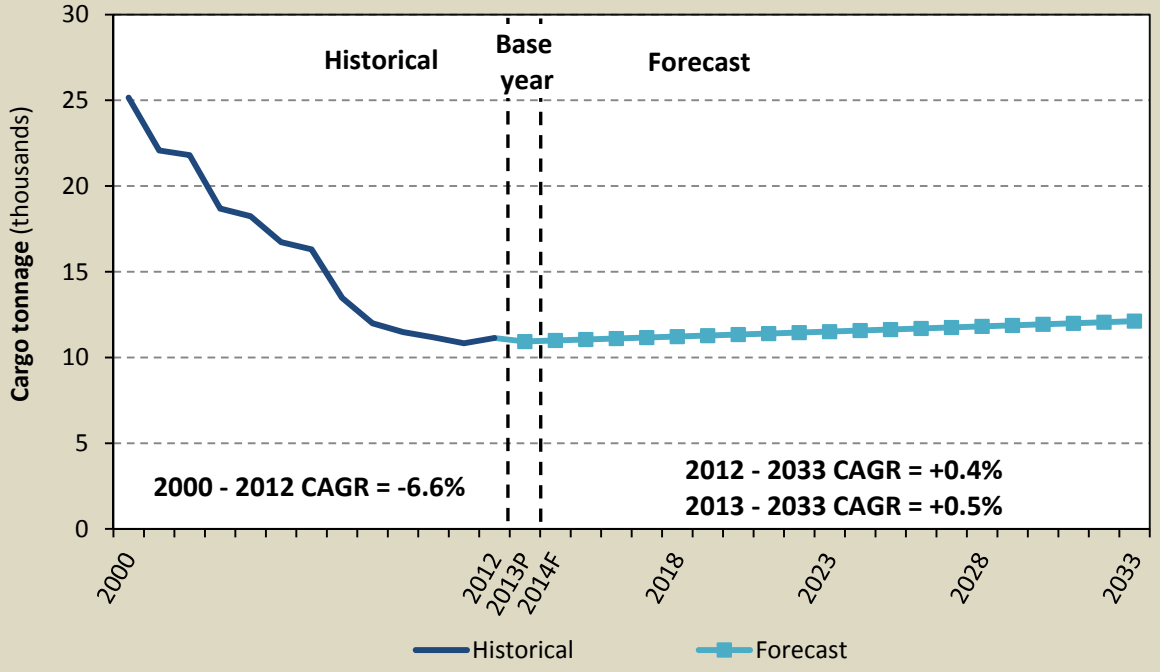


This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.
CAGR = Compound annual growth rate
P=Projected; F=Forecast.
Sources: Historical: Colorado Springs Airport records.
Projected and Forecast: LeighFisher, June 2013.

AIR CARGO

Figure B-2 presents a chart showing historical air cargo tonnage for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033. (The FAA does not prepare cargo forecasts for individual airports as part of the TAF.) Since 2000, the cargo industry nationwide and at COS has experienced significant changes related to: (1) the events of September 11, 2001; (2) the effects of the national and global economic recessions; (3) consolidation in the air cargo industry; (4) replacement of mainline aircraft with flights operated by smaller regional aircraft; and (5) an increasing trend in the volume of cargo transported by truck. All-cargo carriers transported virtually all cargo at the Airport in recent years and are forecast to account for all air cargo at the Airport through 2033. The cargo transported to and from the Airport is forecast to dip slightly (down 1.9%) in 2013 and then increase an average of 0.5% per year from 2013 to 2033.

Figure B-2
FORECAST OF TOTAL (ENPLANED + DEPLANED) CARGO
Colorado Springs Airport

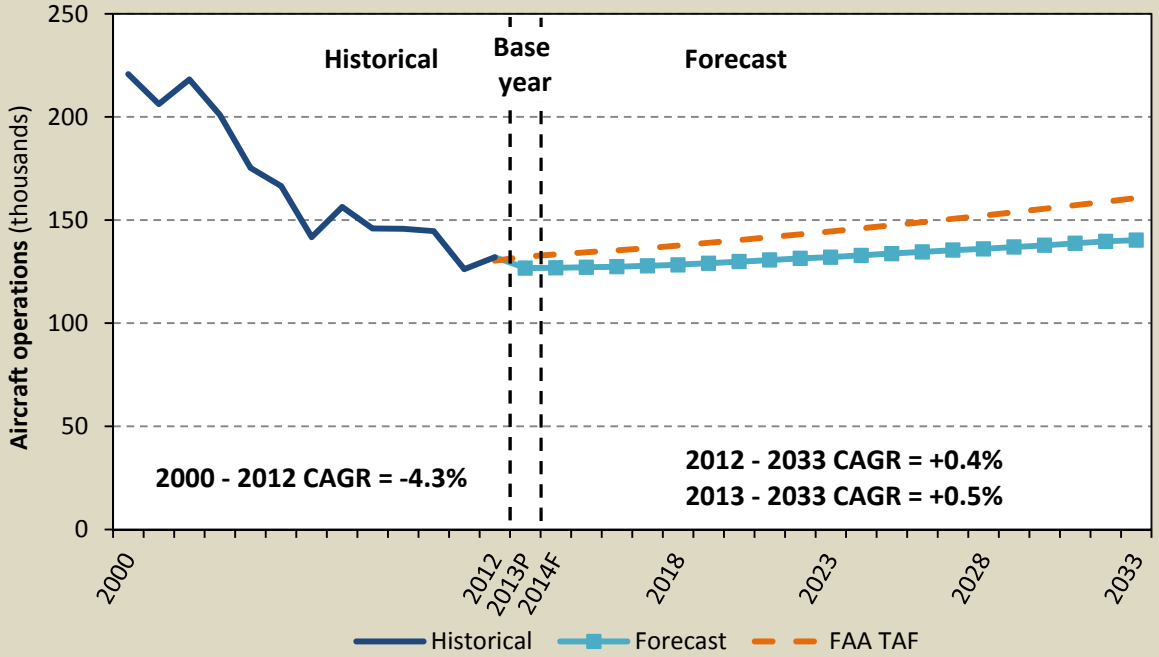


This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.
CAGR = Compound annual growth rate
P=Projected; F=Forecast.
Sources: Historical: Colorado Springs Airport records.

AIRCRAFT OPERATIONS

Figure B-3 presents a chart showing historical total aircraft operations for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033, compared with the FAA TAF for the Airport. (Total aircraft operations include air carrier, air taxi and commuter, general aviation, and military takeoffs and landings.) The aircraft operations forecasts are somewhat lower than the TAF (e.g., -6.8% in 2018 and -8.7% in 2023). The forecast average growth rate in total aircraft operations of 0.5% per year between 2013 and 2033 is lower than the rate forecast by the FAA in its 2013 TAF for the Airport—an average of 1.0% per year from FFY 2013 to FFY 2033. A detailed comparison of the aircraft operations forecasts and the FAA TAF is presented later in this appendix.

Figure B-3
COMPARISON OF TOTAL AIRCRAFT OPERATION FORECASTS
Colorado Springs Airport



This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.
CAGR = Compound annual growth rate
P=Projected; F=Forecast.
Sources: Historical: Colorado Springs Airport records.
Projected and Forecast: LeighFisher, June 2013.

FORECAST DEMAND

The forecast of enplaned passengers was developed taking into account the economic basis for airline traffic, analyses of historical airline traffic, and an assessment of the key factors affecting future airline traffic that were discussed in the 2010 report. In general, changes in airline traffic at the Airport will occur as a function of i) changes in airline service and airfares at the Airport and Denver International Airport (DEN) and, in the longer term, ii) growth in the population and economy of the Airport service region.

It was assumed that continued development of airline service at the Airport will not be constrained by the availability of aviation fuel, long-term limitations in airline fleet capacity, limitations in the capacity of the air traffic control system or the Airport, or government policies or actions that restrict growth. Also considered were recent and potential developments in the national economy and in the air transportation industry as they have affected or may affect airline traffic at the Airport. It was also assumed that another low-cost carrier (LCC) will not replace Frontier's service at the Airport in the near term, and that the other airlines serving the Airport will not backfill the lost service.[4]

From 2015 through 2033, passenger numbers at the Airport were forecast to increase gradually on the basis of assumptions that:

- After relatively slow growth during the remainder of 2013 and 2014, the U.S. economy will experience higher growth thereafter, in line with current economic projections by the Congressional Budget Office
- The economy of the Colorado Springs MSA will grow at a rate comparable to that of the U.S. as a whole
- In the near term, the incumbent airlines will continue to serve the Airport consistent with airline schedules published in May 2013, with no material changes in routes, airfares, or aircraft operated
- In the longer term, the airlines currently serving the Airport will be financially viable and, together with those airlines that may introduce service in the future, will provide the seat capacity required to accommodate additional demand at the Airport
- The level of airline service and availability of generally lower airfares at DEN will continue to attract a substantial proportion of passengers traveling to and from the Airport service region

[4] This forecast update was prepared in advance of the Alaska Airlines announcement of their intention to operate a nonstop flight between Colorado Springs and Seattle beginning in November 2013. Accordingly, the estimate for 2013 does not include the increase that may be expected as a result of this new service offering.

- Service at the Airport will increase only enough to accommodate increases in passengers, airfares will keep pace with inflation, and the market share split between COS and DEN will remain roughly constant, meaning that increases in passengers at COS will derive primarily from natural market growth through the forecast period

- All-cargo operators will handle all of the air cargo at COS through the forecast period; passenger airlines serving the Airport will carry a negligible amount of air cargo

- Aviation fuel prices will remain at levels that are historically high, but lower than the record prices reached in mid-2008

- A generally stable international political environment and safety and security precautions will ensure airline traveler confidence in aviation without imposing unreasonable inconveniences

- There will be no major disruption of airline service or airline travel behavior as a result of international hostilities or terrorist acts or threats

Projected Enplaned Passengers in 2013

In 2013, the number of enplaned passengers at the Airport is projected to total 655,000, a 20.3% decrease from the 2012 total, reflecting actual data for the first 4 months of 2013 (January through April) and, for each of the incumbent airlines, published flight schedules available through March 2014 for the Airport and projected trends in passenger load factors.

Enplaned Passenger Forecasts

The number of enplaned passengers at the Airport is forecast to increase an average of 1.8% per year between 2013 and 2033, from 655,000 in 2013 to 940,000 in 2033, as shown in Table B-1.

In general, the forecasts of enplaned passengers at COS were based on:

- A review of historical trends in enplaned passengers at COS

- Examination of enplaned passengers at DEN and the decreasing share of the combined 2-airport market served by COS

- An evaluation of low cost carrier service trends at DEN and the effect of that service on domestic originating passenger demand at COS

- Professional judgment in evaluating the reasonableness of the forecast results

Table B-1
FORECASTS OF ENPLANED PASSENGERS
Master Plan Update
Colorado Springs Airport
2011 – 2033

	Historical		Projected	Forecast			
	2011	2012	2013	2018	2023	2028	2033
Enplaned passengers							
Mainline *(a)*	231,524	232,538	227,200	246,200	266,200	283,200	305,200
Regional affiliate	435,996	395,893	383,000	407,000	457,000	515,000	576,000
Low-cost carriers	146,816	193,577	44,800	21,800	30,800	42,800	58,800
	814,336	822,008	655,000	675,000	754,000	841,000	940,000
Compound annual growth rate		0.9%	(20.3%)	0.6%	2.2%	2.2%	2.3%
Passenger airline aircraft departures							
Mainline *(a)*	2,153	2,147	2,720	2,610	2,830	3,010	3,240
Regional affiliate	10,092	9,141	7,990	8,420	9,300	10,320	11,360
Low-cost carriers	2,313	2,462	470	160	220	300	410
	14,558	13,750	11,180	11,190	12,350	13,630	15,010
Compound annual growth rate		(5.6%)	(18.7%)	0.0%	2.0%	2.0%	1.9%
Average daily airline passenger aircraft departures							
Mainline *(a)*	6	6	7	7	8	8	9
Regional affiliate	28	25	22	23	25	28	31
Low-cost carriers	6	7	1	0	1	1	1
	40	38	31	31	34	37	41
Compound annual growth rate		(5.6%)	(18.7%)	0.0%	2.0%	2.0%	1.9%

This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.

Note: The base year for the forecasts is 2013. Totals may not add due to rounding.

(a) Includes charters. In calendar year 2012, charter enplaned passengers represented less than 0.3% of total enplaned passengers. Accordingly, charters do not materially affect the forecast of passenger activity.

Sources: Historical: Colorado Springs Airport records. Projected and Forecast: LeighFisher, June 2013.

For the years 2014 through 2018:

- Leakage of passengers to DEN is relatively high due to its proximity to Colorado Springs, the greater choice of airline service available, and the generally lower airfares offered. Over the past 12 years, domestic origin-destination (O&D) passengers declined 34% at COS while increasing 44% at DEN; Table B-2 compares trends in O&D passengers at the two airports. The chart in Figure B-4 shows how COS' share of the combined 2-airport

domestic O&D passengers has decreased, but also how that share decline is projected to taper off in the 10 years after 2013.

- The effect of Frontier's departure from the COS market will continue through April 2014, after which positive growth is projected to resume gradually. The magnitude of the capacity decline in the first quarter of 2014 is such, however, that the change in enplanements for the year as a whole will be negative.

- Passenger growth in years 2015 through 2018 reflects an improving growth trend as losses of share to DEN are expected to taper off in those years.

For the years 2019 through 2033:

- Forecasting longer-term traffic trends at the Airport is highly uncertain, depending in large measure on decisions by incumbent airlines to increase service and by new airlines to initiate service at the Airport. The FAA 2013 TAF rate of increase (+2.2%) was adopted for COS over the 15-year period; comparable to the rate of growth forecast for all U.S. airlines.

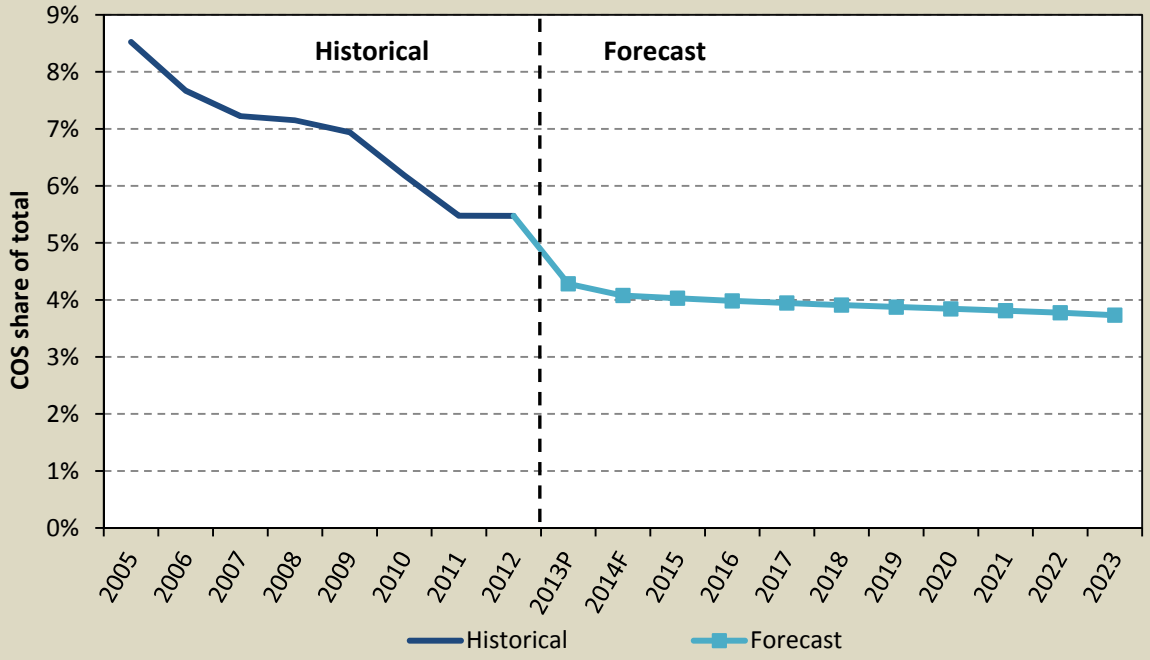
Table B-2
CHANGES IN DOMESTIC O&D PASSENGERS
Colorado Springs Airport, Denver International Airport, and All U.S. Airports
(calendar years)

	Domestic O&D Passengers			Index: 2000=100		
	COS	DEN	U.S.	COS	DEN	U.S.
2000	1,121,920	8,916,680	432,335,400	100	100	100
2001	983,970	8,350,120	402,863,620	88	94	93
2002	983,420	8,496,290	391,376,110	88	95	91
2003	935,270	8,880,770	398,742,200	83	100	92
2004	953,360	9,799,960	434,868,990	85	110	101
2005	950,350	10,201,960	458,525,300	85	114	106
2006	925,630	11,141,510	461,584,640	83	125	107
2007	932,470	11,977,630	475,864,460	83	134	110
2008	909,900	11,816,300	451,467,270	81	133	104
2009	847,490	11,362,570	424,450,380	76	127	98
2010	781,100	11,856,470	428,005,900	70	133	99
2011	727,630	12,563,710	435,044,980	65	141	101
2012	744,900	12,867,220	437,445,540	66	144	101

Note: The 2011 and 2012 domestic passenger totals for COS do not match the totals shown in Tables B-1 and B-6 of this appendix because the data in this table is sourced from U.S. DOT survey estimates as opposed to the more exact totals from the Colorado Springs Airport records which are used throughout this appendix.

Source: U.S. DOT, *Air Passenger Origin-Destination Survey*, reconciled to Schedules T100 and 298C T1.

Figure B-4
COS SHARE OF COMBINED COS + DEN DOMESTIC O&D PASSENGERS
Colorado Springs Airport



This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.
P=Projected; F=Forecast.
Sources: Historical: U.S. DOT, *Air Passenger Origin-Destination Survey*, reconciled to Schedules T100 and

Air Cargo Forecasts

Total cargo tonnage at the Airport is projected to decline 1.9% in 2013, from 11,135 tons in 2012 to 10,925 tons in 2013. Given the lack of growth in cargo tonnage at the Airport in recent years, a modest forecast rate of growth (0.5% per year, on average) was adopted for the years 2014 through 2033, resulting in a total of 12,115 tons in 2033, as shown in Table B-3. All-cargo airlines are forecast to account for all of the cargo tonnage during the forecast period.

Table B-3
FORECASTS OF TOTAL AIR CARGO
Master Plan Update
Colorado Springs Airport
2011 – 2033

	Historical		Projected	Forecast			
	2011	2012	2013	2018	2023	2028	2033
Total air cargo (tons)							
All-Cargo airlines							
Integrated carrier	10,683	10,997	10,750	11,030	11,320	11,620	11,920
Regional feeder	143	138	175	180	185	190	195
	10,825	11,135	10,925	11,210	11,505	11,810	12,115
Passenger airlines	0	0	0	-	-	-	-
Total Airport—air cargo tonnage	10,826	11,135	10,925	11,210	11,505	11,810	12,115
Compound annual growth rate		2.9%	(1.9%)	0.5%	0.5%	0.5%	0.5%
All-cargo airline aircraft departures							
All-Cargo airlines							
Integrated carrier	514	514	510	525	540	555	570
Regional feeder	366	506	340	405	415	425	440
	880	1,020	850	930	955	980	1,010
Compound annual growth rate		15.9%	(16.7%)	1.8%	0.5%	0.5%	0.6%
Cargo per operation (tons)							
All-Cargo airlines							
Integrated carrier	10.4	10.7	10.5	10.5	10.5	10.5	10.5
Regional feeder	0.2	0.1	0.3	0.2	0.2	0.2	0.2
Total	6.2	5.5	6.4	6.0	6.0	6.0	6.0

This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.

Note: Includes enplaned and deplaned freight and mail, in tons.

Sources: Historical: Colorado Springs Airport records. Projected and Forecast: LeighFisher, June 2013.

Aircraft Operations Forecasts

Passenger aircraft operations include total departures and arrivals performed using mainline and regional affiliate aircraft, as shown in Table B-4. Passenger airline aircraft operations were calculated by dividing the enplaned passenger forecasts by category (e.g., mainline, regional affiliate, and low cost carrier) by the estimated number of passengers enplaned per departure. In 2013, the average number of passengers enplaned per departure for the Airport as a whole was approximately 58. This number is expected to increase slowly over the forecast period based on an estimated increase in both the average number of seats per aircraft and the load factor, or percentage of available seats occupied by enplaned passengers. The average number of passengers enplaned per departure is expected to reach approximately 63 in 2033. Dividing the enplaned passenger forecasts by the forecast number of passengers enplaned per departure yields passenger airline aircraft departures. The forecast departures were then multiplied by two to yield passenger airline aircraft operations for each category of activity.

Passenger aircraft operations at the Airport are forecast to increase from 22,360 in 2013 to approximately 30,000 operations in 2033, as shown in Table B-4, representing an average increase of 1.5% per year. Mainline airline aircraft operations at the Airport are forecast to increase an average of 0.9% per year from 2013 to 2033, compared with an average increase of 1.8% per year for regional affiliates.

Cargo aircraft operations were forecast by estimating the average cargo per flight in each of the forecast years. In light of the stable nature of cargo services by FedEx and Key Lime Air in recent years, and the assumption that these services will continue through the forecast period, the average cargo carried on each flight was held constant at approximately 6 tons through 2033. Annual cargo aircraft operations are forecast to increase 0.9% per year, on average, from 1,700 in 2013 to 2,020 in 2033.

The numbers of aircraft operations by general aviation and the military for the years 2013 through 2033, forecast at the Airport by FAA in its 2013 TAF, were adopted for purposes of this forecast. Other aircraft activity (i.e., nonscheduled and ferry flights), which accounts for approximately 3% of all operations at the Airport, is forecast to increase at 1.1% per year.

Total aircraft operations at the Airport are forecast to increase 0.5% per year, on average, from 127,200 in 2013 to 140,740 in 2033.

Table B-4
FORECASTS OF TOTAL AIRCRAFT OPERATIONS BY TYPE
Master Plan Update
Colorado Springs Airport
2011 – 2033

	Historical		Projected	Forecast			
	2011	2012	2013	2018	2023	2028	2033
Passenger airline aircraft operations							
Mainline *(a)*	4,306	4,294	5,440	5,220	5,660	6,020	6,480
Regional affiliate	20,184	18,282	15,980	16,840	18,600	20,640	22,720
Low cost carriers	4,626	4,924	940	320	440	600	820
Total passenger operations	**29,116**	**27,500**	**22,360**	**22,380**	**24,700**	**27,260**	**30,020**
Compound annual growth rate		(5.6%)	(18.7%)	0.0%	2.0%	2.0%	1.9%
All-cargo airline aircraft operations							
Air carrier	1,028	1,028	1,020	1,050	1,080	1,110	1,140
Air taxi	732	1,012	680	810	830	850	880
Total all-cargo operations	**1,760**	**2,040**	**1,700**	**1,860**	**1,910**	**1,960**	**2,020**
Compound annual growth rate		15.9%	(16.7%)	1.8%	0.5%	0.5%	0.6%
A/DACG aircraft operations	n.a.	552	500	500	500	500	500
Compound annual growth rate		-	(9.4%)	0.0%	0.0%	0.0%	0.0%
General aviation operations							
Itinerant	27,787	27,529	28,440	29,360	30,310	31,280	32,290
Local	26,262	28,565	28,920	29,090	29,270	29,450	29,630
Total general aviation operations	**54,049**	**56,094**	**57,360**	**58,450**	**59,580**	**60,730**	**61,920**
Compound annual growth rate		3.8%	2.3%	0.4%	0.4%	0.4%	0.4%
Military operations							
Itinerant	13,800	14,950	14,950	14,950	14,950	14,950	14,950
Local	22,644	26,328	26,330	26,330	26,330	26,330	26,330
Total military operations	**36,444**	**41,278**	**41,280**	**41,280**	**41,280**	**41,280**	**41,280**
Other activity *(b)*	**4,773**	**4,494**	**4,000**	**4,250**	**4,500**	**4,750**	**5,000**
Total airport—aircraft operations	**126,142**	**131,958**	**127,200**	**128,720**	**132,470**	**136,480**	**140,740**
Compound annual growth rate		4.6%	(3.6%)	0.2%	0.6%	0.6%	0.6%

This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.

Notes: Aircraft operations include departures and arrivals; n.a. = not available.

(a) Includes charter airlines.
(b) Includes nonscheduled and empty flights. Other operations accounted for an average of 3.2% of total operations in 2011 and 2012 and are assumed to account for 3.2%-3.6% in future years.

Sources: Historical: City of Colorado Springs records; FAA TAF, January 2013.
Projected and Forecast: LeighFisher, June 2013.

COMPARISON WITH THE FAA 2013 TAF

Table B-5 presents a comparison of the aviation demand forecasts prepared for COS and the Federal Aviation Administration's 2013 TAF for the Airport. The forecasts are compared for the components of total enplaned passengers, commercial aircraft operations and total aircraft operations. The format of Table B-5 is based on the template provided by the FAA for the comparison of airport planning forecasts and the TAF.[5] As required, the results are presented for the base year of 2013 and forecast horizon years which are equal to the base year, plus 1, 5, 10 and 15 years (2014, 2018, 2023, and 2028). The COS aviation demand forecasts were compared graphically with the FAA 2013 TAF in Figures B-1 and B-3 presented earlier.

The key findings of the comparison of the COS aviation demand forecasts with the FAA 2013 TAF are:

- The forecast of enplaned passengers for COS is lower than the TAF. The variance between the COS enplaned passenger forecast and the FAA 2013 TAF is 26.8% in 2014 and 27.4% in 2018, as shown in Table B-5.
- The forecast of commercial operations for COS is lower than the TAF by 18.8% in 2014 and 24.8% in 2018.
- The forecast of total aircraft operations for COS is lower than the TAF by 4.5% in 2014 and 6.5% in 2018.
- Overall, the COS aviation demand forecasts are substantially lower than the FAA 2013 TAF for the Airport, as explained earlier in this appendix.

Table B-6 presents a summary of the COS aviation demand forecasts using a second template provided by the FAA.

[5] U.S. Department of Transportation, Federal Aviation Administration, *Forecasting Aviation Activity by Airport*, July 2001, and *Review and Approval of Aviation Forecasts*, June 2008, http://www.faa.gov.

Table B-5
FAA TAF FORECAST COMPARISON
Master Plan Update
Colorado Springs Airport
2012 – 2028

	Year *(a)*	Colorado Springs Master Plan Update	FAA 2013 TAF	COS MPU vs. 2013 TAF (percent variance)
Passenger Enplanements				
Previous yr. (historical)	2012	822,008	811,984	1.2%
Base yr. (projected)	2013	655,000	853,228	(23.2)
Base yr. + 1yr.	2014	635,000	867,098	(26.8)
Base yr. + 5yrs.	2018	675,000	930,314	(27.4)
Base yr. + 10yrs.	2023	754,000	1,037,178	(27.3)
Base yr. + 15yrs.	2028	841,000	1,157,660	(27.4)
Commercial Operations *(b)*				
Previous yr. (historical)	2012	34,586	32,930	5.0%
Base yr. (projected)	2013	28,060	33,695	(16.7)
Base yr. + 1yr.	2014	27,970	34,453	(18.8)
Base yr. + 5yrs.	2018	28,490	37,894	(24.8)
Base yr. + 10yrs.	2023	31,110	43,646	(28.7)
Base yr. + 15yrs.	2028	33,970	50,164	(32.3)
Total Operations *(c)*				
Previous yr. (historical)	2012	131,958	130,302	1.3%
Base yr. (projected)	2013	127,200	132,333	(3.9)
Base yr. + 1yr.	2014	127,330	133,308	(4.5)
Base yr. + 5yrs.	2018	128,720	137,630	(6.5)
Base yr. + 10yrs.	2023	132,470	144,507	(8.3)
Base yr. + 15yrs.	2028	136,480	152,180	(10.3)

(a) The Colorado Springs Master Plan Update was prepared on a calendar year basis and the FAA 2013 TAF was prepared on a U.S. government fiscal year basis (October through September).
(b) Commercial operations include operations by passenger airlines, all-cargo airlines, and air taxi operators.
(c) Total operations include commercial operations plus operations by general aviation and military.

Sources: Previous year 2012 (historical): City of Colorado Springs.
COS MPU Forecasts: LeighFisher, June 2013.
FAA TAF, January 2013.

Table B-6
SUMMARY OF TRAFFIC FORECASTS USING FAA TEMPLATE
Master Plan Update
Colorado Springs Airport

	Historical	Projected	Forecast				Average annual compound growth rates			
	Previous year 2012	Base year 2013	Base year + 1 year 2014	Base year + 5 years 2018	Base year + 10 years 2023	Base year + 15 years 2028	Base year to +1 year 2013-2014	Base year to +5 years 2013-2018	Base year to +10 years 2013-2023	Base year to +15 years 2013-2028
Passenger enplanements										
Air carrier *(a)*	426,115	272,000	255,000	268,000	297,000	326,000	(6.3%)	(0.3%)	0.9%	1.2%
Commuter *(b)*	395,893	383,000	380,000	407,000	457,000	515,000	(0.8)	1.2	1.8	2.0
Total	822,008	655,000	635,000	675,000	754,000	841,000	(3.1)	0.6	1.4	1.7
Aircraft operations										
Itinerant										
Air carrier *(a)*	10,695	7,800	6,735	7,015	7,630	8,205	(13.7%)	(2.1%)	(0.2%)	0.3%
Commuter/air taxi *(b)*	23,339	20,260	21,235	21,475	23,480	25,765	4.8	1.2	1.5	1.6
Total commercial operations	34,034	28,060	27,970	28,490	31,110	33,970	(0.3)	0.3	1.0	1.3
General aviation	27,529	28,440	28,630	29,360	30,310	31,280	0.7	0.6	0.6	0.6
Military	15,502	15,450	15,450	15,450	15,450	15,450	-	-	-	-
Local										
General aviation	28,565	28,920	28,950	29,090	29,270	29,450	0.1%	0.1%	0.1%	0.1%
Military	26,328	26,330	26,330	26,330	26,330	26,330	-	-	-	-
Total operations	131,958	127,200	127,330	128,720	132,470	136,480	0.1	0.2	0.4	0.5
Cargo/mail (enplaned + deplaned tons)	11,135	10,925	10,985	11,210	11,505	11,810	0.5%	0.5%	0.5%	0.5%
Based Aircraft	250	256	261	283	312	342	2.0%	2.0%	2.0%	1.9%
Operational factors										
Average aircraft size (seats)										
Air Carrier *(a)*	126.2	126.2	127.0	127.2	127.7	128.4				
Commuter *(b)*	56.9	57.3	58.0	62.0	63.0	64.0				
Average enplaning load factor										
Air Carrier *(a)*	72.2%	66.2%	76.0%	76.1%	76.4%	76.7%				
Commuter *(b)*	76.2%	83.7%	78.0%	78.0%	78.0%	78.0%				
GA operations per based aircraft	224	224	221	207	191	178				

Note: The Colorado Springs Master Plan Update was prepared on a calendar year basis and the FAA 2013 TAF Is prepared on a U.S. government fiscal year basis (October through September).

(a) Includes mainline, low cost carrier, and charter airline activity as summarized in the previous tables in this report.

(b) Includes regional affiliate airline activity, which includes flights using regional aircraft with more than 60 seats.

Sources: Previous year 2012 (historical)—City of Colorado Springs records. COS MPU Forecasts—LeighFisher, June 2013. FAA TAF, January 2013.

U.S. Department
of Transportation
**Federal Aviation
Administration**

**Denver Airports District Office
26805 E. 68th Avenue, Room 224
Denver, Colorado 80249
303-342-1250; FAX303-342-1260**

August 16, 2013

Neal Ralston, A.A.E.
Acting Aviation Assistant Director, Planning & Development
Colorado Springs Airport
Airport Development Office
7770 Milton E. Proby Parkway, Suite 50
Colorado Springs, Colorado 80916

Colorado Springs Airport
Colorado Springs, Colorado
AIP Project No. 3-08-0010-049
Approval of Revised Forecast

Dear Mr. Ralston:

The Federal Aviation Administration has completed its review of the revised aviation forecast for the Colorado Springs Airport, dated July 3, 2013. We found it to be supported by reasonable planning assumptions and current data and developed using appropriate forecasting methodologies. Accordingly, this revised forecast is approved for use in the Colorado Springs Airport Master Plan Study.

If you have any questions concerning this matter, please contact me at (303) 342-1264 or by email at linda.bruce@faa.gov.

Sincerely,

Linda A. Bruce

Linda A. Bruce
Community Planner, Colorado

cc: Marc Miller, DEN-616

Appendix C

MATERIALS SUPPORTING ORIGINAL FORECAST

Colorado Springs Airport

Prepared by:

LeighFisher, Inc.

Date:

October 2010

Appendix C
MATERIALS SUPPORTING ORIGINAL FORECAST
Colorado Springs Airport

This appendix provides material supporting the original forecast of aviation demand prepared for the master plan in the summer of 2010, as documented in Chapter 3. It included four primary sections:

- Alternative Forecast Scenarios – which describes alternative forecast scenarios for enplaned passengers, air cargo, and total aircraft operations.
- Peer Aiports – a comparison of COS to its peer airports
- Regression analysis – a summary of the regression equation used to project passenger enplanements
- FAA approval – a letter documenting FAA's approval of the original forecast

ALTERNATIVE FORECAST SCENARIOS

This appendix summarizes the alternative forecasts of enplaned passengers, air cargo, and total aircraft operations for COS. In addition to the baseline forecasts of aviation demand presented in Chapter 5, "Aviation Demand Forecasts", two alternative scenarios were prepared for planning purposes and used as tools to manage uncertainty and to anticipate the facility requirements associated with higher levels of aviation activity and alternative fleet mixes compared with the baseline forecast.

Enplaned Passenger Alternative Forecast Scenarios

The enplaned passenger alternative forecast scenarios are presented in Tables C-1 and C-2. In Scenario 1, the number of enplaned passengers at COS is forecast to increase an average of 4.0% per year between 2009 and 2035, from 929,600 in 2009 to 2.6 million in 2035, as shown in Table C-1. In Scenario 2, the number of enplaned passengers at COS is forecast to increase an average of 5.2% per year between 2009 and 2035, from 929,600 in 2009 to 3.4 million in 2035, as shown in Table C-2. Tables C-1 and C-2 also show the passenger airline departure data associated with these levels of enplaned passengers.

Scenario 1 Forecast Assumptions

In Scenario 1, it was assumed that the majority of market leakage to Denver (80%) would be recaptured gradually through 2035 with a fleet mix that has a larger share of narrowbody aircraft than the baseline scenario. Accordingly, the Scenario 1 forecasts of enplaned passengers at COS were based on:

- A stronger and more rapid economic recovery than assumed in the baseline forecast resulting in a 4.2% increase in enplaned passengers for 2011, compared with a 3.5% increase in 2011 in the baseline forecast

- Oil prices (and fuel prices) would gradually increase with the improved economic conditions relative to 2009 levels

- The cost of travel would increase at faster rate than in the baseline scenario as a result of gradually increasing fuel prices and improved economic conditions

- Narrowbody aircraft would account for a gradually increasing share of the fleet mix beginning in 2011, increasing to 38% of passenger airline departures in 2035

- Average seat size would increase from 72 in 2009 to 103 in 2035

Passenger load factors would be maintained (81% to 82%) in 2010 and 2011 with gradual growth through 2035, reflecting an increased presence of low cost carriers and the trend of increased aircraft utilization in the industry as a whole Scenario 1 provides the basis for evaluating the facility planning implications of an aircraft fleet mix with a larger share of narrowbody aircraft and higher enplanement levels than the baseline forecast.

Scenario 2 Forecast Assumptions

In Scenario 2, it was assumed that all of the market leakage to Denver would be recaptured in the intermediate-term (assumed by 2016) with a fleet mix dominated by narrowbody aircraft rather than regional jets. Accordingly, the Scenario 2 forecasts of enplaned passengers at COS were based on:

- A stronger and more rapid economic recovery than assumed in both the baseline and Scenario 1 forecasts resulting in significant 15.9% increase in enplaned passengers in 2011

- Oil prices (and fuel prices) would gradually increase with the improved economic conditions relative to 2009 levels, similar to the Scenario 1

- The cost of travel would increase at faster rate than in the baseline scenario as a result of gradually increasing fuel prices and improved economic conditions, similar to Scenario 1

- Narrowbody aircraft would account for an increasing share of the fleet mix beginning in 2011, increasing to 30% in 2014 and 47% of passenger airline departures in 2035

- Average seat size would increase from 72 in 2009 to 111 in 2035

- Passenger load factors would be maintained (81% to 82%) in 2010 and 2011 with gradual growth through 2035, reflecting an increased presence of low cost carriers and the trend of increased aircraft utilization in the industry as a whole

Scenario 2 provides the basis for evaluating the facility planning implications of an aircraft fleet mix dominated by narrowbody aircraft and higher enplanement levels than the baseline forecast. The enplanement levels in 2035 would provide insight should the airport return to (or surpass) the levels of activity experienced in the mid-1990s with the Western Pacific Airlines hub operation.

Table C-1
FORECASTS OF ENPLANED PASSENGERS: SCENARIO 1
Colorado Springs Airport

	Historical	Estimated	Scenario 1 forecast (market recaptured gradually)				
	2009	2010	2011	2014	2019	2029	2035
Enplaned passengers							
Mainline *(a)*	255,950	258,400	274,400	328,400	441,700	788,000	1,099,500
Regional affiliate	640,977	625,600	645,800	711,300	830,900	1,122,500	1,346,100
Low cost carriers	32,673	37,700	40,000	47,900	64,500	115,600	162,300
	929,600	921,700	960,200	1,087,600	1,337,100	2,026,100	2,607,900
Average annual percent change		-0.8%	4.2%	4.2%	4.2%	4.2%	4.3%
Passenger airline aircraft departures							
Mainline *(a)*	2,287	2,250	2,390	2,850	3,800	6,640	9,160
Regional affiliate	13,718	12,760	13,110	14,130	15,620	18,650	20,610
Low cost carriers	249	280	340	410	550	970	1,360
	16,254	15,290	15,840	17,390	19,970	26,260	31,130
Average annual percent change		-5.9%	3.6%	3.2%	2.8%	2.8%	2.9%
Average daily passenger airline aircraft departures							
Mainline *(a)*	6	6	7	8	10	18	25
Regional affiliate	38	35	36	39	43	51	56
Low cost carriers	1	1	1	1	2	3	4
	45	42	43	48	55	72	85
Average annual percent change		-5.7%	3.3%	3.2%	2.8%	2.8%	2.9%

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: The base year for the forecasts is 2009.

(a) Includes charters.

Sources: Historical: Colorado Springs Airport records. Forecast: LeighFisher, June 2010.

Table C-2
FORECASTS OF ENPLANED PASSENGERS: SCENARIO 2
Colorado Springs Airport

	Historical	Estimated	Scenario 2 forecast (market recaptured by 2016)				
	2009	2010	2011	2014	2019	2029	2035
Enplaned passengers							
Mainline *(a)*	255,950	258,400	340,800	627,100	905,300	1,321,600	1,629,100
Regional affiliate	640,977	625,600	677,500	854,900	1,052,300	1,392,200	1,588,900
Low cost carriers	32,673	37,700	49,700	91,600	132,300	193,200	238,200
	929,600	921,700	1,068,000	1,573,600	2,089,900	2,907,000	3,456,200
Average annual percent change		-0.8%	15.9%	13.8%	5.8%	3.4%	2.9%
Passenger airline aircraft departures							
Mainline *(a)*	2,287	2,250	2,970	5,440	7,780	11,130	13,550
Regional affiliate	13,718	12,760	13,660	16,590	19,250	22,660	23,920
Low cost carriers	249	280	430	780	1,120	1,620	1,990
	16,254	15,290	17,060	22,810	28,150	35,410	39,460
Average annual percent change		-5.9%	11.6%	10.2%	4.3%	2.3%	1.8%
Average daily passenger airline aircraft departures							
Mainline *(a)*	6	6	8	15	21	30	37
Regional affiliate	38	35	37	45	53	62	66
Low cost carriers	1	1	1	2	3	4	5
	45	42	47	62	77	97	108
Average annual percent change		-5.7%	11.3%	10.2%	4.3%	2.3%	1.8%

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: The base year for the forecasts is 2009.

(a) Includes charters.

Sources: Historical: Colorado Springs Airport records. Forecast: LeighFisher, June 2010.

Air Cargo Alternative Forecast Scenarios

The alternative air cargo forecast scenarios are presented in Tables C-3 and C-4. In Scenario 1, air cargo tonnage is forecast to increase an average of 3.2% per year between 2009 and 2035, from 11,484 in 2009 to 26,181 in 2035, as shown in Table C-3. In Scenario 2, air cargo tonnage is forecast to increase an average of 4.8% per year between 2009 and 2035, from 11,484 in 2009 to 38,485 in 2035, as shown in Table C-4. Tables C-3 and C-4 also show the cargo airline departures that associated with the levels of air cargo tonnage.

Scenario 1 Forecast Assumptions

In Scenario 1, it is assumed that an additional integrated cargo carrier would initiate service in the near-term. Scenario 1 offers insight into the cargo facility planning implications should two integrated carriers serve the airport. While the number of all-cargo operations are not significantly greater than that forecast in the baseline scenario, additional space would have to be allocated to the cargo carrier, potentially increasing the amount of space required for air cargo operations on the airport grounds. Accordingly, the Scenario 1 forecasts of air cargo activity were based on:

- Stronger economic recovery than expected within the baseline forecast scenario.
- An additional integrated cargo carrier (Federal Express currently serves the Airport) would initiate regular service; the carrier would gradually increase the number of flights per week with an accompanying growth in cargo tonnage serving the United States

Scenario 2 Forecast Assumptions

Scenario 2 assumes that an integrated cargo carrier would initiate regional air cargo hub operations in the near-term. Scenario 2 offers insight into the cargo facility planning implications should two integrated carriers serve the airport, with one of the carriers operating a regional hub. With regional hub operations, the spatial needs of the hub carrier would be significantly greater than that of an integrated carrier operating two or three flights per day. The hub carrier would likely operate both narrowbody and small feeder aircraft which would affect the spatial allocation dedicated to this increase cargo activity. Accordingly, the Scenario 2 forecasts of air cargo activity were based on:

- Stronger economic recovery than expected within the baseline forecast scenario.
- The cargo hub carrier would employ a mix of narrowbody and feeder aircraft serving the United States
- Cargo tonnage would increase in accordance with the growth of the hub operation over time.

Table C-3
FORECASTS OF TOTAL AIR CARGO: SCENARIO 1
Colorado Springs Airport

	Historical	Estimated	Scenario 1 forecast (additional integrated carrier)				
	2009	2010	2011	2014	2019	2029	2035
Total air cargo (tons)							
All-Cargo airlines							
Integrated carrier	11,310	11,490	11,720	14,810	17,110	22,360	25,960
Regional feeder	116	110	110	120	120	130	130
	11,426	11,600	11,830	14,930	17,230	22,490	26,090
Passenger airlines	58	72	72	74	78	86	91
Total Airport--air cargo	11,484	11,672	11,902	15,004	17,308	22,576	26,181
Average annual percent change	--	1.6%	2.0%	8.0%	2.9%	2.7%	2.5%
All-cargo airline aircraft departures							
All-Cargo airlines							
Integrated carrier	491	480	480	570	600	660	700
Regional feeder	335	340	340	340	340	340	340
Total Airport--all-cargo airline departures	826	820	820	910	940	1,000	1,040
Average annual percent change	--	-0.7%	0.0%	3.5%	0.7%	0.6%	0.7%
Cargo per operation (tons)							
All-Cargo airlines							
Integrated carrier	11.5	12.0	12.2	13.0	14.3	16.9	18.5
Regional feeder	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total	6.9	7.1	7.2	8.2	9.2	11.2	12.5

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: Includes enplaned and deplaned cargo in tons.

Sources: Historical: Colorado Springs Airport records. Forecast: LeighFisher, June 2010.

Table C-4
FORECASTS OF TOTAL AIR CARGO: SCENARIO 2
Colorado Springs Airport

	Historical 2009	Estimated 2010	Scenario 2 forecast (regional feeder hub) 2011	2014	2019	2029	2035
Total air cargo (tons)							
All-Cargo airlines							
Integrated carrier	11,310	13,270	14,910	20,860	27,010	33,600	37,860
Regional feeder	116	150	180	300	430	500	550
	11,426	13,420	15,090	21,160	27,440	34,100	38,410
Passenger airlines	58	59	59	61	64	71	75
Total Airport--air cargo	11,484	13,479	15,149	21,221	27,504	34,171	38,485
Average annual percent change	--	17.4%	12.4%	11.9%	5.3%	2.2%	2.0%
All-cargo airline aircraft departures							
All-Cargo airlines							
Integrated carrier	491	560	620	800	930	970	1,000
Regional feeder	335	420	500	740	950	1,050	1,120
Total Airport--all-cargo airline departures	826	980	1,120	1,540	1,880	2,020	2,120
Average annual percent change	--	18.6%	14.3%	11.2%	4.1%	0.7%	0.8%
Cargo per operation (tons)							
All-Cargo airlines							
Integrated carrier	11.5	11.8	12.0	13.0	14.5	17.3	18.9
Regional feeder	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total	6.9	6.8	6.7	6.9	7.3	8.4	9.1

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: Includes enplaned and deplaned cargo in tons.

Sources: Historical: Colorado Springs Airport records. Forecast: LeighFisher, June 2010.

Alternative Aircraft Operations Forecasts

Tables C-5 and C-6 provide aircraft operations forecasts for Scenarios 1 and 2. In Table C-5, the passenger and cargo airline operations are shown as derived from the enplaned passenger and air cargo tonnage totals associated with Scenario 1; Table C-6 provides the same for Scenario 2.

Table C-5
FORECASTS OF TOTAL AIRCRAFT OPERATIONS BY TYPE: SCENARIO 1
Colorado Springs Airport

	Historical	Estimated	Scenario 1 (market recaptured gradually)				
	2009	2010	2011	2014	2019	2029	2035
Passenger airline aircraft operations							
Mainline *(a)*	4,574	4,500	4,780	5,700	7,600	13,280	18,320
Regional affiliate *(b)*	27,436	25,620	26,220	28,260	31,240	37,300	41,220
Low cost carriers *(c)*	498	560	680	820	1,100	1,940	2,720
Total passenger operations	32,508	30,680	31,680	34,780	39,940	52,520	62,260
Average annual percent change	--	-5.6%	3.3%	3.2%	2.8%	2.8%	2.9%
All-cargo airline aircraft operations							
Air carrier	982	960	960	1,140	1,200	1,320	1,400
Air taxi	670	680	680	680	680	680	680
Total all-cargo operations	1,652	1,640	1,640	1,820	1,880	2,000	2,080
Average annual percent change	--	-0.7%	0.0%	3.5%	0.7%	0.6%	0.7%
A/DACG aircraft operations	318	500	500	500	500	500	500
Average annual percent change	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
General aviation operations							
Itinerant	34,739	35,090	35,520	36,870	39,350	44,870	48,590
Local	33,672	33,670	34,090	35,370	37,630	42,760	46,330
Total general aviation operations	68,411	68,760	69,610	72,240	76,980	87,630	94,920
Average annual percent change	--	0.5%	1.2%	1.2%	1.3%	1.3%	1.3%
Military operations							
Itinerant	19,100	19,100	19,100	19,100	19,100	19,100	19,100
Local	19,359	19,360	19,360	19,360	19,360	19,360	19,360
Total military operations	38,459	38,460	38,460	38,460	38,460	38,460	38,460
Other activity *(d)*	3,948	3,800	3,900	4,000	4,300	4,900	5,200
Total airport--aircraft operations	145,296	143,660	145,610	151,620	161,880	185,830	203,240
Average annual percent change	--	-1.1%	1.4%	1.4%	1.3%	1.4%	1.5%

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: Aircraft operations include departures and arrivals.

(a) Includes charter airlines.
(b) Includes Frontier Airline regional affiliates Lynx Aviation and Republic Airlines.
(c) Allegiant Air was the only low cost carrier serving the Airport in 2009.
(d) Includes nonscheduled and empty flights. Other operations accounted for 2.7% of commercial airline (passenger and all-cargo) operations in 2009 and are assumed to account for this share in future years.

Sources Historical: City of Colorado Springs records and U.S. Department of Transportation, Federal Aviation Administration, ATADS online database. Forecast: LeighFisher, June 2010.

Table C-6
FORECASTS OF TOTAL AIRCRAFT OPERATIONS BY TYPE: SCENARIO 2
Colorado Springs Airport

	Historical	Estimated	Scenario 2 (market recaptured by 2016)				
	2009	2010	2011	2014	2019	2029	2035
Passenger airline aircraft operations							
Mainline *(a)*	4,574	4,500	5,940	10,880	15,560	22,260	27,100
Regional affiliate *(b)*	27,436	25,620	27,320	33,180	38,500	45,320	47,840
Low cost carriers *(c)*	498	560	860	1,560	2,240	3,240	3,980
Total passenger operations	32,508	30,680	34,120	45,620	56,300	70,820	78,920
Average annual percent change	--	-5.6%	11.2%	10.2%	4.3%	2.3%	1.8%
All-cargo airline aircraft operations							
Air carrier	982	1,120	1,240	1,600	1,860	1,940	2,000
Air taxi	670	840	1,000	1,480	1,900	2,100	2,240
Total all-cargo operations	1,652	1,960	2,240	3,080	3,760	4,040	4,240
Average annual percent change	--	18.6%	14.3%	11.2%	4.1%	0.7%	0.8%
A/DACG aircraft operations	318	500	500	500	500	500	500
Average annual percent change	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
General aviation operations							
Itinerant	34,739	35,090	35,520	36,870	39,350	44,870	48,590
Local	33,672	33,670	34,090	35,370	37,630	42,760	46,330
Total general aviation operations	68,411	68,760	69,610	72,240	76,980	87,630	94,920
Average annual percent change	--	0.5%	1.2%	1.2%	1.3%	1.3%	1.3%
Military operations							
Itinerant	19,100	19,100	19,100	19,100	19,100	19,100	19,100
Local	19,359	19,360	19,360	19,360	19,360	19,360	19,360
Total military operations	38,459	38,460	38,460	38,460	38,460	38,460	38,460
Other activity *(d)*	3,948	3,800	4,000	4,400	5,000	5,700	6,100
Total airport--aircraft operations	145,296	143,980	148,750	164,120	180,820	206,970	222,960
Average annual percent change	--	-0.9%	3.3%	3.3%	2.0%	1.4%	1.2%

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: Aircraft operations include departures and arrivals.

(a) Includes charter airlines.
(b) Includes Frontier Airline regional affiliates Lynx Aviation and Republic Airlines.
(c) Allegiant Air was the only low cost carrier serving the Airport in 2009.
(d) Includes nonscheduled and empty flights. Other operations accounted for 2.7% of commercial airline (passenger and all-cargo) operations in 2009 and are assumed to account for this share in future years.

Sources: Historical: City of Colorado Springs records and U.S. Department of Transportation, Federal Aviation Administration, ATADS online database. Forecast: LeighFisher, June 2010.

PEER AIRPORTS

This appendix summarizes a comparison of COS with other small hub airport peers conducted as part of the preparation of aviation demand forecasts for the Master Plan Update. The objective was to better understand the performance of Colorado Springs Airport relative to some of its peers and to evaluate the key drivers at peer airports in preparing forecasts of aviation demand for the Airport. A number of characteristics and metrics were used to compare Colorado Springs Airport with 11 peer airports, the average of the 12 airports, and the average of the top 30 small hub airports in the U.S. according to passenger activity.

Note: the peer airports presentation on the following pages was prepared by Jacobs Consultancy in March 2010. Jacobs Consultancy's name as of the date of this publication is LeighFisher.

JACOBS CONSULTANCY

Peer Airport Comparison

Colorado Springs Airport

Prepared for the **City of Colorado Springs**

March 2010

COLORADO SPRINGS AIRPORT

Contents

- **Introduction**
- **Key drivers**
- **Peer airport identification**
- **Enplaned passengers**
- **Seats**
- **Load factor**
- **Airline yield**

- As part of the preparation of aviation activity forecasts for the Master Plan Update, a comparison to other small hub airport peers was conducted. The objective was to better understand the performance of Colorado Springs Airport relative to some of its peers.

- Throughout the presentation, each characteristic or metric for the Colorado Springs Airport is compared to that of 11 peer airports, the average of the 12 airports, and the average of the top 30 small hub airports in the U.S. according to passenger activity.

- This evaluation informed the preparation of baseline forecasts as well as the definition of alternative demand scenarios.

Bombardier Q400

ECONOMIC HEADLINES

- **March 5, 2010**
  U.S. Consumer Credit Rises for First Time in Year
  In an encouraging sign for the economy, U.S. consumers increased their debt in January for the first time in a year, signaling that household demand may be on the upswing.
- **March 5, 2010**
  U.S. Jobless Rate Steady at 9.7%
  The number of people filing for initial unemployment benefits declined according to the Labor Department showing signs that the labor market may have turned the corner.
- **January 29, 2010**
  U.S. GDP Surges 5.7% in Fourth Quarter of 2009
  The U.S. economy grew a better-than-expected 5.9 percent in the fourth quarter of 2009. The stronger surge in economic growth followed a 2.2% increase in GDP in the third quarter after four quarters of contraction.

Key Drivers

- **Economic recovery**
- **Oil prices**
- **COS seating capacity**
- **COS average aircraft size**
- **COS load factors**
- **Cost of travel**

- The following key drivers were examined to inform the forecast scenario assumptions.
- **Economic recovery –** the duration and strength of the recovery could distinguish the forecast scenarios (e.g. low forecast scenario may project late recovery).
- **Oil prices** – the volatility of oil prices could help to define alternative forecast scenarios. Will oil prices remain around $70 to $90 per barrel, or return to peak prices of $120 or more? What affect will alternative assumptions have on future aviation demand?
- **COS seating capacity** – using published schedules, near-term seating capacity can be estimated; alternative scenarios may be used to consider potential long-term developments.
- **COS average aircraft size** – will regional/small capacity jets continue to dominate the market in the long-term? Will large turboprops continue to play a role? Should one of the scenarios anticipate a return of narrowbody aircraft? Is this likely?
- **COS load factors** – load factors are strong for COS operators, will this continue? What effect might these load factors have on fleet mix?
- **Cost of travel** – similar to the assumptions for an economic recovery, the cost of travel could distinguish the forecast scenarios.

Bombardier C Series

AIRLINE INDUSTRY HEADLINES

- **March 1, 2010**
  Things are Looking Up for U.S. Airlines
  The industry is beginning to show signs of a recovery, with modest increases in revenue and forecasts of growing demand this year.
- **February 26, 2010**
  Bombardier Gets $3.1 Billion Order From Republic Airways
  Republic will be the U.S. launch customer for Bombardier's new CSeries, providing the Canadian manufacturer with a crucial foothold in the world's largest domestic airline market before its larger rivals have their own new-technology offerings ready**.**
- **February 24, 2010**
  U.S. Airline Passenger Revenue Rose in January
  Passenger revenue at U.S. airlines rose 1.4% in January compared with the same month a year ago, reversing 14 consecutive months of declines, according to the Air Transport Association trade group.

Takeaways

- **Peer airports identified by the evaluation include those serving:**

  Sarasota, FL

  Akron, OH

  Dayton, OH

  Portland, ME

  Albany, NY

  Little Rock, AR

  Greensboro, NC

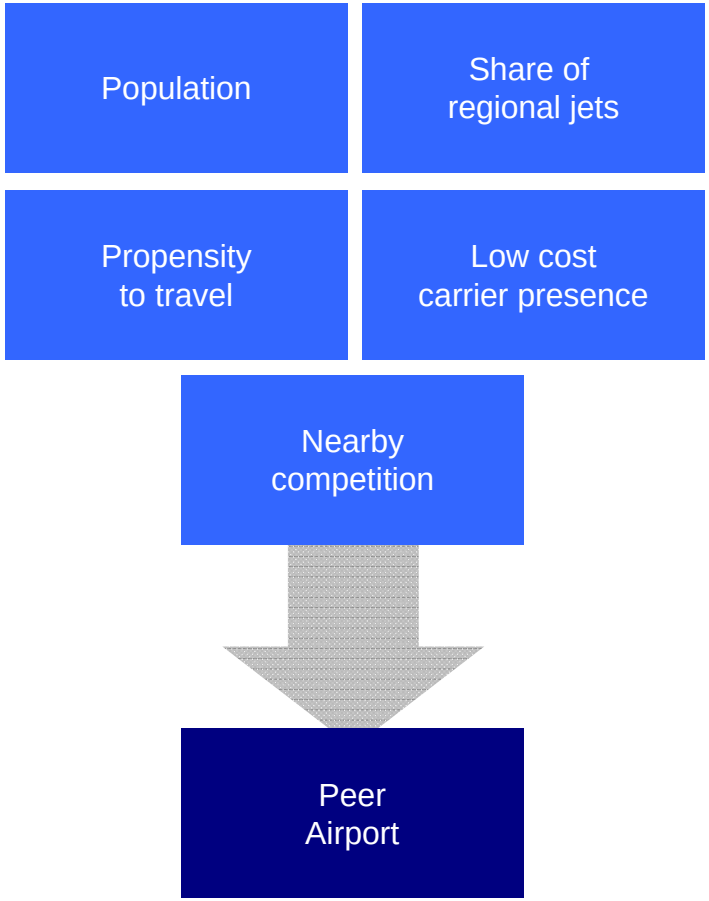
  Des Moines, IA

  Rochester, NY

  Grand Rapids, MI

  Madison, WI

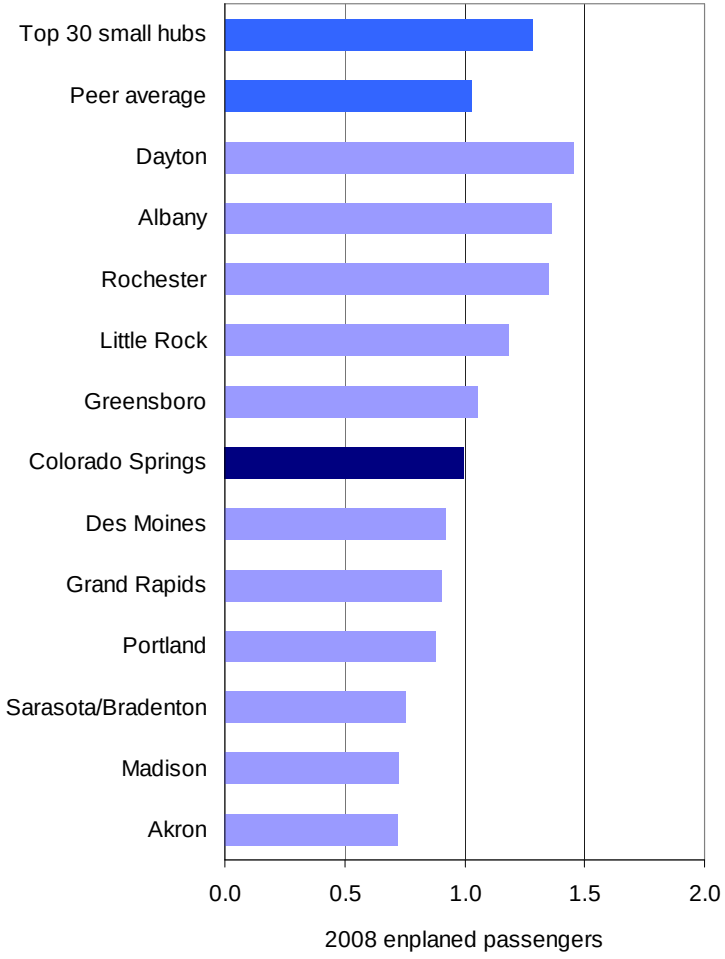
- **To identify which airports should be included for comparison purposes, those with similar passenger activity levels were evaluated in terms of the following characteristics:**
  - Regional population
  - Low cost carrier presence and share of market
  - Share of regional jets in aircraft fleet mix
  - Propensity to travel (trips per person)
  - Distance and drive time to nearby medium and large hub airports
- **Airports with outlying data points were eliminated, for example:**
  - Long Island McArthur Airport served just over 1 million enplanements in 2008, but is located in a region with a population of nearly 8 million people (COS had just under 1 million enplanements in a region with just over 600 thousand people)
  - Orlando Sanford Airport had 83% of its seats in 2008 offered by the low cost carrier Allegiant Air relative to COS' 10% share of seats offered by low cost carriers (including Allegiant and Frontier), in addition the airport is a "secondary" airport serving a much larger metropolitan area
  - Savannah / Hilton Head International experiences about 3.6 trips per person due to its location and demographics, relative to COS' more typical 1.6 trips per person



Takeaways

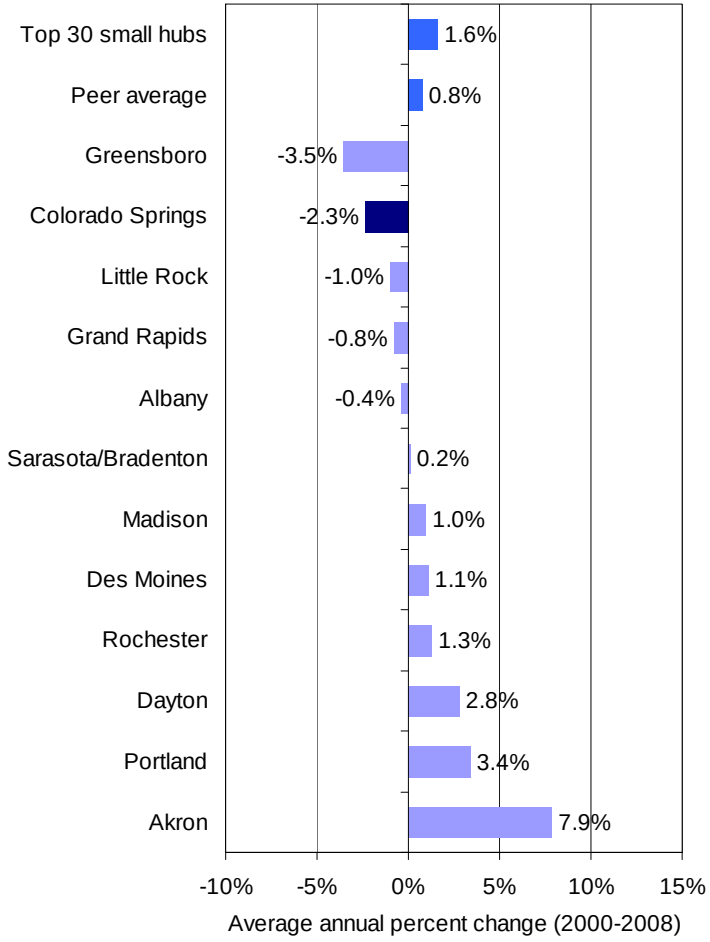
- **COS served over 997 thousand enplaned passengers in 2008**
- **Since 2001, COS has typically served approximately 1 million enplaned passengers per year**
- **COS served over 1.2 million enplaned passengers in 2000, contributing to its average annual percent change of -2.3%**

ENPLANED PASSENGERS AT PEER AIRPORTS
Ranked by 2008 enplaned passengers



Source: U.S. Department of Transportation, FAA Air Carrier Activity Information System, www.faa.gov

TRENDS IN ENPLANED PASSENGERS AT PEER AIRPORTS
Ranked by average annual percent change between 2000 and 2008

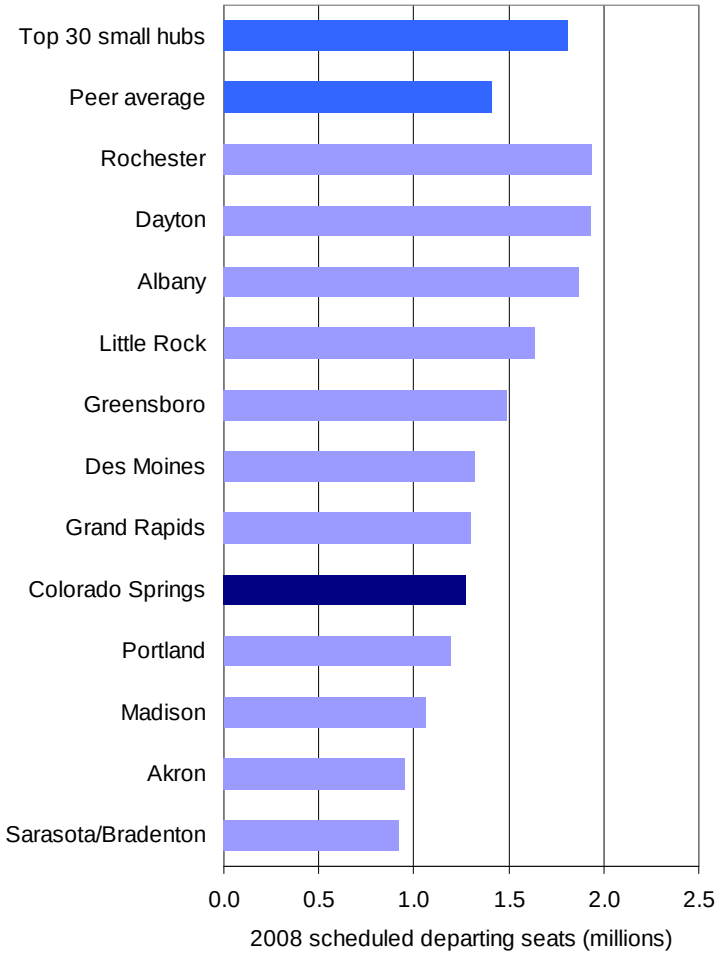


Source: U.S. Department of Transportation, FAA Air Carrier Activity Information System, www.faa.gov

Takeaways

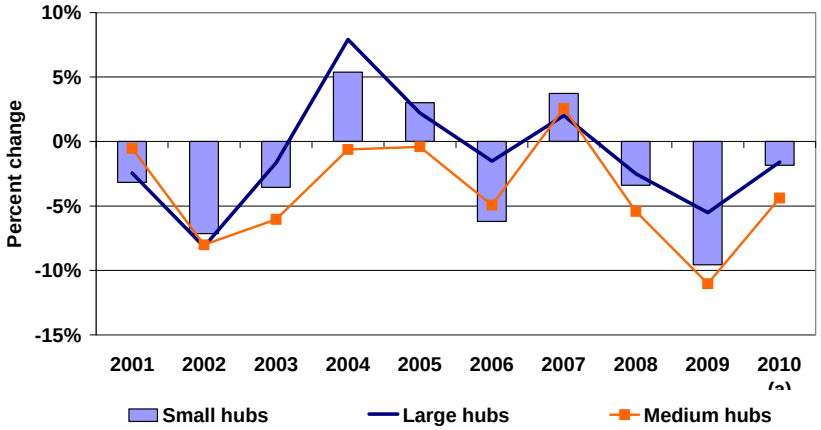
- **COS seating capacity was 1.27 million seats in 2008.**
- **Seating capacity at small hub airports has generally followed the trend for large hub airports since 2000, reflecting the role of many small airports as spokes in airline connecting networks**
- **COS seating capacity decreased an average of 5.6% per year between 2000 and 2009, compared with an average decrease of 2.4% for all small hubs**

TOTAL SEATING CAPACITY AT PEER AIRPORTS
Ranked by 2008 scheduled departing seats



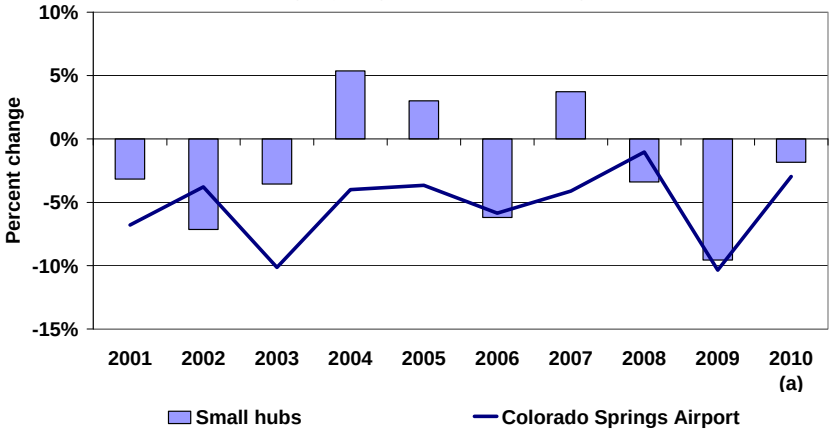
Source: Official Airline Guides, Inc., online database, accessed December 2009.

YEAR OVER YEAR PERCENT CHANGE
IN TOTAL SCHEDULED DEPARTING SEATS BY HUB SIZE



(a) Represents the percent change for January through June.
Source: Official Airline Guide, Inc., online database, accessed December 2009.

YEAR OVER YEAR PERCENT CHANGE
IN TOTAL SCHEDULED DEPARTING SEATS
Colorado Springs Airport and Small Hub Airports



(a) Represents the percent change for January through June.
Source: Official Airline Guide, Inc., online database, accessed December 2009.

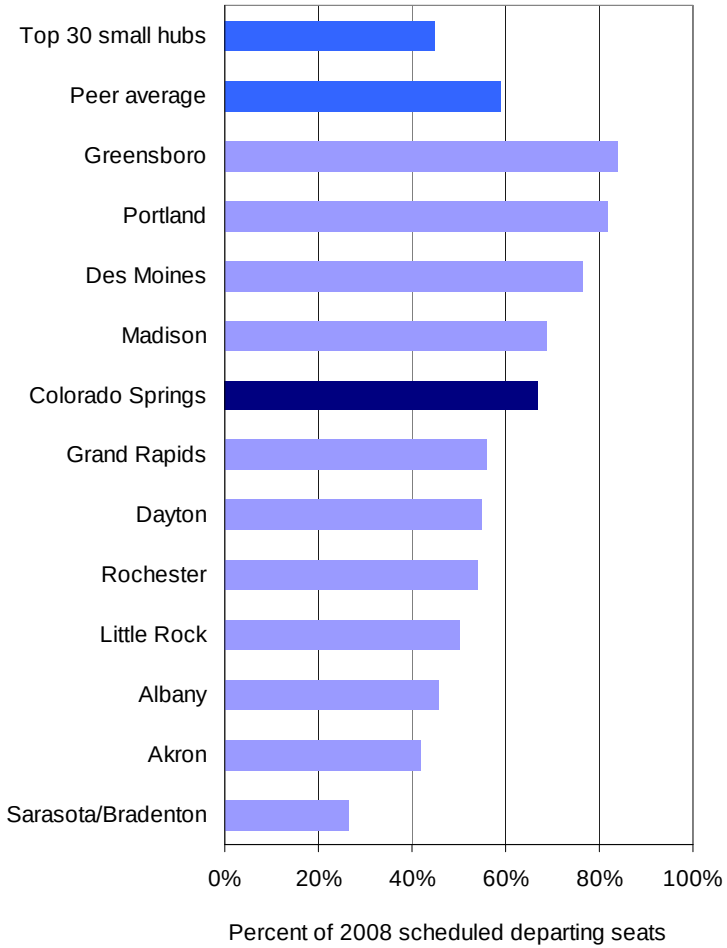
Regional Aircraft Seats

Takeaways

- **Regional aircraft accounted for nearly 70% of total seating capacity at COS in 2008 compared with 14% in 2000**
- **Regional aircraft seating capacity at COS increased an average of 12.8% per year between 2000 and 2009, compared with an average increase of 4.6% for all small hubs**
- **Large regional jets (with more than 60 seats) drove much of the growth in regional aircraft seating capacity at COS and accounted for 27% of total seats in 2009, compared with 16% for small hubs**

REGIONAL AIRCRAFT SEATING CAPACITY AT PEER AIRPORTS

Ranked by 2008 regional aircraft share of scheduled departing seats

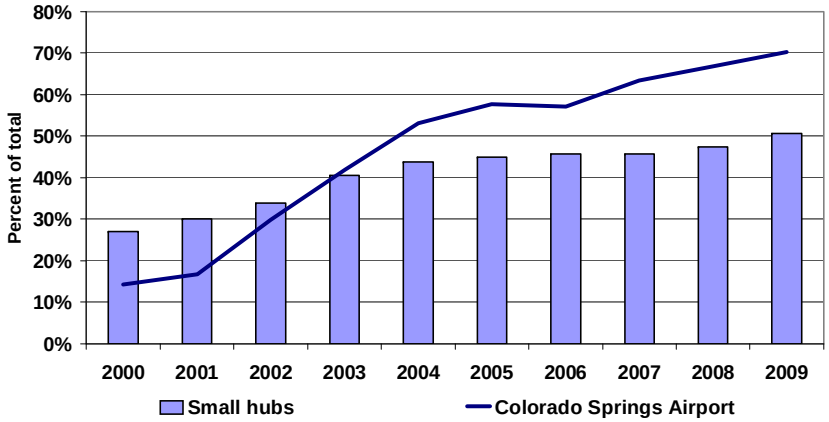


Note: Regional aircraft include prop, turboprop, and regional jet aircraft. Includes turboprop (Q400) and regional jets with more than 60 seats (CR7, CR9).

Source: Official Airline Guide, Inc., online database, accessed December 2009.

REGIONAL AIRCRAFT SEATS AS A PERCENT OF TOTAL SCHEDULED DEPARTING SEATS

Colorado Springs Airport and Small Hub Airports

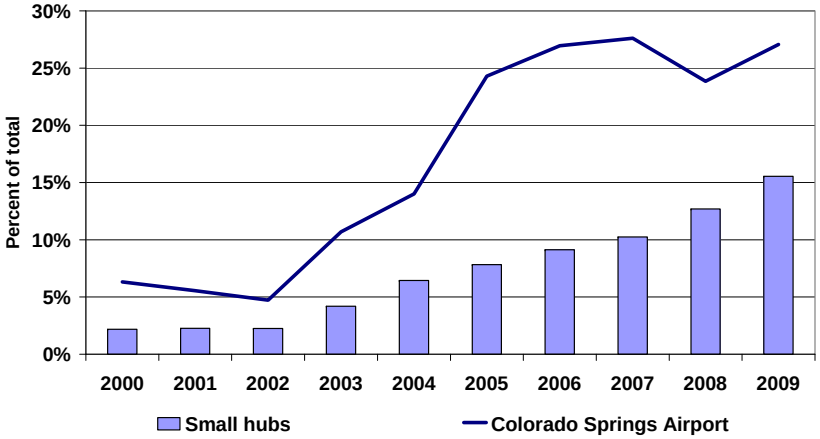


Note: Regional aircraft include prop, turboprop, and regional jet aircraft. Includes turboprop (Q400) and regional jets with more than 60 seats (CR7, CR9).

Source: Official Airline Guide, Inc., online database, accessed December 2009.

LARGE REGIONAL JET SEATS AS A PERCENT OF TOTAL SCHEDULED DEPARTING SEATS

Colorado Springs Airport and Small Hub Airports



Note: Large regional jet aircraft have more than 60 seats (excludes the Q400 turboprop aircraft).

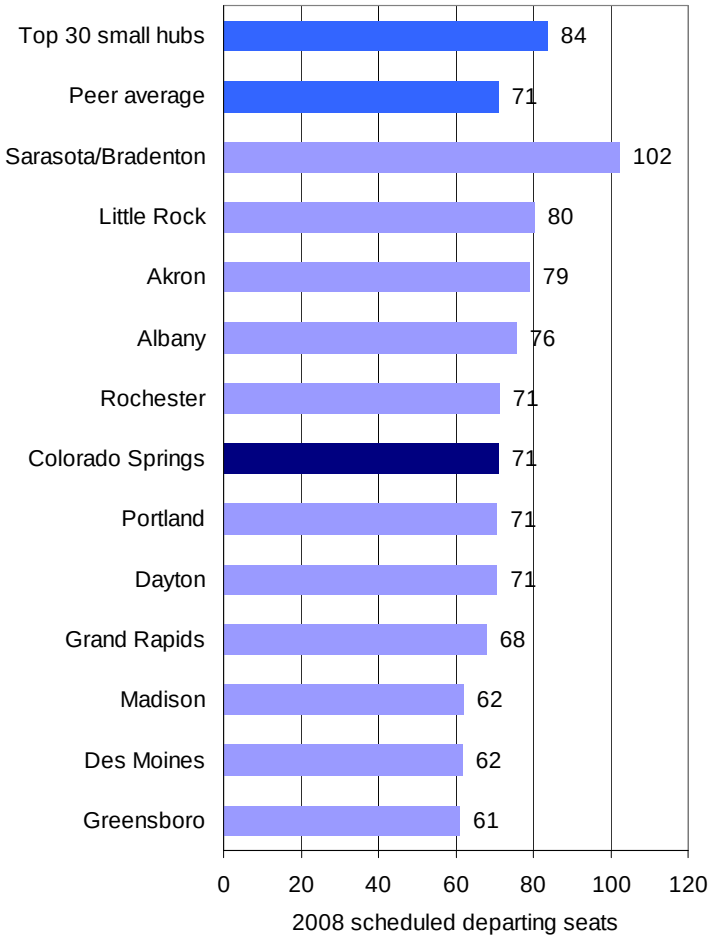
Source: Official Airline Guide, Inc., online database, accessed December 2009.

Average Seats Per Departure

Takeaways

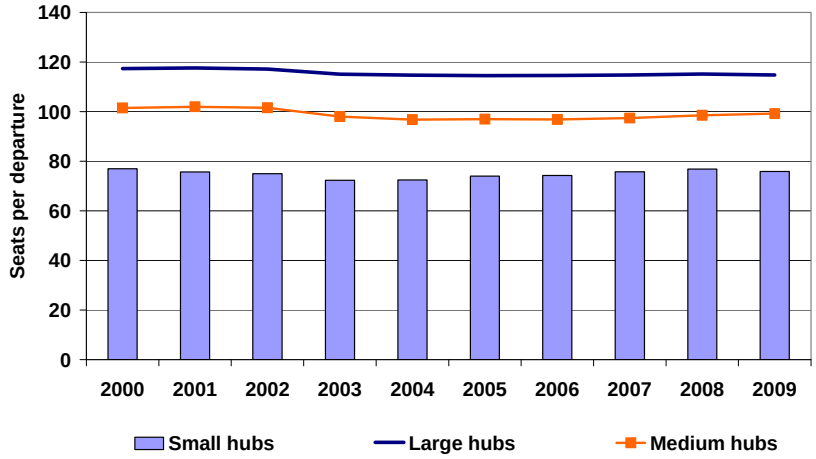
- **Since 2000, small hub airports have averaged about 75 seats per departure, compared with an average of 100 and 116 for medium and large hub airports, respectively**
- **The average number of seats per departure at COS has decreased since 2000, reflecting the replacement of narrowbody aircraft with turboprops and regional jets**

AVERAGE SEATS PER DEPARTURE AT PEER AIRPORTS
Ranked by 2008 scheduled departing seats



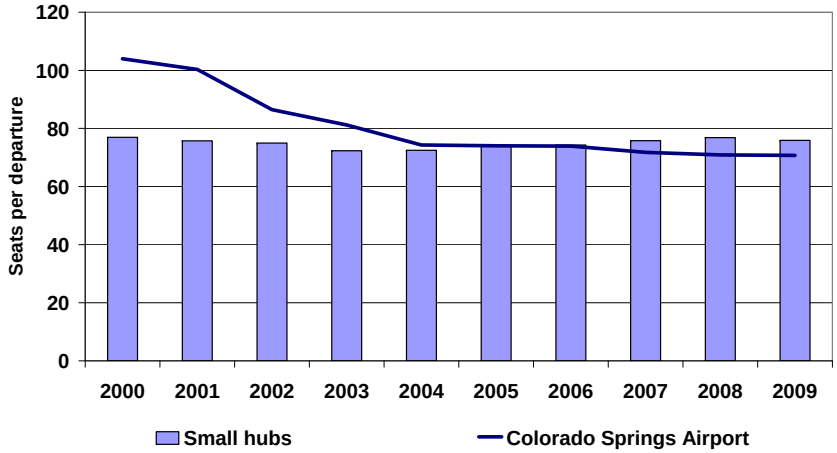
Source: Official Airline Guides, Inc., online database, accessed December 2009.

AVERAGE SEATS PER DEPARTURE BY HUB SIZE



Source: Official Airline Guide, Inc., online database, accessed December 2009.

AVERAGE SEATS PER DEPARTURE
Colorado Springs Airport and Small Hub Airports



Source: Official Airline Guide, Inc., online database, accessed December 2009.

Takeaways

- **Changes in the contractual arrangements between regional airlines and mainline carriers may affect future levels of service and regional aircraft fleets**

Corporate Groupings of Top 50 Regional Airlines
(as of December 2008)

2008 Individual Carrier Rank	2008 Carrier Group Rank	Carrier	Primary Codes Shared in 2008	2008 Passengers Enplaned	2008 Enplaned Carrier Group
	1	**SkyWest Airlines**			**33,125,090**
1		- SkyWest Airlines	UA/DL/YX	20,668,204	
4		- Atlantic Southeast	DL	12,456,886	
	2	**American Eagle**			**19,103,083**
2		- American Eagle	AA	16,558,307	
17		- Executive Airlines	AA	2,544,776	
	3	**Republic Holdings**			**18,794,634**
8		- Chautauqua Airlines	AA/CO/DL/UA/US	7,599,581	
10		- Republic Airlines	F9/US/YX	7,001,933	
14		- Shuttle America	DL/MW/UA	4,193,120	
3	4	**ExpressJet Airlines**	CO/DL/UA/VQ	14,848,078	
	5	**Mesa Airlines**			**13,057,975**
5		- Mesa Airlines	UA/US	11,181,822	
20		- Freedom Airlines	DL	1,811,776	
38		- Air Midwest	US/YV	64,377	
	6	**Pinnacle Airlines**			**12,867,690**
6		- Pinnacle Airlines	DL/NW	10,331,557	
18		- Colgan Air	CO/UA/US	2,536,133	
7	7	**Comair**	DL	8,101,300	
	8	**US Airways Group**			**7,839,737**
13		- PSA Airlines	US	4,743,922	
16		- Piedmont Airlines	US	3,095,815	
	9	**Northwest Airlines**			**7,426,537**
12		- Mesaba Airlines	NW	5,293,662	
19		- Compass Air	NW	2,132,875	
9	10	**Horizon Air**	AS	7,389,899	
11	11	**Air Wisconsin**	US	5,593,952	
	12	**Trans States Airlines**			**4,986,457**
15		- Trans States Airlines	UA/AA/US	3,495,153	
21		- GoJet Airlines	UA	1,491,304	
22	13	Lynx Aviation	F9	984,706	
23	14	Cape Air	CO	701,647	
24	15	Commutair	CO	698,116	
25	16	Gulfstream Intl	CO	685,901	
26	17	Great Lakes Aviation Ltd.		569,844	
27	18	Hawaii Island Air		525,506	
28	19	ERA Aviation		354,006	
29	20	Peninsula Airways	AS	228,400	
30	21	Hageland Aviation		158,323	
31	22	Skyway Airlines	YX	146,780	
32	23	Frontier Flying Service		144,607	
33	24	Seaborne Aviation		135,598	
34	25	Grant Aviation		118,659	
35	26	Kenmore Air Harbor		110,233	
36	27	Bering Air		79,984	
37	28	Pacific Wings Airlines		69,005	
39	29	Yute Air - Flight Alaska		52,805	
40	30	PM Air LLC		51,992	
41	31	Wings of Alaska		41,165	
42	32	Warbelows Air Ventures		39,633	
43	33	Wright Air		29,810	
44	34	Vieques Airlink		26,585	
45	35	Mokulele Flight Services	YV	26,266	
46	36	New England Airlines		21,485	
47	37	Pacific Airways		20,240	
48	38	Taquan Air Service		18,230	
49	39	Iliamna Air Taxi		18,212	
50	40	Homer Air		17,134	
			Total Traffic Activity - Top 50 Airlines	159,209,304	
			Total Traffic Activity	159,320,717	
			Top 50 Airlines as a Percent of Total	99.9%	

REGIONAL AIRLINE INDUSTRY HEADLINES

- **February 17, 2010**
  ExpressJet Contracts with United
  Regional carrier ExpressJet Airlines signed a contract with United airlines to fly 22 ERJ-145 aircraft for United Express. The company was successful in bidding to replace flying done by other United Express partner carriers whose contracts have expired.
- **February 15, 2010**
  SkyWest to Launch COS-IAD Service
  SkyWest operating as United Express will begin a daily nonstop flight from Colorado Springs Airport to Washington-Dulles on June 9.
- **January 5, 2010**
  Mesa Air Group Files for Bankruptcy Protection
  Mesa will seek to dramatically reduce the current fleet of aircraft from 130 to 77. The filing comes after the loss of contracts with United and Delta as well as litigation with Aloha Airlines.
- **December 30, 2009**
  Regional Airlines Get Wings Clipped by Big Partners
  Shakeout is likely as commuter lines contend with lower fees and fewer routes amid overall industry downturn.

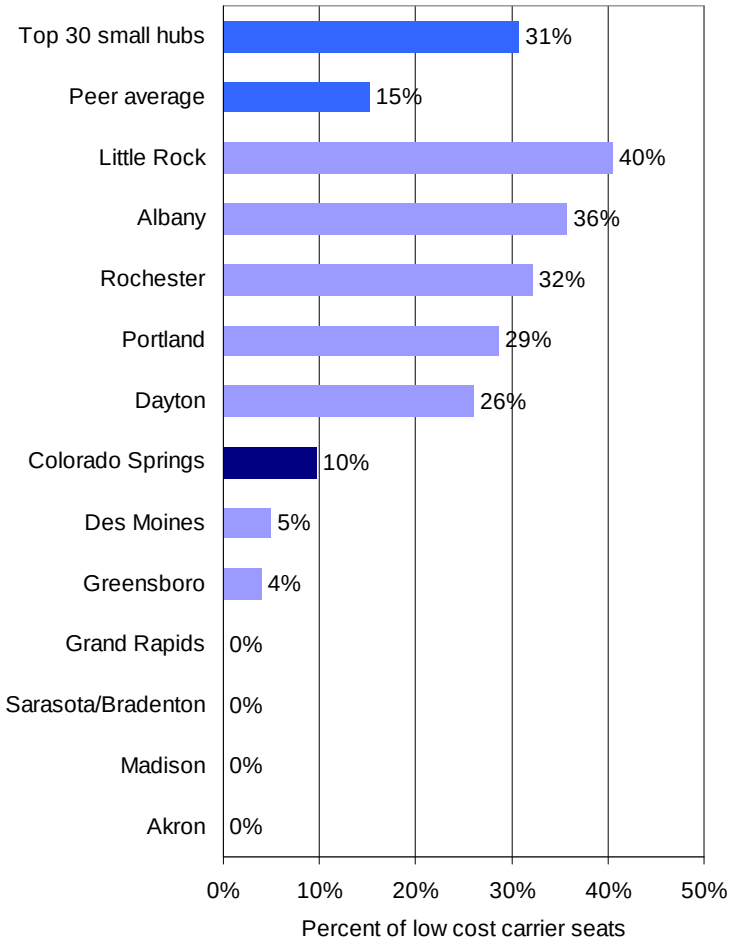
Low Cost Carrier Seats

Takeaways

- **Low cost carriers (LCCs) accounted for 10% of COS total seating capacity in 2008, compared with an average of 31% for the top 30 small hub airports (which is consistent with the national average)**
- **LCCs accounted for 40% of total seating capacity at Denver International Airport in 2008 and 2009, reflecting the re-introduction of service by Southwest in 2006 as well as low cost service by Frontier and JetBlue**
- **LCCs include: AirTran, Allegiant, America West, Frontier, Independence Air, JetBlue, Spirit, Southwest, and Virgin America**

LOW COST CARRIER SEATING CAPACITY AT PEER AIRPORTS

Ranked by 2008 low cost carrier share of scheduled departing seats

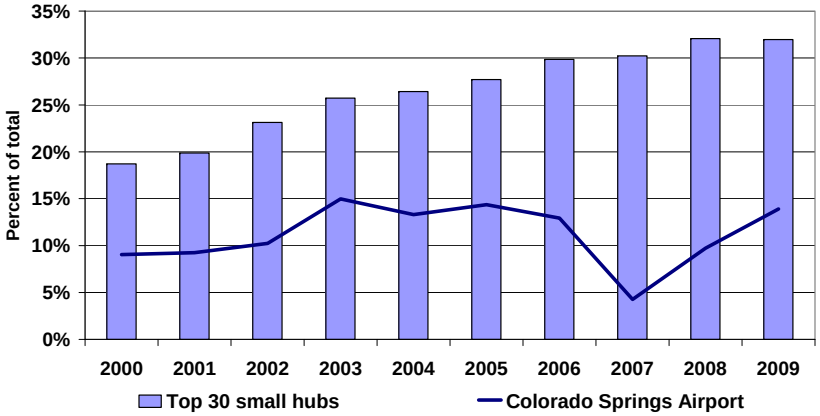


Note: Low cost carriers include AirTran, Allegiant, America West, Frontier, Independence Air, JetBlue, Spirit, Southwest, and Virgin America.

Source: Official Airline Guides, Inc, online database, accessed December 2009.

LOW COST CARRIER SEATS AS A PERCENT OF TOTAL SCHEDULED DEPARTING SEATS

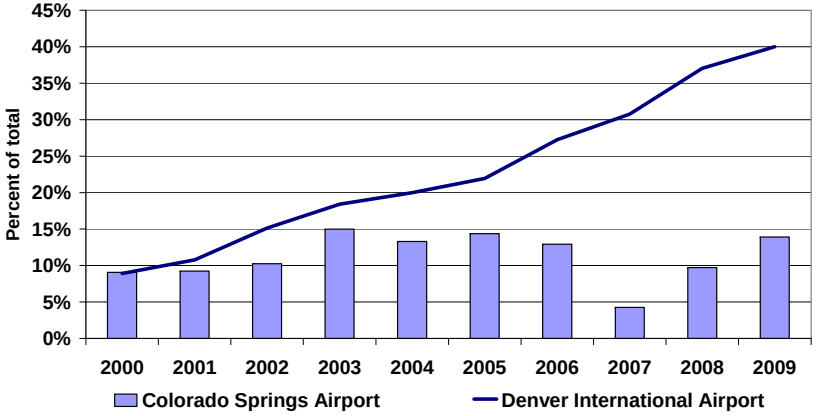
Colorado Springs Airport and Top 30 Small Hub Airports



Note: Low cost carriers include AirTran, Allegiant, America West, Frontier, Independence Air, JetBlue, Spirit, Southwest, and Virgin America.
Source: Official Airline Guide, Inc., online database, accessed December 2009.

LOW COST CARRIER SEATS AS A PERCENT OF TOTAL SCHEDULED DEPARTING SEATS

Colorado Springs Airport and Denver International Airport



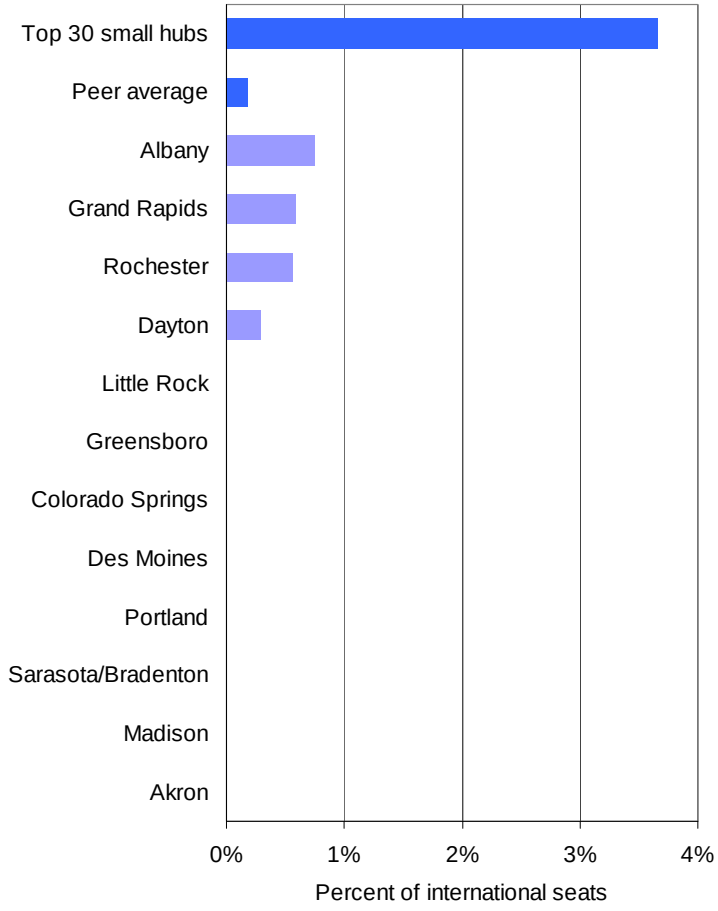
Note: Low cost carriers include AirTran, Allegiant, America West, Frontier, Independence Air, JetBlue, Spirit, Southwest, and Virgin America.
Source: Official Airline Guide, Inc., online database, accessed December 2009.

Takeaways

- **International service accounts for a small share of seating capacity at most small hub airports.**
- **Seven of the 12 peer airports do not have international service**
- **Those peer airports with international service have less than 1% of scheduled departing seats bound for international destinations**

INTERNATIONAL SEATING CAPACITY AT PEER AIRPORTS

Ranked by 2008 international share of scheduled departing seats

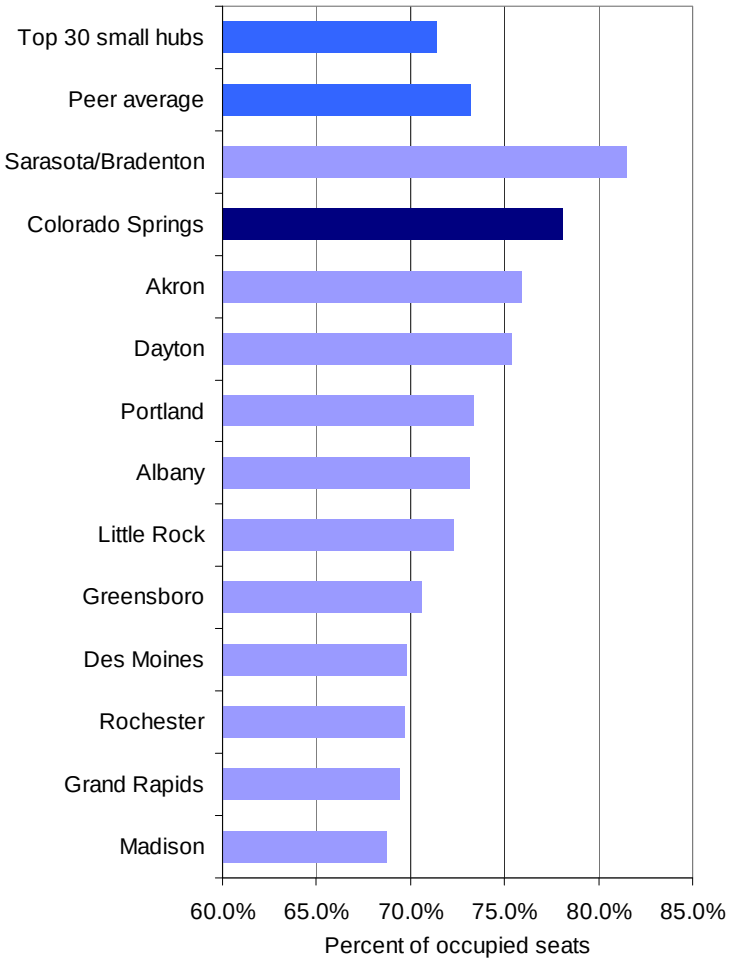


Source: Official Airline Guides, Inc, online database, accessed December 2009.

Takeaways

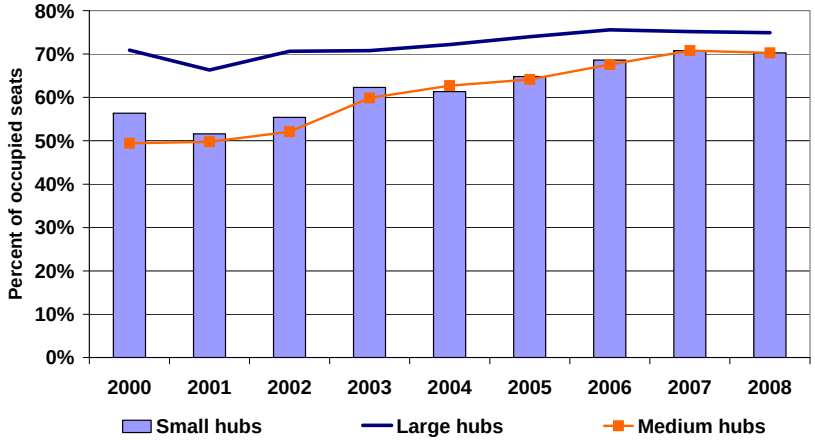
- **COS exhibited a higher load factor than all but one of its peers, with 78.1% of seats occupied in 2008**
- **The load factors at COS have been higher than the average for all small hub airports since 2000**
- **Of the top 30 small hub airports, COS ranked second highest in terms of load factor for 2008**

ENPLANED PASSENGER LOAD FACTOR AT PEER AIRPORTS
Ranked by 2008 load factor



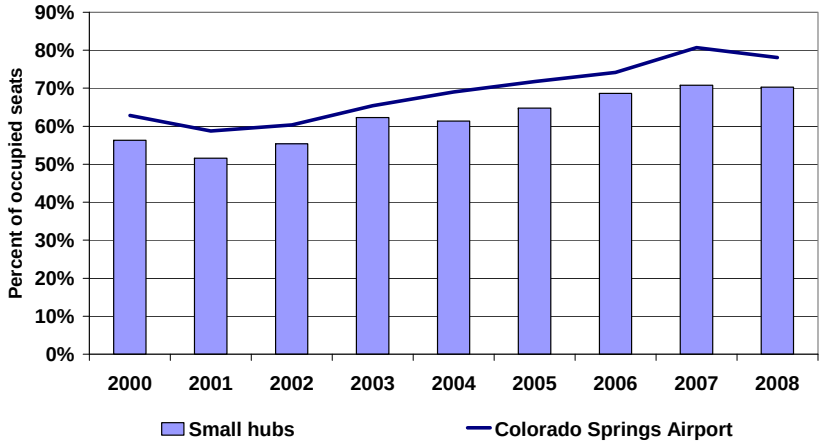
Sources: U.S. Department of Transportation, Federal Aviation Administration, Air Carrier Activity Information System, www.faa.gov and Official Airline Guide, Inc., online database, accessed December 2009.

AVERAGE ENPLANED PASSENGER LOAD FACTOR BY HUB SIZE



Sources: U.S. Department of Transportation, Federal Aviation Adminstration, Air Carrier Activity Information System, www.faa.gov and Official Airline Guide, Inc., online database, accessed December 2009.

AVERAGE ENPLANED PASSENGER LOAD FACTOR
Colorado Springs Airport and Small Hub Airports

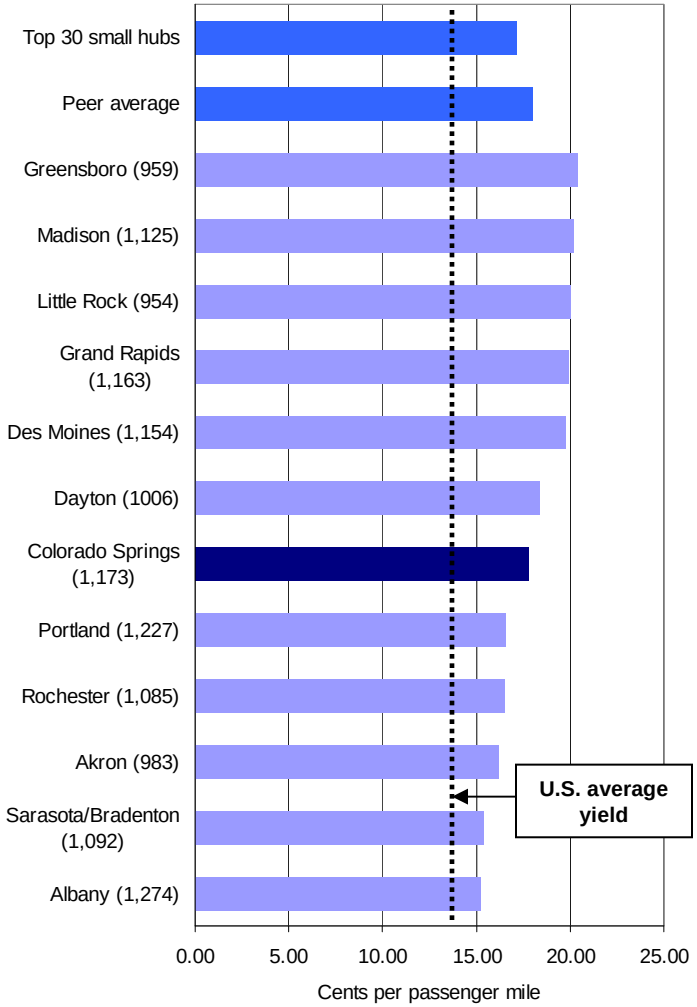


Sources: U.S. Department of Transportation, Federal Aviation Adminstration, Air Carrier Activity Information System, www.faa.gov and Official Airline Guide, Inc., online database, accessed December 2009.

Takeaways

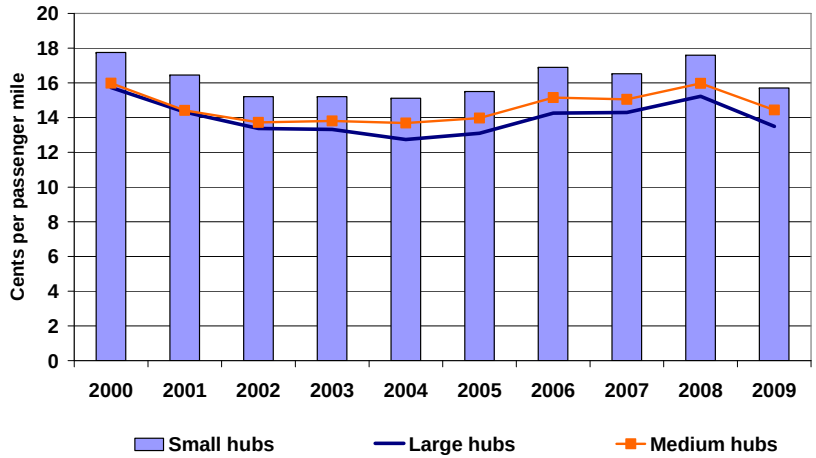
- **COS airlines enjoy higher than average airline yields at over 17 cents per passenger mile**
- **Variation in average yields among small hubs reflects differences in average trip length, shares of low cost carrier service, and origin-destination patterns**
- **Average yields at COS have been higher than the average for all small hub airports and the nation as a whole since 2000 reflecting its central geographical location**
- **Average yield at DEN in 2008 was 15.87 cents per passenger mile; average trip length of 1,068**

AVERAGE AIRLINE YIELD AT PEER AIRPORTS
Ranked by 2008 yield, average trip length in parenthesis



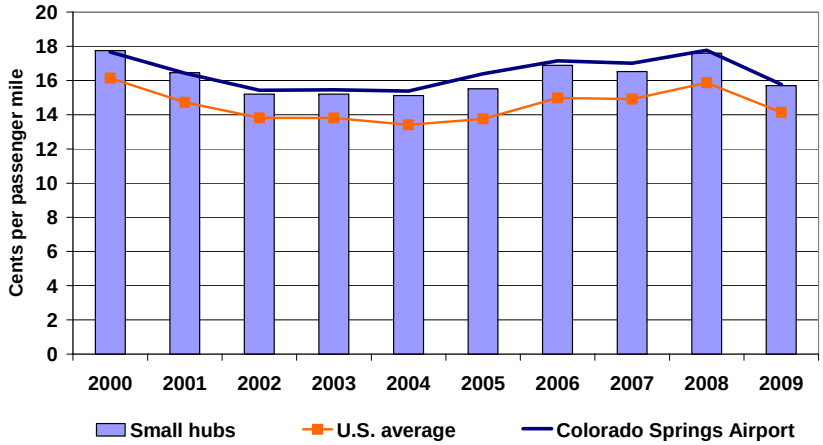
Source: U.S. Department of Transportation, Origin-Destination Survey of Airline Passenger Traffic, Domestic, OD1B online database, accessed December 2009.

AVERAGE AIRLINE YIELD BY HUB SIZE



Source: U.S. Department of Transportation, Origin-Destination Survey of Airline Passenger Traffic, Domestic, OD1B online database, accessed December 2009.

AVERAGE AIRLINE YIELD
Colorado Springs Airport, Small Hub Airports, and United States



Source: U.S. Department of Transportation, Origin-Destination Survey of Airline Passenger Traffic, Domestic, OD1B online database, accessed December 2009.

REGRESSION ANALYSIS

Regression analysis compares the historical relationship between a dependent variable, in this case, enplaned passengers, and an independent or "predictor" variable. The predictor variable is eventually used to project future levels of the dependent variable. In aviation demand forecasts, the predictor variable is typically represented by an economic or demographic metric such as population, employment, or personal income. Regression analyses produce a mathematical equation that identifies the strength or reliability of the historical correlation between the dependent variable (enplaned passengers) and predictor variables. The statistical reliability of this equation is typically measured by a regression statistic known as "R-squared." An R-squared of 1.0 would represent a perfect historical correlation between the dependent and predictor variable and suggest that the measurement of this historical relationship will be a reliable predictor of future results. An R-squared value above 0.90 is considered to be acceptable for forecast purposes.

The regression model defined during the forecast process to represent passenger demand is presented in Table C-7.

Table C-7
REGRESSION MODEL
Colorado Springs Airport

Regression model	Coefficient	t-statistic
ORIGINATING PASSENGER MODEL		
Dependent variable = In(COS originating passengers)		
Independent variables		
ln(Colorado Springs MSA total income, in 2009 dollars)	0.87	5.33
ln(COS domestic airline yield, 2009 dollars)	-1.97	-4.39
ln(DEN domestic airline yield, 2009 dollars)	1.59	4.81
Dummy variable for Western Pacific service expansion and cessation (1995 - 1998)	0.38	3.75
Constant	0.19	0.06
Observations	26	
Adjusted R-squared	0.92	

Source: LeighFisher, July 2010.

FAA APPROVAL LETTER

U.S. Department
of Transportation
**Federal Aviation
Administration**

**Denver Airports District Office
26805 E. 68th Avenue, Room 224
Denver, Colorado 80249
303-342-1250; FAX303-342-1260**

September 23, 2010

Neal Ralston, A.A.E.
Airport Planning & Development Mngr.
Colorado Springs Airport
Airport Development Office
7770 Milton E. Proby Parkway, Suite 50
Colorado Springs, Colorado 80916

Colorado Springs Airport
Colorado Springs, Colorado
AIP Project No. 3-08-0010-049
Forecast Approval

Dear Mr. Ralston:

The Federal Aviation Administration has completed its review of forecast information for the Colorado Springs Airport, dated July 26, 2010. We found it to be supported by reasonable planning assumptions and current data and developed using appropriate forecasting methodologies. Accordingly, this forecast is approved for use in the Colorado Springs Airport Airport's Master Plan Update Study.

If you have any questions concerning this matter, please contact me at (303) 342-1264 or by email at linda.bruce@faa.gov.

Sincerely,

Linda A. Bruce
Airport Planner, Colorado

cc: Chris Schaffer, DEN-615

Appendix D

PLANNING ACTIVITY LEVEL 4 FACILITY REQUIREMENTS

Colorado Springs Airport

Prepared by:

LeighFisher, Inc.

Appendix D

PLANNING ACTIVITY LEVEL 4 FACILITY REQUIREMENTS

Colorado Springs Airport

This appendix summarizes the facility requirements to accommodate the forecast aviation demand associated with Planning Activity Level 4 (PAL 4). PAL 4 is based on the Scenario 1 forecast year 2035, as documented in Appendix C, with the exception of the air cargo demand. The air cargo tonnage and air cargo operations are based on Scenario 2, forecast year 2035, also documented in Appendix C. Table D-1 depicts each of the PALs for reference.

Table D-1

SUMMARY OF PLANNING ACTIVITY LEVELS

Colorado Springs Airport

	2009	PAL 1	PAL 2	PAL 3	PAL 4
Enplaned passenger					
Mainline	255,950	306,500	392,000	445,200	1,099,500
Regional affiliate	640,977	849,500	1,141,700	1,308,500	1,346,100
Low cost carrier	32,673	59,200	111,200	156,800	162,300
Total	929,600	1,215,200	1,644,900	1,910,500	2,607,900
Passenger airline departures					
Mainline	2,287	2,640	3,310	3,710	9,160
Regional affiliate	13,718	16,100	19,400	20,700	20,610
Low cost carrier	249	500	930	1,310	1,360
Total	16,254	19,240	23,640	25,720	31,130
Air cargo tonnage					
Integrated carrier	11,310	13,770	16,470	18,110	37,860
Regional feeder	116	120	130	130	550
	11,426	13,890	16,600	18,240	38,410
Aircraft operations					
Passenger airline					
Mainline	4,574	5,280	6,620	7,420	18,320
Regional affiliate	27,436	32,200	38,800	41,400	41,220
Low cost carrier	498	1,000	1,860	2,620	2,720
Total	32,508	38,480	47,280	51,440	62,260
All-cargo airline	1,652	1,640	1,660	1,660	4,240

Sources: Chapter 3 of the Master Plan Update Technical Report, Table 3-22 (enplaned passengers and passenger airline departures), Table 3-23 (air cargo tonnage), and Table 3-25 (aircraft operations); and Appendix C of the Master Plan Update Technical Report, Table C-1 (PAL4 enplaned passengers and passenger airline departures), Table C-4 (PAL4 air cargo tonnage), Table C-5 (PAL4 passenger aircraft operations), and Table C-6 (PAL4 all-cargo aircraft operations).

Rationale for PAL 4 Analysis

PAL 4 was analyzed to inform airport management as to the implications of a higher level of demand on key facilities. The level of demand presented by PAL 4 is similar to that experienced at the historical peak of activity in 1996, in which the airport served over 2.4 million enplanements. The facility requirements analysis of PAL 4 was focused on the passenger terminal, with some additional analysis of air cargo requirements.

Passenger Terminal Results

Table D-2 summarizes the results of the analysis of the passenger terminal at PAL 4. For reference purposes, PAL 3 is also shown. Notably, the passenger terminal appears to be capable of accommodating PAL 4 activity, albeit at a lower level of service with increased congestion. Numbers highlighted in blue represent those areas where a potential capacity shortfall is expected.

Notably, the ticketing lobby would technically require 6 additional counter positions for PAL 4; however, this requirement is based on a maximum ten-minute wait time. The extra six positions would only be required during peak periods, and therefore, the existing lobby would meet demand, albeit with a slightly longer wait time.

In addition, the security checkpoint would require as many as 12 lanes to meet demand at a ten-minute wait time. To better understand how the security checkpoint would function if it were constrained to a certain number of lanes, an additional model run was completed. The model applied the PAL 4 schedule to a security checkpoint limited to 8 lanes, which resulted in a maximum wait time of 30 minutes, with a queue of 540 passengers requiring about 7,600 square feet of queue space (at a level of service C). Typical wait time throughout the day (outside of the morning departure peak) was less than 10 minutes.

The passenger concourse would require as many as three additional gates to accommodate demand for the PAL 4 flight schedule, as shown in Table D-2. Notably, this assumes continued preferential use of aircraft gates. In addition, the schedule requires 17 remain-overnight parking positions, three more than exist today.

Table D-2
SUMMARY OF PASSENGER TERMINAL ANALYSIS
Colorado Springs Airport

	Existing	PAL 3	PAL 4
Demand			
Annual enplaned passengers	929,600	1,910,500	2,607,900
Average day peak month (ADPM) passengers	3,089	6,348	8,665
Peak hour passengers	617	1,269	1,733
Facility requirements			
Terminal processor			
Ticketing check-in positions (ea) *(a)(b)*	30	29	36
Ticketing lobby queue area (sf) *(c)*			
Level of service A	7,500	4,800	6,600
Level of service C	7,500	3,800	5,200
Security screening lanes	4	7	11 -12
Security lane maximum queue (passengers)	170	173	282
Security screening queue area *(c)*			
Level of service A	810	3,400	5,500
Level of service C	810	2,500	4,000
Baggage claim			
Baggage claim circulation area (sf) *(d)*			
Level of service A	15,500	6,800	7,700
Level of service C	15,500	4,500	5,000
Baggage claim frontage (lf)	600	350	390
Passenger concourse			
Aircraft parking active positions *(e)*	12	12	15
Remain-overnight aircraft positions	16	15	17

Notes: Blue shading highlights potential functional deficiencies.
lf = linear feet; sf = square feet; ea = each

(a) Check-in positions include agent desks, electronic kiosks, and baggage drop positions.
(b) Assuming that facilities are dedicated to exclusive use by individual airlines.
(c) Queue areas based on International Air Transport Association (IATA) levels of service for ticketing and check-in queue: level of service A: 19.4 sf /passenger; level of service C: 14.0 sf/passenger
(d) Circulation areas based on IATA levels of service for baggage claim area: level of service A: 28.0 sf / passenger; level of service C: 18.3 sf / passenger
(e) Twelve gates do not include the 4 aircraft parking positions at the east unit terminal.

Source: LeighFisher, November 2010.

Air Cargo Results

Table D-3 shows the results of the analysis of the air cargo facilities at PAL 4. For air cargo, the more demanding forecast Scenario 2 was analyzed. For reference purposes, PAL 3 is also shown. As shown, PAL 4 would likely require additional space for warehousing of air cargo. In addition, the requirement for aircraft parking rises from 115,000 square feet to 260,000 square feet. While in total there is over 370,000 square feet of aircraft apron in place today, this space is not entirely adjacent to the building warehouse that is currently available. Given the spatial requirements associated with PAL 4, alternatives should be examined to either consolidate air cargo to one contiguous land area or provide for additional space for a second integrated air cargo carrier.

Table D-3
AIR CARGO REQUIREMENTS
Colorado Springs Airport

	Existing	PAL 3	PAL 4
Demand			
Annual cargo tonnage			
All-cargo	11,426	18,240	38,410
Belly cargo	58	91	75
Total	11,484	18,331	38,485
Annual departures			
Mainline aircraft	491	490	1,000
Feeder aircraft	335	340	1,120
Total	826	830	2,120
Average daily departures			
Mainline aircraft	2	2	4
Feeder aircraft	1	1	4
Total	3	3	8
Facility Requirements			
Belly cargo			
Aircraft apron *(a)*	15,200	15,200	15,200
Building warehouse *(b)*	10,300	10,300	10,300
Landside area *(c)*	39,300	39,300	39,300
All-cargo (Other) *(d)*			
Aircraft apron *(a)*	79,400	15,000	160,000
Building warehouse *(b)*	18,700	1,400	31,600
Landside area *(c)*	27,500	1,400	31,600
All-cargo (FDX)			
Aircraft apron *(a)*	292,500	100,000	100,000
Building warehouse *(b)*	29,900	26,000	26,000
Landside area *(c)*	63,300	26,000	26,000
Total all-cargo			
Aircraft apron *(a)*	371,900	115,000	260,000
Building warehouse *(b)*	48,600	27,400	57,600
Landside area *(c)*	90,800	27,400	57,600
Total cargo area (acres) *(e)*	13.8	6.2	11.6

Notes: Blue shading highlights potential functional deficiencies.

(a) Mainline aircraft assumed to require 50,000 square feet of apron and feeder aircraft, 15,000 square feet.
(b) A cargo warehouse building utilization of 1.5 square foot per ton was assumed.
(c) Landside area is considered to be approximately equivalent to building warehouse area required.
(d) Cargo carriers, other than Fedex, would be accommodated at "Other" all facilities.
(e) Total cargo area = apron + warehouse + landside areas with a 15% factor applied.

Source: LeighFisher, November 2010.

Appendix E

WIND AND WEATHER ANALYSIS

Colorado Springs Airport

Prepared by:

LeighFisher, Inc.

Appendix E

WIND AND WEATHER ANALYSIS

Colorado Springs Airport

This appendix summarizes the wind and weather analysis conducted for the Colorado Springs Airport Master Plan. An analysis of Airways Hourly Surface Observations (TD-3280) data from the National Climatic Data Center (NCDC) was conducted to assess the annual percent occurrence of weather conditions and runway use configurations. Weather conditions—namely cloud ceiling and visibility—determine the air traffic control (ATC) procedures that can be used at an airport, which in turn affect runway capacity and aircraft delay.

COLORADO SPRINGS WEATHER CONDITIONS

For purposes of the wind and weather analysis, visual meteorological conditions (VMC) and instrument meteorological conditions (IMC) are defined in accordance with FAA guidance, as follows:

- VMC weather is defined as cloud ceilings at least 1,000 feet above ground level (AGL) *and* visibility at least 3 miles.
- IMC weather is defined as cloud ceilings below 1,000 feet AGL *or* visibility less than 3 miles.

In VMC weather, aircraft operations operate under Visual Flight Rules (VFR); likewise, in IMC weather, aircraft operations operated under Instrument Flight Rules (IFR). Under IFR, aircraft operations are reliant on instrument landing systems (ILS) which provide varying approach minima. Category I, Category II, and Category III ILS provide for aircraft operations in the following weather conditions:

- Category I ILS provides for operations when cloud ceilings are at least 200 feet but less than 1,000 feet above ground level (AGL) *or* visibility is at least 1/2 mile but less than 3 miles.
- Category II ILS provides for operations when cloud ceilings are at least 100 feet but less than 200 feet above ground level (AGL) *or* visibility is at least 1/4 mile but less than 1/2 mile.
- Category III ILS provides for operations when cloud ceilings are of less than 100 feet above ground level (AGL) *or* visibility is less than 1/4 mile.

The percent occurrence of weather conditions that would require the use of Category I, Category II, and Category III instrument landing systems (ILS) was examined for a 10-year period ended in October 2009, as summarized in Table E-1. As shown, it was determined that the provision of a Category II/III ILS would have enabled the Airport to remain open up to 2.6% more of the year (the equivalent of approximately 9.5 days).

Table E-1
WEATHER CONDITIONS
Colorado Springs Airport

Weather condition	Cloud ceiling (ft)	Visibility (mi)	24-hour annual occurrence	Daytime annual occurrence	Nighttime annual occurrence	Annual occurrence between 0500 and 1000 hours	Occurrence in February between 0500 and 1000 hours
VFR	1,000	3	92.6%	93.6%	91.0%	90.1%	87.1%
IFR	<1,000 or	<3	7.4%	6.4%	9.0%	9.9%	12.9%
Category I	200-1,000 or	1/2 to 3	4.7%	4.3%	5.4%	5.8%	5.1%
Category II	100-200 or	1/4 to 1/2	2.0%	1.5%	2.9%	3.1%	5.4%
Category III	<100 or	< 1/4	0.6%	0.6%	0.7%	1.0%	2.4%
Additional coverage with Category II/III ILS			2.6%	2.1%	3.6%	4.1%	7.8%

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Table E-2 summarizes the weather conditions on a monthly basis. As expected, the best weather conditions occur in the summer months (e.g. July), and the most inclement weather condition occur in the winter months (e.g. February). From January through March, IMC occurs over 10 percent of the time. It is during these months, when the airport is most vulnerable to being closed due to Category II or Category III conditions which would require an instrument landing system of greater capability than that currently available. The Airport experiences the greatest share of Category II/III conditions at nearly 6% of the time.

Table E-2
MONTHLY SUMMARY OF WEATHER CONDITIONS
Colorado Springs Airport

Month	VMC	IMC	Category I	Category II	Category III
Jan	89.97	10.03	6.91	2.11	1.01
Feb	87.84	12.16	6.40	3.86	1.90
Mar	88.18	11.82	7.84	3.49	0.49
Apr	90.54	9.47	6.73	2.45	0.29
May	94.55	5.45	3.37	1.72	0.35
Jun	96.55	3.45	1.71	0.72	1.01
Jul	97.56	2.44	1.58	0.63	0.23
Aug	95.56	4.44	3.21	0.94	0.29
Sep	97.36	2.64	1.64	0.67	0.33
Oct	91.21	8.79	5.64	2.80	0.35
Nov	91.39	8.61	4.69	3.07	0.85
Dec	90.63	9.38	6.50	2.12	0.76

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Tables E-3 through E-8 provide the percent occurrences of various weather conditions by hour of the day and month of the year, as follows:

- Table E-3 – VMC
- Table E-4 – IMC
- Table E-5 – Category I
- Table E-6 – Category II
- Table E-7 – Category III
- Table E-8 – Category II/III

Evaluating the weather on an hourly basis provides insight as to the timing of weather conditions versus the timing of most aircraft operations. For example, the peak hour for airline arrivals is 1 p.m. For the ten-year sample, the 1 p.m. hour experiences IMC about 4.5% of the time and Category II/III conditions about 1.2% of the time. As shown on Table E-8, the most prevalent Category II/III conditions occur between the hours of midnight and 10 a.m.

Table E-3
24 HOUR DISTRIBUTION OF VMC
Colorado Springs Airport

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Hourly Average
0	89.80	81.38	84.49	91.55	93.49	98.88	97.13	95.41	96.73	90.74	90.13	90.81	91.77
1	89.44	83.71	84.65	89.39	92.71	96.74	95.60	95.47	97.51	89.44	89.76	90.52	91.28
2	90.45	84.64	84.62	88.89	92.77	93.96	95.89	93.45	95.42	89.80	88.01	90.55	90.74
3	87.16	85.00	82.89	90.40	92.02	94.40	95.40	92.08	95.05	88.36	88.75	89.54	90.11
4	87.00	86.22	84.98	87.64	92.38	94.10	95.05	91.82	94.38	88.40	87.94	90.03	90.01
5	89.02	88.51	83.45	86.84	92.15	89.89	94.17	92.08	94.71	88.95	87.98	91.89	89.98
6	86.67	89.19	85.63	84.61	92.48	90.77	94.13	91.10	94.27	89.18	90.06	91.56	89.98
7	86.25	86.11	84.88	84.51	89.99	91.08	95.08	90.55	94.58	88.49	88.99	89.96	89.22
8	84.20	84.82	83.94	88.01	90.09	92.06	98.21	87.78	91.85	88.43	87.77	89.48	88.91
9	86.80	87.18	86.12	86.87	90.52	95.79	98.34	93.06	95.72	91.72	88.72	88.86	90.83
10	87.46	86.79	86.31	89.66	93.20	96.47	98.99	94.79	98.18	90.32	91.58	89.15	91.93
11	90.97	89.58	88.40	91.65	93.85	98.88	99.28	97.23	98.92	90.32	92.62	89.15	93.41
12	90.75	87.04	90.42	92.39	96.60	97.83	99.28	97.59	98.25	92.70	92.25	91.17	93.90
13	94.56	93.20	91.89	91.41	96.89	100.00	99.64	98.21	98.96	95.08	94.34	91.46	95.48
14	94.88	92.16	92.73	93.50	97.91	97.90	98.99	97.91	99.63	95.86	95.55	91.53	95.73
15	93.19	91.44	92.41	93.67	98.27	98.13	99.28	99.28	99.63	94.20	95.62	92.54	95.66
16	93.48	92.19	94.17	94.98	97.94	98.51	99.35	98.57	100.00	93.84	94.95	90.22	95.70
17	93.16	90.73	93.45	94.71	97.61	99.25	97.69	97.91	99.63	94.56	93.53	90.68	95.26
18	90.68	90.80	92.05	94.04	97.91	99.63	98.63	98.27	100.00	92.18	92.56	89.44	94.69
19	90.75	92.30	92.83	91.65	97.25	100.00	99.35	100.00	100.00	91.36	91.92	91.07	94.88
20	93.48	91.12	91.53	93.67	96.17	98.27	97.98	99.28	100.00	93.19	93.10	92.44	95.04
21	90.03	85.82	89.15	91.95	96.57	97.22	98.31	98.27	98.55	90.91	92.72	91.95	93.50
22	89.05	85.11	89.48	90.98	95.16	99.63	97.20	96.84	97.51	89.86	91.21	90.06	92.71
23	89.96	83.21	85.89	89.87	95.23	97.90	98.57	96.48	97.14	91.17	93.36	90.94	92.53
Average	89.97	87.84	88.18	90.54	94.55	96.55	97.56	95.56	97.36	91.21	91.39	90.63	92.64

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Table E-4
24 HOUR DISTRIBUTION OF IMC
Colorado Springs Airport

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Hourly Average
0	10.20	18.62	15.51	8.45	6.51	1.12	2.87	4.59	3.27	9.26	9.87	9.19	8.23
1	10.56	16.29	15.35	10.61	7.29	3.26	4.40	4.53	2.49	10.56	10.24	9.48	8.72
2	9.55	15.36	15.38	11.11	7.23	6.04	4.11	6.55	4.58	10.20	11.99	9.45	9.26
3	12.84	15.00	17.11	9.60	7.98	5.60	4.60	7.92	4.95	11.64	11.25	10.46	9.89
4	13.00	13.78	15.02	12.36	7.62	5.90	4.95	8.18	5.62	11.60	12.06	9.97	9.99
5	10.98	11.49	16.55	13.16	7.85	10.11	5.83	7.92	5.29	11.05	12.02	8.11	10.02
6	13.33	10.81	14.37	15.39	7.52	9.23	5.87	8.90	5.73	10.82	9.94	8.44	10.02
7	13.75	13.89	15.12	15.49	10.01	8.92	4.92	9.45	5.42	11.51	11.01	10.04	10.78
8	15.80	15.18	16.06	11.99	9.91	7.94	1.79	12.22	8.15	11.57	12.23	10.52	11.09
9	13.20	12.82	13.88	13.13	9.48	4.21	1.66	6.94	4.28	8.28	11.28	11.14	9.17
10	12.54	13.21	13.69	10.34	6.80	3.53	1.01	5.21	1.82	9.68	8.42	10.85	8.07
11	9.03	10.42	11.60	8.35	6.15	1.12	0.72	2.77	1.08	9.68	7.38	10.85	6.59
12	9.25	12.96	9.58	7.61	3.40	2.17	0.72	2.41	1.75	7.30	7.75	8.83	6.10
13	5.44	6.80	8.11	8.59	3.11	-	0.36	1.79	1.04	4.92	5.66	8.54	4.52
14	5.12	7.84	7.27	6.50	2.09	2.10	1.01	2.09	0.37	4.14	4.45	8.47	4.27
15	6.81	8.56	7.59	6.33	1.73	1.87	0.72	0.72	0.37	5.80	4.38	7.46	4.34
16	6.52	7.81	5.83	5.02	2.06	1.49	0.65	1.43	-	6.16	5.05	9.78	4.30
17	6.84	9.27	6.55	5.29	2.39	0.75	2.31	2.09	0.37	5.44	6.47	9.32	4.74
18	9.32	9.20	7.95	5.96	2.09	0.37	1.37	1.73	-	7.82	7.44	10.56	5.31
19	9.25	7.70	7.17	8.35	2.75	-	0.65	-	-	8.64	8.08	8.93	5.12
20	6.52	8.88	8.47	6.33	3.83	1.73	2.02	0.72	0.00	6.81	6.90	7.56	4.96
21	9.97	14.18	10.85	8.05	3.43	2.78	1.69	1.73	1.45	9.09	7.28	8.05	6.50
22	10.95	14.89	10.52	9.02	4.84	0.37	2.80	3.16	2.49	10.14	8.79	9.94	7.29
23	10.04	16.79	14.11	10.13	4.77	2.10	1.43	3.52	2.86	8.83	6.64	9.06	7.47
Average	10.03	12.16	11.82	9.47	5.45	3.45	2.44	4.44	2.64	8.79	8.61	9.38	7.36

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Table E-5
24 HOUR DISTRIBUTION OF CATEGORY I CONDITIONS
Colorado Springs Airport

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Hourly Average
0	4.17	11.21	11.08	4.98	4.05	1.12	0.42	3.88	2.59	4.79	6.97	6.39	5.10
1	7.20	8.52	11.21	6.26	5.26	2.58	1.96	3.45	1.45	4.73	4.61	5.96	5.26
2	5.54	7.91	9.19	7.44	4.77	4.68	2.28	4.50	2.49	5.44	5.73	5.70	5.46
3	7.07	9.06	9.03	5.62	4.94	2.14	3.26	5.21	2.56	6.88	5.59	6.39	5.64
4	7.33	6.66	7.89	9.90	3.47	2.44	3.59	6.45	2.86	8.70	4.78	6.58	5.89
5	6.55	4.15	9.45	8.22	4.45	3.80	4.20	5.15	2.80	7.24	6.37	4.33	5.57
6	7.79	3.80	9.94	9.73	4.12	4.10	3.85	7.17	3.27	6.26	3.64	5.64	5.80
7	9.32	4.58	10.33	11.31	6.25	4.10	3.62	7.43	3.64	7.37	6.37	7.04	6.80
8	10.72	6.70	9.81	7.44	5.49	2.75	1.14	5.73	3.30	8.08	5.93	6.74	6.16
9	9.45	5.37	9.78	7.00	4.35	1.49	0.36	3.75	3.27	4.89	4.95	8.41	5.27
10	9.81	5.91	8.24	6.87	4.12	1.80	0.36	3.16	1.79	5.35	3.94	8.90	5.03
11	7.59	6.30	7.92	5.89	3.76	1.12	0.72	2.44	1.04	7.20	3.91	7.17	4.59
12	7.53	7.73	6.55	5.89	2.39	1.49	0.72	1.76	0.71	5.54	4.88	6.52	4.29
13	5.08	4.58	4.79	7.24	2.09	-	0.36	1.79	0.37	3.55	4.24	6.22	3.35
14	4.76	4.94	5.57	4.71	1.44	0.75	0.65	2.09	0.37	3.13	3.77	6.45	3.21
15	5.15	4.55	5.25	6.33	1.37	1.87	0.72	0.72	0.37	5.80	3.70	4.79	3.38
16	5.54	4.58	4.17	4.01	0.72	1.49	0.65	1.43	-	5.51	3.64	5.87	3.13
17	5.54	4.91	5.18	4.92	2.03	0.75	1.66	1.08	0.37	4.79	4.38	6.65	3.52
18	7.59	4.48	5.83	5.22	1.73	0.37	1.37	1.73	-	6.10	4.68	6.16	3.78
19	6.22	4.12	4.72	7.98	2.09	-	0.65	-	-	6.91	4.21	5.60	3.54
20	5.15	5.55	6.03	5.59	3.17	0.37	0.72	0.72	-	4.07	3.33	5.54	3.35
21	7.89	8.70	8.77	6.26	2.42	0.71	1.37	1.08	1.45	4.40	3.70	6.39	4.41
22	6.55	10.13	7.01	5.82	3.76	0.37	1.79	3.16	2.49	4.66	4.04	7.85	4.78
23	6.26	9.06	10.36	6.94	2.68	0.75	1.43	3.16	2.12	4.07	5.15	8.70	5.04
Average	6.91	6.40	7.84	6.73	3.37	1.71	1.58	3.21	1.64	5.64	4.69	6.50	4.68

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Table E-6
24 HOUR DISTRIBUTION OF CATEGORY II CONDITIONS
Colorado Springs Airport

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Hourly Average
0	4.37	5.91	4.43	3.47	2.45	-	2.44	0.72	0.67	3.81	2.53	2.15	2.73
1	2.35	5.16	4.14	4.34	2.03	-	2.44	1.08	1.04	4.53	4.92	3.19	2.92
2	3.03	5.26	5.83	3.67	2.45	0.68	1.83	2.05	1.72	4.11	4.92	2.74	3.18
3	3.75	3.72	7.40	3.30	3.04	2.41	1.34	2.70	2.02	4.76	4.98	3.10	3.55
4	2.38	5.66	6.78	2.09	4.15	2.1	1.37	1.73	2.39	2.90	5.56	2.74	3.30
5	3.75	4.05	5.73	4.28	2.75	2.92	0.98	2.77	2.49	3.81	4.58	2.44	3.37
6	3.23	5.51	4.43	5.66	3.40	3.09	1.37	1.73	2.09	4.56	4.51	2.80	3.51
7	2.77	6.70	4.79	4.18	3.11	2.04	0.65	2.02	1.41	4.14	4.65	2.64	3.23
8	4.11	6.59	4.30	3.80	3.11	1.73	0.65	3.23	1.41	3.49	5.62	3.39	3.43
9	2.67	4.76	3.45	4.41	3.17	1.36	0.65	2.51	-	3.39	4.24	2.38	2.74
10	2.09	4.76	4.11	2.46	2.03	1.05	0.65	1.40	0.03	3.03	3.44	1.60	2.21
11	1.43	3.72	2.67	2.46	1.73	-	-	0.33	0.03	2.48	2.12	2.67	1.62
12	0.36	3.33	2.38	1.72	1.01	-	-	-	-	1.76	1.52	1.96	1.16
13	-	1.83	3.32	0.67	1.01	-	-	-	-	1.37	1.04	1.96	0.93
14	0.36	2.51	1.34	1.78	0.65	-	0.36	-	-	1.01	-	1.66	0.80
15	1.01	2.11	1.99	-	0.36	-	-	-	-	-	-	2.02	0.62
16	0.65	1.68	0.94	-	0.65	-	-	-	-	0.65	0.74	1.96	0.60
17	0.65	2.86	1.37	0.37	0.36	-	-	-	-	0.65	1.72	1.01	0.73
18	1.37	2.83	2.12	0.74	0.36	-	-	-	-	0.72	2.09	3.10	1.10
19	1.01	2.08	2.09	0.37	-	-	-	-	-	1.43	2.53	1.66	0.92
20	1.37	2.15	1.79	0.74	-	-	-	-	-	2.74	2.90	1.30	1.08
21	2.09	2.47	2.09	1.78	0.36	-	-	-	-	4.04	3.57	0.65	1.41
22	3.10	2.86	3.52	3.20	1.08	-	0.36	-	-	3.75	4.01	1.43	1.94
23	2.80	4.05	2.74	3.20	2.09	-	-	0.36	0.74	4.04	1.48	0.36	1.81
Average	2.11	3.86	3.49	2.45	1.72	0.72	0.63	0.94	0.67	2.80	3.07	2.12	2.04

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Table E-7
24 HOUR DISTRIBUTION OF CATEGORY III CONDITIONS
Colorado Springs Airport

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Hourly Average
0	1.66	1.50	-	-	-	-	-	-	-	0.65	0.37	0.65	0.40
1	1.01	2.61	-	-	-	0.68	-	-	-	1.3	0.71	0.33	0.54
2	0.98	2.18	0.36	-	-	0.68	-	-	0.37	0.65	1.35	1.01	0.62
3	2.02	2.22	0.68	0.67	-	1.05	-	-	0.37	-	0.67	0.98	0.71
4	3.29	1.47	0.36	0.37	-	1.36	-	-	0.37	-	1.72	0.65	0.79
5	0.68	3.29	1.37	0.67	0.65	3.39	0.65	-	-	-	1.08	1.34	1.07
6	2.31	1.50	-	-	-	2.04	0.65	-	0.37	-	1.79	-	0.71
7	1.66	2.61	-	-	0.65	2.78	0.65	-	0.37	-	-	0.36	0.74
8	0.98	1.90	1.96	0.74	1.31	3.46	-	3.26	3.44	-	0.67	0.39	1.50
9	1.08	2.69	0.65	1.72	1.96	1.36	0.65	0.68	1.01	-	2.09	0.36	1.17
10	0.65	2.54	1.34	1.01	0.65	0.68	-	0.65	-	1.30	1.04	0.36	0.84
11	-	0.39	1.01	-	0.65	-	-	-	-	-	1.35	1.01	0.37
12	1.37	1.90	0.65	-	-	0.68	-	0.65	1.04	-	1.35	0.36	0.66
13	0.36	0.39	-	0.67	-	-	-	-	0.67	-	0.37	0.36	0.23
14	-	0.39	-	-	-	1.36	-	-	-	-	0.67	0.36	0.26
15	0.65	1.90	0.36	-	-	-	-	-	-	-	0.67	0.65	0.34
16	0.33	1.54	0.72	1.01	0.69	-	-	-	-	-	0.67	1.96	0.57
17	0.65	1.50	-	-	-	-	0.65	1.01	-	-	0.37	1.66	0.48
18	0.36	1.90	-	-	-	-	-	-	-	1.01	0.67	1.30	0.43
19	2.02	1.50	0.36	-	0.65	-	-	-	-	0.29	1.35	1.66	0.65
20	-	1.18	0.65	-	0.65	1.36	1.30	-	-	-	0.67	0.72	0.54
21	-	3.01	-	-	0.65	2.07	0.33	0.65	-	0.65	-	1.01	0.68
22	1.30	1.90	-	-	-	-	0.65	-	-	1.73	0.74	0.65	0.57
23	0.98	3.69	1.01	-	-	1.36	-	-	-	0.72	-	-	0.63
Average	1.01	1.90	0.49	0.29	0.35	1.01	0.23	0.29	0.33	0.35	0.85	0.76	0.65

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Table E-8
24 HOUR DISTRIBUTION OF CATEGORY II / III CONDITIONS
Colorado Springs Airport

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Hourly Average
0	6.03	7.41	4.43	3.47	2.45	-	2.44	0.72	0.67	4.47	2.90	2.80	3.13
1	3.36	7.77	4.14	4.34	2.03	0.68	2.44	1.08	1.04	5.83	5.62	3.52	3.46
2	4.01	7.45	6.19	3.67	2.45	1.36	1.83	2.05	2.09	4.76	6.26	3.75	3.80
3	5.77	5.94	8.08	3.97	3.04	3.46	1.34	2.70	2.39	4.76	5.66	4.07	4.26
4	5.67	7.12	7.14	2.46	4.15	3.46	1.37	1.73	2.76	2.90	7.28	3.39	4.10
5	4.43	7.34	7.10	4.95	3.40	6.31	1.63	2.77	2.49	3.81	5.66	3.78	4.44
6	5.54	7.02	4.43	5.66	3.40	5.12	2.02	1.73	2.46	4.56	6.30	2.80	4.22
7	4.43	9.31	4.79	4.18	3.76	4.82	1.30	2.02	1.79	4.14	4.65	3.00	3.97
8	5.08	8.49	6.26	4.55	4.41	5.19	0.65	6.48	4.85	3.49	6.30	3.78	4.93
9	3.75	7.45	4.11	6.13	5.13	2.71	1.30	3.19	1.01	3.39	6.33	2.74	3.91
10	2.74	7.30	5.44	3.47	2.68	1.73	0.65	2.05	0.03	4.34	4.48	1.96	3.04
11	1.43	4.12	3.68	2.46	2.39	-	-	0.33	0.03	2.48	3.47	3.68	1.99
12	1.73	5.23	3.03	1.72	1.01	0.68	-	0.65	1.04	1.76	2.86	2.31	1.81
13	0.36	2.22	3.32	1.35	1.01	-	-	-	0.67	1.37	1.41	2.31	1.16
14	0.36	2.9	1.69	1.78	0.65	1.36	0.36	-	-	1.01	0.67	2.02	1.05
15	1.66	4.01	2.35	-	0.36	-	-	-	-	-	0.67	2.67	0.96
16	0.98	3.22	1.66	1.01	1.34	-	-	-	-	0.65	1.41	3.91	1.17
17	1.30	4.37	1.37	0.37	0.36	-	0.65	1.01	-	0.65	2.09	2.67	1.22
18	1.73	4.73	2.12	0.74	0.36	-	-	-	-	1.73	2.76	4.40	1.53
19	3.03	3.58	2.44	0.37	0.65	-	-	-	-	1.73	3.87	3.32	1.57
20	1.37	3.33	2.44	0.74	0.65	1.36	1.30	-	-	2.74	3.57	2.02	1.61
21	2.09	5.48	2.09	1.78	1.01	2.07	0.33	0.65	-	4.69	3.57	1.66	2.09
22	4.40	4.76	3.52	3.20	1.08	-	1.01	-	-	5.48	4.75	2.09	2.51
23	3.78	7.73	3.75	3.20	2.09	1.36	-	0.36	0.74	4.76	1.48	0.36	2.43
Average	3.13	5.76	3.98	2.73	2.08	1.74	0.86	1.23	1.00	3.15	3.92	2.88	2.68

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for Nov 1, 2000, through Oct 31, 2009, from the National Climatic Data Center.

Figure E-1 depicts graphically the occurance of VMC, IMC and Category II/III conditions by month. As shown the period from October through April provides the majority of IMC weather. It is during these months that the Airport is most vulnerable to being closed to aircraft operations. These same months experience the greatest share of Category II/III conditions for which the Airport cannot accommodate aircraft operations. Figure E-2 provides greater detail of the inclement weather conditions by month.

Figure E-3 shows the percent occurance of inclement weather conditions on an hourly basis. As shown, from 11 a.m. to 8 p.m. the Airport experiences minimal Category II/III conditions (less than 2%). Conversely, the hours from 8 p.m. to 11 a.m. each experience Category II/III conditions more than 2% of the time. From the hours of 3 a.m. to 7 a.m., the airport experiences Category II/III conditions at least 4% of the time, with the worst hour being 8 a.m. with nearly 5%.

Figure E-1
WEATHER CONDITIONS SUMMARY
Colorado Springs Airport

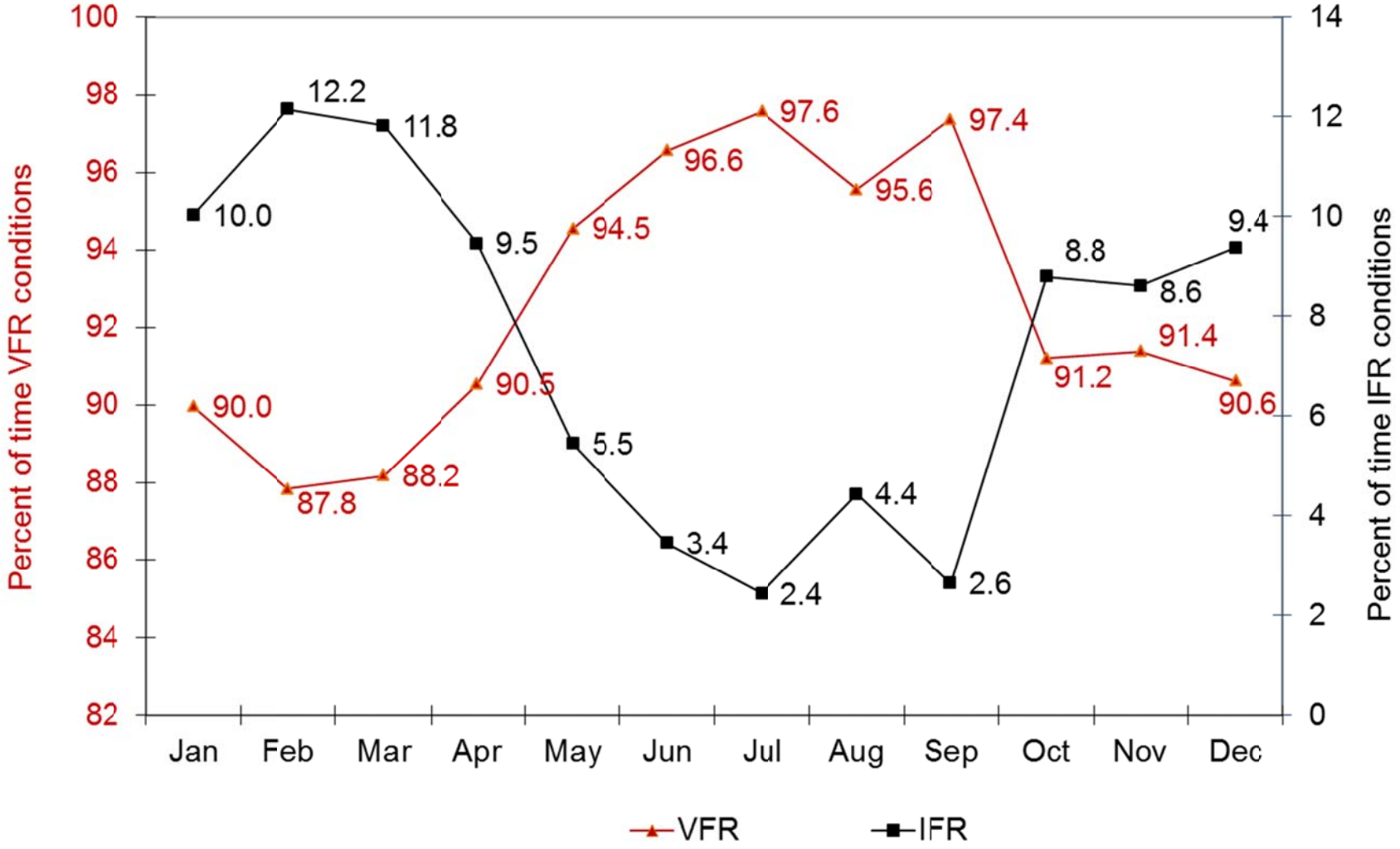


Figure E-2
INSTRUMENT METEOROLGICAL CONDITIONS SUMMARY
Colorado Springs Airport

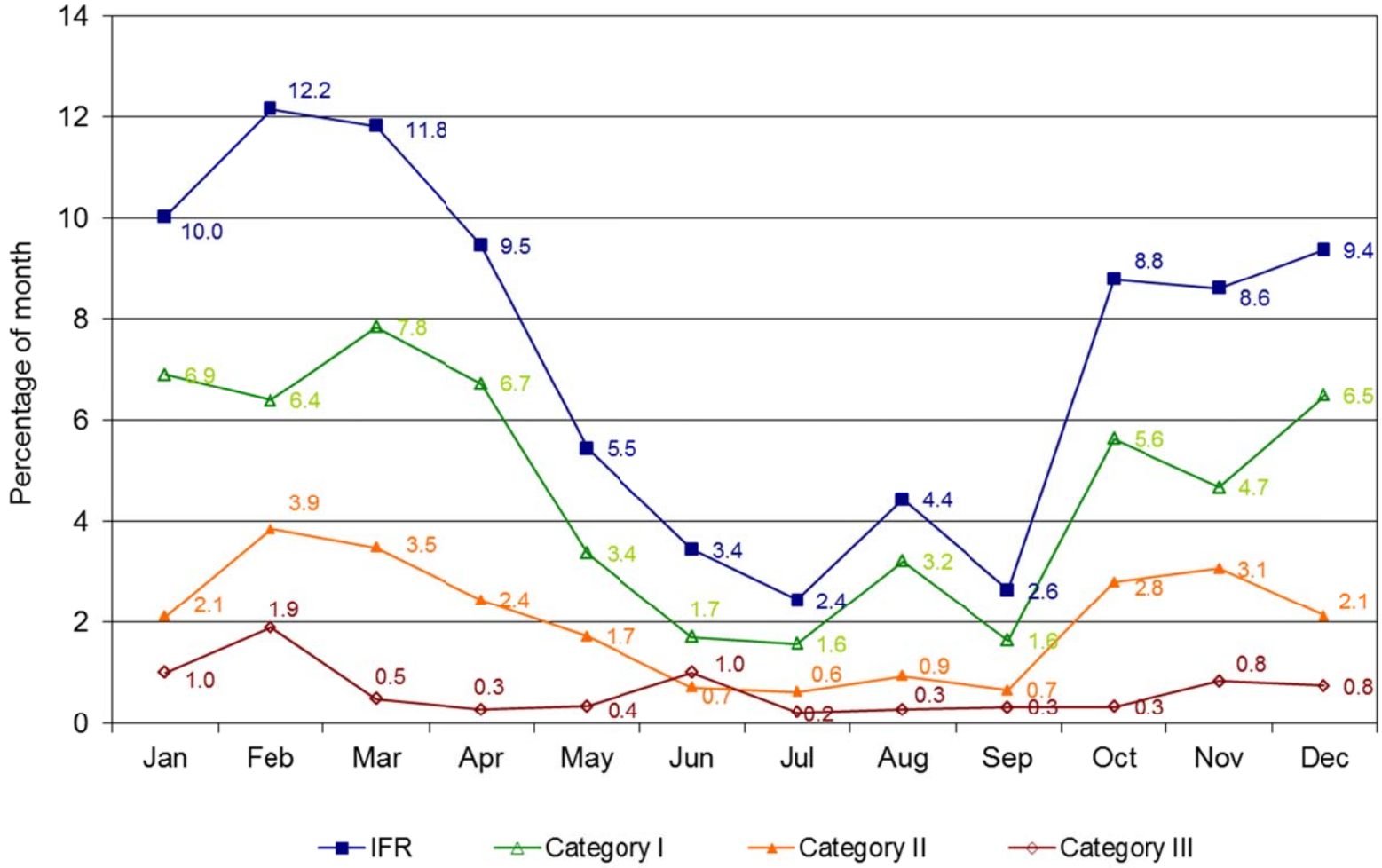
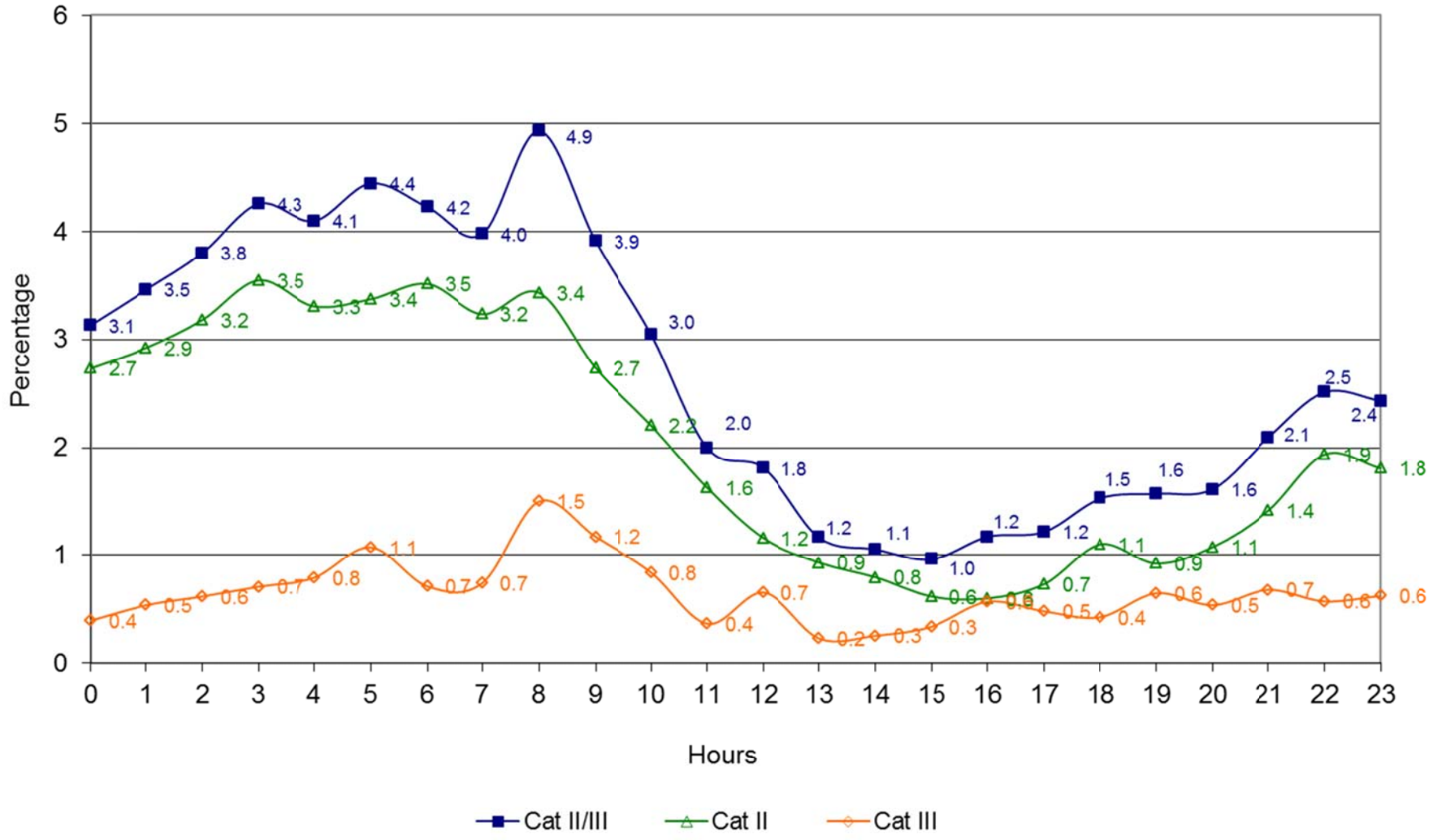


Figure E-3
CATEGORY II / III WEATHER CONDITIONS BY HOUR OF DAY
Colorado Springs Airport



RUNWAY WIND COVERAGE

Runway wind coverage refers to the percent of time that the crosswinds associated with a particular runway orientation are within an acceptable level. Airport wind coverage is determined by considering all runways simultaneously. Crosswinds—which are the components of wind that flow in a direction perpendicular to a runway's orientation—can effectively close a runway for use. The maximum allowable crosswind components for a particular aircraft are determined largely by aircraft size, aircraft weight, and pilot capabilities. In general, larger, heavier air carrier aircraft can land and take off in higher crosswinds than smaller, lighter general aviation aircraft.

The FAA provides the following guidance regarding wind coverage in AC 150/5300-13, *Airport Design*:

> The desirable wind coverage for an airport is 95 percent, based on the total numbers of weather observations. This value of 95 percent takes into account various factors influencing operations and the economics of providing the coverage.*

Based on this guidance, wind coverage for the airfield was estimated using the following maximum allowable crosswind component conditions:

- 10.5-knot crosswind component, which represents the crosswind component at which pilots of small, light general aviation aircraft would be unable to use the runway
- 13-knot crosswind component, which represents the crosswind component at which pilots of twin-engine propeller aircraft would be unable to use the runway
- 16-knot crosswind component, which represents the crosswind component at which pilots of larger commuter propeller aircraft and smaller business jet aircraft would be unable to use the runway
- 20-knot crosswind component, which represents the crosswind component at which pilots of regional and air carrier jets would be unable to use the runway

Summary of Wind Coverage Findings

Table E-9 summarizes the wind coverage of the Airport's runways at these crosswind speeds. In this table, wind data for daytime hours was presented. Separate coverage estimates are provided for visual meteorological conditions (VMC), instrument meteorological conditions (IMC), and all weather conditions.

*Federal Aviation Administration, Advisory Circular 150/5300-13, *Airport Design*, Change 18, Appendix 2, p. 87.

These results indicate that the Airport's current runway system provides wind coverage in excess of the FAA's 95% coverage criteria for all four crosswind components that were evaluated. In addition, the results of the wind analysis indicate that Airport's primary runway—Runway 17L-35R—could be used 96% of the time with a 10.5-knot crosswind component.

Table E-9
WIND DATA SUMMARY DAYTIME HOURS (7 AM – 10 PM)
Colorado Springs Airport

	% Calm	10.5	13.0	16.0	20.0
All weather	15.7				
35R/35L - north flow *(a)*		85.54	85.68	86.12	86.50
17L/17R - south flow		11.27	12.01	12.55	12.84
31 - northwest flow		1.92	1.76	1.23	0.47
13 - southeast flow		1.27	0.56	0.10	0.00
Total		100.00	100.00	100.00	99.81
VMC *(b)*					
35R/35L - north flow *(a)*	15.0	85.19	85.30	85.77	86.18
17L/17R - south flow		11.50	12.26	12.81	13.11
31 - northwest flow		1.98	1.82	1.29	0.52
13 - southeast flow		1.33	0.61	0.13	0.00
Total		100.00	100.00	100.00	99.81
IMC *(c)*	25.6				
35R/35L - north flow *(a)*		90.11	90.59	90.95	91.25
17L/17R - south flow		7.70	8.17	8.49	8.65
31 - northwest flow		1.66	1.24	0.57	0.10
13 - southeast flow		0.53	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00

Notes:

(a) North flow includes the percentage of calm weather. Calm weather includes all winds below 5 knots; analysis assumed 10-knot tailwind component.

(b) VMC (Visual Meteorological Conditions) weather is defined as a cloud ceiling of at least 1,000 feet and reported visibility of at least 3 miles.

(c) IMC (Instrument Meteorological Conditions) weather is defined as a cloud ceiling less than 1,000 feet or reported visibility less than 3 miles.

Source: LeighFisher, January 2010 based on Surface Airways Hourly Data (TD-3280) for November 1, 2000, through October 31, 2009, from the National Climatic Data Center.

Detailed Wind Coverage Data

Tables E-10 through E-13 provide additional detail regarding the wind coverage under various assumptions.

Table E-10
WIND COVERAGE—DAYTIME HOURS—5 KNOT TAILWIND COMPONENT
Colorado Springs Airport

	%Calm	Crosswind component 10.5 knots	13 knots	16 knots	20 knots
All weather					
35R/35L - north flow *(a)*	15.7	58.17	60.35	62.33	63.28
17L/17R - south flow		30.61	32.43	34.26	35.99
31 - northwest flow		1.95	1.77	1.23	0.47
13 - southeast flow		1.29	0.56	0.10	0.00
Total		92.02	95.11	97.92	99.74
Unfavorable		7.98	4.89	2.08	0.26
VFR					
35R/35L - north flow *(a)*	15.0	57.65	59.86	61.91	62.92
17L/17R - south flow		30.74	32.60	34.50	36.30
31 - northwest flow		2.01	1.84	1.29	0.52
13 - southeast flow		1.35	0.62	0.13	0.00
Total		91.75	94.92	97.83	99.74
Unfavorable		8.25	5.08	2.17	0.26
IFR					
35R/35L - north flow *(a)*	25.6	65.07	67.08	68.40	68.61
17L/17R - south flow		28.84	30.05	30.87	31.29
31 - northwest flow		1.68	1.26	0.57	0.10
13 - southeast flow		0.54	0.00	0.00	0.00
Total		96.13	98.39	99.84	100.00
Unfavorable		3.87	1.61	0.16	0.00

	%Calm	Crosswind component 10.5 knots	13 knots	16 knots	20 knots
All weather					
17L/17R - south flow *(a)*	15.7	67.03	69.55	72.40	74.49
35R/35L - north flow		21.75	23.23	24.20	24.80
31 - northwest flow		1.95	1.77	1.23	0.47
13 - southeast flow		1.29	0.56	0.10	0.00
Total		92.02	95.11	97.93	99.76
Unfavorable		7.98	4.89	2.07	0.24
VFR					
17L/17R - south flow *(a)*	15.0	66.62	69.23	72.21	74.39
35R/35L - north flow		21.76	23.23	24.22	24.81
31 - northwest flow		2.01	1.84	1.29	0.52
13 - southeast flow		1.35	0.62	0.13	0.00
Total		91.74	94.92	97.85	99.72
Unfavorable		8.26	5.08	2.15	0.28
IFR					
17L/17R - south flow *(a)*	25.6	72.68	74.00	75.03	75.07
35R/35L - north flow		21.25	23.12	24.23	24.83
31 - northwest flow		1.68	1.26	0.57	0.10
13 - southeast flow		0.54	0.00	0.00	0.00
Total		96.15	98.38	99.83	100.00
Unfavorable		3.85	1.62	0.17	0.00

Table E-10 *(continued)*
WIND COVERAGE—DAYTIME HOURS—5 KNOT TAILWIND COMPONENT
Colorado Springs Airport

		Crosswind component						Crosswind component			
	%Calm	10.5 knots	13 knots	16 knots	20 knots		%Calm	10.5 knots	13 knots	16 knots	20 knots
Category I						**Category I**					
35R/35L - north flow *(a)*	19.4	63.56	66.25	67.76	67.88	17L/17R - south flow *(a)*	19.4	68.52	70.07	71.10	71.09
17L/17R - south flow		29.33	30.61	31.52	32.00	35R/35L - north flow		24.37	26.80	28.17	28.79
31 - northwest flow		2.50	1.61	0.65	0.12	31 - northwest flow		2.50	1.61	0.65	0.12
13 - southeast flow		0.18	0.00	0.00	0.00	13 - southeast flow		0.18	0.00	0.00	0.00
Total		95.57	98.47	99.93	100.00	Total		95.57	98.48	99.92	100.00
Unfavorable		4.43	1.53	0.07	0.00	Unfavorable		4.43	1.52	0.08	0.00
Category II/III						**Category II/III**					
35R/35L - north flow *(a)*	38.1	68.15	68.79	69.77	70.09	17L/17R - south flow *(a)*	38.1	81.08	82.05	83.06	83.17
17L/17R - south flow		27.84	28.93	29.57	29.89	35R/35L - north flow		14.91	15.67	16.28	16.81
31 - northwest flow		0.04	0.56	0.40	0.02	31 - northwest flow		0.04	0.56	0.40	0.02
13 - southeast flow		1.23	0.19	0.00	0.00	13 - southeast flow		1.23	0.19	0.00	0.00
Total		97.26	98.47	99.74	100.00	Total		97.26	98.47	99.74	100.00
Unfavorable		2.74	1.53	0.26	0.00	Unfavorable		2.74	1.53	0.26	0.00

(a) Includes calm wind observations (i.e. winds less than 5 knots).

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for November 1, 2000, through October 31, 2009, January 2010.

Table E-11
WIND COVERAGE—NIGHT TIME HOURS—5 KNOT TAILWIND COMPONENT
Colorado Springs Airport

	%Calm	Crosswind component 10.5 knots	13 knots	16 knots	20 knots
All weather					
35R/35L - north flow *(a)*	23.3	87.08	88.09	88.84	89.01
17L/17R - south flow		9.41	9.93	10.43	10.84
31 - northwest flow		1.49	0.86	0.42	0.15
13 - southeast flow		0.00	0.00	0.00	0.00
Total		97.98	98.88	99.69	100.00
Unfavorable		2.02	1.12	0.31	0.00
VFR					
35R/35L - north flow *(a)*	22.5				
17L/17R - south flow		88.18	89.24	90.03	90.21
31 - northwest flow		8.18	8.70	9.21	9.63
13 - southeast flow		1.55	0.88	0.42	0.16
		0.00	0.00	0.00	0.00
Total					
Unfavorable		97.91	98.82	99.66	100.00
		2.09	1.18	0.34	0.00
IFR					
35R/35L - north flow *(a)*	32.2	75.54	76.10	76.78	76.86
17L/17R - south flow		21.95	22.51	22.83	23.04
31 - northwest flow		1.03	0.78	0.39	0.10
13 - southeast flow		0.00	0.00	0.00	0.00
Total		98.52	99.39	100.00	100.00
Unfavorable		1.48	0.61	0.00	0.00

	%Calm	Crosswind component 10.5 knots	13 knots	16 knots	20 knots
All weather					
17L/17R - south flow *(a)*	23.3	54.37	54.93	55.68	56.05
35R/35L - north flow		42.14	43.10	43.58	43.80
31 - northwest flow		1.49	0.86	0.42	0.15
13 - southeast flow		0.00	0.00	0.00	0.00
Total		98.00	98.89	99.68	100.00
Unfavorable		2.00	1.11	0.32	0.00
VFR					
17L/17R - south flow *(a)*	22.5	52.40	53.01	53.83	54.22
35R/35L - north flow		43.96	44.92	45.41	45.62
31 - northwest flow		1.55	0.88	0.42	0.16
13 - southeast flow		0.00	0.00	0.00	0.00
Total		97.91	98.81	99.66	100.00
Unfavorable		2.09	1.19	0.34	0.00
IFR					
17L/17R - south flow *(a)*	32.2	73.70	73.94	74.41	74.47
35R/35L - north flow		23.77	24.68	25.20	25.43
31 - northwest flow		1.03	0.78	0.39	0.10
13 - southeast flow		0.00	0.00	0.00	0.00
Total		98.50	99.40	100.00	100.00
Unfavorable		1.50	0.60	0.00	0.00

Table E-11 *(continued)*
WIND COVERAGE—NIGHT TIME HOURS—5 KNOT TAILWIND COMPONENT
Colorado Springs Airport

		Crosswind component						Crosswind component			
	%Calm	10.5 knots	13 knots	16 knots	20 knots		%Calm	10.5 knots	13 knots	16 knots	20 knots
Category I						**Category I**					
35R/35L - north flow *(a)*	28.1	75.79	76.67	77.52	77.70	17L/17R - south flow *(a)*	28.1	69.77	70.26	70.78	70.87
17L/17R - south flow		20.76	21.47	21.88	22.17	35R/35L - north flow		26.77	27.90	28.62	29.00
31 - northwest flow		1.61	1.15	0.60	0.13	31 - northwest flow		1.61	1.15	0.60	0.13
13 - southeast flow		0.00	0.00	0.00	0.00	13 - southeast flow		0.00	0.00	0.00	0.00
Total		98.16	99.29	100.00	100.00	Total		98.15	99.31	100.00	100.00
Unfavorable		1.84	0.71	0.00	0.00	Unfavorable		1.85	0.69	0.00	0.00
Category II/III						**Category II/III**					
35R/35L - north flow *(a)*	38.2	74.99	75.10	75.52	75.46	17L/17R - south flow *(a)*	38.2	79.46	79.34	79.74	79.74
17L/17R - south flow		23.78	24.14	24.34	24.45	35R/35L - north flow		19.32	19.91	20.14	20.17
31 - northwest flow		0.20	0.26	0.09	0.09	31 - northwest flow		0.20	0.26	0.09	0.09
13 - southeast flow		0.00	0.00	0.00	0.00	13 - southeast flow		0.00	0.00	0.00	0.00
Total		98.97	99.50	99.95	100.00	Total		98.98	99.51	99.97	100.00
Unfavorable		1.03	0.50	0.05	0.00	Unfavorable		1.02	0.49	0.03	0.00

(a) Includes calm wind observations (i.e. winds less than 5 knots).

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for November 1, 2000, through October 31, 2009, January 2010.

Table E-12
WIND COVERAGE—DAYTIME HOURS—10 KNOT TAILWIND COMPONENT
Colorado Springs Airport

		Crosswind component						Crosswind component			
	%Calm	10.5 knots	13 knots	16 knots	20 knots		%Calm	10.5 knots	13 knots	16 knots	20 knots
All weather						**All weather**					
35R/35L - north flow *(a)*	15.7	85.54	85.68	86.12	86.50	17L/17R - south flow *(a)*	15.7	87.01	87.03	87.35	87.68
17L/17R - south flow		11.27	12.01	12.55	12.84	35R/35L - north flow		9.80	10.66	11.32	11.68
31 - northwest flow		1.92	1.76	1.23	0.47	31 - northwest flow		1.92	1.76	1.23	0.47
13 - southeast flow		1.27	0.56	0.10	0.00	13 - southeast flow		1.27	0.56	0.10	0.00
Total		100.00	100.00	100.00	99.81	Total		100.00	100.00	100.00	99.83
Unfavorable		0.00	0.00	0.00	0.19	Unfavorable		0.00	0.00	0.00	0.17
VFR						**VFR**					
35R/35L - north flow *(a)*	15.1	85.19	85.30	85.77	86.18	17L/17R - south flow *(a)*	15.1	87.02	87.06	87.42	87.77
17L/17R - south flow		11.50	12.26	12.81	13.11	35R/35L - north flow		9.66	10.50	11.16	11.52
31 - northwest flow		1.98	1.82	1.29	0.52	31 - northwest flow		1.98	1.82	1.29	0.52
13 - southeast flow		1.33	0.61	0.13	0.00	13 - southeast flow		1.33	0.61	0.13	0.00
Total		100.00	100.00	100.00	99.81	Total		100.00	100.00	100.00	99.81
Unfavorable		0.00	0.00	0.00	0.19	Unfavorable		0.00	0.00	0.00	0.19
IFR						**IFR**					
35R/35L - north flow *(a)*	25.6	90.11	90.59	90.95	91.25	17L/17R - south flow *(a)*	25.6	86.04	85.67	85.43	85.44
17L/17R - south flow		7.70	8.17	8.49	8.65	35R/35L - north flow		11.77	13.09	14.00	14.46
31 - northwest flow		1.66	1.24	0.57	0.10	31 - northwest flow		1.66	1.24	0.57	0.10
13 - southeast flow		0.53	0.00	0.00	0.00	13 - southeast flow		0.53	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00	Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00	Unfavorable		0.00	0.00	0.00	0.00

Table E-12 *(continued)*
WIND COVERAGE—DAYTIME HOURS—10 KNOT TAILWIND COMPONENT
Colorado Springs Airport

		Crosswind component			
	%Calm	10.5 knots	13 knots	16 knots	20 knots
Category I					
35R/35L - north flow *(a)*	19.4	89.20	89.79	90.31	90.65
17L/17R - south flow		8.17	8.63	9.04	9.23
31 - northwest flow		2.45	1.58	0.65	0.12
13 - southeast flow		0.18	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00
Category II/III					
35R/35L - north flow *(a)*	38.1	91.97	92.07	92.22	92.46
17L/17R - south flow		6.77	7.18	7.39	7.52
31 - northwest flow		0.04	0.56	0.40	0.02
13 - southeast flow		1.22	0.19	0.00	0.00
Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00

		Crosswind component			
	%Calm	10.5 knots	13 knots	16 knots	20 knots
Category I					
17L/17R - south flow *(a)*	19.4	83.63	82.99	82.77	82.79
35R/35L - north flow		13.74	15.43	16.58	17.09
31 - northwest flow		2.45	1.58	0.65	0.12
13 - southeast flow		0.18	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00
Category II/III					
17L/17R - south flow *(a)*	38.1	91.06	91.06	90.92	90.89
35R/35L - north flow		7.68	8.19	8.68	9.09
31 - northwest flow		0.04	0.56	0.40	0.02
13 - southeast flow		1.22	0.19	0.00	0.00
Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00

(a) Includes calm wind observations (i.e. winds less than 5 knots).

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for November 1, 2000, through October 31, 2009, January 2010.

Table E-13
WIND COVERAGE— NIGHT TIME HOURS—10 KNOT TAILWIND COMPONENT
Colorado Springs Airport

		Crosswind component						Crosswind component			
	%Calm	10.5 knots	13 knots	16 knots	20 knots		%Calm	10.5 knots	13 knots	16 knots	20 knots
All weather						**All weather**					
35R/35L - north flow *(a)*	23.3	96.43	96.91	97.27	97.52	17L/17R - south flow *(a)*	23.3	88.09	88.04	88.09	88.18
17L/17R - south flow		2.11	2.24	2.31	2.33	35R/35L - north flow		10.45	11.11	11.49	11.67
31 - northwest flow		1.47	0.85	0.42	0.15	31 - northwest flow		1.47	0.85	0.42	0.15
13 - southeast flow		0.00	0.00	0.00	0.00	13 - southeast flow		0.00	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00	Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00	Unfavorable		0.00	0.00	0.00	0.00
VFR						**VFR**					
35R/35L - north flow *(a)*	22.5	96.63	97.16	97.54	97.78	17L/17R - south flow *(a)*	22.5	88.00	88.03	88.09	88.17
17L/17R - south flow		1.84	1.97	2.04	2.06	35R/35L - north flow		10.47	11.10	11.50	11.67
31 - northwest flow		1.53	0.87	0.42	0.16	31 - northwest flow		1.53	0.87	0.42	0.16
13 - southeast flow		0.00	0.00	0.00	0.00	13 - southeast flow		0.00	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00	Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00	Unfavorable		0.00	0.00	0.00	0.00
IFR						**IFR**					
35R/35L - north flow *(a)*	32.2	94.16	94.33	94.67	94.94	17L/17R - south flow *(a)*	32.2	88.58	88.10	88.04	88.16
17L/17R - south flow		4.82	4.90	4.94	4.96	35R/35L - north flow		10.41	11.13	11.57	11.74
31 - northwest flow		1.01	0.77	0.39	0.10	31 - northwest flow		1.01	0.77	0.39	0.10
13 - southeast flow		0.00	0.00	0.00	0.00	13 - southeast flow		0.00	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00	Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00	Unfavorable		0.00	0.00	0.00	0.00

Table E-13 *(continued)*
WIND COVERAGE— NIGHT TIME HOURS—10 KNOT TAILWIND COMPONENT
Colorado Springs Airport

		Crosswind component						Crosswind component			
	%Calm	10.5 knots	13 knots	16 knots	20 knots		%Calm	10.5 knots	13 knots	16 knots	20 knots
Category I						**Category I**					
35R/35L - north flow *(a)*	28.1	93.75	94.08	94.58	95.01	17L/17R - south flow *(a)*	28.1	86.78	86.31	86.23	86.42
17L/17R - south flow		4.67	4.78	4.82	4.86	35R/35L - north flow		11.64	12.55	13.18	13.45
31 - northwest flow		1.58	1.13	0.60	0.13	31 - northwest flow		1.58	1.13	0.60	0.13
13 - southeast flow		0.00	0.00	0.00	0.00	13 - southeast flow		0.00	0.00	0.00	0.00
Total		0.00	0.00	0.00	0.00	Total		0.00	0.00	0.00	0.00
Unfavorable		100.00	100.00	100.00	100.00	Unfavorable		100.00	100.00	100.00	100.00
Category II/III						**Category II/III**					
35R/35L - north flow *(a)*	38.2	94.70	94.57	94.72	94.71	17L/17R - south flow *(a)*	38.2	91.26	90.71	90.70	90.68
17L/17R - south flow		5.11	5.17	5.19	5.20	35R/35L - north flow		8.54	9.03	9.21	9.23
31 - northwest flow		0.20	0.26	0.09	0.09	31 - northwest flow		0.20	0.26	0.09	0.09
13 - southeast flow		0.00	0.00	0.00	0.00	13 - southeast flow		0.00	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00	Total		100.00	100.00	100.00	100.00
Unfavorable		0.00	0.00	0.00	0.00	Unfavorable		0.00	0.00	0.00	0.00

Notes: Calm includes all winds below 5 knots; analysis assumed 10-knot tailwind component.

(a) Includes calm wind observations (i.e. winds less than 5 knots).

Source: LeighFisher analysis of Surface Airways Hourly Data (TD-3280) for November 1, 2000, through October 31, 2009, January 2010.

Appendix F

COST ESTIMATES

Colorado Springs Airport

Prepared by:

Jacobs Engineering Inc.

Date:

July 2013

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COLORADO SPRINGS AIRPORT

Master Plan Update

Recommended Projects

SUMMARY OF TOTAL PROJECT COSTS

Calculated by: Kevin Davis
Date: **7/8/2013**

Calculated by: John Cessar
Date: **7/9/2013**

Project No.	Description		Cost
PHASE 1			
Contingencies: (Construction @ 15%) (Design @ 10%) (Mobilization @ 4%)			
1	Shift Runway 17R Threshold to the South by 1,790 Feet; construct Taxiways A1, A2, C1 and C2	$	8,491,000
2	Extend Runway 35L to the South by 2,500 Feet; construct Taxiways A8, A9, C7 and C8	$	43,752,000
3	Reduce Length of Runway 13-31 by 400 Feet; construct Taxiways B1 and B2; displace Runway 13 threshold	$	3,567,000
4	Remove Existing High-Speed Exit Taxiway C-1	$	775,000
5	Remove Existing High-Speed Exit Taxiway C-3	$	1,104,000
15	Provide Runway 35R with an Instrument Landing System	$	3,250,000
16	Pave Perimeter Vehicle Service Roads	$	6,142,000
	Subtotal - Phase 1	**$**	**67,081,000**
PHASE 2			
Contingencies: (Construction @ 20%) (Design @ 12%) (Mobilization @ 4%)			
6	Construct Proposed High-Speed Exit Taxiway C4	$	6,651,000
7	Remove Existing Exit Taxiways A6, C6 & C7	$	599,000
8	Construct Proposed High-Speed Taxiway C6	$	6,086,000
	Subtotal - Phase 2	**$**	**13,336,000**
PHASE 3			
Contingencies: (Construction @ 20%) (Design @ 12%) (Mobilization @ 4%)			
10	Realign Taxiway B	$	2,349,000
11	Construct Proposed Bypass Taxiway E2	$	2,168,000
12	Remove Existing Taxiway E2	$	762,000
13	Remove Existing High-Speed Exit Taxiway E4	$	2,188,000
14	Construct Proposed High-Speed Exit Taxiway E4	$	5,107,000
	Subtotal - Phase 3	**$**	**12,574,000**
PHASE 4			
Contingencies: (Construction @ 20%) (Design @ 12%) (Mobilization @ 4%)			
9	Remove and Realign Taxiway A	$	21,301,000
	Subtotal - Phase 4	**$**	**21,301,000**
GRAND TOTAL	**All Recommended Development Projects**	**$**	**114,292,000**

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COLORADO SPRINGS AIRPORT
COLORADO SPRINGS, COLORADO
Master Plan Update
Basic (Unadjusted) Unit Prices
Taken from Bid Table for Recent Projects at Airport

Item No.	Description	Units	Quantity	Unit Price Listed Below Used as Basis For Estimates	Total Cost	Avg. Unit Prices from Bid Tabs "Unadjusted"	BID TAB SUMMARIES Low Bid T/W G&M COS-110 Unit Cost	Low Bid T/W H&M COS-111 Unit Cost	2nd Low Bid R/W 12-30 2010 Unit Cost	Low Bid T/W E G H (III) 2011 Unit Cost	Low Bid T/W E G H (IV) 2013 Unit Cost
P-100a	Mobilization (5%)	LS	1	VARIES	VARIES		$ 230,000.00	$ 241,000.00	$ 50,000.00	$ 580,000.00	$ 500,000.00
P-107	Bituminous Pavement Removal (Full Depth-Taxiway 3-Inch)	SY	1	$5.00	$ 4.91	$ 4.91			$ 6.81		$ 3.00
P-107	Bituminous Pavement Removal (Full Depth-Taxiway 8-Inch)	SY	1	$7.50	$ 7.41	$ 7.41			$ 6.81		$ 8.00
P-140	Asphalt Pavement Removal - Partial (0 to 3.5-Inch Nominal)	SY	1	$3.00	$ 50.77	$ 50.77		$100.00	$1.53		
P-140	Asphalt Pavement Removal - Stair Step	SY	1	$6.60	$ 6.55	$ 6.55			$6.55		
P-140	Asphalt Pavement Removal - Full Depth (Complete)	SY	1	$8.00	$ 8.00	$ 8.00			$8.00		
P-140	Concrete Removal - 14 Inch (Complete)	SY	1	$9.40	$ 9.38	$ 9.38	$6.75	$12.00			
P-140	Concrete Removal - 6 Inch (Complete) [$1.00 for each inch of thickness]	SY	1	$7.00	$ 6.83	$ 6.83	$4.30	$6.00		$4.00	$13.00
P-140	CTB Removal (6-Inch)	SY	1	$3.30	$ 3.28	$ 3.28	$2.56	$4.00			
P-152a	Unclassified Excavation	CY	1	$7.50	$ 7.10	$ 7.10	$8.50	$7.00	$7.00	$8.00	$5.00
P-152b	Subgrade Preparation 12-Inches	SY	1	$4.20	$ 4.17	$ 4.17	$5.00	$5.00	$2.84	$4.00	$4.00
P-154a	Subbase Course	CY	1	$55.00	$ 50.00	$ 50.00	$50.00	$50.00			
P-156a	Silt Fence	LF	1	$2.00	$ 2.00	$ 2.00	$1.50	$3.00		$1.50	
P-209a	Crushed Aggregate Base Course	CY	1	$51.00	$ 50.67	$ 50.67	$50.00	$50.00		$52.00	
P-401a	Bituminous Surface Course	TON	1	$100.00	$ 98.10	$ 98.10	$149.00	$130.00	$60.50	$76.00	$75.00
P-401b	Bituminous Paving Base Course	TON	1	$75.00	$ 74.88	$ 74.88	$89.50	$97.00		$62.00	$51.00
P-401c	Bituminous Binder - Surface Course	TON	1	$920.00	$ 919.00	$ 919.00	$1,200.00	$1,290.00	$505.00	$900.00	$700.00
P-401d	Bituminous Binder - Base Course	TON	1.0	$700.00	$ 691.00	$ 691.00	$754.00	$830.00		$680.00	$500.00
P-501	PCC Pavement, 16-Inch	SY	1	$82.00	$ 81.17	$ 81.17	$84.00	$87.50			$72.00
P-501	PCC Pavement, 16-Inch (Reinforced)	SY	1	$100.00	$ 98.67	$ 98.67	$84.00	$140.00			$72.00
P-603a	Bituminous Tack Coat	GAL	1	$5.00	$ 4.70	$ 4.70	$7.00	$6.00	$3.32	$4.00	$3.20
P-620a	Temporary Runway and Taxiway Painting	SF	1	$1.50	$ 1.34	$ 1.34	$0.70	$1.00	$0.37	$3.00	$1.65
P-620b	Permanent Runway and Taxiway Painting	SF	1	$1.25	$ 1.20	$ 1.20	$0.70	$1.00	$0.55	$2.10	$1.65
P-620c	Obliterate Runway and Taxiway Painting	SF	1	$2.50	$ 2.35	$ 2.35	$3.00	$3.00	$2.11	$1.15	$2.50
P-650a	Runway Sawcut Grooving	SY	1	$5.00	$ 4.50	$ 4.50				$4.50	$4.50
D-705a	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	1	$26.50	$ 26.17	$ 26.17	$27.50	$27.00			$24.00
D-705b	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	1	$30.00	$ 29.38	$ 29.38	$32.50	$31.00		$28.00	$26.00
D-705c	Install 6-Inch Non-Perforated PE Pipe Underdrain (Concrete Encased)	LF	1	$49.00	$ 48.50	$ 48.50	$33.50	$32.00		$80.00	
D-750a	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	1	$605.00	$ 604.67	$ 604.67	$664.00	$650.00			$500.00
D-750b	Install Underdrain Inspection Pit	EA	1	$3,800.00	$ 3,792.50	$ 3,792.50	$4,000.00	$4,170.00		$3,600.00	$3,400.00
D-750c	Install Undedrain Outfall	EA	1	$1,200.00	$ 1,000.00	$ 1,000.00	$1,000.00				
D-750d	Install 6-Inch Underdrain Cleanout	EA	1	$700.00	$ 698.75	$ 698.75	$675.00	$670.00		$750.00	$700.00
F-162b	Driveway Gates	EA	1	$3,500.00	$ 3,500.00	$ 3,500.00					$3,500.00
T-901a	Seeding with Hydromulch	AC	1	$2,500.00	$ 2,425.12	$ 2,425.12	$3,100.00	$2,540.00	$1,685.60	$2,500.00	$2,300.00
T-901c	Straw Bales	EA	1	$25.00	$ 23.00	$ 23.00	$20.00	$26.00			
T-905a	Topsoiling (Stripping and Replacement)	AC	1	$2,500.00	$ 2,473.67	$ 2,473.67			$2,921.00	$2,250.00	$2,250.00
T-905a	Topsoiling	SY	1	$1.25	$ 1.00	$ 1.00	$1.00	$1.00			
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	VARIES	VARIES	$ 16,436.00	$20,800.00	$9,380.00	$20,000.00	$22,000.00	$10,000.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	1	$4.20	$ 4.16	$ 4.16	$6.00	$7.00	$3.69	$2.15	$1.95
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	1	$3.00	$ 2.89	$ 2.89			$3.42	$2.75	$2.50
L-108f	Field Circuit Lightning Arrestor	LF	1	$2,000.00	$ 1,976.67	$ 1,976.67	$2,500.00	$2,930.00		$500.00	
L-110	Single-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	1	$22.00	$ 21.17	$ 21.17	$29.50	$27.50	$16.86	$13.50	$18.50
L-110	Single-Way Duct, 2" Sch. 40 PVC Direct Earth Bury	LF	1	$10.50	$ 10.36	$ 10.36	$20.00		$6.44	$8.00	$7.00
L-110	2-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	1	$22.30	$ 22.29	$ 22.29	$20.00		$16.86		$30.00
L-110	Multi-Way Duct, 2 X 2" Sch 40 PVC Concrete Encased	LF	1	$17.00	$ 16.86	$ 16.86			$16.86		
L-110	Multi-Way Duct, 3 X 2" Sch 40 PVC Concrete Encased	LF	1	$60.00	$ 58.50	$ 58.50		$98.00	$19.00		
L-110	4 w 3" Schedule 40 PVC Concrete Encased Duct	LF	1	$52.00	$ 51.67	$ 51.67	$78.00			$31.00	$46.00
L-110i	4 w 4" Schedule 40 PVC Direct Earth Duct Burial	LF	1	$45.00	$ 44.50	$ 44.50	$44.50				
L-110j	12 w 3" Sch 40 PVC Concrete Encased Duct	LF	1	$65.00	$ 65.00	$ 65.00	$70.00			$60.00	
L-115	Elec. J-Box L-867B In-Pavement	EA	1	$840.00	$ 831.50	$ 831.50			$738.00		$925.00
L-120	Install New Runway Edge Light (Bulb Only)	EA	1	$700.00	$ 685.00	$ 685.00			$685.00		
L-125c	L-850C Inpavement Runway Edge Light	EA	1	$2,300.00	$ 2,300.00	$ 2,300.00	$2,000.00				$2,600.00
L-125d	L-850C Inpavement Runway Edge Light - Yellow / Clear	EA	1	$2,000.00	$ 2,000.00	$ 2,000.00	$2,000.00				
L-125e	L-852T Taxiway Edge Light	EA	1	$1,950.00	$ 1,930.00	$ 1,930.00		$1,930.00	$1,930.00		
L-125g	Reinstall Existing Guidance Sign on New Base	EA	1	$4,700.00	$ 4,628.00	$ 4,628.00	$7,500.00		$1,756.00		

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COLORADO SPRINGS AIRPORT
COLORADO SPRINGS, COLORADO
Master Plan Update
Basic (Unadjusted) Unit Prices
Taken from Bid Table for Recent Projects at Airport

Item No.	Description	Units	Quantity	Unit Price Listed Below Used as Basis For Estimates	Total Cost	Avg. Unit Prices from Bid Tabs "Unadjusted"	BID TAB SUMMARIES Low Bid T/W G&M COS-110 Unit Cost	Low Bid T/W H&M COS-111 Unit Cost	2nd Low Bid R/W 12-30 2010 Unit Cost	Low Bid T/W E G H (III) 2011 Unit Cost	Low Bid T/W E G H (IV) 2013 Unit Cost
L-125h	Install New Guidance Sign Double Face - 3 Module	EA	1	$8,700.00	$ 8,643.33	$ 8,643.33	$11,200.00	$8,230.00		$6,500.00	
L-125h	Install New Guidance Sign Double Face - 4 Module	EA	1	$6,350.00	$ 6,350.00	$ 6,350.00				$6,500.00	$6,200.00
L-125h	Relocate L-858 Sign, 3 Module	EA	1	$6,850.00	$ 6,850.00	$ 6,850.00	$8,500.00				$5,200.00
L-125i	L-861T Taxiway Edge Light in Shoulder Pavement	EA	1	$1,600.00	$ 1,564.75	$ 1,564.75	$1,700.00		$1,159.00	$1,400.00	$2,000.00
L-125j	L-862 Runway Edge Light	EA	1	$1,500.00	$ 1,500.00	$ 1,500.00					$1,500.00
L-125k	L-862 Runway Edge Light - Yellow / Clear	EA	1	$1,500.00	$ 1,500.00	$ 1,500.00					$1,500.00
L-130	New In-Pavement Surface Condition Sensor w/ 150' Type IIA Cable, Complete	EA	1	$15,000.00	$ 15,000.00	$ 15,000.00				$ 15,000.00	
	New RDR Sign	EA	1	$7,500.00							
	New Sign Panel	EA	1	$500.00							
	Base Can	EA	1	$400.00							
	Handhole	EA	1	$250.00							
	REIL Master & Slave Units	EA	1	$1,500.00							
	Install Inlet	EA	1	$4,000.00							

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Calculated by: Kevin Davis
Date: **7/8/2013**

COLORADO SPRINGS AIRPORT
COLORADO SPRINGS, COLORADO
Master Plan Update
Recommended Projects
SUMMARY OF PROBABLE CONSTRUCTION COSTS

Checked by: John Cessar
Date: **7/9/2013**

Project 1: Shift Runway 17R Threshold to the South by 1,790 Feet

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization (4% x Total Cost of All Other Items)	LS	1	$ 262,000.00	$ 262,000.00
P-140a	Asphalt Pavement Removal (Partial)	SY	1,000	$3.00	$ 3,000.00
P-140b	Asphalt Pavement Removal (Complete)	SY	98,000	$8.00	$ 784,000.00
P-152a	Unclassified Excavation	CY	18,000	$7.50	$ 135,000.00
P-152b	Subgrade Preparation 12-Inches	SY	42,000	$4.20	$ 176,400.00
P-154a	Subbase Course (For Shoulders Only)	CY	5,000	$55.00	$ 275,000.00
P-156a	Silt Fence	LF	2,500	$2.00	$ 5,000.00
P-209a	Crushed Aggregate Base Course (Shoulders)	CY	3,700	$51.00	$ 188,700.00
P-209a	Crushed Aggregate Base Course (Structural Section)	CY	5,700	$51.00	$ 290,700.00
P-310a	Geotextile Fabric	SY	42,000	$2.00	$ 84,000.00
P-401a	Bituminous Surface Course (Taxiways)	TON	11,200	$100.00	$ 1,120,000.00
P-401b	Bituminous Paving Base Course (Taxiways)	TON	11,200	$75.00	$ 840,000.00
P-401c	Bituminous Binder - Surface Course (T/W s)	TON	730	$920.00	$ 671,600.00
P-401d	Bituminous Binder - Base Course (T/W s)	TON	730	$700.00	$ 511,000.00
P-403a	Bituminous Surface Course (Shoulders)	TON	7,100	$75.00	$ 532,500.00
P-403c	Bituminous Binder - Surface Course (Shoulders)	TON	470	$920.00	$ 432,400.00
P-603a	Bituminous Tack Coat	GAL	12,600	$5.00	$ 63,000.00
P-620a	Temporary Runway and Taxiway Painting	SF	25,000	$1.50	$ 37,500.00
P-620b	Permanent Runway and Taxiway Painting	SF	25,000	$1.25	$ 31,250.00
P-620c	Obliterate Runway and Taxiway Painting	SF	15,000	$2.50	$ 37,500.00
D-701l	Install 24-Inch CMP	LF	300	$55.00	$ 16,500.00
D-701m	Install 24-Inch CMP F.E.S.	EA	8	$250.00	$ 2,000.00
T-901a	Seeding with Hydromulch	AC	10.00	$2,500.00	$ 25,000.00
T-901c	Straw Bales	EA	20	$25.00	$ 500.00
T-905a	Topsoiling	SY	41,904	$1.25	$ 52,379.86
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$15,000.00	$ 15,000.00
L-108a	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	220	$4.20	$ 924.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	4,000	$4.20	$ 16,800.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	4,220	$3.00	$ 12,660.00
L-108f	Field Circuit Lightning Arrestor	LF	1	$2,000.00	$ 2,000.00

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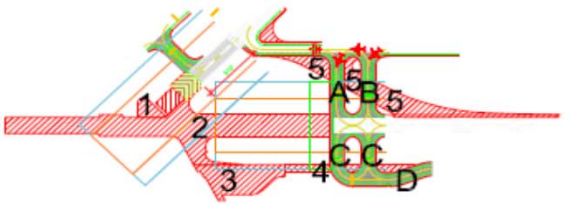
Date: **7/9/2013**

Project 1: Shift Runway 17R Threshold to the South by 1,790 Feet

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
L-110a	Single-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	220	$22.00	$ 4,840.00
L-110b	Single-Way Duct, 2" Sch. 40 PVC Direct Earth Bury	LF	4,000	$10.50	$ 42,000.00
L-125d	L-850C Inpavement Runway Edge Light - Yellow / Clear	EA	4	$2,300.00	$ 9,200.00
L-125e	L-852T Taxiway Edge Light in Shoulder Pavement	EA	21	$1,950.00	$ 40,950.00
L-125g	Relocate L-858B Runway Distance Remaining Sign	EA	4	$7,500.00	$ 30,000.00
L-125h	Relocate L-858 Sign Panels	EA	12	$500.00	$ 6,000.00
L-125k	L-862 Runway Edge Light - Yellow / Clear	EA	8	$1,500.00	$ 12,000.00
L-125l	L-862E Runway Threshold Light	EA	8	$1,500.00	$ 12,000.00
L-125m	L-867B Base Can	EA	10	$400.00	$ 4,000.00
L-125s	Handhole, Earth Bury	EA	10	$250.00	$ 2,500.00
L-125t	Demolish Existing Handhole	EA	10	$200.00	$ 2,000.00
L-125w	Install L-849 REIL Master and Slave Units	EA	2	$1,500.00	$ 3,000.00
				Raw Construction Cost:	$ 6,792,803.86
				Construction Contingency (15% of Raw Construction Cost):	$ 1,018,921
				Design Cost (10% of Raw Construction Cost):	$ 679,280
				Total Project Cost:	$ 8,491,005

1. Shift the Runway 17R threshold to the south by 1,790 feet. Runway 17R-35L is shown on Figure 5-1 shifted to the south by approximately 1,790 feet. This project provides separation from Runway 13-31, eliminating the runway intersection and reducing the risk of wrong runway departures. The project involves pavement removal, earthwork, and re-marking of the runway. This project would be done in concert with projects 2 and 3 *and Project 4 . In addition, this project includes the installation of new taxiways A1, A2, C1 and C2.*

Project #1



NEW PAVEMENT AREAS

REMOVAL AREAS

Area 1 = 28,231 SF
Area 2 = 577,525 SF
Area 3 = 165,000 SF
Area 4 = 93,200 SF
~~Area 5 = 310,000 SF~~ (Part of Project #4)
Tota Area = 863,956 SF

	STRUCTURAL AND SHOULDER PAVEMENTS	STRUCTURAL PAVEMENT ONLY	SHOULDER PAVEMENT ONLY
Area A = 83,500 SF		46,940 SF	36,560 SF
Area B = 83,500 SF		54,460 SF	29,040 SF
Area C = 201,200 SF		164,610 SF	36,590 SF
Area C' = 41,565 SF		63,800 SF	22,235 SF
Area D = 50,500 SF		28,410 SF	22,090 SF
Totals = 377,135 SF		230,620 SF	146,515 SF

JACOBS

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Project 2: **Extend Runway 35L to the South by 2,500 Feet**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 1,370,000.00	$ 1,370,000.00
P-140a	Asphalt Pavement Removal (Partial) [Includes small portion of T/W and Exist. VSR]	SY	6,000	$3.00	$ 18,000.00
P-140b	Asphalt Pavement Removal (Complete)	SY	6,900	$3.50	$ 24,150.00
P-152a	Unclassified Excavation	CY	1,754,100	$4.00	$ 7,016,400.00
P-152	Unclassifed Excavation - Haul to On-Airport Waste Site (E. of M. Proby Entrance)	CY	371,000	$2.00	$ 742,000.00
P-152	Unclassifed Excavation - Haul to Future Development Area South of Main Entrance)	CY	1,207,690	$2.50	$ 3,019,225.00
P-152	Unclassifed Excavation Debris - Haul to Landfill	Ton	175,400	$15.00	$ 2,631,006.88
P-152b	Subgrade Preparation - 24 Inch (R/W & T/W STRUCTURAL SECTIONS)	SY	101,600	$6.30	$ 640,080.00
P-152c	Subgrade Preparation - 12 Inch (R/W & T/W SHOULDERS)	SY	49,200	$4.20	$ 206,640.00
P-154a	Subbase Course (R/W SHLDRS @ 10")	CY	4,100	$55.00	$ 225,500.00
P-154a	Subbase Course (T/W SHLDR @ 12")	CY	11,600	$55.00	$ 638,000.00
P-156a	Silt Fence	LF	2,500	$2.00	$ 5,000.00
P-209a	Crushed Aggregate Base Course - 8 Inches (R/W STRUCTURAL SECTION)	CY	9,300	$51.00	$ 474,300.00
P-209b	Crushed Aggregate Base Course - 6 Inches (R/W AND T/W SHOULDERS)	CY	8,200	$51.00	$ 418,200.00
P-300a	Aggregate Base Course Class 6 [8" THICK]	CY	3,700	$40.00	$ 148,000.00
P-400a	Asphalt Concrete Pavement (Grading C, 50 Blow Marshall) [6" THICK]	TON	5,400	$70.00	$ 378,000.00
P-401a	Bituminous Surface Course - 13 Inch (T/W STRUCTURAL SECTION)	TON	42,400	$100.00	$ 4,240,000.00
P-401aa	Bituminous Surface Course - 8-INCH (R/W STRUCTURAL SECTION)	TON	18,200	$100.00	$ 1,820,000.00
P-401aaa	Bituminous Surface Course - 6-INCH (R/W SHOULDERS)	TON	4,800	$100.00	$ 480,000.00
P-401b	Bituminous Base Course - 6 INCH (T/W STRUCTURAL SECTION)	TON	26,100	$75.00	$ 1,957,500.00
P-401b	Bituminous Base Course - 8 INCH (R/W STRUCTURAL SECTION)	TON	18,200	$75.00	$ 1,365,000.00
P-401c	Bituminous Binder - Surface Course	TON	4,300	$920.00	$ 3,956,000.00
P-401d	Bituminous Binder - Base Course	TON	2,900	$700.00	$ 2,030,000.00
P-603a	Bitumnious Tack Coat	GAL	40,000	$5.00	$ 200,000.00
P-620a	Temporary Runway and Taxiway Pavement Marking	SF	40,000	$1.50	$ 60,000.00
P-620b	Permanent Runway and Taxiway Pavement Marking	SF	35,000	$1.25	$ 43,750.00
P-620c	Pavement Marking Obliteration	SF	158,000	$2.50	$ 395,000.00
D-701l	Install 24-Inch CMP	LF	150	$35.00	$ 5,250.00
D-701m	Install 24-Inch CMP FES	EA	2	$150.00	$ 300.00
D-705a	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	600	$26.50	$ 15,900.00
D-705b	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	17,000	$30.00	$ 510,000.00
D-750d	Install 6-Inch Underdrain Cleanout	EA	20	$700.00	$ 14,000.00
T-901a	Seeding with Hydromulch	AC	10.00	$2,500.00	$ 25,000.00
T-901c	Straw Bales	EA	20	$25.00	$ 500.00
T-905a	Topsoiling	SY	49,173	$1.25	$ 61,465.97
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$20,000.00	$ 20,000.00
L-108a	1/C L-824 Type C, Unshielded #6 AWG 5kV Cable (Runway Circuits)	LF	6,500	$5.00	$ 32,500.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	6,500	$4.20	$ 27,300.00

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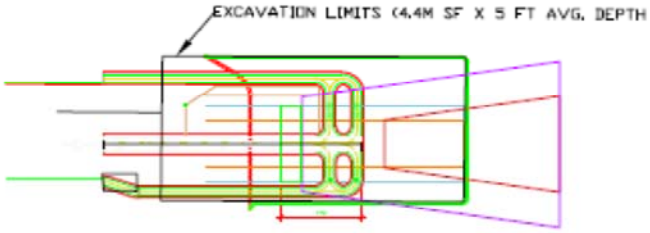
Project 2: **Extend Runway 35L to the South by 2,500 Feet**

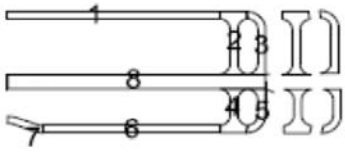
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	6,500	$3.00	$ 19,500.00
L-108f	Field Circuit Lightning Arrestor	LF	1	$2,000.00	$ 2,000.00
L-110a	Single-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	6,500	$22.00	$ 143,000.00
L-110b	Single-Way Duct, 2" Sch. 40 PVC Direct Earth Bury	LF	250	$10.50	$ 2,625.00
L-125	L-850C Inpavement Runway Edge Light - Yellow / Clear	EA	4	$2,300.00	$ 9,200.00
L-125	L-852T Taxiway Edge Light	EA	1	$1,950.00	$ 1,950.00
L-125	L-858B Runway Distance Remaining Sign	EA	1	$7,500.00	$ 7,500.00
L-125	Relocate L-858B Runway Distance Remaining Sign	EA	4	$7,500.00	$ 30,000.00
L-125	Relocate L-858 Sign Panels	EA	12	$200.00	$ 2,400.00
L-125	L-861T Taxiway Edge Light	EA	60	$1,600.00	$ 96,000.00
L-125	L-862 Runway Edge Light - Yellow / Clear	EA	27	$1,500.00	$ 40,500.00
L-125	L-862E Runway Threshold Light	EA	8	$1,500.00	$ 12,000.00
L-125	L-867B Base Can	EA	35	$1,000.00	$ 35,000.00
L-125	Handhole, Earth Bury	EA	10	$250.00	$ 2,500.00
L-125	Demolish Existing Handhole	EA	10	$150.00	$ 1,500.00
L-125	Install L-849 REIL Master and Slave Units	EA	1	$1,500.00	$ 1,500.00
L-1000	**RECONSTRUCT RUNWAY 35L APPROACH LIGHTING SYSTEM**	**LS**	**1**	**$750,000.00**	**$ 750,000.00**
			Raw Construction Cost:		$ 35,001,142.86
	Construction Contingency (15% of Raw Construction Cost):				$ 5,250,171
	Design Cost (10% of Raw Construction Cost):				$ 3,500,114
			Total Project Cost:		$ 43,751,428.57

2. Extend Runway 35L to the south by 2,500 feet. This project would involve extension of Runway 35L to south approximately 2,500 feet. The net increase in departure length for Runway 17R-35L is 710 feet. The net increase in arrival length for Runway 17R is 710 feet, and the net decrease for Runway 35L is 65 feet. The Runway 35L threshold is displaced by approximately 775 feet to provide a Runway Protection Zone (RPZ) clear of Milton E. Proby Parkway. The project involves construction of new pavement, significant earthwork, re-marking of the runway, and relocation of the approach lighting system for Runway 35L arrivals. This project would be done in concert with projects 1 and 3 *and project 4 . Repaving of Vehicle Service Road covered under project 16.*

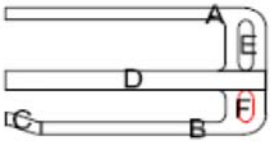
Project #2
Extend R/W 35L



STRUCTURAL PAVEMENT LIMITS



PAVEMENT LIMITS INCLUDE PAVED 25' SHOULDERS



ALL PAVEMENT SURFACE ASSUMED TO BE BITUMINOUS ASPHALT

STRUCTURAL PAVEMENT AREA ONLY
TAXIWAYS
Area 1 = 154,720 SF
Area 2 = 73,900 SF
Area 3 = 55,000 SF
Area 4 = 58,950 SF
Area 5 = 40,255 SF
Area 6 = 128,800 SF
Area 7 = 27,120 SF
T/W TOTAL = 538,745 SF
R/W Area 8 = 375,000 SF

OVERALL PAVEMENT AREA STRUCTURAL. AND SHOULDERS
TAXIWAYS
Area A = 519,500 SF
Area B = 398,200 SF
Area C = 45,200 SF
Area E = - 69,900 SF
Area F = - 41,700 SF
T/W TOTAL = 851,300 SF
R/W Area D = 505,000 SF

ESTIMATE OF PROBABLE CONSTRUCTION COSTS

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Project #3: Reduce Length of Runway 13-31 by 400 Feet

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization (5%)	LS	1	$ 109,000.00	$ 109,000.00
P-140	Asphalt Pavement Removal - Partial (0 to 3.5-Inch Nominal)	SY	3,400	$3.00	$ 10,200.00
P-140	Asphalt Pavement Removal - Full Depth (16 Inch)	SY	12,700	$12.00	$ 152,400.00
P-401a	Bituminous Surface Course (Overlay of 4 inches in Blas Pad Area)	TON	1,000	$100.00	$ 100,000.00
P-401c	Bituminous Binder - Surface Course	TON	65	$920.00	$ 59,800.00
TAXIWAY BITUMINOUS PAVEMENT SECTION (Total Area = 16,670 SY; Structural Area = 11,780 SY)					
P-152a	Unclassified Excavation	CY	11,000	$7.50	$ 82,500.00
P-152b	Subgrade Preparation 12-Inches	SY	16,100	$4.20	$ 67,620.00
P-154a	Subbase Course (For Shoulders Only)	CY	3,000	$55.00	$ 165,000.00
P-156a	Silt Fence	LF	2,500	$2.00	$ 5,000.00
P-209a	Crushed Aggregate Base Course (Shoulders)	CY	1,800	$51.00	$ 91,800.00
P-209a	Crushed Aggregate Base Course (Structural Section)	CY	1,900	$51.00	$ 96,900.00
P-310a	Geotextile Fabric	SY	16,100	$2.00	$ 32,200.00
P-401a	Bituminous Surface Course (Taxiways)	TON	3,700	$100.00	$ 370,000.00
P-401b	Bituminous Paving Base Course (Taxiways)	TON	3,700	$75.00	$ 277,500.00
P-401c	Bituminous Binder - Surface Course (T/W s)	TON	250	$920.00	$ 230,000.00
P-401d	Bituminous Binder - Base Course (T/W s)	TON	250	$700.00	$ 175,000.00
P-403a	Bituminous Surface Course (Shoulders)	TON	3,400	$100.00	$ 340,000.00
P-403c	Bituminous Binder - Surface Course (Shoulders)	TON	230	$920.00	$ 211,600.00
P-603a	Bituminous Tack Coat	GAL	1,170	$5.00	$ 5,850.00
P-620a	Temporary Runway and Taxiway Painting	SF	26,000	$1.50	$ 39,000.00
P-620b	Permanent Runway and Taxiway Painting	SF	26,000	$1.25	$ 32,500.00
P-620c	Obliterate Runway and Taxiway Painting	SF	13,000	$2.35	$ 30,550.00
T-901a	Seeding with Hydromulch	AC	2.61	$2,500.00	$ 6,525.48
T-905a	Topsoiling	SY	12,633	$1.50	$ 18,950.00
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$10,000.00	$ 10,000.00
L-108a	1/C L-824 Type B, Unshielded #6 AWG 5kV Cable (Runway Circuits)	LF	500	$5.00	$ 2,500.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	500	$4.20	$ 2,100.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	500	$3.25	$ 1,625.00
L-108c	Copper Counterpoise Wire w/ Grounding Rods	LF	500	$3.00	$ 1,500.00
L-108f	Field Circuit Lightning Arrestor	LF	1	$1,000.00	$ 1,000.00
L-110	Single-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	500	$22.00	$ 11,000.00
L-115	Elec. J-Box L-867B In-Pavement	EA	6	$840.00	$ 5,040.00

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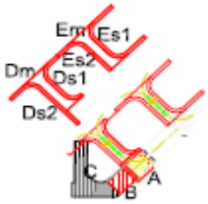
Project #3: Reduce Length of Runway 13-31 by 400 Feet

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
L-120	Install New Runway Edge Light	EA	12	$1,950.00	$ 23,400.00
L-125d	L-850C Inpavement Runway Edge Light - Yellow / Clear	EA	4	$2,000.00	$ 8,000.00
L-125g	Remove and Relocate L-858B Runway Distance Remaining Sign Panels	EA	8	$200.00	$ 1,600.00
L-125h	Relocate L-858 Sign, 3 Module	EA	2	$3,000.00	$ 6,000.00
L-125k	L-862 Runway Edge Light - Yellow / Clear	EA	6	$1,950.00	$ 11,700.00
L-125l	L-862E Runway Threshold Light	EA	8	$1,950.00	$ 15,600.00
L-125s	Handhole, Earth Bury	EA	4	$250.00	$ 1,000.00
L-125w	Install L-849 REIL Master and Slave Units	EA	1	$1,500.00	$ 1,500.00
L-1000	Remove Existing (Old) PAPI and Install New PAPI at New Location	LS	1	$40,000.00	$ 40,000.00
				Raw Construction Cost:	$ 2,853,460.48
				Construction Contingency (15% of Raw Construction Cost):	$ 428,019
				Design Cost (10% of Raw Construction Cost):	$ 285,346
				Total Project Cost:	$ 3,566,825.60

3. Reduce length of Runway 13-31 by 400 feet. Runway 13-31 would be shortened by approximately 400 feet. The shortening of Runway 13-31, like the Runway 17R-35L shift, eliminates the runway intersection. The Runway 13 threshold would be displaced by approximately 510 feet to provide a standard 1,000 foot Runway Safety Area and clear RPZ. This project would be done in concert with projects 1 and 2 and Project 4. *Installation of new Taxiways B1 and B2 included with this project.*

Project #3
Reduce Length of
R/W 13-31 by 400 feet



Striping
Threshold 150'x4'x8EA = 4800 SF
#13 = (60'+90') X 6' = 900 SF
^ arrows = (70'X3') X6 = 1260 SF
Tails = (80'X3') x 2ea = 480 SF
Yellow TW CL. . . . . .
. . (670' + 150') X 0.5' = 410 SF
R/W CL (120' X 3') X 9 = 3240 SF
Dist Mkr (150'X 3') X 2 = 9000 SF
Double (75' X 6') X 4 = 1800 SF
Yellow Chevrons .....
..... (270' X 3') X 4ea = 3240 SF
TOTAL . . . . . = 25,130 SF

A

B

C

PARTIAL PAVEMENT REMOVAL AREA
Area A = 30,150 SF
FULL DEPTH PAVEMENT REMOVAL AREA
Area B = 30,000 SF
Area C = 83,700 SF
Total Area = 113,700 SF

New Surface Course
Area A + Shoulders
AREA = 35,100 SF

	NEW TAXIWAY PAVEMENT (Structural Area)
Dm	Area = 37,770 SF
Em	Area = 38,083 SF
	Area = 75,853 SF
	NEW TAXIWAY PAVEMENT (Shoulder Area)
Ds1	Area = 14,720 SF
Ds2	Area = 18,250 SF
Es1	Area = 22,240 SF
Es2	Area = 13,800 SF
	Area = 69,010 SF

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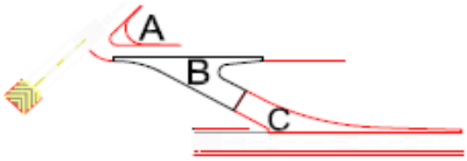
Project #4: Remove Existing High-Speed Exit Taxiway C-1

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization (10%)	LS	1	$ 57,000.00	$ 57,000.00
P-140	Asphalt Pavement Removal - Full Depth (16 Inch)	SY	16,700	$12.00	$ 200,400.00
P-140	Concrete Removal - 15 Inch (Complete)	SY	21,000	$9.40	$ 197,400.00
P-620b	Permanent Runway and Taxiway Painting (Taxiay Edge Striping)	SF	600	$1.50	$ 900.00
P-620c	Obliterate Runway and Taxiway Painting	SF	2,000	$2.50	$ 5,000.00
T-901a	Seeding with Hydromulch	AC	7.59	$2,500.00	$ 18,979.57
T-905a	Topsoiling	SY	37,000	$1.50	$ 55,500.00
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$20,000.00	$ 20,000.00
L-108a	1/C L-824 Type B, Unshielded #6 AWG 5kV Cable (Runway Circuits)	LF	1,200	$5.00	$ 6,000.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	1,200	$4.20	$ 5,040.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	1,200	$3.00	$ 3,600.00
L-110	Single-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	1,200	$22.00	$ 26,400.00
L-115	Elec. J-Box L-867B In-Pavement	EA	2	$840.00	$ 1,680.00
L-125i	L-861T Taxiway Edge Light in Shoulder Pavement	EA	6	$1,950.00	$ 11,700.00
L-125h	Install New Guidance Sign Double Face - 3 Module	EA	1	$8,700.00	$ 8,700.00
L-125r	Demolish Existing Base/Light	EA	6	$250.00	$ 1,500.00
				Raw Construction Cost:	$ 619,799.57
				Construction Contingency (15% of Raw Construction Cost):	$ 92,970
				Design Cost (10% of Raw Construction Cost):	$ 61,980
				Total Project Cost:	$ 774,749.46

4. Remove existing high-speed exit Taxiway C-1. This project would be done in concert with project 1. The high-speed exit would no longer be located in the proper placement for Runway 35L arrivals as it is too near the relocated end of the runway. Further, the geometry of the existing taxiway would conflict with the new perpendicular exits at Taxiway C1.

Project #4
Remove Existing High-Speed Exit Taxiway C-1



	FULL DEPTH CONCRETE PAVEMENT REMOVAL
A	Area A = 20,700 SF
B	Area B = 160,000 SF
	SubTotal Area = 180,700 SF
	FULL DEPTH BITUMINOUS PAVEMENT REMOVAL
C	Area C = 150,000 SF

ESTIMATE OF PROBABLE CONSTRUCTION COSTS

JACOBS

Calculated by: Kevin Davis
Date: **7/8/2013**

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Date: **7/9/2013**

Project #5: Remove Existing High-Speed Exit Taxiway C-3

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization (10%)	LS	1	$ 81,000.00	$ 81,000.00
REMOVE 125000 SF (13,890 SY) of BITUMINOUS PAVEMENT					
P-140	Asphalt Pavement Removal - Full Depth (16 Inch)	SY	14,000	$12.00	$ 168,000.00
REMOVE 100050 SF (7,620 SY) of PCC PAVEMENT [*Because of joints must go to T/W "C" Edge and Rebuild Shoulder with T/W Edge Lights*]					
P-140	Concrete Removal - 15 Inch (Complete)	SY	8,000	$9.40	$ 75,200.00
REPAVE CONCRETE T/W "C" STRUCTURAL SECTION SO NEW SHOULDER CAN BE CONSTRUCTRED (8150 SF)					
P-152b	Subgrade Preparation - 24 Inch (T/W Structural Section)	SY	1,000	$6.30	$ 6,300.00
P-154	Subbase Course - 10" (T/W Shoulders)	CY	300	$55.00	$ 16,500.00
P-209b	C.A.B.C. - 6 Inches (T/W Structural and Shoulder Sections)	CY	200	$51.00	$ 10,200.00
P-501	Portland Cement Concrete Pavement - 16 Inches (T/W Structural Section)	SY	1,000	$82.00	$ 82,000.00
P-403	Bituminous Base Course - 8 Inch (T/W Structural Section)	TON	400	$55.00	$ 22,000.00
P-403	Bituminous Binder - Base Course	TON	26	$550.00	$ 14,300.00
P-501	Portland Cement Concrete Pavement - 16 Inches (T/W Structural Section)	SY	1,000	$82.00	$ 82,000.00
REPAVE SHOULDERS (1200 feet X 25 feet = 30,000 SF/ 9 = 3,333 SY)					
P-152a	Unclassified Excavation	CY	1,200	$10.00	$ 12,000.00
P-152b	Subgrade Preparation - 12 Inch	SY	3,400	$4.20	$ 14,280.00
P-154	Subbase Course - 10"	CY	1,000	$55.00	$ 55,000.00
P-209b	C.A.B.C. - 6 Inches	CY	600	$51.00	$ 30,600.00
P-403	Bituminous Surface Course - 3 Inch (T/W Shoulders)	TON	600	$100.00	$ 60,000.00
P-403	Bituminous Binder - Surface Course	TON	39	$920.00	$ 35,880.00
P-620b	Permanent Runway and Taxiway Painting (Taxiay Edge Striping)	SF	1,200	$1.50	$ 1,800.00
P-620c	Obliterate Runway and Taxiway Painting	SF	500	$2.50	$ 1,250.00
T-901a	Seeding with Hydromulch	AC	4.44	$2,500.00	$ 11,108.24
T-905a	Topsoiling	SY	22,000	$1.50	$ 33,000.00
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108a	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	600	$5.00	$ 3,000.00

ESTIMATE OF PROBABLE CONSTRUCTION COSTS

JACOBS

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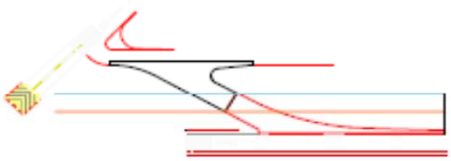
Project #5: Remove Existing High-Speed Exit Taxiway C-3

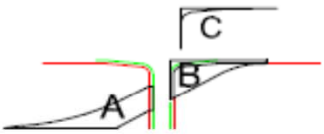
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	600	$4.20	$ 2,520.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	600	$3.00	$ 1,800.00
L-110	Single-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	1,200	$22.00	$ 26,400.00
L-115	Elec. J-Box L-867B In-Pavement	EA	2	$840.00	$ 1,680.00
L-125i	L-861T Elevated Taxiway Edge Light in Shoulder Pavement	EA	10	$1,950.00	$ 19,500.00
L-125h	Install New Guidance Sign Double Face - 3 Module	EA	1	$8,700.00	$ 8,700.00
L-125r	Demolish Existing Base/Light	EA	6	$250.00	$ 1,500.00
				Raw Construction Cost:	$ 882,518.24
				Construction Contingency (15% of Raw Construction Cost):	$ 132,378
				Design Cost (10% of Raw Construction Cost):	$ 88,252
				Total Project Cost:	$ 1,103,147.80

5. Remove existing high-speed exit Taxiway C3. The location of this high-speed exit would no longer be properly placed given the shift of the Runway 17R threshold to the south, as it would be 1,500 feet closer to the end of the runway. Moreover, the geometry associated with Taxiway C3 conflicts with the geometry with Taxiway G in the current configuration.

Project #5

Remove Existing High-Speed Exit Taxiway C-3





	STRUCTURAL SECTION PAVEMENT REMOVAL	PCC PAVEMENT AREA	BITUMINOUS PAVEMENT AREA
A	Area A = 124,300 SF	Area A = 0 SF	Area A = 124,300 SF
	SHOULDER PAVEMENT REMOVAL		
B	Area B = 100,050 SF	Area B = 100,050 SF	Area B = 0 SF
	STRUCTURAL SECTION PAVEMENT		
C	Area C = 8,150 SF	Area C = 8,150 SF	Area C = 0 SF

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

JACOBS

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Project #6: **Construct Proposed High-Speed Exit Taxiway C-4** **[STRUCTURAL AREA = 25,115 SY]**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 194,000.00	$ 194,000.00
P-140a	Asphalt Pavement Removal (Partial) [Includes small portion of T/W and Exist. VSR]	SY	1,000	$5.00	$ 5,000.00
TAXIWAY BITUMINOUS PAVEMENT SECTION (Total Area = 16,670 SY; Structural Area = 11,780 SY)					
P-152a	Unclassified Excavation	CY	11,200	$7.50	$ 84,000.00
P-152b	Subgrade Preparation - 12 Inch (T/W Shoulder Section)	SY	4,900	$4.20	$ 20,580.00
P-152b	Subgrade Preparation - 24 Inch (T/W Structural Section)	SY	16,700	$6.30	$ 105,210.00
P-154	Subbase Course - 12" (R/W Shoulders)	CY	1,600	$55.00	$ 88,000.00
P-156a	Silt Fence	LF	1,000	$2.00	$ 2,000.00
P-209b	C.A.B.C. - 6 Inches (Bituminous T/W Structural and Shoulder Sections)	CY	2,800	$51.00	$ 142,800.00
P-401a	Bituminous Surface Course - 10 Inch (T/W Structural Section)	TON	6,500	$100.00	$ 650,000.00
P-401aa	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON	1,600	$100.00	$ 160,000.00
P-401b	Bituminous Paving Base Course - 3 Inch (T/W Structural Section Only)	TON	2,000	$75.00	$ 150,000.00
P-401c	Bituminous Binder - Surface Course	TON	527	$920.00	$ 484,380.00
P-401d	Bituminous Binder - Base Course	TON	130	$700.00	$ 91,000.00
P-603a	Bitumnious Tack Coat	GAL	7,500	$5.00	$ 37,500.00
TAXIWAY PORTLAND CEMENT CONCRETE SECTION (Total Area = 17,780 SY; Structural Area = 13,335 SY)					
P-152a	Unclassified Excavation	CY	11,900	$7.50	$ 89,250.00
P-152b	Subgrade Preparation - 12 Inch (T/W Shoulder Section)	SY	4,500	$4.20	$ 18,900.00
P-152b	Subgrade Preparation - 24 Inch (T/W Structural Section)	SY	13,400	$6.30	$ 84,420.00
P-154	Subbase Course - 10" (T/W Shoulders)	CY	1,300	$55.00	$ 71,500.00
P-156a	Silt Fence	LF	500	$2.00	$ 1,000.00
P-209b	C.A.B.C. - 6 Inches (T/W Structural and Shoulder Sections)	CY	3,000	$51.00	$ 153,000.00
P-403	Bituminous Surface Course - 3 Inch (T/W Shoulders)	TON	800	$100.00	$ 80,000.00
P-403	Bituminous Binder - Surface Course	TON	52	$920.00	$ 47,840.00
P-403	Bituminous Base Course - 8 Inch (T/W Structural Section)	TON	5,800	$75.00	$ 435,000.00
P-403	Bituminous Binder - Base Course	TON	377	$700.00	$ 263,900.00
P-501	Portland Cement Concrete Pavement - 16 Inches (T/W Structural Section)	SY	13,400	$82.00	$ 1,098,800.00
P-620a	Temporary Runway and Taxiway Pavement Marking	SF	10,450	$1.50	$ 15,675.00
P-620b	Permanent Runway and Taxiway Pavement Marking	SF	10,450	$1.25	$ 13,062.50
P-620c	Pavement Marking Obliteration	SF	200	$2.50	$ 500.00
P-621	Concrete Pavement Grooving	SY	13,400	$5.00	$ 67,000.00
D-701l	Install 24-Inch CMP	LF	800	$35.00	$ 28,000.00
D-701m	Install 24-Inch CMP FES	EA	2	$150.00	$ 300.00
D-705a	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	250	$26.50	$ 6,625.00

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Date: **7/9/2013**

Project #6: **Construct Proposed High-Speed Exit Taxiway C-4** **[STRUCTURAL AREA = 25,115 SY]**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
D-705b	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	3,500	$30.00	$ 105,000.00
D-750a	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$605.00	$ 2,420.00
D-750b	Install Underdrain Inspection Pit	EA	6	$3,800.00	$ 22,800.00
D-750d	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751d	Install Inlet	EA	1	$4,000.00	$ 4,000.00
T-901a	Seeding with Hydromulch	AC	3.00	$2,500.00	$ 7,500.00
T-901c	Straw Bales	EA	4	$25.00	$ 100.00
T-905a	Topsoiling	SY	9,722	$1.50	$ 14,583.33
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108a	1/C L-824 Type B, Unshielded #6 AWG 5kV Cable (Runway Circuits)	LF	3,500	$5.00	$ 17,500.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	3,500	$4.20	$ 14,700.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	3,500	$3.00	$ 10,500.00
L-110a	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	3,500	$22.00	$ 77,000.00
L-125h	Install New Guidance Sign Double Face - 3 Module	EA	3	$8,700.00	$ 26,100.00
L-125i	L-861T Taxiway Edge Light	EA	20	$1,950.00	$ 39,000.00
				Raw Construction Cost:	$ 5,038,245.83
	Construction Contingency (20% of Raw Construction Cost):				$ 1,007,649
	Design Cost (12% of Raw Construction Cost):				$ 604,590
				Total Project Cost:	$ 6,650,484.50

6. Construct proposed high-speed exit Taxiway C4. This project provides a new high-speed exit for Runway 35L arrivals. The location of this high-speed exit accounts for the change in location of the Runway 35L threshold with the runway extension to the south.

ESTIMATE OF PROBABLE CONSTRUCTION COSTS

Project #6:

Construct New High-Speed Exit Taxiway C-4

A' AND B' REPRESENT THE T/W STRUCTURAL SECTION ONLY

Areas A and B REPRESENT THE TAXIWAY AREA INCLUDING STRUCTURAL SECTION AND SHOULDERS

	NEW FULL DEPTH CONCRETE PAVEMENT (15-INCH)
A	Area A = 160,000 SF
A'	Area A' = 120,000 SF (Structural Section)
	Shldr Area = 40,000 SF (A - A')
	FULL DEPTH BITUMINOUS PAVEMENT
B	Area B = 150,000 SF
B'	Area B' = 106,000 SF (Structural Section)
	Shldr Area = 44,000 SF (B - B')

ESTIMATE OF PROBABLE CONSTRUCTION COSTS

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Project #7: Remove Exit Taxiways A6, C6 and C7

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization (10%)	LS	1	$ 18,000.00	$ 18,000.00
REMOVE 118,290 SF (13,143 SY) of BITUMINOUS PAVEMENT					
P-140	Asphalt Pavement Removal - Full Depth (16 Inch)	SY	14,000	$12.00	$ 168,000.00
REMOVE 125,350 SF (13,930 SY) of PCC PAVEMENT [*Because of joints must go to T/W "C" Edge and Rebuild Shoulder with T/W Edge Lights*]					
P-140	Concrete Removal - 15 Inch (Complete)	SY	14,000	$9.40	$ 131,600.00
P-620b	Permanent Runway and Taxiway Painting (Taxiay Edge Striping)	SF	1,200	$1.50	$ 1,800.00
P-620c	Obliterate Runway and Taxiway Painting	SF	500	$2.50	$ 1,250.00
T-901a	Seeding with Hydromulch	AC	5.59	$2,500.00	$ 13,983.01
T-905a	Topsoiling	SY	28,000	$1.50	$ 42,000.00
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108a	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	1,200	$5.00	$ 6,000.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	1,200	$4.20	$ 5,040.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	1,200	$3.00	$ 3,600.00
L-110	Single-Way Duct, 2" Sch. 40 PVC Concrete Encased	LF	1,200	$22.00	$ 26,400.00
L-115	Elec. J-Box L-867B In-Pavement	EA	2	$840.00	$ 1,680.00
L-125i	L-861T Elevated Taxiway Edge Light in Shoulder Pavement	EA	15	$1,950.00	$ 29,250.00
L-125h	Install New Guidance Sign Double Face - 3 Module	EA		$8,700.00	$ -
L-125r	Demolish Existing Base/Light	EA		$250.00	$ -
				Raw Construction Cost:	$ 453,603.01
	Construction Contingency (20% of Raw Construction Cost):				$ 90,721
	Design Cost (12% of Raw Construction Cost):				$ 54,432
				Total Project Cost:	$ 598,755.98

7. Remove existing exit Taxiways A6, C6, C7. These taxiways currently serve the existing end of Runway 35L. With the extension to Runway 35L, these taxiways are no longer required but may remain in place. However, these exits must be removed to enable the construction of a new high-speed exit Taxiway C6 to serve Runway 17R arrivals. This project would be done in concert with project 8.

ESTIMATE OF PROBABLE CONSTRUCTION COSTS

Project #7
Remove Exit Taxiways A6, C6 & C7

	STRUCTURAL SECTION PAVEMENT REMOVAL	PCC PAVEMENT AREA	BITUMINOUS PAVEMENT AREA
A	Area A = 133,575 SF	Area A = 80,200 SF	Area A = 53,430 SF
	SHOULDER PAVEMENT REMOVAL		
B	Area B = 22,000 SF	Area B = 15,000 SF	Area B = 7,000 SF
C	Area C = 45,000 SF	Area C = 22,500 SF	Area C = 22,500 SF
D	Area D = 15,300 SF	Area D = 7,650 SF	Area D = 7,650 SF
E	Area E = 27,710 SF	Area E = 0 SF	Area E = 27,710 SF
	TOTAL AREAS =	125,350 SF	118,290 SF

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Project #8: **Construct Proposed High-Speed Exit Taxiway C-4** **[STRUCTURAL AREA = 25,115 SY]**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 178,000.00	$ 178,000.00
P-140a	Asphalt Pavement Removal (Partial) [Includes small portion of T/W and Exist. VSR]	SY	1,000	$5.00	$ 5,000.00
TAXIWAY BITUMINOUS PAVEMENT SECTION (Total Area = 34,444 SY; Structural Area = 25,111 SY)					
P-152a	Unclassified Excavation	CY	11,200	$7.50	$ 84,000.00
P-152b	Subgrade Preparation - 12 Inch (T/W Shoulder Section)	SY	9,400	$4.20	$ 39,480.00
P-152b	Subgrade Preparation - 24 Inch (T/W Structural Section)	SY	25,200	$6.30	$ 158,760.00
P-154	Subbase Course - 12" (R/W Shoulders)	CY	1,600	$55.00	$ 88,000.00
P-156a	Silt Fence	LF	1,000	$2.00	$ 2,000.00
P-209b	C.A.B.C. - 6 Inches (Bituminous T/W Structural and Shoulder Sections)	CY	5,800	$51.00	$ 295,800.00
P-401a	Bituminous Surface Course - 10 Inch (T/W Structural Section)	TON	13,700	$100.00	$ 1,370,000.00
P-401aa	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON	3,100	$100.00	$ 310,000.00
P-401b	Bituminous Paving Base Course - 3 Inch (T/W Structural Section Only)	TON	4,100	$75.00	$ 307,500.00
P-401c	Bituminous Binder - Surface Course	TON	1,092	$920.00	$ 1,004,640.00
P-401d	Bituminous Binder - Base Course	TON	267	$700.00	$ 186,550.00
P-603a	Bitumnious Tack Coat	GAL	15,500	$5.00	$ 77,500.00
P-620a	Temporary Runway and Taxiway Pavement Marking	SF	10,450	$1.50	$ 15,675.00
P-620b	Permanent Runway and Taxiway Pavement Marking	SF	10,450	$1.25	$ 13,062.50
P-620c	Pavement Marking Obliteration	SF	2,000	$2.50	$ 5,000.00
P-621	Concrete Pavement Grooving	SY	15,500	$5.00	$ 77,500.00
D-701l	Install 24-Inch CMP	LF	800	$35.00	$ 28,000.00
D-701m	Install 24-Inch CMP FES	EA	2	$150.00	$ 300.00
D-705a	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	250	$26.50	$ 6,625.00
D-705b	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	3,500	$30.00	$ 105,000.00
D-750a	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$605.00	$ 2,420.00
D-750b	Install Underdrain Inspection Pit	EA	6	$3,800.00	$ 22,800.00
D-750d	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751d	Install Inlet	EA	1	$4,000.00	$ 4,000.00
T-901a	Seeding with Hydromulch	AC	3.00	$2,500.00	$ 7,500.00
T-901c	Straw Bales	EA	4	$25.00	$ 100.00
T-905a	Topsoiling	SY	15,000	$1.50	$ 22,500.00
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108a	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	3,500	$5.00	$ 17,500.00

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Project #8: **Construct Proposed High-Speed Exit Taxiway C-4** **[STRUCTURAL AREA = 25,115 SY]**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	3,500	$4.20	$ 14,700.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	3,500	$3.00	$ 10,500.00
L-110a	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	3,500	$22.00	$ 77,000.00
L-125h	Install New Guidance Sign Double Face - 3 Module	EA	3	$8,700.00	$ 26,100.00
L-125i	L-861T Taxiway Edge Light	EA	20	$1,950.00	$ 39,000.00
				Raw Construction Cost:	$ 4,610,312.50
				Construction Contingency (20% of Raw Construction Cost):	$ 922,062.50
				Design Cost (12% of Raw Construction Cost):	$ 553,237.50
				Total Project Cost:	$ 6,085,612.50

8. Construct proposed high-speed exit Taxiway C6. This project provides a new high-speed exit for Runway 17R arrivals. The location of this high-speed exit accounts for the change in location of the Runway 17R threshold to the south. This project would be done in concert with project 7.

Project #8: Construct New High-Speed Exit Taxiway C-6

A' AND B' REPRESENT THE T/W STRUCTURAL SECTION ONLY

Areas A and B REPRESENT THE TAXIWAY AREA INCLUDING STRUCTURAL SECTION AND SHOULDERS

	FULL DEPTH BITUMINOUS PAVEMENT
A	Area A = 160,000 SF
B	Area B = 150,000 SF
	Total Area = 310,000 SF
A'	Area A' = 120,000 SF (Structural Section)
B'	Area B' = 106,000 SF (Structural Section)
	Structural Area = 126,000 SF
	Shldr Area = 184,000 SF (310,000 - 126,000)

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Checked by: John Cessar
Date: **7/9/2013**

Project #9 **Remove and Realign Taxiway A**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 621,000.00	$ 621,000.00
P-140a	Asphalt Pavement Removal (Complete) [19 inch total depth]	SY	70,425	$12.00	$ 845,100.00
TAXIWAY BITUMINOUS PAVEMENT SECTION (Total Area = 34,444 SY; Structural Area = 25,111 SY)					
P-152	Unclassified Excavation	CY	58,600	$7.50	$ 439,500.00
P-152	Subgrade Preparation - 12 Inch (T/W Shoulder Section)	SY		$4.20	$ -
P-152	Subgrade Preparation - 24 Inch (T/W Structural Section)	SY	105,200	$6.30	$ 662,760.00
P-154	Subbase Course - 12" (T/W Shoulders)	CY		$55.00	$ -
P-156	Silt Fence	LF	1,000	$2.00	$ 2,000.00
P-209	C.A.B.C. - 6 Inches (Bituminous T/W Structural and Shoulder Sections)	CY	29,300	$51.00	$ 1,494,300.00
P-401	Bituminous Surface Course - 10 Inch (T/W Structural Section)	TON	57,200	$100.00	$ 5,720,000.00
P-401	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON		$100.00	$ -
P-401	Bituminous Paving Base Course - 3 Inch (T/W Structural Section Only)	TON	17,200	$75.00	$ 1,290,000.00
P-401	Bituminous Binder - Surface Course	TON	3,718	$920.00	$ 3,420,560.00
P-401	Bituminous Binder - Base Course	TON	1,118	$700.00	$ 782,600.00
P-603	Bitumnious Tack Coat	GAL	47,300	$5.00	$ 236,500.00
P-620	Temporary Runway and Taxiway Pavement Marking	SF	8,000	$1.50	$ 12,000.00
P-620	Permanent Runway and Taxiway Pavement Marking	SF	8,000	$1.25	$ 10,000.00
P-620	Pavement Marking Obliteration	SF	2,500	$2.50	$ 6,250.00
P-621	Concrete Pavement Grooving	SY		$5.00	$ -
D-701	Install 24-Inch CMP	LF	800	$35.00	$ 28,000.00
D-701	Install 24-Inch CMP FES	EA	2	$150.00	$ 300.00
D-705	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	250	$26.50	$ 6,625.00
D-705	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	3,500	$30.00	$ 105,000.00
D-750	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$605.00	$ 2,420.00
D-750	Install Underdrain Inspection Pit	EA	6	$3,800.00	$ 22,800.00
D-750	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751	Install Inlet	EA	1	$3,800.00	$ 3,800.00
T-901	Seeding with Hydromulch	AC	3.00	$2,500.00	$ 7,500.00
T-901	Straw Bales	EA	4	$25.00	$ 100.00

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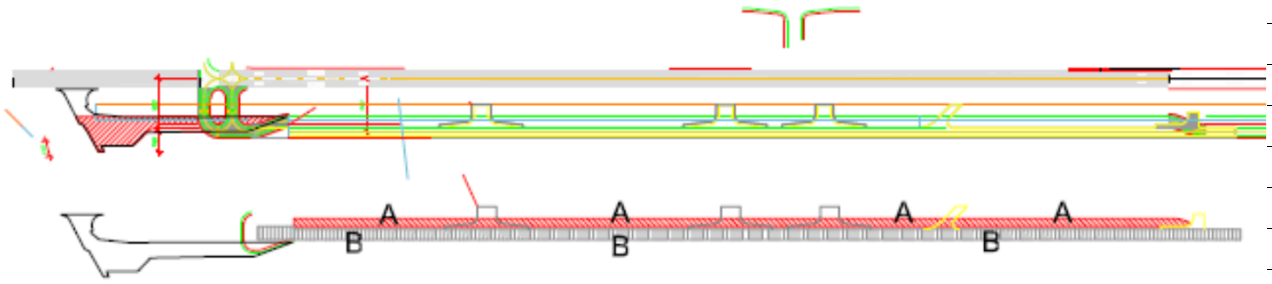
Project #9 **Remove and Realign Taxiway A**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
T-905	Topsoiling	CY	15,000	$15.00	$ 225,000.00
L-100	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	3,500	$5.00	$ 17,500.00
L-108	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	3,500	$4.20	$ 14,700.00
L-108	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	3,500	$3.00	$ 10,500.00
L-110	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	3,500	$22.00	$ 77,000.00
L-125	Install New Guidance Sign Double Face - 3 Module	EA	3	$8,700.00	$ 26,100.00
L-125	L-861T Taxiway Edge Light	EA	20	$1,950.00	$ 39,000.00
				Raw Construction Cost:	$ 16,136,715.00
				Construction Contingency (20% of Raw Construction Cost):	$ 3,227,343.00
				Design Cost (12% of Raw Construction Cost):	$ 1,936,405.80
				Total Project Cost:	$ 21,300,463.80

9. Remove and realign Taxiway A. The realignment of Taxiway A would provide a parallel taxiway for ADG IV aircraft, with a centerline to centerline separation from Runway 17R-35L of 500 feet.

Project #9: Remove and Realign Taxiway A



A	REMOVAL OF TAXIWAY BITUMINOUS PAVEMENT AREA = 633,825 SF
B	REMOVAL OF TAXIWAY BITUMINOUS PAVEMENT Area B = 946,000 SF

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Project #10 **Realign Taxiway B**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 69,000.00	$ 69,000.00
P-140a	Portland Cement Concrete Pavement Removal (Complete) [16 inch Depth]	SY	14,000	$10.00	$ 140,000.00
TAXIWAY SHOULDERS BITUMINOUS PAVEMENT SECTIONS (Total Area = 3,489 SY)					
P-152	Unclassified Excavation	CY	1,200	$7.50	$ 9,000.00
P-152	Subgrade Preparation - 12 Inch (T/W Shoulder Section)	SY	3,500	$4.20	$ 14,700.00
P-154	Subbase Course - 12" (T/W Shoulders)	CY	1,200	$55.00	$ 66,000.00
P-156	Silt Fence	LF	1,000	$2.00	$ 2,000.00
P-209	C.A.B.C. - 6 Inches (Bituminous T/W Shoulder Section)	CY	600	$51.00	$ 30,600.00
P-401	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON	1,200	$100.00	$ 120,000.00
P-401	Bituminous Binder - Surface Course	TON	78	$920.00	$ 71,760.00
P-603	Bitumnious Tack Coat	GAL	1,047	$5.00	$ 5,233.33
TAXIWAY PORTLAND CEMENT CONCRETE SECTION (Total Area = 5,567 SY)					
P-152a	Unclassified Excavation	CY	3,800	$7.50	$ 28,500.00
P-152b	Subgrade Preparation - 24 Inch (T/W Structural Section) *(50% more effort thanfor 12-Inch Prep)*	SY	5,600	$6.30	$ 35,280.00
P-156a	Silt Fence	LF	500	$2.00	$ 1,000.00
P-209b	C.A.B.C. - 6 Inches (T/W Structural and Shoulder Sections)	CY	1,000	$51.00	$ 51,000.00
P-403	Bituminous Base Course - 8 Inch (T/W Structural Section)	TON	2,500	$75.00	$ 187,500.00
P-403	Bituminous Binder - Base Course	TON	163	$700.00	$ 113,750.00
P-501	Portland Cement Concrete Pavement - 16 Inches (T/W Structural Section)	SY	5,600	$82.00	$ 459,200.00
P-620	Temporary Runway and Taxiway Pavement Marking	SF	2,500	$1.50	$ 3,750.00
P-620	Permanent Runway and Taxiway Pavement Marking	SF	2,500	$1.25	$ 3,125.00
P-620	Pavement Marking Obliteration	SF	500	$2.50	$ 1,250.00
P-621	Concrete Pavement Grooving	SY	5,567	$5.00	$ 27,835.00
D-701	Install 24-Inch CMP	LF	800	$35.00	$ 28,000.00
D-701	Install 24-Inch CMP FES	EA	2	$150.00	$ 300.00
D-705	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	250	$26.50	$ 6,625.00
D-705	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	3,500	$30.00	$ 105,000.00
D-750	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$605.00	$ 2,420.00

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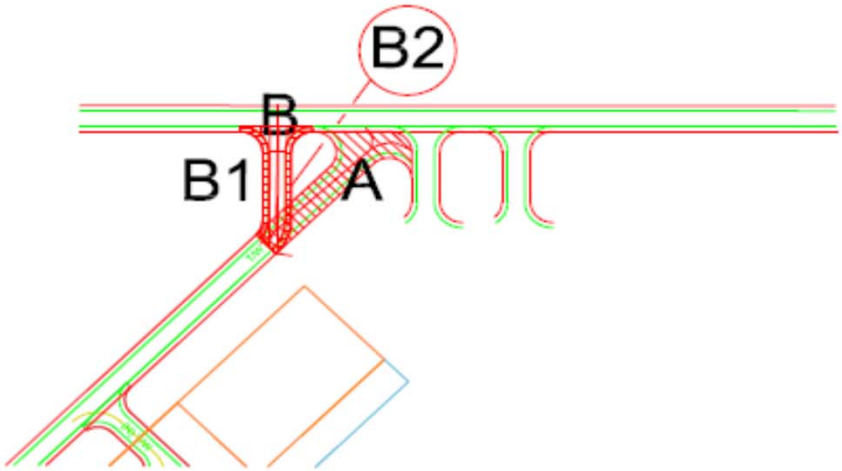
Project #10 **Realign Taxiway B**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
D-750	Install Underdrain Inspection Pit	EA	6	$3,800.00	$ 22,800.00
D-750	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751	Install Inlet	EA	1	$4,000.00	$ 4,000.00
T-901	Seeding with Hydromulch	AC	3.70	$2,500.00	$ 9,250.00
T-901	Straw Bales	EA	20	$25.00	$ 500.00
T-905	Topsoiling	SY	18,000	$1.50	$ 27,000.00
L-100	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	2,000	$5.00	$ 10,000.00
L-108	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	2,000	$4.20	$ 8,400.00
L-108	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	2,000	$3.00	$ 6,000.00
L-110	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	2,000	$22.00	$ 44,000.00
L-125	Install New Guidance Sign Double Face - 3 Module	EA	2	$8,700.00	$ 17,400.00
L-125	L-861T Taxiway Edge Light	EA	20	$1,950.00	$ 39,000.00
				Raw Construction Cost:	$ 1,778,978.33
				Construction Contingency (20% of Raw Construction Cost):	$ 355,795.67
				Design Cost (12% of Raw Construction Cost):	$ 213,477.40
				Total Project Cost:	$ 2,348,251.40

10. Realign Taxiway B. Taxiway B currently intersects Taxiways E, E4, and G creating the potential for pilot confusion. Taxiway B would be realigned to intersect Taxiway E at a ninety degree angle, eliminating the potential and providing equivalent functionality.

Project #10 Realign Taxiway B



	REMOVAL OF TAXIWAY PC PAVEMENT
A	AREA = 118,050 SF
	NEW PC CONCRETE PAVEMENT STRUCTURAL SECTION
B	Area B = 50,100 SF
	NEW BITUM. PAVEMENT SHOULDERS
B1	Area B1 = 14,800 SF
B2	Area B2 = 16,600 SF

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Project #11	**Construct Proposed Bypass Taxiway E2**				
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
P-100a	Mobilization	LS	1	$ 70,000.00	$ 70,000.00
P-140	Asphalt Pavement Removal - Partial (0 to 3.5-Inch Nominal)	SY	900	$3.00	$ 2,700.00
TAXIWAY SHOULDERS BITUMINOUS PAVEMENT SECTIONS (Total Area = 3,489 SY)					
P-152	Unclassified Excavation (Shoulders Only)	CY	2,100	$7.50	$ 15,750.00
P-152	Subgrade Preparation - 12 Inch (Shoulders Only)	SY	3,100	$4.20	$ 13,020.00
P-154	Subbase Course - 12" (T/W Shoulders)	CY	1,100	$55.00	$ 60,500.00
P-156	Silt Fence	LF	1,000	$2.00	$ 2,000.00
P-209	C.A.B.C. - 6 Inches (Bituminous T/W Shoulder Section)	CY	600	$51.00	$ 30,600.00
P-401	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON	1,000	$100.00	$ 100,000.00
P-401	Bituminous Binder - Surface Course	TON	65	$920.00	$ 59,800.00
P-603	Bitumnious Tack Coat	GAL	918	$5.00	$ 4,590.00
TAXIWAY PORTLAND CEMENT CONCRETE SECTION (Total Area = 5,567 SY)					
P-152a	Unclassified Excavation	CY	3,500	$7.50	$ 26,250.00
P-152b	Subgrade Preparation - 24 Inch (T/W Structural Section)	SY	5,200	$6.30	$ 32,760.00
P-156a	Silt Fence	LF	500	$2.00	$ 1,000.00
P-209b	C.A.B.C. - 6 Inches (T/W Structural Section)	CY	900	$51.00	$ 45,900.00
P-403	Bituminous Base Course - 8 Inch (T/W Structural Section)	TON	2,300	$100.00	$ 230,000.00
P-403	Bituminous Binder - Base Course	TON	150	$920.00	$ 137,540.00
P-501	Portland Cement Concrete Pavement - 16 Inches (T/W Structural Section)	SY	5,200	$82.00	$ 426,400.00
P-620	Temporary Taxiway Pavement Marking	SF	2,500	$1.50	$ 3,750.00
P-620	Permanent Taxiway Pavement Marking	SF	2,500	$1.25	$ 3,125.00
P-620	Pavement Marking Obliteration	SF		$2.50	$ -
P-621	Concrete Pavement Grooving	SY	5,567	$5.00	$ 27,835.00
D-701	Install 24-Inch CMP	LF	800	$35.00	$ 28,000.00
D-701	Install 24-Inch CMP FES	EA	2	$150.00	$ 300.00
D-705	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	700	$26.50	$ 18,550.00
D-705	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	3,500	$30.00	$ 105,000.00

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Project #11 **Construct Proposed Bypass Taxiway E2**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
D-750	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$605.00	$ 2,420.00
D-750	Install Underdrain Inspection Pit	EA	4	$3,800.00	$ 15,200.00
D-750	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751	Install Inlet	EA	1	$4,000.00	$ 4,000.00
T-901	Seeding with Hydromulch	AC	4.30	$2,500.00	$ 10,750.00
T-901	Straw Bales	EA	20	$25.00	$ 500.00
T-905	Topsoiling	CY	21,000	$1.50	$ 31,500.00
L-100	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	2,000	$5.00	$ 10,000.00
L-108	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	2,000	$4.20	$ 8,400.00
L-108	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	2,000	$3.00	$ 6,000.00
L-110	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	2,000	$22.00	$ 44,000.00
L-125	Install New Guidance Sign Double Face - 3 Module	EA	2	$8,700.00	$ 17,400.00
L-125	L-861T Taxiway Edge Light	EA	20	$1,950.00	$ 39,000.00
				Raw Construction Cost:	$ 1,642,340.00
				Construction Contingency (20% of Raw Construction Cost):	$ 328,468.00
				Design Cost (12% of Raw Construction Cost):	$ 197,080.80
				Total Project Cost:	$ 2,167,888.80

11. Construct proposed bypass Taxiway E2. This proposed taxiway would provide a bypass taxiway to serve aircraft needing to access the Runway 17L end.

Project #11 Construct Proposed Bypass Taxiway E2

	PROJECT #11 CONSTRUCT PROPOSED BYPASS TAXIWAY E2
A	Structural Area = 46,534 SF
A'	Shoulder Area = 27,540 SF (12,690 + 14,850)

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Project #12 **Remove Existing Taxiway E2**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 30,000.00	$ 30,000.00
P-140	Portland Cement Concrete Pavement Removal (Complete) [16 inch Depth]	SY	14,000	$9.40	$ 131,600.00
P-152	Unclassified Excavation	CY	1,200	$7.50	$ 9,000.00
P-152	Subgrade Preparation - 12 Inch (T/W Shoulder Section)	SY	3,500	$4.20	$ 14,700.00
P-620	Pavement Marking Obliteration	SF	500	$2.50	$ 1,250.00
BITUMINOUS PAVEMENT FOR R/W AND T/W SHOULDER (Total Area = 2,050 SY {625 + 1425})					
P-152	Unclassified Excavation (Shoulders Only)	CY	1,400	$7.50	$ 10,500.00
P-152	Subgrade Preparation - 12 Inch (Shoulders Only)	SY	2,100	$4.20	$ 8,820.00
P-154	Subbase Course - 12" (T/W Shoulders)	CY	1,100	$55.00	$ 60,500.00
P-156	Silt Fence	LF	1,000	$2.00	$ 2,000.00
P-209	C.A.B.C. - 6 Inches (Bituminous T/W Shoulder Section)	CY	400	$51.00	$ 20,400.00
P-401	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON	700	$100.00	$ 70,000.00
P-401	Bituminous Binder - Surface Course	TON	46	$920.00	$ 41,860.00
P-603	Bitumnious Tack Coat	GAL	918	$5.00	$ 4,590.00
P-621	Concrete Pavement Grooving	SY		$5.00	$ -
D-705	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	1,350	$30.00	$ 40,500.00
D-750	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$605.00	$ 2,420.00
D-750	Install Underdrain Inspection Pit	EA	4	$3,800.00	$ 15,200.00
D-750	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751	Install Inlet	EA	1	$4,000.00	$ 4,000.00
T-901	Seeding with Hydromulch	AC	3.70	$3,100.00	$ 11,470.00
T-901	Straw Bales	EA	20	$20.00	$ 400.00
T-905	Topsoiling	SY	18,000	$1.50	$ 27,000.00
L-100	Electrical Demolition (T/W Edge Lights and Hold Sign)	LS	1	$5,000.00	$ 5,000.00
L-108	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	800	$5.00	$ 4,000.00
L-108	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	800	$4.20	$ 3,360.00

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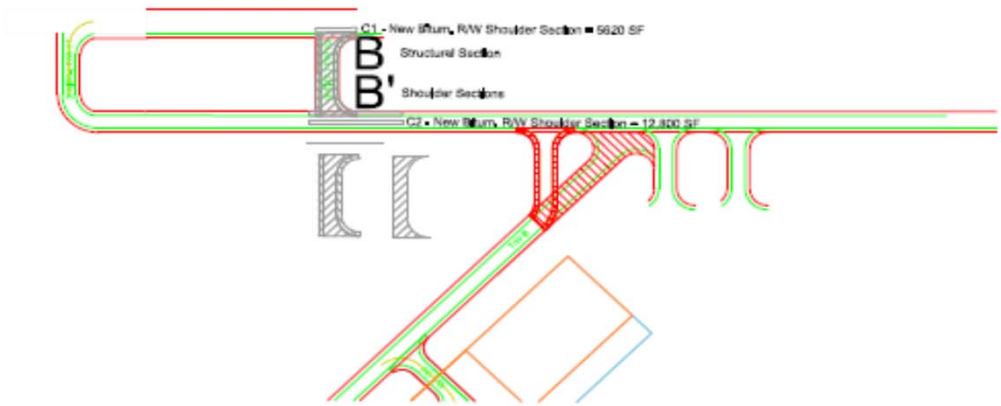
Project #12 **Remove Existing Taxiway E2**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
L-108	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	1,600	$3.00	$ 4,800.00
L-110	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	1,600	$22.00	$ 35,200.00
L-125	Runway Edge Light	EA	4	$1,950.00	$ 7,800.00
L-125	Taxiway Edge Light	EA	4	$1,950.00	$ 7,800.00
				Raw Construction Cost:	$ 576,970.00
				Construction Contingency (20% of Raw Construction Cost):	$ 115,394.00
				Design Cost (12% of Raw Construction Cost):	$ 69,236.40
				Total Project Cost:	$ 761,600.40

12. Construct proposed bypass Taxiway E2. This proposed taxiway would provide a bypass taxiway to serve aircraft needing to access the Runway 17L end.

Project #12 Remove Existing Taxiway E2



	PROJECT #12 REMOVE TAXIWAY E2
B	Structural Area = 43,250 SF
B'	Shoulder Area = 27,010 SF (12,310 + 14,700)
	BITUMINOUS SHOULDER AREAS
C1	Bitum. R/W Shldr Area = 5,620 SF
C2	Bitum. T/W Shldr Area = 12,800 SF
C2	Total Shoulder Area = 18,420 SF

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Date: **7/8/2013**

COLORADO SPRINGS AIRPORT
COLORADO SPRINGS, COLORADO
Master Plan Update
Recommended Projects
SUMMARY OF PROBABLE CONSTRUCTION COSTS

Checked by: John Cessar
Date: **7/9/2013**

Project #13 **Remove Existing High-Speed Exit Taxiway E4**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 70,000.00	$ 70,000.00
P-140	Portland Cement Concrete Pavement Removal (Complete) [16 inch Depth]	SY	28,000	$9.40	$ 263,200.00
P-140	Portland Cement Concrete Pavement Removal (Complete) [8 inch Depth]	SY	3,000	$8.00	$ 24,000.00
P-140	Bituminous Pavement Removal (Complete) [Shoulders]	SY	6,000	$7.50	$ 45,000.00
P-152	Unclassified Excavation After Pavement Removal	CY	18,100	$7.50	$ 135,750.00
P-620	Pavement Marking Obliteration	SF	500	$2.50	$ 1,250.00
BITUMINOUS PAVEMENT FOR R/W AND T/W SHOULDER (Total Area = 2,050 SY {625 + 1425})					
P-152	Unclassified Excavation After Pavement Removal	CY	2,900	$7.50	$ 21,750.00
P-152	Subgrade Preparation - 12 Inch (Shoulders Only)	SY	8,700	$4.20	$ 36,540.00
P-154	Subbase Course - 12" (T/W Shoulders)	CY	2,900	$55.00	$ 159,500.00
P-156	Silt Fence	LF	2,000	$2.00	$ 4,000.00
P-209	C.A.B.C. - 6 Inches (Bituminous T/W Shoulder Section)	CY	1,500	$51.00	$ 76,500.00
P-401	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON	2,900	$100.00	$ 290,000.00
P-401	Bituminous Binder - Surface Course	TON	189	$920.00	$ 173,420.00
P-603	Bitumnious Tack Coat	GAL	3,903	$5.00	$ 19,512.50
P-621	Concrete Pavement Grooving	SY		$5.00	$ -
D-705	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	3,122	$30.00	$ 93,660.00
D-750	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$605.00	$ 2,420.00
D-750	Install Underdrain Inspection Pit	EA	4	$3,800.00	$ 15,200.00
D-750	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751	Install Inlet	EA	1	$4,000.00	$ 4,000.00
T-901	Seeding with Hydromulch	AC	7.50	$2,500.00	$ 18,750.00
T-901	Straw Bales	EA	10	$25.00	$ 250.00
T-905	Topsoiling	SY	37,000	$1.50	$ 55,500.00
L-100	Electrical Demolition (T/W Edge Lights and Hold Sign)	LS	1	$5,000.00	$ 5,000.00
L-108	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	3,150	$5.00	$ 15,750.00
L-108	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	3,150	$4.20	$ 13,230.00
L-108	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	3,150	$3.00	$ 9,450.00

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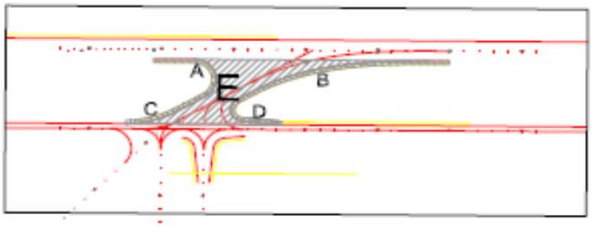
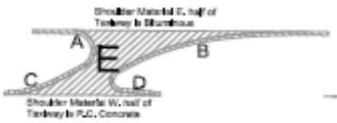
Project #13 **Remove Existing High-Speed Exit Taxiway E4**

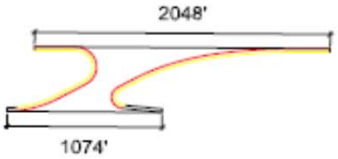
Item No.	Description	Units	Quantity	Unit Cost	Total Cost
L-110	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	3,150	$22.00	$ 69,300.00
L-125	Runway Edge Light	EA	10	$1,950.00	$ 19,500.00
L-125	Taxiway Edge Light	EA	6	$1,950.00	$ 11,700.00
				Raw Construction Cost:	$ 1,656,932.50
				Construction Contingency (20% of Raw Construction Cost):	$ 331,386.50
				Design Cost (12% of Raw Construction Cost):	$ 198,831.90
				Total Project Cost:	$ 2,187,150.90

13. Remove existing high-speed exit Taxiway E4. The geometry at the intersection of Taxiway E, E4, G, and H is convoluted, potentially giving rise to pilot confusion. This taxiway would be replaced in a location approximately 1,400 feet south to eliminate this potential.

Project #13: Remove Existing High Speed Exit Taxiway E4







	REMOVAL OF SHOULDER BITUMINOUS PAVEMENT
A	Area A = 15,680 SF
B	Area B = 37,560 SF
	Total Area = 53,240 SF
	REMOVAL OF P.C. CONCRETE PAVEMENT
C	Area C = 15,025 SF
D	Area D = 11,720 SF
	Total Area = 26,745 SF
	REMOVAL OF STRUCTURAL PCC PAVEMENT
E	Area D = 244,340 SF

NEW RUNWAY SHOULDER BITUM. PAVEMENT
Area = 51,200 SF (2018' x 25')
NEW TAXIWAY SHOULDER BITUM. PAVEMENT
Area = 26,850 SF (1074' x 25')
TOTAL SHOULDER BITUM. PAVEMENT
Total Shldr Area = 78,050 SF (51,200 + 26,850)

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

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Calculated by: Kevin Davis
Date: **7/8/2013**

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Date: **7/9/2013**

Project #14 **Construct Proposed High-Speed Exit Taxiway C-4** **[STRUCTURAL AREA = 25,115 SY]**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 150,000.00	$ 150,000.00
P-140a	Asphalt Pavement Removal (Full Depth Existing Shoulder)	SY	6,612	$5.00	$ 33,061.11
TAXIWAY BITUMINOUS PAVEMENT SECTION (SHOULDERS - AREA = 76520 SF/(8502 SY))					
P-152a	Unclassified Excavation	CY	5,700	$6.00	$ 34,200.00
P-152b	Subgrade Preparation - 12 Inch (T/W Shoulder Section)	SY	8,600	$2.50	$ 21,500.00
P-154	Subbase Course - 12" (R/W Shoulders)	CY	1,500	$36.00	$ 54,000.00
P-156a	Silt Fence	LF	1,000	$1.50	$ 1,500.00
P-209b	C.A.B.C. - 6 Inches (T/W Shoulder Section)	CY	1,500	$52.00	$ 78,000.00
P-401aa	Bituminous Surface Course - 6-Inch (T/W Shoulder Section)	TON	2,800	$80.00	$ 224,000.00
P-401c	Bituminous Binder - Surface Course	TON	182	$800.00	$ 145,600.00
P-603a	Bitumnious Tack Coat	GAL	2,551	$2.00	$ 5,101.33
TAXIWAY PORTLAND CEMENT CONCRETE SECTION (Total Area = 17,780 SY; Structural Area = 13,335 SY)					
P-152a	Unclassified Excavation	CY	14,200	$6.00	$ 85,200.00
P-152b	Subgrade Preparation - 24 Inch (T/W Structural Section)	SY	21,300	$2.50	$ 53,250.00
P-156a	Silt Fence	LF	500	$1.50	$ 750.00
P-209b	C.A.B.C. - 6 Inches (T/W Structural Sections)	CY	3,600	$52.00	$ 187,200.00
P-403	Bituminous Base Course - 8 Inch (T/W Structural Section)	TON	9,300	$55.00	$ 511,500.00
P-403	Bituminous Binder - Base Course	TON	605	$550.00	$ 332,475.00
P-501	Portland Cement Concrete Pavement - 16 Inches (T/W Structural Section)	SY	21,300	$72.00	$ 1,533,600.00
P-620a	Temporary Runway and Taxiway Pavement Marking	SF	4,445	$1.25	$ 5,556.25
P-620b	Permanent Runway and Taxiway Pavement Marking	SF	4,445	$1.25	$ 5,556.25
P-620c	Pavement Marking Obliteration	SF		$3.50	$ -
P-621	Concrete Pavement Grooving	SY	15,500	$5.00	$ 77,500.00
D-701l	Install 24-Inch CMP	LF	800	$35.00	$ 28,000.00
D-701m	Install 24-Inch CMP FES	EA	2	$150.00	$ 300.00
D-705a	Install 6-Inch Non-Perforated Polyethylene Pipe Underdrain	LF	250	$26.00	$ 6,500.00
D-705b	Install 6-Inch Perforated Polyethylene Pipe Underdrain	LF	2,380	$25.00	$ 59,500.00

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Date: 7/8/2013
Checked by: John Cessar
Date: 7/9/2013

COLORADO SPRINGS AIRPORT
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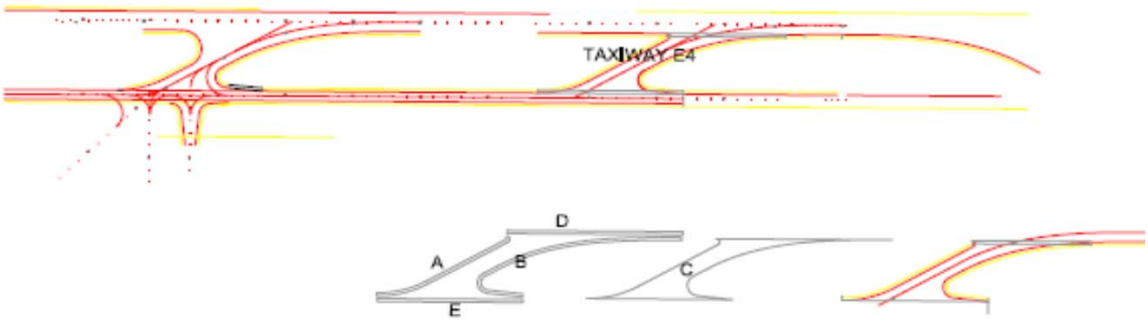
SUMMARY OF PROBABLE CONSTRUCTION COSTS

Project #14 **Construct Proposed High-Speed Exit Taxiway C-4** **[STRUCTURAL AREA = 25,115 SY]**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
D-750a	Tie Underdrain Pipe into Existing Manhole/ Inlet	EA	4	$200.00	$ 800.00
D-750b	Install Underdrain Inspection Pit	EA	6	$3,400.00	$ 20,400.00
D-750d	Install 6-Inch Underdrain Cleanout	EA	4	$700.00	$ 2,800.00
D-751d	Install Inlet	EA	1	$4,000.00	$ 4,000.00
T-901a	Seeding with Hydromulch	AC	4.00	$3,100.00	$ 12,400.00
T-901c	Straw Bales	EA	4	$20.00	$ 80.00
T-905a	Topsoiling	CY	4,400	$15.00	$ 66,000.00
L-100a	Electrical Demolition (R/W Edge Lights, MALSR, PAPIs, RDR Signs, T/W Edge Lights)	LS	1	$5,000.00	$ 5,000.00
L-108a	1/C L-824 Type C, Unshielded #8 AWG 5kV Cable (Runway Circuits)	LF	2,500	$5.00	$ 12,500.00
L-108aa	1/C L-824 Type B, Unshielded #8 AWG 5kV Cable (Taxiway Circuits)	LF	2,500	$5.00	$ 12,500.00
L-108b	1/C #6 AWG BSD copper Counterpoise Wire w/ Grounding Rods	LF	2,500	$2.00	$ 5,000.00
L-110a	Single-Way Duct, 2" Sch. 40 PVC CLSM Encased	LF	2,500	$20.00	$ 50,000.00
L-125h	Install New Guidance Sign Double Face - 3 Module	EA	2	$6,500.00	$ 13,000.00
L-125i	Taxiway Edge Lights	EA	20	$1,500.00	$ 30,000.00
				Raw Construction Cost:	$ 3,868,329.94
				Construction Contingency (20% of Raw Construction Cost):	$ 773,665.99
				Design Cost (12% of Raw Construction Cost):	$ 464,199.59
				Total Project Cost:	$ 5,106,195.53

14. Construct proposed high-speed exit Taxiway E4. This project provides a new high-speed exit for Runway 35R arrivals. The location of this high-speed exit accounts for the removal of existing Taxiway E4.

Project #14: Construct Proposed High-Speed Exit Taxiway E4



	NEW SHOULDER BITUMINOUS PAVEMENT
A	Area A = 27,570 SF
B	Area B = 48,950 SF
	Total Area = 76,520 SF
	NEW STRUCTURAL PCC PAVEMENT
C	Area C = 191,400 SF

	REMOVAL OF EXIST. BITUM. PAVEMENT SHOULDER
E	Area D = 32,510 SF
D	Area D = 27,000 SF
	Total Area = 59,510 SF

Dimensions taken from Drawing titled "Kevin Cost Est Drawing"

JACOBS

Calculated by: Kevin Davis
Date: **7/8/2013**
Checked by: John Cessar
Date: **7/9/2013**

COLORADO SPRINGS AIRPORT
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Project #15 **Provide Runway 35R with and Instrument Landing System (ALSF-II)**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
P-100a	Mobilization	LS	1	$ 100,000.00	$ 100,000.00
L-1000	Furnish and Install ALSF-II Instrument Landing System for Runway 35R	LS	1	$2,500,000.00	$ 2,500,000.00
				Raw Construction Cost:	$ 2,600,000.00
	Construction Contingency (15% of Raw Construction Cost):				$ 390,000
	Design Cost (10% of Raw Construction Cost):				$ 260,000
				Total Project Cost:	$ 3,250,000.00

Kevin,

The ALSF-2 system would cost about $2.5 million. That would include the actual system and the building for the electrical equipment. You can add whatever fluff you are adding to that. Let me know if you need anything else.

Zach Ambariantz
Electrical Engineer
JACOBS
707 17th Street, Suite 2400
Denver, CO 80202-5131
Phone - 303-223-5880
Fax - 303-820-4819
zachary.ambariantz@jacobs.com
www.jacobs.com

fluff = contingency

15. Provide Runway 35R with an Instrument Landing System. The approach to Runway 35R would be enhanced by the addition of an ALSF-II. The ALSF-II would provide Category II capability for arrivals in inclement weather conditions.

ESTIMATE OF PROBABLE CONSTRUCTION COSTS

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COLORADO SPRINGS, COLORADO

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Recommended Projects

SUMMARY OF PROBABLE CONSTRUCTION COSTS

Calculated by: Kevin Davis
Date: **7/8/2013**

Checked by: John Cessar
Date: **7/9/2013**

Project 16: **VSR Improvements**

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
	2013 Estimate of Future VSR Project for Master Plan Updatre				
Project #16A	VSR Project West of T/W E	LF	6,542	$120.00	$ 785,040
Project #16B	VSR Project 3/4 Perimeter of R/W 17L/35R	LF	25,325	$120.00	$ 3,039,000
Project #16C	VSR located NW of R/W 17R/35L	LF	7,800	$120.00	$ 936,000
P-100a	Mobilization @ 4%	LS	1	$153,000.00	$ 153,000.00
			Raw Construction Cost:		$ 4,913,040.00
	Construction Contingency (15% of Raw Construction Cost):				$ 736,956
	Design Cost (10% of Raw Construction Cost):				$ 491,304
	Total Project Cost:				$ 6,141,300.00

Historical Bid Tab

2007	**VSR Project East of R/W 17R**	**LF**	**8,458**	**$117.75**	**$ 995,930**

16. Pave perimeter vehicle service road. The perimeter vehicle service road requires realignment around the ends of Runway 17R-35L. In addition, the perimeter road is not paved in its entirety. The FAA Runway Safety Action Team has expressed a desire that the perimeter road be paved to reduce the number of vehicles using taxiways and runways to move about the airport.

Appendix G

DRAINAGE PLAN UPDATE

Colorado Springs Airport

Prepared by:

Jacobs Engineering Inc.

Date:

July 2013

COLORADO SPRINGS AIRPORT
MASTER PLAN UPDATE

EXISTING DRAINAGE AND LAND USE REPORT

Identification of the Existing Drainage Structures, Flow Patterns and Land Use within the Limits of the Colorado Springs Airport

Prepared For:

Colorado Springs Airport

7770 Milton E. Proby
Colorado Springs, CO 80916

Prepared By:

JACOBS

707 17TH Street, Suite 2300
Denver, CO 80202

August 2013

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Appendix A: FEMA Flood Insurance Rate Maps ..... Appendix A

FEMA LOMR ..... Appendix A

NRCS Existing Soils Map ..... Appendix A

Appendix B: CUHP Input & Output ..... Appendix B

CulvertMaster Output ..... Appendix B

Appendix C: Exhibit 1: Existing Sub-Basin and Routing Exhibit ..... Appendix C

Exhibit 2: Existing Drainage Structure Exhibit ..... Appendix C

Exhibit 3: Existing Land Use Exhibit ..... Appendix C

Appendix D: Recommended Development Plan – Drainage Considerations ..... Appendix D

Exhibit 4: Recommended Development Plan - Drainage Impacts ..... Appendix D

Project Overview

The Colorado Springs Airport (COS) is in the process of updating its Master Plan that will serve as a road map for the development of the Airport over the next 25 years. The updated Master Plan will identify needs and evaluate alternatives to provide guidance for the future development of the Airport. The information identified through the master planning process will also ensure the continued operation of a safe, efficient, and environmentally compatible Airport.

This report indentifies the existing drainage patterns and structures that currently exist within the Airport property. Combined with the existing land use of the Airport, this information will help to identify future development opportunities that are in line with the overall Master Plan for the Airport while maintaining existing drainage patterns.

Sources of Information

Jacobs researched aerial photography, photos, existing topography, and previous drainage and master planning reports for the Airport property (References 1 through 7) to identify the major drainage and outfall structures within the project limits. FEMA floodplain maps and NRCS Web Soil Surveys (References 8 through 12) were also reviewed for details on local floodplains and soil types within the project limits.

Project Location and Description

The Colorado Springs Airport is located in southeast Colorado Springs in El Paso County, Colorado. The majority of the Airport is located within Township 14 South, Range 65 West, while south and west areas of property extend into portions of Township 15 south, Range 65 west, Township 14 south, Range 66 West, and Township 15 south, Range 66 west of the 6th Principal Meridian.

The Airport property is bordered by E. Platte Avenue to the north, S. Powers Boulevard to the west and south, and S. Marksheffel Road to the east. The center of the Airport property contains the Airport terminal, parking lots, and runways. The north portion of the Airport property is occupied by Peterson Air Force Base (AFB). The west portion of the Airport contains some commercial development. The south and east portions of the Airport are mostly undeveloped leaving room for commercial and aviation expansion in the future including the new Business Park that is currently being developed in the southern portion of the property.

Floodplains

The one FEMA regulated floodplain within the Airport property limits is a small portion of the Sand Creek East Fork that cuts through the northwest corner of the property. The Sand Creek East Fork is designated Zone AE, meaning it has been fully studied and base floodplain elevations (BFE's) have been determined. Per FEMA map panels 0841 C0753 F and 0841 C0754 F dated 1997 (Reference 8), the designated floodplain within the Airport property remains in the existing channel. This is also confirmed with later dated Letters of Map Revision (LOMR) that are dated 2004 and 2007 (References 9 and 10 respectively). The BFE's shown in the LOMR dated 2007 are the current effective floodplain elevations.

There is a second FEMA regulated floodplain bordering the Airport property at the Peterson Basin Outfall on the west side of the Airport. The Peterson Field Drainage is a designated Zone AE floodplain as well so the floodplain has been studied and BFE's have been determined. Per FEMA map panel 0841 C0761 F dated 1997 (Reference 11), the designated floodplain does come out of the banks of the Drainage, however this floodplain is outside of the Airport property boundary.

See Appendix A for FEMA floodplain maps and LOMR information.

Soil Types

The predominant soils within the limits of the Airport include hydrologic soil group types A and B per the Natural Resources Conservation Service (NRCS) Web Soil Survey (Reference 12). Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups, A through D, according to the rate water infiltrations when the soils are not protected by vegetation. Groups A and B

indicate soils with higher infiltration rates that account for a lower runoff potential. See Appendix A for a soils map of the Airport property.

Hydrology

This study uses the Colorado Urban Hydrograph Procedure (CUHP) for the 100-Year 2-Hour storm event as recommended by the City of Colorado Springs & El Paso County Drainage Design Manual (DDM) (Reference 13). The one-hour Rainfall Depth of 2.6 inches for this storm event is derived using Figure 5-1 of the DDM. This rainfall depth is used to model the drainage basins for this study using CUHP 2005 as developed by the Urban Drainage and Flood Control District (Reference 14). CUHP computes a discharge hydrograph for a basin using parameters that include the drainage area, stream length, basin centroid, stream slope, percent imperviousness, and soil infiltration rates. A summary of input parameters used can be viewed in Appendix B along with the resulting 100-Year existing flows for each basin.

Major Basin Description

The Colorado Springs Airport is divided into four major drainage basins that carry water off the Airport property and into four separate drainage features. The delineation of these four basins can be viewed in Exhibit 1 included in Appendix C. There is also a small portion of the northwest corner of the property that drains directly into the Sand Creek East Fork that runs through the Airport property as previously discussed in the Floodplains section of this report. Approximately 0.50 acres of the Airport property runoff makes it into the Sand Creek East Fork. All four offsite drainage features, as well as the Sand Creek East Fork, ultimately drain to Fountain Creek.

The Big Johnson Basin is approximately 682 acres of land that is located at the south end of the Airport property. Overland flows from this basin drain south through natural drainage channels and under Powers Boulevard through multiple culvert crossings. From there the flows drain overland through natural channel beds and into the Big Johnson Reservoir approximately one mile to the south. Except for a military aviation expansion in the northern corner of the basin, the Big Johnson Basin is mostly undeveloped and serves primarily as open space and agricultural land.

The Windmill Gulch Basin is approximately 1,742 acres of land that is located in the southwest corner of the Airport property where Powers Boulevard changes direction from north/south to east/west. Portions of the basin also extend into the center of the airport property along Milton E. Proby and include the southern portions of the terminal, parking lots, and the east runway. This basin is partially developed, mostly along Milton E. Proby. South of Milton E. Proby the basin is largely undeveloped and contains a large natural drainage channel that drains the basin to the southwest under Powers Boulevard and into the Windmill Gulch.

The Peterson Field Basin is approximately 4,344 acres of land that is located in the northern half of the Airport property. This total area encompasses the runoff from the Peterson Air Force Base that makes up approximately 931 acres of that total, portions of the Airport property that makes up approximately 2,365 acres. It also includes offsite runoff on the west side of the basin between Powers Boulevard and Aviation Way as well as offsite runoff on the northeast side of the basin that travels onto the Airport property and through the existing detention pond system. The Peterson Field Basin drains through a series of storm sewer systems, detention ponds and open channels and is conveyed under Powers Boulevard at the southwest corner of basin and into the Peterson Field Drainage. This Drainage is a series of concrete lined channels that conveys the runoff to Sand Creek just upstream of its confluence with Fountain Creek. The Peterson Field Basin is almost fully developed with some commercial lots available on the western portion of the basin and some open space available for runway expansion. The property within the current Peterson Air Force Base boundary line is almost completely built out.

The Jimmy Camp Creek Basin is approximately 1,370 acres of land that is located along the eastern boundary of the Airport. This basin includes the northern portion of the east runway as well as a small southern portion of the Peterson Air Force Base property. The rest of the basin is mostly undeveloped. The runoff from the runway portion of the basin is collected in storm sewers and is transported to a detention pond on the east side of the runway before discharging into a natural channel. This channel carries the water offsite to the Jimmy Camp Creek. The rest of the basin runoff travels by overland flow to

one of two main natural channels before leaving the property. Due to the two main outfall points, the Jimmy Camp Creek Basin is divided into a North Basin and a South Basin for calculating the separate travel times, even through both outfalls join off the Airport property before discharging into Jimmy Camp Creek.

The major basin acreages differ slightly from the previous studies referenced in this report. For the Windmill Gulch, Big Johnson, and Jimmy Camp Creek Basins this is due to slight shifts in the basin boundaries due to new construction that has recently been built that includes new roads, ponds and storm sewer systems that route the runoff in a slightly different drainage pattern than in the past. The Peterson Field Basin appears to have a large increase in acreage when compared to previous studies. This is due to previous studies not including the Peterson Air Force Base and some if not all of the offsite areas in the total.

Sub-Basin Description

Each of the four major drainage basins is divided into sub-basins that correspond to major drainage structures or property outfall locations. This allows analysis of culverts and ponds throughout the Airport property and will be helpful in determining existing flow restrictions for separate areas of development throughout the property. The basin break outs shown in Exhibit 1: Existing Sub-Basin and Routing Exhibit in Appendix C show the individual sub-basin delineations and their corresponding routing elements and outfall location. Existing 100-year flows for each sub-basin are summarized in the CUHP output included in Appendix B.

Along with the major drainage basin break outs, Exhibit 2: Existing Drainage Structure Exhibit in Appendix C also includes other existing known drainage features including ditches, ponds, sumps, culverts, riprap areas, catch basins, manholes and some of the main storm sewer alignments. Individual storm sewer systems within the sub-basins were not analyzed for this study. The purpose of this study is to be an overall Drainage Master Plan Update for the Airport and is meant to show a broader picture of the drainage patterns with the Airport property. Storm sewer systems shown on Exhibit 2 are based on layouts in previous studies. Future development of individual portions of the property will require additional ground survey and analysis of any existing storm sewer system capacities affected by that development.

Offsite sub-basins on the northwest side of the Airport have been included in the major Peterson Field Basin due to the fact that they outfall at the same location as the Peterson Field Basin and are included in the release flows to the Peterson Field Drainage channel.

Basin WG-9 is a unique situation in that it has a natural sump within the basin without an outlet structure. Runoff will accumulate in the depression and eventually infiltrate into the ground. Should development occur within Basin WG-9 and the sump is regraded, a detention pond will be required to account for the additional flow traveling out of Basin WG-9 and through Basin WG-8.

Existing Major Drainage Structures

The existing major drainage and outfall structures within the Airport property are summarized in Table 1 below. Unless otherwise noted the existing flows listed do not include any detention time and are just a combination of flows from the contributing basins. The structures analyzed include culverts and pipes that release off the Airport property. Also included are culvert and pipe crossings under Milton E. Proby. Culvert sizes, inverts, and lengths were estimated from previous report, topography, and aerial mapping. The CulvertMaster program by Bentley (Reference 15) was used to analyze the capacity of the structures based on a maximum headwater depth of 1.5 times the structure height or the top of the existing roadway, whichever is less. CulvertMaster output can be viewed in Appendix B.

Table 1: Major Structure and Outfall Summary

Structure ID	Size	Location	Contributing Basin(s)	Capacity* (CFS)	Existing 100-YR Flows (CFS)
BJ-1	8’ X 6’ CBC	Property Outfall	BJ-1	508	106
BJ-2	8’ X 8’ CBC	Property Outfall	BJ-2	786	523
BJ-2**	8’ X 4’ CBC (Silted)	Property Outfall	BJ-2	504	523
BJ-3	60” CMP	Property Outfall	BJ-3	203	89
BJ-4	42” CMP	Property Outfall	BJ-4	96	25
BJ-5	24” CMP	Property Outfall	BJ-5	19	11
BJ-6	36” CMP	Property Outfall	BJ-6	45	54
WG-1	4 - 24” X 38” HERCP	Property Outfall	WG-1	149	174
WG-2	18” RCP	Internal Property Structure	WG-2	8	61
WG-3	60” RCP	Internal Property Structure	WG-3, WG-4	225	353
WG-4	6’ X 4’ CBC	Internal Property Structure	WG-4	207	163
WG-5	11’ X 7’ CBC	Internal Property Structure	WG-5	879	183
WG-6	54” RCP	Internal Property Structure	WG-6	155	20
WG-7	8’ X 6’ CBC	Internal Property Structure	WG-5, WG-7, WG-8, WG-10	507	555
WG-8	60” RCP	Internal Property Structure	WG-8, WG-10	225	291
WG-11	2 - 8’ X 3’ CBC	Property Outfall	WG-11	361	127
WG-12	60” CMP	Property Outfall	WG-12	79	39
WG-13	42” & 36” CMP	Property Outfall	WG-13	100	25
WG-14	2 - 8’ X 6’ CBC	Property Outfall	WG-2, WG-3, WG-4, WG-5, WG-6- WG-7, WG-8, WG-10, WG-14	689	1315
PD-3	2 - 9’ X 8’ CBC	Offsite Property Outfall	PD-1, PD-2, PD-3, P-POND-2****	1760	1134***
PD-5	2 – 6’ X 6’ CBC	Property Outfall	PD-4, PD-5, PD-6, PD-7, PD-8, PD-9	38	633***
PD-OS-3	2 - 8’ X 6’ CBC	Offsite Property Outfall	P-POND-1****	1016	437***
PD-OS-4	6’ X 4’ CBC	Offsite Property Outfall	PD-OS-4	208	39

* Capacity based on a maximum headwater elevation of 1.5 x structure height.
**Second BJ-2 reference shows 8' X 8' culvert under existing conditions. The culvert is silted in half way only providing an 8' X 4' opening.
***Flow rate includes pond detention time.
*****100-Year discharge from P-POND-1 and P-POND-2 per study listed in Reference 3.

As designed, most of the property outfall culverts within the Big Johnson Basin have plenty of capacity to handle the existing flows. However, outfall culvert for Basin BJ-2 is severely silted in and only retains about half its designed capacity and the outfall culvert for Basin BJ-6 is slightly undersized. Any future development would require the 8' X 8' CBC to be cleaned out, the 36" CMP to be upsized and new detention areas added so as not to exceed these existing flows. The 8' X 6' CBC outlet for Basin BJ-1 is shown for information only. This culvert is outside of the Airport property boundary and is maintained by others.

The property outfall culverts for the Peterson Basin also have capacity for the existing flows based on the existing detention system already in place. Future development within the basin may require additional detention capacity within the existing ponds or with additional detention ponds.

The culverts within the Windmill Gulch Basin are in good condition, but some of them are undersized for the existing flows of the contributing basins. Detention is suggested at the outfalls of basins WG-1, WG-3, and WG-14. Additional storage capacity is suggested at basin WG-8. The 18" culvert at WG-2 is also undersized and is creating localized depression storage behind it. Any development in this area would require upsizing of this crossing or rerouting of the flows based on future grading.

The Jimmy Camp Creek Basins do not contain major structure outfalls. The property outfall locations are currently open channels or ditches leaving the property. Future development of these areas would require detention structures with culvert outfalls sized so as not to exceed existing flow rates leaving the property.

Existing Detention Pond Structures

The existing detention pond structures within the Airport property are summarized in Table 2. The existing 100-Year flow rates listed were taken from referenced previous studies. Ponds that are shown on the exhibits in Appendix C but are not listed in this table, such as Cutter Pond and SkyWest Pond, serve individual businesses and are maintained by these businesses. Natural sumps are also displayed on the exhibits. These sumps currently act as depression storage within the sub-basins. Some have culvert outlets while others do not and instead serve as a retention area where runoff is collected and infiltrated into the ground. Future development around these sump areas may require build out of defined detention ponds.

Table 2: Existing Detention Pond Summary

Pond ID	Location	Contributing Basin(s)	Capacity (AC-FT)	100-YR Release Rate (CFS)
POND 700	BJ-2	Portion of BJ-2	37	46
POND 10	WG-14	Portion of WG-14	16	21
ADACG DB-1	BJ-2	Portion of BJ-2	10	49
ADACG DB-2	WG-8	WG-10	20	44
POND 6	PD-OS-3	PD-OS-1, PD-OS-2, PD-OS-3	64	436.6

POND 8	PD-5	PD-4, PD-5, PD-6, PD-7, PD-8, PD-9	38	633
POND 5	PD-9	PD-9	57	140
POND 4	PD-7	PD-7, PD-10, P-PD-3	22	420
POND 1	P-AFB-1	P-AFB-1, P-PD-6, P-PD-7	10	41
POND 2	PD-11	Portion of PD-11	32	6
POND 3	PD-11	Portion of PD-11	5	47
POND JC-1	JCC-N2	JCC-N1, JCC-N2	116	Unknown*
POND 11	WG-14	Road Portion of WG-14	2.1	45.6
POND 250	BJ-3	BJ-3	5.7	76.2

* Information unavailable from referenced previous reports.

Land Use and Future Development

The existing land use for the Airport property is shown on the Exhibit 3: Existing Land Use Exhibit in Appendix C. This exhibit includes areas for aviation, commercial, Peterson AFB, and offsite commercial development. Hatched areas in red are included to show existing pond locations as well as potential future land areas to be set aside for detention ponds and drainage channels during future development. Some of the natural sump locations are not designated in red, because there is the possibility that they could be relocated if future development or airport expansion were to occur in these areas. The future drainage land use areas are based on existing ponds that could be expanded, outfall locations that currently are not detained in any way, and existing culvert outfall locations where capacities are exceeded by existing flows.

The URS study of the Peterson Field Drainage Basin (References 3 & 16) recommended some drainage improvements that have already been implemented, including POND 8 and the new storm sewer running down Aviation Way. Additional recommendations from this study should be considered for future development of the airfield including an expansion of POND 4 and a new pond at the existing SUMP 7 location for any expansion of the terminal.

The Peterson AFB is almost already fully developed. There is some space available within their property in the Jimmy Camp Creek North Basin, but any other future development by the AFB would require the purchase of additional land.

The CH2MHill study of the Windmill Gulch and Big Johnson Basin (Reference 4) includes recommendations for the development of a business park on the south side of the Airport property. These recommendations encompass the addition of detention facilities at the major outfall locations for these basins as shown in the Land Use Exhibit in Appendix C. Some of these business park recommendations have begun to be developed including a new access road through the Windmill Gulch and Big Johnson Basins that was recently constructed and includes two new detention ponds, one in each basin (Reference 7).

There have not been any recent studies of the Jimmy Camp Creek Basins to show possibilities for future build out. Most of the land surrounding the east runway is available for aviation expansion and development. Some land is also available for future commercial use in the southeast corner of the Jimmy Camp Creek South Basin. Both the north and south Basins would require detention for the increased runoff created by any additional impervious areas.

Area available for future development around the Sand Creek East Fork in the northwest corner of the Airport property is limited. The 100-Year floodplain, for the most part, stays within the banks of the Sand Creek East Fork. See the FEMA Flood Insurance Rate Map shown in Appendix A.

The Colorado Springs Airport Master Plan Update includes recommendations for future build out and expansion of the Airport property as listed in the report and exhibits by Leigh and Fisher dated May 2013. Corresponding drainage impacts and recommendations are discussed in Appendix D.

Summary

This report indentifies the existing drainage patterns and structures that currently exist within the limits of the Colorado Springs Airport property. This information was obtained through the use of aerial photography, photos, existing topography, and previous drainage and master planning reports.

Combined with the existing land use of the Airport, this information helps to identify future development opportunities that are in line with the overall Master Plan for the Airport while maintaining existing drainage patterns.

References

1. *Colorado Springs Airport Drainage Master Plan – Volumes I and II;* CH2M HILL; May 1998.

2. *Master Development Drainage Plan for Colorado Springs Airport;* Drexel, Barrell & Co.; January 2000, Revised April 2000.

3. *Peterson Field Drainage Basin Master Development Drainage Plan;* Colorado Springs Airport; URS; September 2004.

4. *Master Development Drainage Plan;* Colorado Springs Airport in the Windmill Gulch and Big Johnson Basin(s); Colorado Springs Airport Business Park Concept Plan; CH2M HILL; June 2005.

5. *Peterson Air Force Base Stormwater Drainage Study;* U.S. Air Force Center for Environmental Excellence; URS; May 2007.

6. *A/CACG Facility Drainage Study;* Peterson AFB, Colorado; U.S. Army Corps of Engineers Omaha District; October 2009.

7. *Final Drainage Report for Colorado Springs Airport Business Park Defense Access Road Project;* CH2M HILL; January 2010.

8. *Flood Insurance Rate Map: El Paso County, Colorado and Incorporated Areas;* Community Panel Numbers 08041C0753 F and 08041C0754 F; Federal Emergency Management Agency (FEMA); March 1997.

9. *Letter of Map Revision;* LOMR 03-08-0689P-080059; Federal Emergency Management Agency (FEMA); October 2004.

10. *Letter of Map Revision;* LOMR 05-08-0389P-080060; Federal Emergency Management Agency (FEMA); May 2007.

11. *Flood Insurance Rate Map: El Paso County, Colorado and Incorporated Areas;* Community Panel Numbers 08041C0761 F; Federal Emergency Management Agency (FEMA); March 1997.

12. *Hydrologic Soil Group – El Paso County Area, Colorado;* Web Soil Survey; Natural Resources Conservation Service (NRCS); United States Department of Agriculture (USDA); December 2010.

13. *Drainage Criteria Manual*; Volume 1; City of Colorado Springs & El Paso County; October 1987, Revised October 1994.

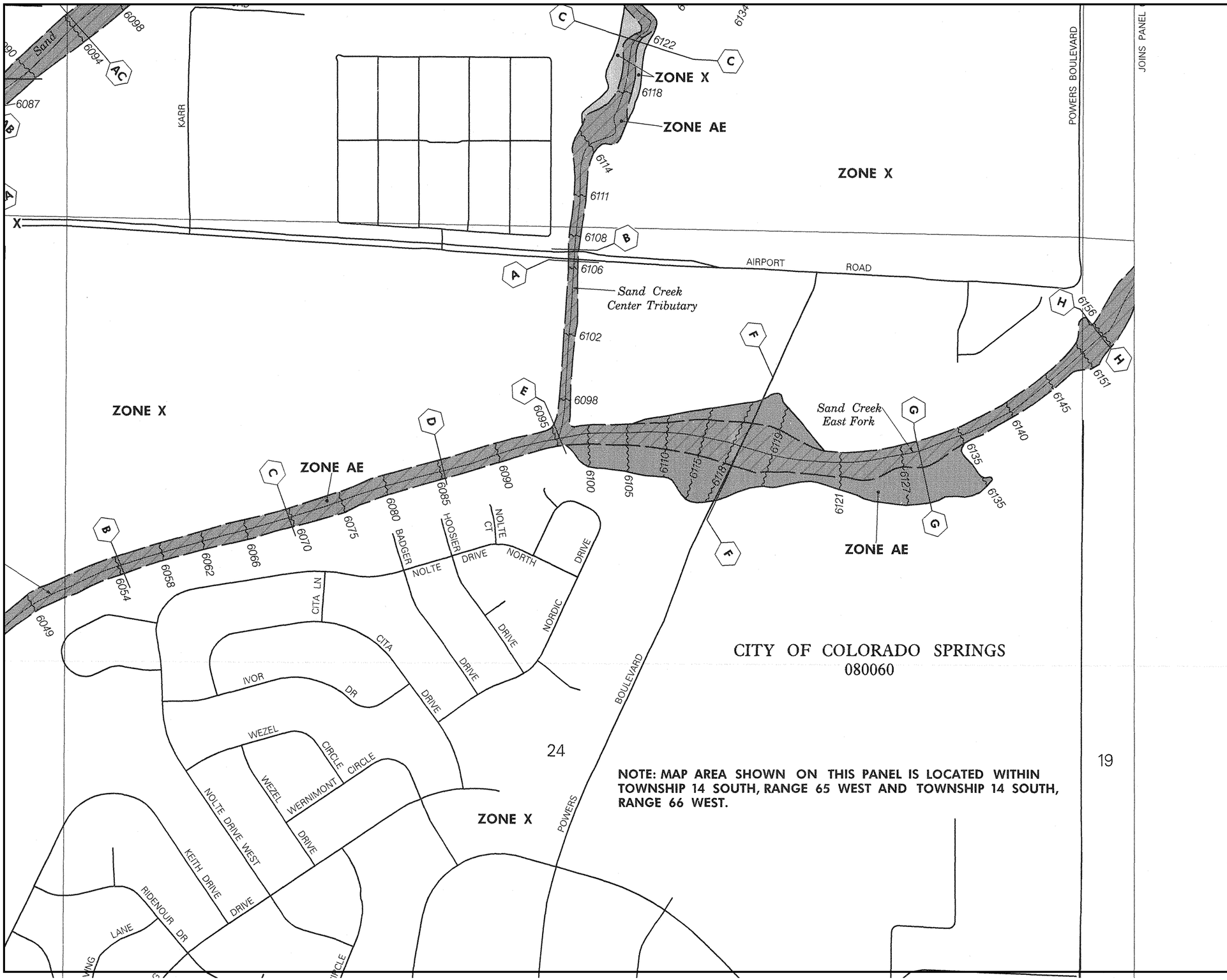
14. *CUHP 2005*; Version 1.3.3; Urban Drainage and Flood Control District (UDFCD); February 2010.

15. *Bentley CulvertMaster*; Version 3.2; Haestad Methods Solution Center; Bentley Systems, Inc.; August 2008.

16. *Drainage Report: Detention Pond 8*; Colorado Springs Airport; URS; October 2005.

APPENDIX A

FEMA Flood Insurance Rate Maps
FEMA LOMR
NRCS Existing Soils Map



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 753 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

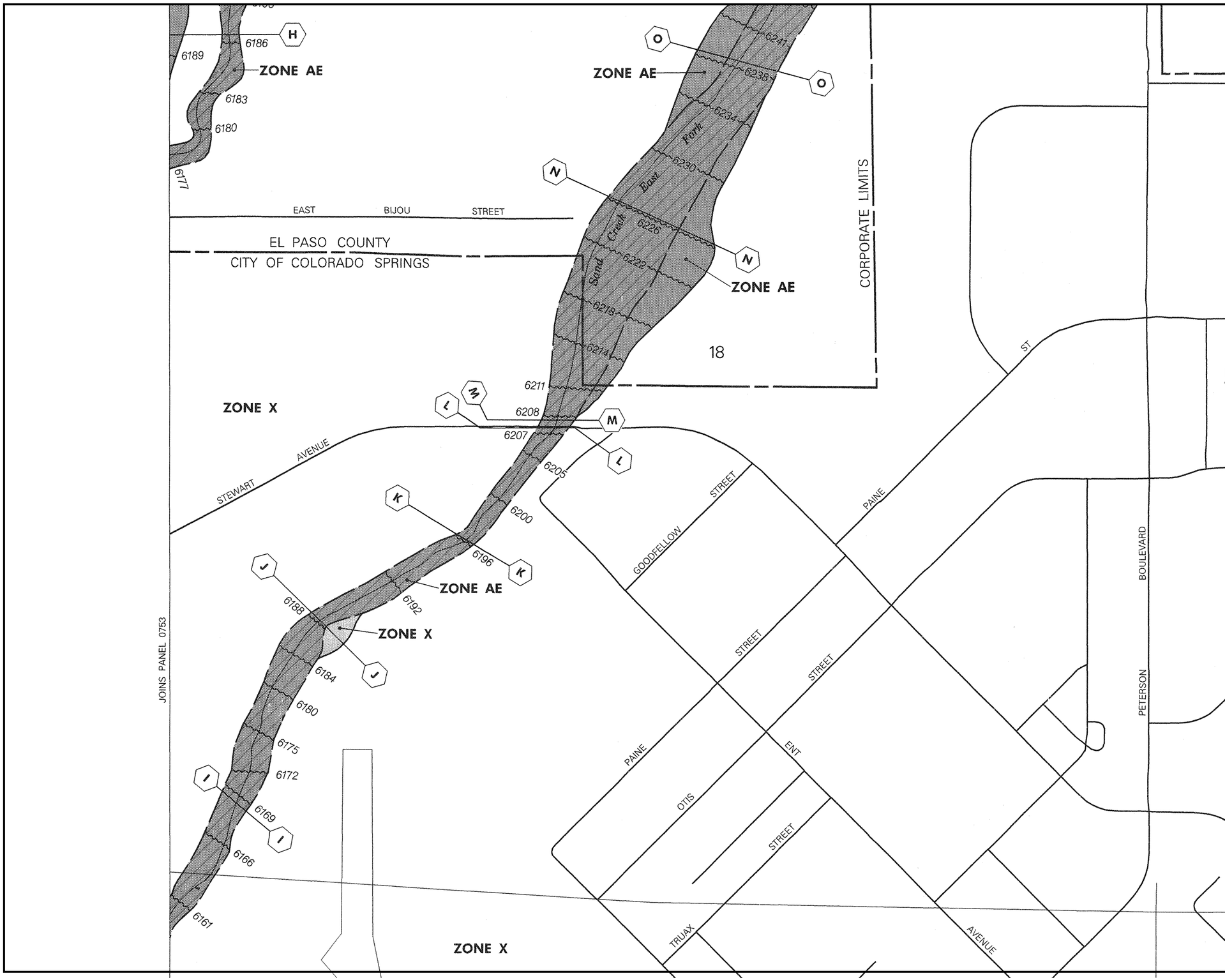
COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0753	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0753	F

MAP NUMBER 08041C0753 F

EFFECTIVE DATE: MARCH 17, 1997

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 754 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

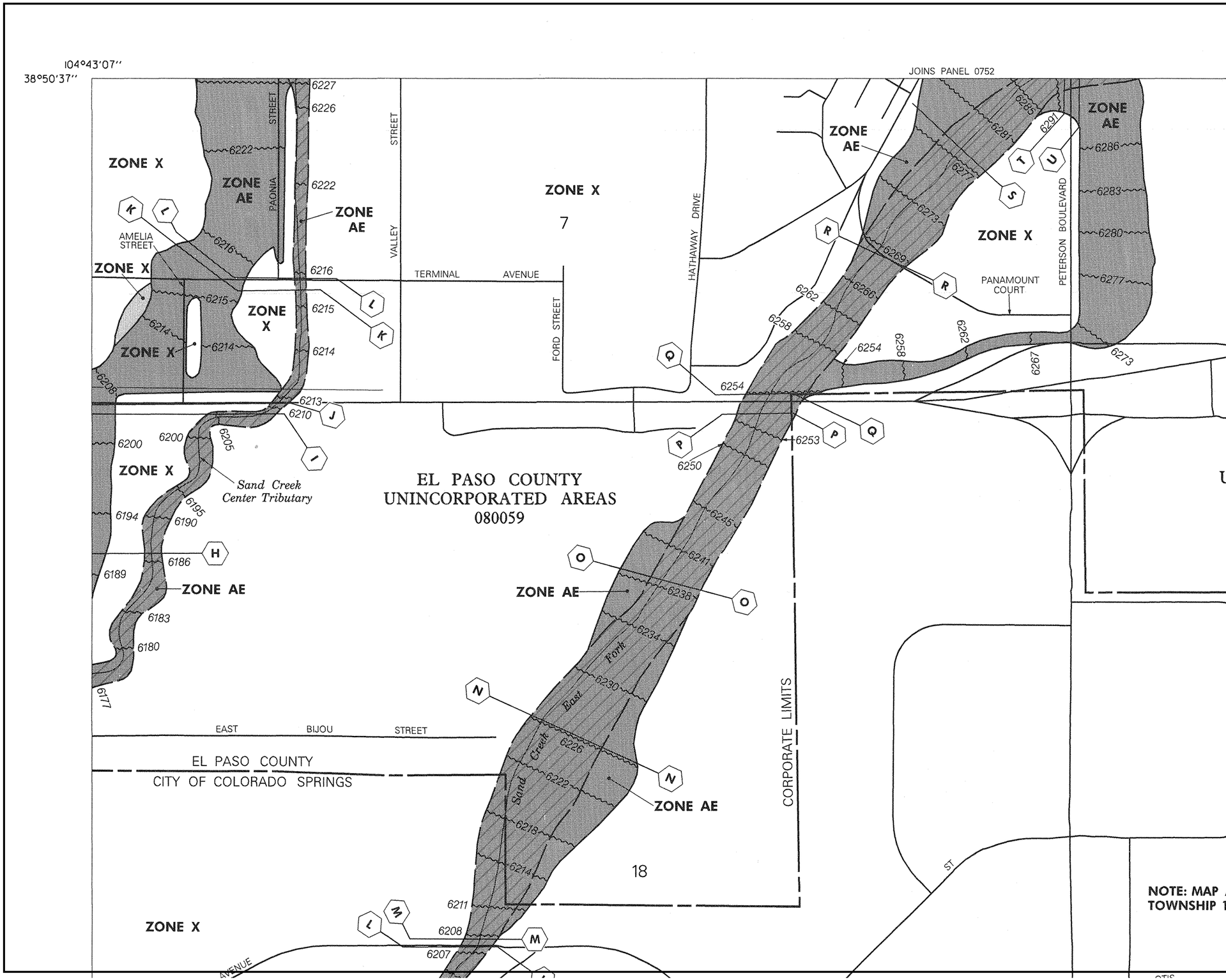
COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0754	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0754	F

MAP NUMBER
08041C0754 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 754 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0754	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0754	F

MAP NUMBER
08041C0754 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

NOTE: MAP A
TOWNSHIP 14

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Federal Emergency Management Agency

Washington, D.C. 20472

JAN 3 0 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Lionel Rivera
Mayor, City of Colorado Springs
P.O. Box 1575
Colorado Springs, CO 80901

IN REPLY REFER TO:
Case No.: 05-08-0368P
Community Name: City of Colorado Springs, CO
Community No.: 080060
Effective Date of This Revision: MAY 2 3 2007

Dear Mayor Rivera:

The Flood Insurance Study report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denver, Colorado, at (303) 235-4830, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Patrick, F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

For: William R. Blanton Jr., CFM, Chief
Engineering Management Section
Mitigation Division

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: The Honorable Sallie Clark
Chair, El Paso County
Board of Commissioners

[redacted]
Regional Floodplain Administrator
Pikes Peak Regional Building Department

[redacted]
J. F. Sato and Associates, Inc.

[redacted]
Engineering and Surveying, Inc.

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Colorado Springs El Paso County Colorado	CHANNELIZATION CULVERT	FLOODWAY HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA BASEMAP CHANGES
	COMMUNITY NO.: 080060		
IDENTIFIER	Sand Creek Center Tributary and East Fork LOMR	APPROXIMATE LATITUDE & LONGITUDE: 38.830, -104.720 SOURCE: USGS QUADRANGLE DATUM: NAD 27	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 08041C0753 F DATE: March 17, 1997 TYPE: FIRM NO.: 08041C0754 F DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE(S): 205P, 206P, 209P, and 210P FLOODWAY DATA TABLE: 5

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES) See Page 2 for Additional Flooding Sources

Sand Creek Center Tributary – from just upstream of Airport Road to approximately 1,350 feet upstream of East Frontage Road

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Sand Creek Center Tributary	Zone AE	Zone AE	YES	YES
	Floodway	Floodway	YES	YES
	BFEs*	BFEs	YES	YES
	Zone X (shaded)	Zone X (shaded)	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

FLOODING SOURCE(S) & REVISED REACH(ES)

Sand Creek East Fork – from approximately 970 feet downstream of Powers Boulevard to just downstream of Stewart Avenue

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Sand Creek East Fork	Zone AE	Zone AE	YES	YES
	Floodway	Floodway	YES	YES
	BFEs*	BFEs	YES	YES
	Zone X (shaded)	Zone X (shaded)	YES	YES

* BFEs - Base Flood Elevations

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 080059 **Name:** El Paso County, Colorado

AFFECTED MAP PANELS			AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM	NO.: 08041C0752 F	DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999
TYPE: FIRM	NO.: 08041C0753 F	DATE: March 17, 1997	PROFILE(S): 206P
TYPE: FIRM	NO.: 08041C0754 F	DATE: March 17, 1997	FLOODWAY DATA TABLE: 5

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Jeanine D. Petterson
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267
(303) 235-4830

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD 29)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Sand Creek Center Tributary	Approximately 150 feet upstream of Airport Road	6,109	6,108	08041C0753 F
	Approximately 1,250 feet upstream of East Frontage Road	6,168	6,164	08041C0753 F
Sand Creek East Fork	Approximately 810 feet downstream of Powers Boulevard	6,099	6,096	08041C0753 F
	Approximately 140 feet downstream of Stewart Avenue	6,206	6,205	08041C0754 F

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below.

LOCAL NEWSPAPER Name: *El Paso County News*
Dates: 02/14/2007 02/21/2007

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Sand Creek East Fork								
A	1,100	100	455	11.9	6,038.7	6,038.7	6,038.7	0.0
B	2,400	100	446	12.2	6,054.3	6,054.3	6,054.3	0.0
C	3,330	100	450	12.0	6,069.9	6,069.9	6,069.9	0.0
D	4,240	100	449	12.1	6,085.1	6,085.1	6,085.1	0.0
E	4,870	102	446	12.0	6,095.1	6,095.1	6,095.1	0.0
F	6,188	70	489	10.9	6,118.5	6,118.5	6,118.5	0.0
G	7,403	71	396	13.5	6,136.0	6,136.0	6,136.0	0.0
H	7,931	148	507	10.5	6,158.8	6,158.8	6,158.8	0.0
I	8,943	98	444	12.0	6,169.0	6,169.0	6,169.0	0.0
J	9,666	86	423	12.6	6,177.0	6,177.0	6,177.0	0.0
K	10,721	81	415	12.8	6,193.3	6,193.3	6,193.3	0.0
L	11,347	166	526	10.1	6,207.3	6,207.3	6,207.3	0.0
M	11,375	173	632	8.4	6,207.9	6,207.9	6,207.9	0.0
N	12,610	367	699	7.6	6,228.8	6,228.8	6,228.9	0.1
O	13,720	188	570	10.0	6,241.7	6,241.7	6,241.7	0.0
P	14,805	125	479	11.1	6,257.9	6,257.9	6,257.9	0.0
Q	14,885	125	601	8.9	6,259.9	6,259.9	6,259.9	1.0
R	15,850	228	582	9.2	6,268.7	6,268.7	6,268.7	0.0
S	16,325	300	678	7.9	6,277.3	6,277.3	6,277.5	0.2
T	16,995	321	690	7.7	6,291.4	6,291.4	6,292.0	0.6
U	17,065	326	667	8.0	6,291.4	6,291.4	6,292.1	0.7
V	17,915	388	1,598	3.3	6,293.4	6,293.4	6,294.0	0.6
W	18,995	367	683	7.8	6,307.2	6,307.2	6,307.6	0.4
X	20,525	413	706	7.5	6,326.4	6,326.4	6,327.1	0.7
Y	22,125	255	620	8.6	6,348.7	6,348.7	6,348.8	0.1
Z	23,105	397	706	7.6	6,359.9	6,359.9	6,359.9	0.0
AA	24,835	431	705	7.4	6,383.7	6,383.7	6,383.7	0.0
AB	26,505	353	667	7.8	6,401.0	6,401.0	6,401.5	0.5

Revised Data

Revised by LOMR dated OCT 07 2004

[1] Feet above confluence with Sand Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

AND INCORPORATED AREAS

FLOODWAY DATA

SAND CREEK EAST FORK

MAY 23 2007

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET (NGVD))	WITH FLOODWAY (FEET (NGVD))	INCREASE
Sand Creek Center Tributary				Revised Data				
A	940	40	92	8.6	6,106.5	6,106.5	6,106.5	0.0
B	990	40	118	6.7	6,107.2	6,107.2	6,107.2	0.0
C	2,238	91	120	6.6	6,120.2	6,120.2	6,120.2	0.0
D	3,948	46	95	8.0	6,138.3	6,138.3	6,138.3	0.0
E	4,547	170	159	4.8	6,147.4	6,147.4	6,147.4	0.0
F	5,539	52	97	7.8	6,156.8	6,156.8	6,156.8	0.0
G	7,191	63	104	7.3	6,176.2	6,176.2	6,176.2	0.0
H	7,940	52	98	7.8	6,189.6	6,189.6	6,189.6	0.0
I	8,527	40	67	5.7	6,197.6	6,197.6	6,197.6	0.0
J	9,366	17	42	9.0	6,213.4	6,213.4	6,213.4	0.0
K	10,055	232	278	4.0	6,221.9	6,221.9	6,221.9	0.0
L	10,627	539	469	2.4	6,230.6	6,230.6	6,230.6	0.0
M	11,321	31	79	9.1	6,241.1	6,241.1	6,241.1	0.0
N	11,648	60	99	7.3	6,244.6	6,244.6	6,245.4	0.8
O	12,840	29	85	9.6	6,253.8	6,253.8	6,253.8	0.0
P	13,730	27	83	9.9	6,273.6	6,273.6	6,273.6	0.0
Q	14,592	26	68	9.3	6,299.7	6,299.7	6,299.7	0.0
R	14,670	40	61	6.9	6,304.2	6,304.2*	6,305.2	1.0
S	15,050	20	63	10.1	6,307.6	6,307.6	6,308.1	0.5
T	15,460	25	68	9.5	6,310.8	6,310.8	6,311.4	0.6
U	15,750	20	41	7.8	6,319.6	6,319.6	6,319.6	0.0
V	16,670	20	39	8.1	6,346.0	6,346.0	6,346.0	0.0

[1] Feet Above confluence with Sand Creek East Fork

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

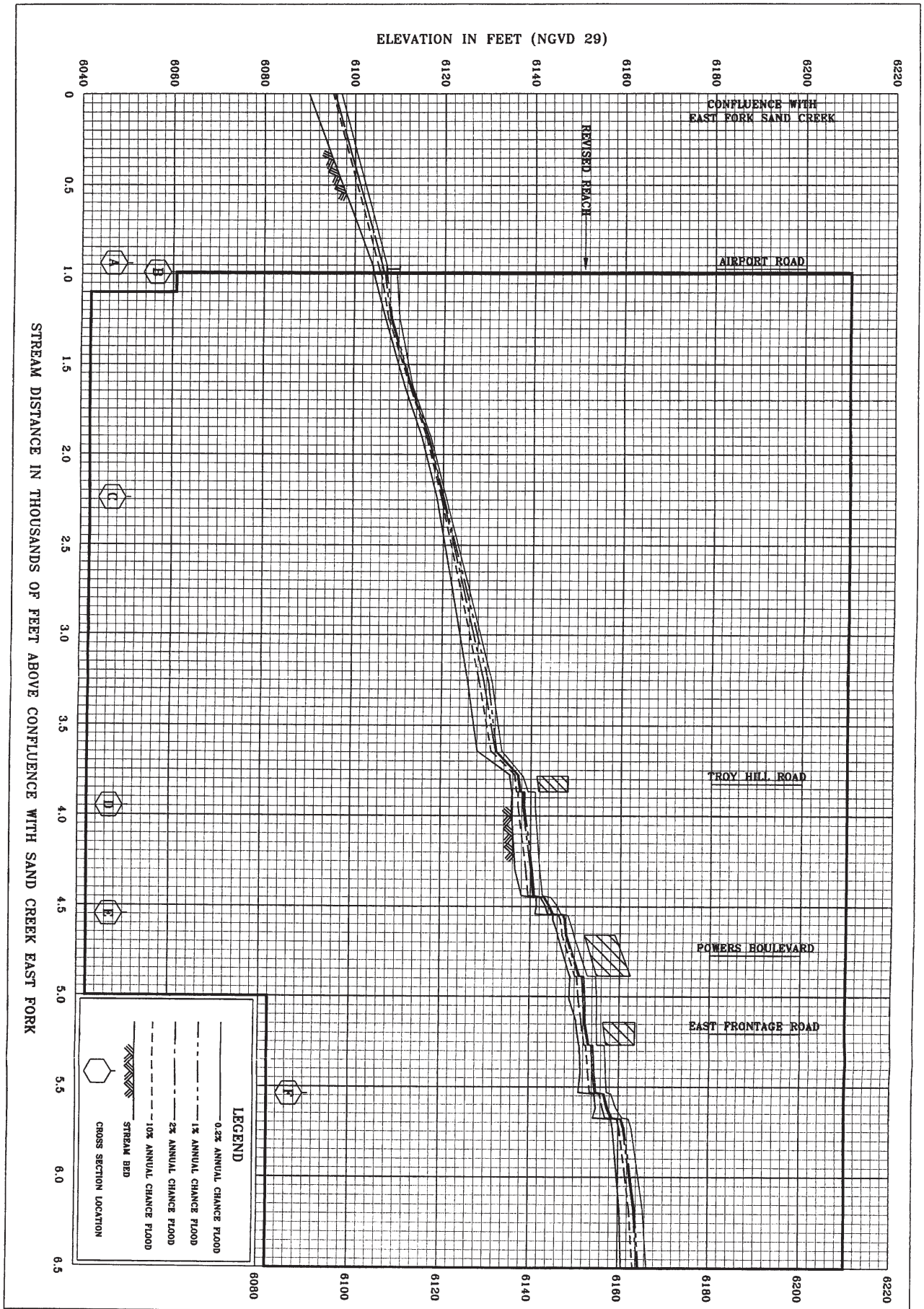
EL PASO COUNTY, CO

AND INCORPORATED AREAS

FLOODWAY DATA

MAY 23 2007

Sand Creek Center Tributary



FEDERAL EMERGENCY MANAGEMENT AGENCY

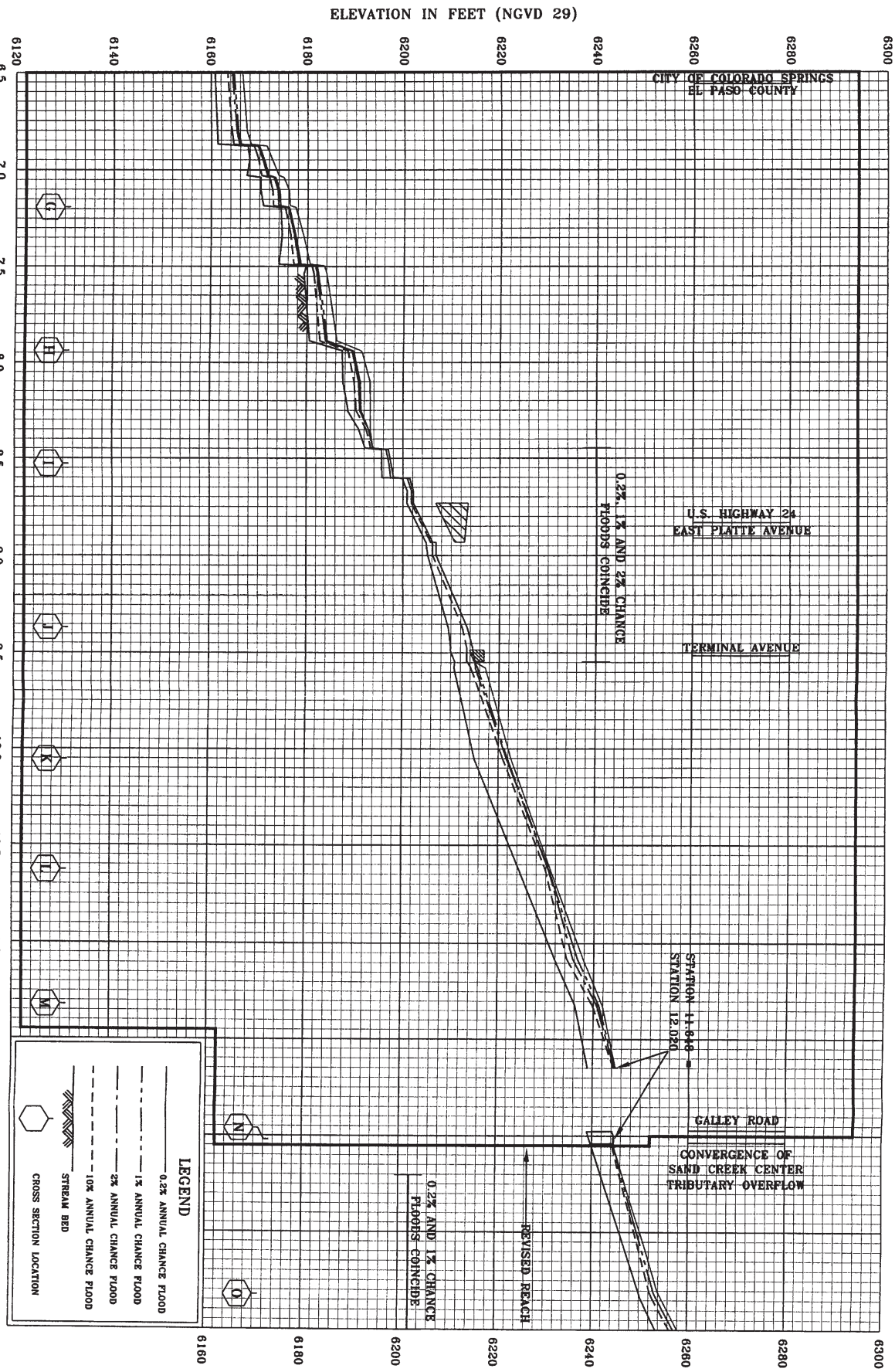
EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOOD PROFILES

SAND CREEK CENTER TRIBUTARY

MAR 2 5 2007

205P

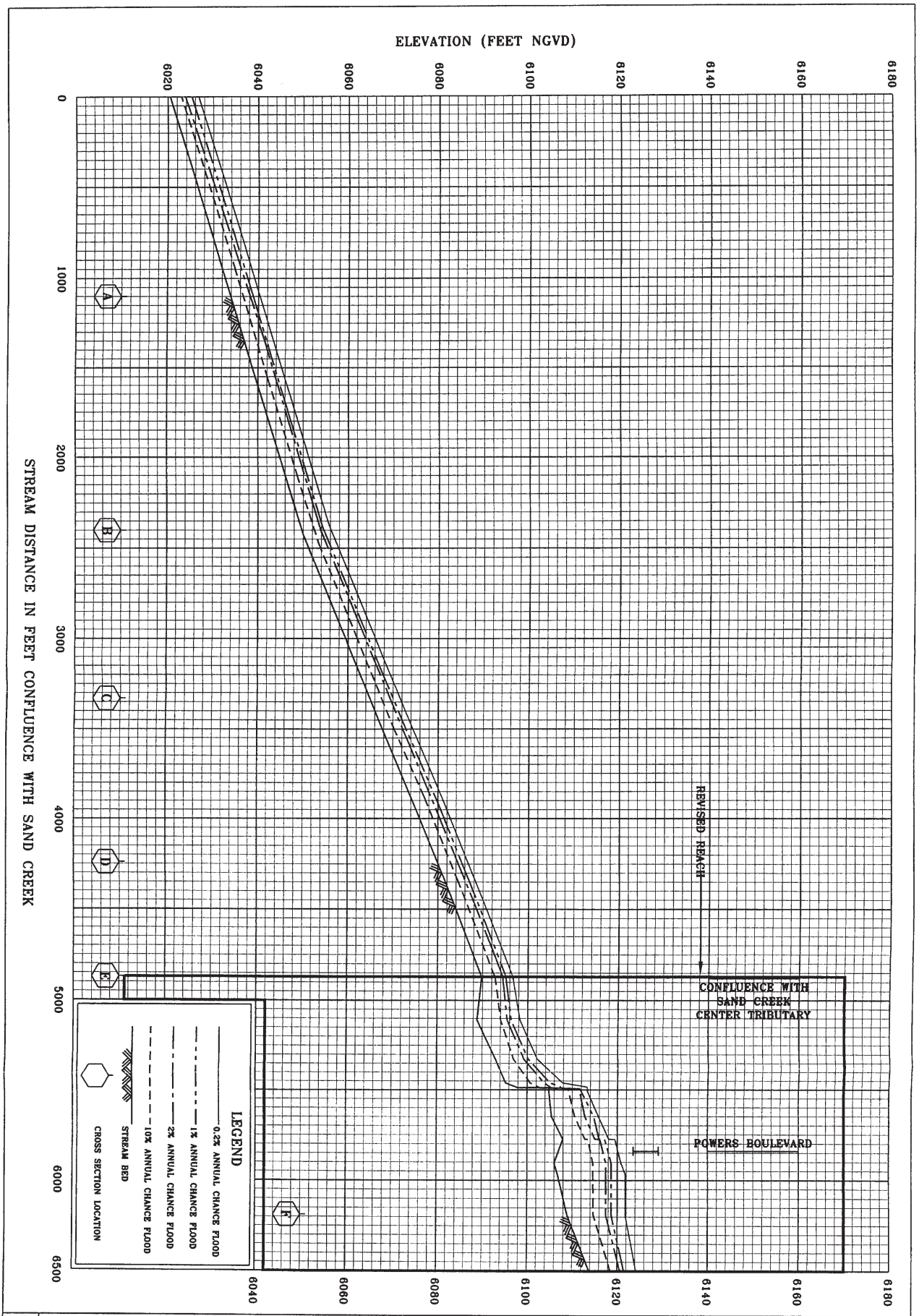


FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOOD PROFILES

SAND CREEK CENTER TRIBUTARY



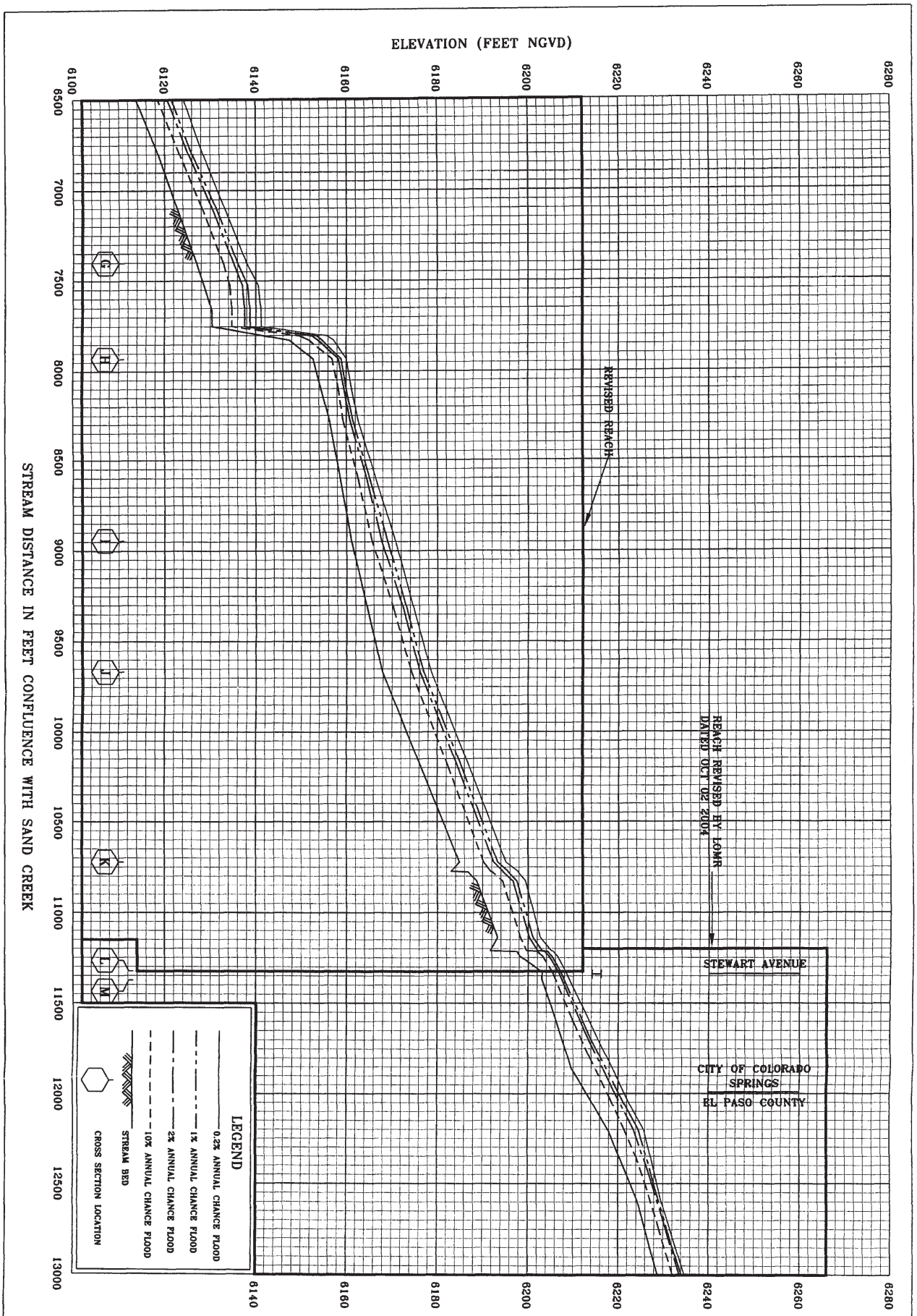
FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOOD PROFILES

SAND CREEK EAST FORK

209P

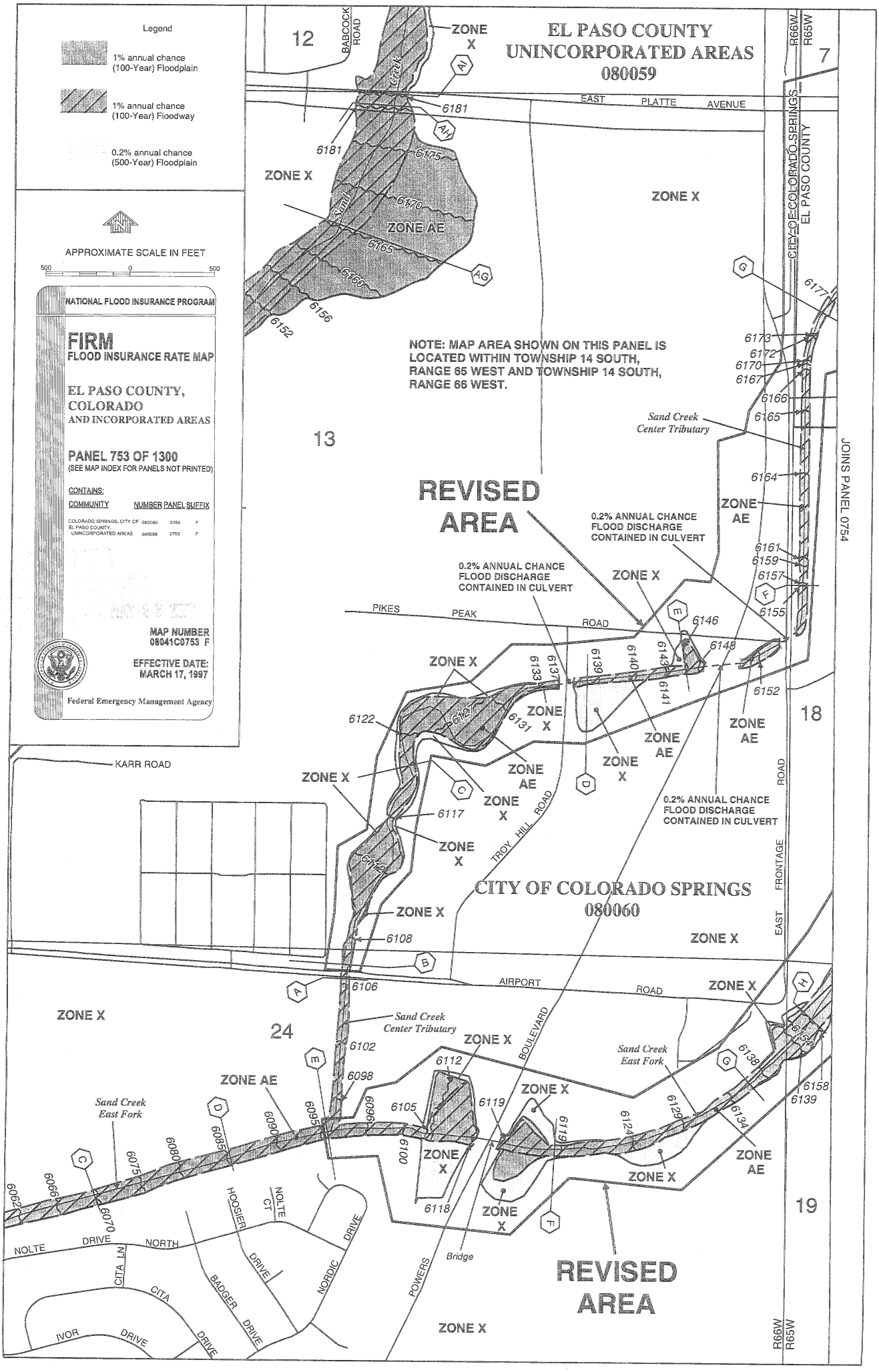


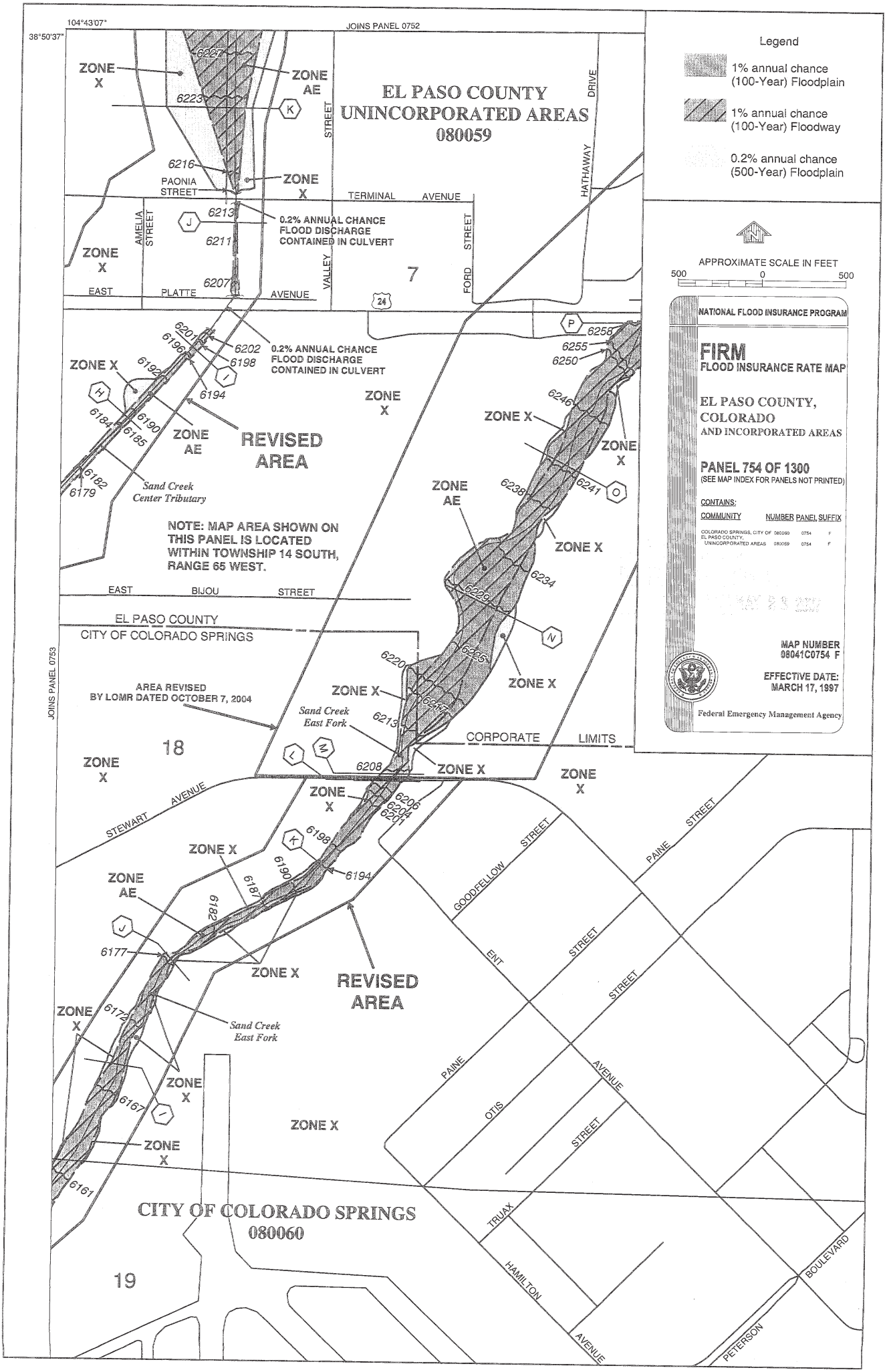
FEDERAL EMERGENCY MANAGEMENT AGENCY

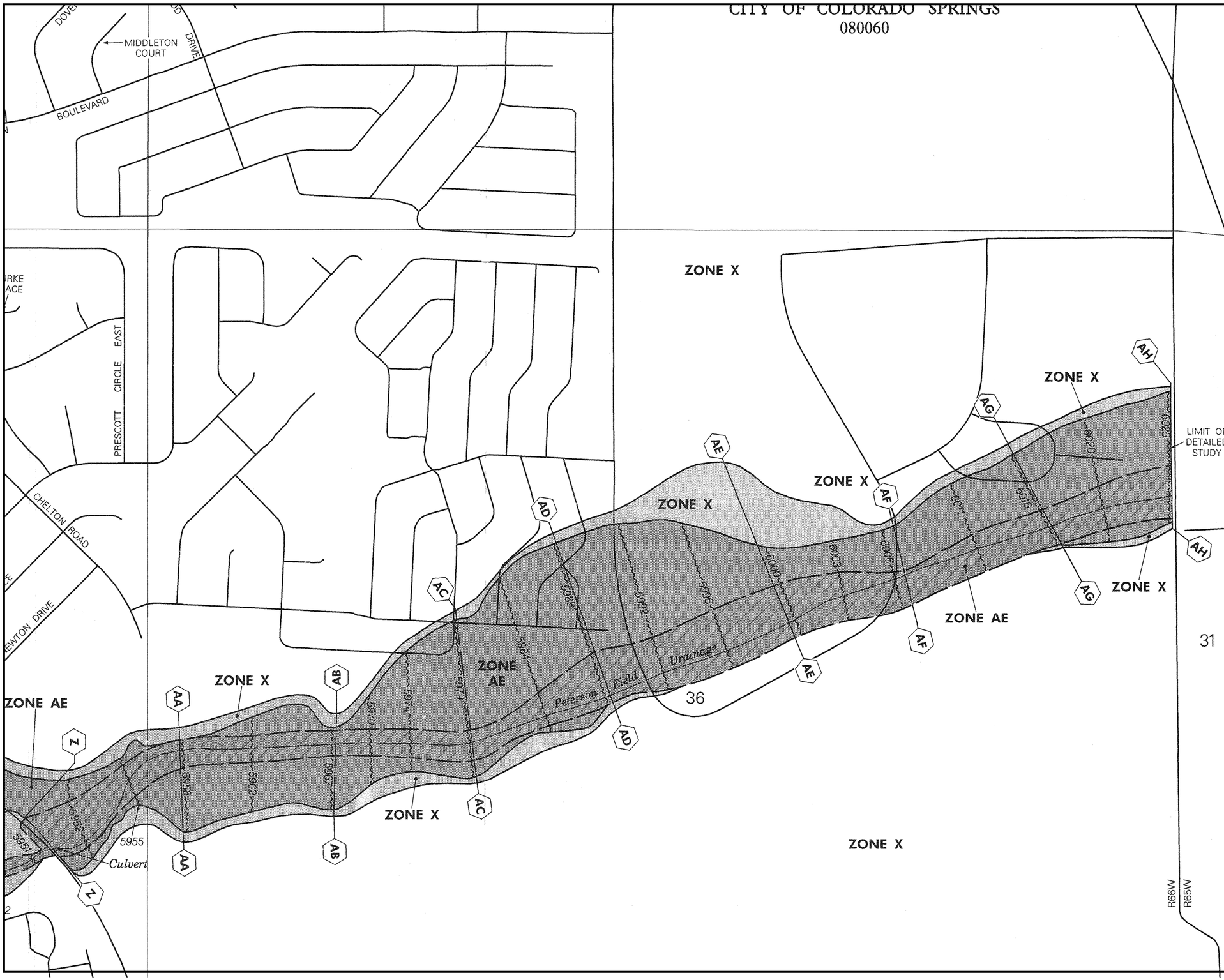
EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOOD PROFILES

SAND CREEK EAST FORK


Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
APPROXIMATE SCALE IN FEET
500 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 753 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
COLORADO SPRINGS, CITY OF 080060 0753 F
EL PASO COUNTY, UNINCORPORATED AREAS 080059 0753 F
MAP NUMBER 08041C0753 F
EFFECTIVE DATE: MARCH 17, 1997
Federal Emergency Management Agency
EL PASO COUNTY
UNINCORPORATED AREAS
080059
CITY OF COLORADO SPRINGS
080060
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 14 SOUTH, RANGE 65 WEST AND TOWNSHIP 14 SOUTH, RANGE 66 WEST.
REVISED AREA
REVISED AREA
0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
ZONE X
ZONE AE
Sand Creek
Sand Creek Center Tributary
Sand Creek East Fork
Bridge
EAST PLATTE AVENUE
PIKES PEAK ROAD
KARR ROAD
TROY HILL ROAD
AIRPORT ROAD
BOULEVARD
POWERS
NOLTE DRIVE
NORTH
CITA LN
CITA DRIVE
IVOR DRIVE
BADGER DRIVE
HOOSIER DRIVE
NOLTE CT
NORDIC DRIVE
EAST FRONTAGE ROAD
BABCOCK ROAD
CITY OF COLORADO SPRINGS
EL PASO COUNTY
JOINS PANEL 0754
R66W
R65W
12
13
18
19
24
7


104°43'07"
38°50'37"
JOINS PANEL 0752
JOINS PANEL 0753
EL PASO COUNTY
UNINCORPORATED AREAS
080059
Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
APPROXIMATE SCALE IN FEET
500 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 754 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
COLORADO SPRINGS, CITY OF 080060 0754 F
EL PASO COUNTY, UNINCORPORATED AREAS 080059 0754 F
MAP NUMBER 08041C0754 F
EFFECTIVE DATE: MARCH 17, 1997
Federal Emergency Management Agency
ZONE X
ZONE AE
PAONIA STREET
TERMINAL AVENUE
AMELIA STREET
VALLEY STREET
FORD STREET
HATHAWAY DRIVE
EAST PLATTE AVENUE
0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
REVISED AREA
Sand Creek Center Tributary
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 14 SOUTH, RANGE 65 WEST.
EAST BIJOU STREET
EL PASO COUNTY
CITY OF COLORADO SPRINGS
AREA REVISED BY LOMR DATED OCTOBER 7, 2004
Sand Creek East Fork
CORPORATE LIMITS
STEWART AVENUE
GOODFELLOW STREET
PAINE STREET
ENT STREET
OTIS STREET
PAINE AVENUE
TRUAX
HAMILTON AVENUE
PETERSON BOULEVARD
CITY OF COLORADO SPRINGS
080060
7
18
19



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 761 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0761	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0761	F

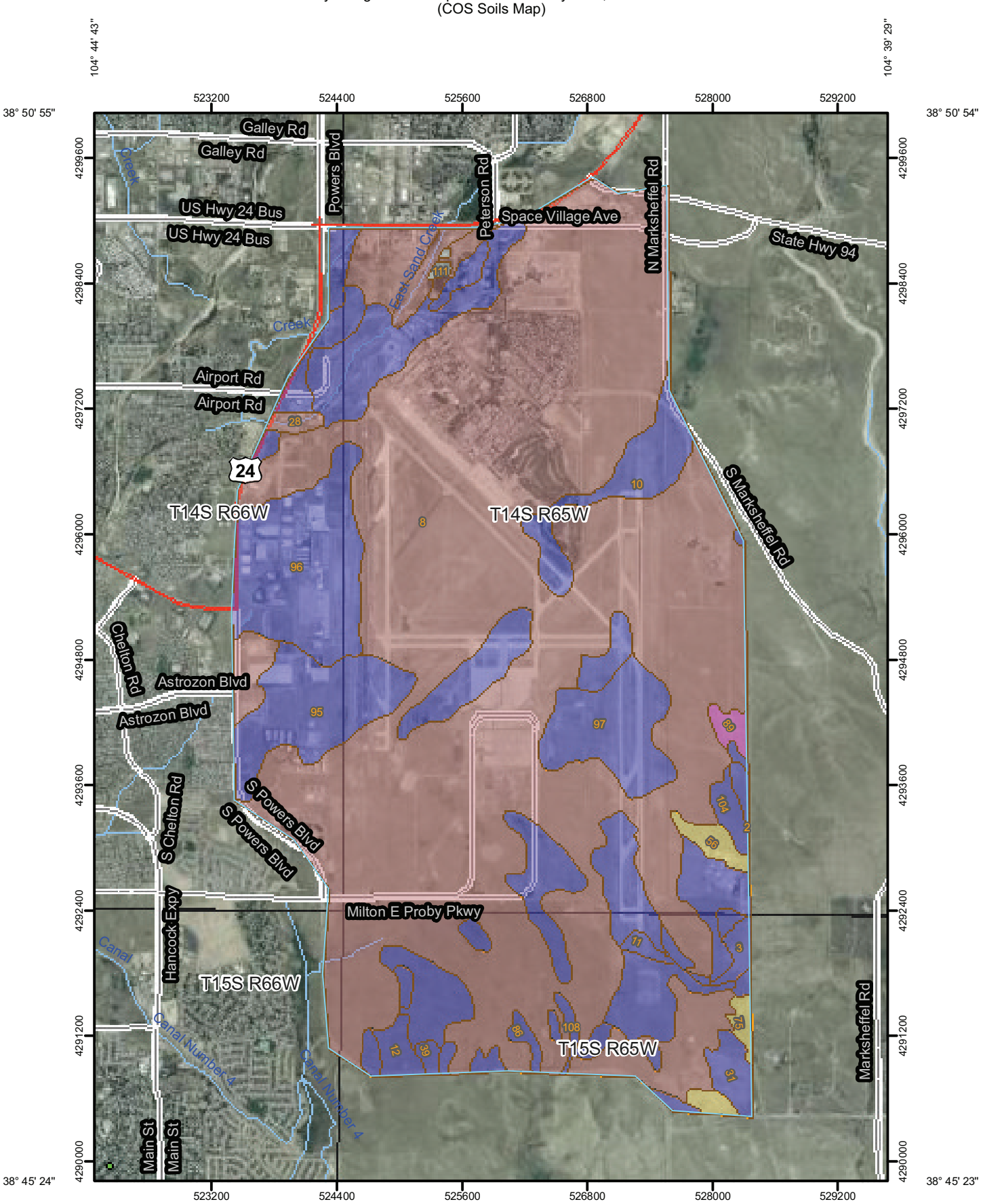
MAP NUMBER 08041C0761 F

EFFECTIVE DATE: MARCH 17, 1997

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Hydrologic Soil Group—El Paso County Area, Colorado
(COS Soils Map)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:48,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 13N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 7, May 4, 2009

Date(s) aerial images were photographed: 7/30/2005; 7/29/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — El Paso County Area, Colorado				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
2	Ascalon sandy loam, 1 to 3 percent slopes	B	0.1	0.0%
3	Ascalon sandy loam, 3 to 9 percent slopes	B	45.7	0.5%
8	Blakeland loamy sand, 1 to 9 percent slopes	A	5,776.5	66.0%
10	Blendon sandy loam, 0 to 3 percent slopes	B	203.5	2.3%
11	Bresser sandy loam, 0 to 3 percent slopes	B	52.1	0.6%
12	Bresser sandy loam, 3 to 5 percent slopes	B	44.3	0.5%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A	69.5	0.8%
31	Fort Collins loam, 3 to 8 percent slopes	B	61.2	0.7%
39	Keith silt loam, 0 to 3 percent slopes	B	14.6	0.2%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	C	64.5	0.7%
75	Razor-Midway complex	C	24.1	0.3%
86	Stoneham sandy loam, 3 to 8 percent slopes	B	62.6	0.7%
89	Tassel fine sandy loam, 3 to 18 percent slopes	D	29.7	0.3%
95	Truckton loamy sand, 1 to 9 percent slopes	B	337.0	3.9%
96	Truckton sandy loam, 0 to 3 percent slopes	B	1,051.5	12.0%
97	Truckton sandy loam, 3 to 9 percent slopes	B	831.4	9.5%
104	Vona sandy loam, 1 to 3 percent slopes	B	48.0	0.5%
108	Wiley silt loam, 3 to 9 percent slopes	B	25.5	0.3%
111	Water		8.6	0.1%
Totals for Area of Interest			**8,750.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

APPENDIX B

CUHP Input & Output
CulvertMaster Output

Summary of CUHP Input Parameters (Version 1.3.3)

							Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			
Catchment Name/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	Percent Eff. Imperv.
Big Johnson	100 YR	1.07	0.54	1.03	0.035	6.0	0.35	0.10	4.80	0.80	0.0010	0.00	0.12	0.06	5.13
Windmill Gulch	100 YR	2.72	1.06	2.02	0.023	10.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.20	0.10	8.65
Peterson	100 YR	6.79	2.31	5.74	0.013	32.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.64	0.18	30.13
Jimmy Camp Creek N	100 YR	1.51	0.82	1.81	0.040	5.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.10	0.05	4.26
Jimmy Camp Creek S	100 YR	0.63	0.32	1.59	0.050	1.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.02	0.01	0.84

Summary of CUHP Input Parameters (Version 1.3.3)

							Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			
Catchment Name/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	Percent Eff. Imperv.
BJ-1	100 YR	0.14	0.22	0.57	0.035	1.0	0.35	0.10	4.80	0.80	0.0010	0.00	0.02	0.01	0.84
BJ-2	100 YR	0.68	0.54	1.03	0.035	15.0	0.35	0.10	4.80	0.80	0.0010	0.00	0.30	0.12	13.38
BJ-3	100 YR	0.11	0.27	0.62	0.040	15.0	0.35	0.10	4.80	0.80	0.0010	0.00	0.30	0.12	13.38
BJ-4	100 YR	0.04	0.14	0.49	0.040	1.0	0.35	0.10	4.80	0.80	0.0010	0.00	0.00	0.01	0.84
BJ-5	100 YR	0.02	0.10	0.45	0.040	1.0	0.35	0.10	4.80	0.80	0.0010	0.00	0.00	0.01	0.84
BJ-6	100 YR	0.08	0.21	0.50	0.040	1.0	0.35	0.10	4.80	0.80	0.0010	0.00	0.02	0.01	0.84
WG-1	100 YR	0.27	0.39	0.74	0.023	5.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.10	0.05	4.26
WG-2	100 YR	0.10	0.22	0.50	0.020	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.02	0.01	0.84
WG-3	100 YR	0.36	0.50	0.96	0.023	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.02	0.01	0.84
WG-4	100 YR	0.13	0.29	0.68	0.015	35.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.70	0.19	33.22
WG-5	100 YR	0.14	0.32	0.59	0.015	35.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.70	0.19	33.22
WG-6	100 YR	0.04	0.20	0.44	0.023	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.00	0.01	0.84
WG-7	100 YR	0.13	0.24	0.61	0.023	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.02	0.01	0.84
WG-8	100 YR	0.34	0.27	0.86	0.023	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.02	0.01	0.84
WG-9	100 YR	0.17	0.24	0.46	0.023	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.02	0.01	0.84
WG-10	100 YR	0.13	0.51	1.04	0.010	15.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.30	0.12	13.38
WG-11	100 YR	0.24	0.45	1.10	0.026	5.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.10	0.05	4.26
WG-12	100 YR	0.08	0.19	1.20	0.040	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.02	0.01	0.84
WG-13	100 YR	0.03	0.09	0.24	0.040	1.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.00	0.01	0.84
WG-14	100 YR	0.61	0.53	1.20	0.023	5.0	0.35	0.10	4.85	0.85	0.0010	0.00	0.10	0.05	4.26
PD-1	100 YR	0.24	0.49	0.96	0.010	30.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.60	0.17	28.09
PD-2	100 YR	0.11	0.32	1.02	0.015	35.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.70	0.19	33.22
PD-3	100 YR	0.19	0.45	0.82	0.013	20.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.40	0.13	18.21
PD-4	100 YR	0.23	0.61	1.29	0.010	15.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.30	0.12	13.38
PD-5	100 YR	0.61	0.60	2.18	0.013	20.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.40	0.13	18.21
PD-6	100 YR	0.72	0.43	1.20	0.016	5.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.10	0.05	4.26
PD-7	100 YR	0.18	0.20	0.81	0.040	10.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.20	0.10	8.65
PD-8	100 YR	0.32	0.80	1.23	0.014	30.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.60	0.17	28.09
PD-9	100 YR	0.09	0.21	0.49	0.024	15.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.30	0.12	13.38
PD-10	100 YR	1.78	1.26	2.17	0.013	2.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.04	0.02	1.69
PD-OS-1	100 YR	0.35	0.44	1.09	0.013	25.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.50	0.15	23.10
PD-OS-2	100 YR	0.17	0.30	0.53	0.017	30.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.60	0.17	28.09
PD-OS-3	100 YR	0.16	0.32	1.21	0.015	15.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.30	0.12	13.38
PD-OS-4	100 YR	0.08	0.25	0.54	0.016	10.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.20	0.10	8.65
P-AFB-1	100 YR	1.56	0.95	1.93	0.013	45.0	0.35	0.10	4.90	0.90	0.0008	0.00	0.83	0.22	43.52

Summary of CUHP Input Parameters (Version 1.3.3)

							Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			
Catchment Name/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	Percent Eff. Imperv.
JCC-N1	100 YR	0.54	0.34	1.06	0.050	1.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.02	0.01	0.84
JCC-N2	100 YR	0.27	0.55	1.47	0.010	1.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.02	0.01	0.84
JCC-N3	100 YR	0.35	0.35	1.45	0.010	20.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.40	0.13	18.21
JCC-N4	100 YR	0.35	0.47	0.89	0.021	5.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.10	0.05	4.26
JCC-S1	100 YR	0.09	0.17	0.51	0.050	1.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.02	0.01	0.84
JCC-S2	100 YR	0.11	0.20	0.44	0.050	1.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.02	0.01	0.84
JCC-S3	100 YR	0.43	0.40	1.18	0.050	1.0	0.35	0.10	4.60	0.70	0.0018	0.00	0.02	0.01	0.84

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.3.3)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph		
Catchment Name/ID	User Comment for Catchment	Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)
Big Johnson	100 YR Design Storm	0.144	0.315	36.2	10.24	18.8	7.24	17.1	887	2,485,824	1.03	2,571,061	50.0	730	2,569,672
Windmill Gulch	100 YR Design Storm	0.131	0.341	64.2	18.29	33.4	12.93	30.5	1,271	6,319,104	1.06	6,677,692	65.0	1,202	6,677,207
Peterson	100 YR Design Storm	0.099	0.533	85.7	30.01	44.6	20.06	61.0	2,376	15,774,528	1.30	20,499,059	95.0	2,748	20,495,601
Jimmy Camp Creek N	100 YR Design Storm	0.147	0.337	53.6	15.37	27.8	10.86	25.6	846	3,508,032	1.40	4,910,154	60.0	1,014	4,909,355
Jimmy Camp Creek S	100 YR Design Storm	0.160	0.321	34.6	10.04	18.0	7.10	16.7	546	1,463,616	1.35	1,981,395	50.0	571	1,981,143

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.3.3)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph		
Catchment Name/ID	User Comment for Catchment	Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)
BJ-1	100 YR Design Storm	0.191	0.256	28.9	7.18	15.0	5.07	12.0	145	325,248	0.96	312,919	45.0	106	312,948
BJ-2	100 YR Design Storm	0.120	0.276	34.4	8.80	17.9	6.22	14.7	594	1,579,776	1.18	1,859,772	45.0	523	1,856,967
BJ-3	100 YR Design Storm	0.155	0.210	31.7	6.62	16.5	4.68	11.0	104	255,552	1.18	300,845	45.0	89	300,912
BJ-4	100 YR Design Storm	0.282	0.212	37.2	7.57	19.4	5.35	12.6	32	92,928	0.96	89,400	45.0	25	89,360
BJ-5	100 YR Design Storm	0.349	0.191	41.8	7.65	21.8	5.40	12.7	14	46,464	0.96	44,700	50.0	11	44,670
BJ-6	100 YR Design Storm	0.227	0.236	33.2	7.51	17.3	5.31	12.5	72	185,856	0.96	178,811	45.0	54	178,611
WG-1	100 YR Design Storm	0.147	0.260	36.1	8.72	18.8	6.16	14.5	225	627,264	0.98	614,425	45.0	174	614,235
WG-2	100 YR Design Storm	0.212	0.244	36.2	8.27	18.8	5.84	13.8	83	232,320	0.92	213,901	45.0	61	213,805
WG-3	100 YR Design Storm	0.160	0.295	44.1	11.51	23.0	8.13	19.2	245	836,352	0.92	770,045	50.0	190	769,679
WG-4	100 YR Design Storm	0.119	0.319	21.9	6.87	11.4	4.85	11.4	178	302,016	1.51	455,795	40.0	163	455,558
WG-5	100 YR Design Storm	0.116	0.322	20.7	6.64	10.8	4.69	11.1	202	325,248	1.51	490,856	40.0	183	490,548
WG-6	100 YR Design Storm	0.282	0.212	47.9	9.31	24.9	6.58	15.5	25	92,928	0.92	85,556	50.0	20	85,517
WG-7	100 YR Design Storm	0.196	0.253	35.6	8.42	18.5	5.95	14.0	110	302,016	0.92	278,072	45.0	81	277,879
WG-8	100 YR Design Storm	0.160	0.293	31.4	8.56	16.3	6.05	14.3	325	789,888	0.92	727,265	45.0	236	725,778
WG-9	100 YR Design Storm	0.180	0.264	27.5	7.06	14.3	4.99	11.8	186	394,944	0.92	363,632	45.0	128	363,549
WG-10	100 YR Design Storm	0.147	0.216	71.2	13.29	37.0	9.39	22.1	55	302,016	1.14	344,479	60.0	55	344,351
WG-11	100 YR Design Storm	0.149	0.256	46.7	10.68	24.3	7.55	17.8	154	557,568	0.98	546,156	50.0	127	545,652
WG-12	100 YR Design Storm	0.227	0.236	48.2	10.22	25.1	7.22	17.0	50	185,856	0.92	171,121	50.0	39	170,942
WG-13	100 YR Design Storm	0.308	0.203	24.4	5.31	12.7	3.75	8.9	37	69,696	0.92	64,167	40.0	25	64,056
WG-14	100 YR Design Storm	0.147	0.294	46.7	12.04	24.3	8.51	20.1	392	1,417,152	0.98	1,388,146	55.0	326	1,387,383
PD-1	100 YR Design Storm	0.102	0.307	32.9	9.25	17.1	6.54	15.4	219	557,568	1.26	700,494	45.0	197	699,925
PD-2	100 YR Design Storm	0.125	0.311	30.2	8.70	15.7	6.15	14.5	109	255,552	1.37	348,941	45.0	102	348,440
PD-3	100 YR Design Storm	0.123	0.242	41.7	9.26	21.7	6.55	15.4	137	441,408	1.05	463,777	50.0	114	463,390
PD-4	100 YR Design Storm	0.123	0.235	66.1	13.44	34.4	9.49	22.4	104	534,336	0.95	509,492	60.0	87	509,427
PD-5	100 YR Design Storm	0.113	0.289	59.1	14.60	30.7	10.32	24.3	309	1,417,152	1.05	1,488,967	60.0	277	1,487,975
PD-6	100 YR Design Storm	0.147	0.302	44.9	11.90	23.4	8.41	19.8	481	1,672,704	0.77	1,294,277	50.0	327	1,293,317
PD-7	100 YR Design Storm	0.145	0.227	27.1	6.21	14.1	4.39	10.4	200	418,176	0.86	359,756	40.0	130	358,902
PD-8	100 YR Design Storm	0.101	0.320	40.9	11.57	21.3	8.18	19.3	235	743,424	1.26	933,992	50.0	224	933,988
PD-9	100 YR Design Storm	0.165	0.204	31.1	6.37	16.2	4.50	10.6	87	209,088	0.95	199,366	45.0	62	199,467
PD-10	100 YR Design Storm	0.157	0.367	92.0	27.43	47.9	19.38	45.7	580	4,135,296	0.72	2,993,467	80.0	407	2,993,023
PD-OS-1	100 YR Design Storm	0.107	0.290	34.3	9.14	17.8	6.46	15.2	306	813,120	1.15	936,311	45.0	262	935,321
PD-OS-2	100 YR Design Storm	0.114	0.291	20.2	6.01	10.5	4.25	10.0	253	394,944	1.26	496,183	40.0	197	496,005

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.3.3)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph		
Catchment Name/ID	User Comment for Catchment	Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)
PD-OS-3	100 YR Design Storm	0.138	0.223	50.5	10.12	26.2	7.15	16.9	95	371,712	0.95	354,429	50.0	76	354,300
PD-OS-4	100 YR Design Storm	0.186	0.201	44.9	8.41	23.3	5.95	14.0	54	185,856	0.86	159,892	50.0	39	159,729
P-AFB-1	100 YR Design Storm	0.091	0.600	27.1	9.48	14.1	6.34	23.3	1,727	3,624,192	1.58	5,737,132	50.0	1,762	5,732,055
JCC-N1	100 YR Design Storm	0.160	0.314	30.0	8.74	15.6	6.17	14.6	539	1,254,528	1.35	1,698,338	45.0	545	1,695,936
JCC-N2	100 YR Design Storm	0.160	0.283	72.3	17.20	37.6	12.15	28.7	112	627,264	1.35	849,169	65.0	137	849,067
JCC-N3	100 YR Design Storm	0.113	0.265	43.4	10.36	22.6	7.32	17.3	242	813,120	1.60	1,297,797	50.0	296	1,297,263
JCC-N4	100 YR Design Storm	0.147	0.271	42.4	10.31	22.0	7.29	17.2	248	813,120	1.40	1,138,115	50.0	277	1,137,660
JCC-S1	100 YR Design Storm	0.219	0.240	27.2	6.51	14.1	4.60	10.8	99	209,088	1.35	283,056	40.0	94	282,707
JCC-S2	100 YR Design Storm	0.206	0.247	25.0	6.24	13.0	4.41	10.4	132	255,552	1.35	345,958	40.0	124	345,576
JCC-S3	100 YR Design Storm	0.160	0.303	35.4	9.74	18.4	6.88	16.2	364	998,976	1.35	1,352,380	50.0	382	1,352,483

Culvert Calculator Report
BJ-01 - 8' x 6' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,983.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,983.00	ft	Discharge	507.60	cfs
Inlet Control HW Elev.	5,983.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,982.75	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,974.00	ft	Downstream Invert	5,972.00	ft
Length	148.00	ft	Constructed Slope	0.013514	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.65	ft
Slope Type	Steep		Normal Depth	3.24	ft
Flow Regime	Supercritical		Critical Depth	5.00	ft
Velocity Downstream	17.38	ft/s	Critical Slope	0.004247	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 6 ft		Rise	6.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,982.75	ft	Upstream Velocity Head	2.50	ft
Ke	0.50		Entrance Loss	1.25	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,983.00	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	48.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
BJ-02 - 8' x 4' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,912.00	ft	Headwater Depth/Height	3.00	
Computed Headwater Elevation	5,912.00	ft	Discharge	504.19	cfs
Inlet Control HW Elev.	5,912.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,909.79	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,900.00	ft	Downstream Invert	5,895.00	ft
Length	184.00	ft	Constructed Slope	0.027174	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.89	ft
Slope Type	Steep		Normal Depth	2.51	ft
Flow Regime	Supercritical		Critical Depth	4.00	ft
Velocity Downstream	21.84	ft/s	Critical Slope	0.012948	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 4 ft		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,909.79	ft	Upstream Velocity Head	3.86	ft
Ke	0.50		Entrance Loss	1.93	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,912.00	ft	Flow Control	Submerged	
Inlet Type	30 to 75° wingwall flares		Area Full	32.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
BJ-02 - 8' x 8' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,912.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,912.00	ft	Discharge	785.62	cfs
Inlet Control HW Elev.	5,912.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,911.71	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,900.00	ft	Downstream Invert	5,895.00	ft
Length	184.00	ft	Constructed Slope	0.027174	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	4.16	ft
Slope Type	Steep		Normal Depth	3.45	ft
Flow Regime	Supercritical		Critical Depth	6.69	ft
Velocity Downstream	23.62	ft/s	Critical Slope	0.004848	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 8 ft		Rise	8.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,911.71	ft	Upstream Velocity Head	3.35	ft
Ke	0.50		Entrance Loss	1.67	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,912.00	ft	Flow Control	Submerged	
Inlet Type	30 to 75° wingwall flares		Area Full	64.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
BJ-03 - 60" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,905.50	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,905.50	ft	Discharge	202.95	cfs
Inlet Control HW Elev.	5,905.50	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,905.35	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,898.00	ft	Downstream Invert	5,889.00	ft
Length	220.00	ft	Constructed Slope	0.040909	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.31	ft
Slope Type	Steep		Normal Depth	2.15	ft
Flow Regime	Supercritical		Critical Depth	4.06	ft
Velocity Downstream	22.88	ft/s	Critical Slope	0.006166	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,905.35	ft	Upstream Velocity Head	2.19	ft
Ke	0.50		Entrance Loss	1.10	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,905.50	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	19.6	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
BJ-04 - 42" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,937.25	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,937.25	ft	Discharge	95.60	cfs
Inlet Control HW Elev.	5,937.25	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,937.21	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,932.00	ft	Downstream Invert	5,926.00	ft
Length	194.00	ft	Constructed Slope	0.030928	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.86	ft
Slope Type	Steep		Normal Depth	2.86	ft
Flow Regime	Supercritical		Critical Depth	3.02	ft
Velocity Downstream	11.36	ft/s	Critical Slope	0.028413	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,937.21	ft	Upstream Velocity Head	1.83	ft
Ke	0.20		Entrance Loss	0.37	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,937.25	ft	Flow Control	N/A	
Inlet Type	Beveled ring, 33.7° (1.5:1) bevels		Area Full	9.6	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
BJ-05 - 24" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,943.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,943.00	ft	Discharge	18.80	cfs
Inlet Control HW Elev.	5,942.72	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,943.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,940.00	ft	Downstream Invert	5,936.00	ft
Length	202.00	ft	Constructed Slope	0.019802	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	1.56	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.56	ft
Velocity Downstream	7.15	ft/s	Critical Slope	0.025920	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,943.00	ft	Upstream Velocity Head	0.56	ft
Ke	0.50		Entrance Loss	0.28	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,942.72	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	3.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
BJ-06 - 36" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,936.50	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,936.50	ft	Discharge	45.48	cfs
Inlet Control HW Elev.	5,935.60	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,936.50	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,932.00	ft	Downstream Invert	5,930.00	ft
Length	192.00	ft	Constructed Slope	0.010417	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	2.20	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.20	ft
Velocity Downstream	8.20	ft/s	Critical Slope	0.020169	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,936.50	ft	Upstream Velocity Head	0.64	ft
Ke	0.50		Entrance Loss	0.32	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,935.60	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	7.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
PD-03 - DOUBLE 9' x 8' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,997.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,997.00	ft	Discharge	1,760.52	cfs
Inlet Control HW Elev.	5,997.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,996.68	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,985.00	ft	Downstream Invert	5,980.00	ft
Length	300.00	ft	Constructed Slope	0.016667	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	4.42	ft
Slope Type	Steep		Normal Depth	4.01	ft
Flow Regime	Supercritical		Critical Depth	6.67	ft
Velocity Downstream	22.13	ft/s	Critical Slope	0.004398	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	9.00	ft
Section Size	9 x 8 ft		Rise	8.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	5,996.68	ft	Upstream Velocity Head	3.34	ft
Ke	0.50		Entrance Loss	1.67	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,997.00	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	144.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
PD-05 - DOUBLE 6' x 6' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,994.00	ft	Headwater Depth/Height	1.33	
Computed Headwater Eleva	5,994.00	ft	Discharge	665.29	cfs
Inlet Control HW Elev.	5,993.72	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,994.00	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	5,986.00	ft	Downstream Invert	5,980.00	ft
Length	150.00	ft	Constructed Slope	0.040000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.48	ft
Slope Type	Steep		Normal Depth	2.10	ft
Flow Regime	Supercritical		Critical Depth	4.57	ft
Velocity Downstream	22.35	ft/s	Critical Slope	0.005099	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	6 x 6 ft		Rise	6.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	5,994.00	ft	Upstream Velocity Head	2.29	ft
Ke	0.50		Entrance Loss	1.14	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,993.72	ft	Flow Control	Transition	
Inlet Type	30 to 75° wingwall flares		Area Full	72.0	ft²
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
PD-OS-04 - 6' x 4' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,996.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Eleva	5,996.00	ft	Discharge	207.92	cfs
Inlet Control HW Elev.	5,996.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,995.85	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,990.00	ft	Downstream Invert	5,980.00	ft
Length	450.00	ft	Constructed Slope	0.022222	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.86	ft
Slope Type	Steep		Normal Depth	1.86	ft
Flow Regime	Supercritical		Critical Depth	3.34	ft
Velocity Downstream	18.67	ft/s	Critical Slope	0.004469	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	6 x 4 ft		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,995.85	ft	Upstream Velocity Head	1.67	ft
Ke	0.50		Entrance Loss	0.84	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,996.00	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	24.0	ft²
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

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Culvert Calculator Report
PD-OS-03 - DOUBLE 8' x 6' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,994.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,994.00	ft	Discharge	1,016.44	cfs
Inlet Control HW Elev.	5,994.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,993.76	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,985.00	ft	Downstream Invert	5,980.00	ft
Length	300.00	ft	Constructed Slope	0.016667	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.21	ft
Slope Type	Steep		Normal Depth	3.00	ft
Flow Regime	Supercritical		Critical Depth	5.01	ft
Velocity Downstream	19.80	ft/s	Critical Slope	0.004248	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 6 ft		Rise	6.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	5,993.76	ft	Upstream Velocity Head	2.50	ft
Ke	0.50		Entrance Loss	1.25	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,994.00	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	96.0	ft²
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
WG-01 - 4-24" x 38" HERCP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,973.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,973.00	ft	Discharge	148.79	cfs
Inlet Control HW Elev.	5,973.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,972.90	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,970.00	ft	Downstream Invert	5,962.00	ft
Length	240.00	ft	Constructed Slope	0.033333	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.00	ft
Slope Type	Steep		Normal Depth	1.00	ft
Flow Regime	Supercritical		Critical Depth	1.69	ft
Velocity Downstream	15.09	ft/s	Critical Slope	0.006825	ft/ft

Section					
Section Shape	Horizontal Ellipse		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.15	ft
Section Size	24x38 inch		Rise	2.00	ft
Number Sections	4				

Outlet Control Properties					
Outlet Control HW Elev.	5,972.90	ft	Upstream Velocity Head	1.01	ft
Ke	0.20		Entrance Loss	0.20	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,973.00	ft	Flow Control	N/A	
Inlet Control Type	Groove end with headwall (horizontal ellipse)		Area Full	20.4	ft^2
K	0.00180		HDS 5 Chart	29	
M	2.50000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

Culvert Calculator Report
WG-02 - 18" RCP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,013.25	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	6,013.25	ft	Discharge	7.66	cfs
Inlet Control HW Elev.	6,012.61	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	6,013.25	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	6,011.00	ft	Downstream Invert	6,010.00	ft
Length	312.00	ft	Constructed Slope	0.003205	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	1.07	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.07	ft
Velocity Downstream	5.67	ft/s	Critical Slope	0.007189	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,013.25	ft	Upstream Velocity Head	0.29	ft
Ke	0.20		Entrance Loss	0.06	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,012.61	ft	Flow Control	N/A	
Inlet Type	Groove end w/headwall		Area Full	1.8	ft^2
K	0.00180		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

Culvert Calculator Report
WG-03 - 60" RCP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,015.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	6,015.00	ft	Discharge	225.10	cfs
Inlet Control HW Elev.	6,015.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	6,014.74	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,007.50	ft	Downstream Invert	6,000.00	ft
Length	495.00	ft	Constructed Slope	0.015152	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.09	ft
Slope Type	Steep		Normal Depth	3.09	ft
Flow Regime	Supercritical		Critical Depth	4.25	ft
Velocity Downstream	17.66	ft/s	Critical Slope	0.007038	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,014.74	ft	Upstream Velocity Head	2.49	ft
Ke	0.20		Entrance Loss	0.50	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,015.00	ft	Flow Control	N/A	
Inlet Type	Groove end w/headwall		Area Full	19.6	ft^2
K	0.00180		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

Culvert Calculator Report
WG-04 - 6' x 4' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,057.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	6,057.00	ft	Discharge	206.91	cfs
Inlet Control HW Elev.	6,057.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	6,056.83	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,051.00	ft	Downstream Invert	6,050.00	ft
Length	105.00	ft	Constructed Slope	0.009524	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.66	ft
Slope Type	Steep		Normal Depth	2.51	ft
Flow Regime	Supercritical		Critical Depth	3.33	ft
Velocity Downstream	12.94	ft/s	Critical Slope	0.004464	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	6 x 4 ft		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,056.83	ft	Upstream Velocity Head	1.67	ft
Ke	0.50		Entrance Loss	0.83	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,057.00	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	24.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
WG-05 - 11' x 7' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,058.50	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	6,058.50	ft	Discharge	878.97	cfs
Inlet Control HW Elev.	6,058.50	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	6,058.21	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,048.00	ft	Downstream Invert	6,047.00	ft
Length	84.00	ft	Constructed Slope	0.011905	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	4.61	ft
Slope Type	Steep		Normal Depth	3.75	ft
Flow Regime	Supercritical		Critical Depth	5.83	ft
Velocity Downstream	17.34	ft/s	Critical Slope	0.003587	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	11.00	ft
Section Size	11 x 7 ft		Rise	7.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,058.21	ft	Upstream Velocity Head	2.92	ft
Ke	0.50		Entrance Loss	1.46	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,058.50	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	77.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
WG-06 - 54" RCP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,029.75	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	6,029.75	ft	Discharge	154.47	cfs
Inlet Control HW Elev.	6,029.75	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	6,029.57	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,023.00	ft	Downstream Invert	6,022.00	ft
Length	115.00	ft	Constructed Slope	0.008696	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.24	ft
Slope Type	Steep		Normal Depth	3.16	ft
Flow Regime	Supercritical		Critical Depth	3.64	ft
Velocity Downstream	12.62	ft/s	Critical Slope	0.006316	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.50	ft
Section Size	54 inch		Rise	4.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,029.57	ft	Upstream Velocity Head	1.95	ft
Ke	0.50		Entrance Loss	0.98	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,029.75	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	15.9	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
WG-07 - 8' x 6' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,051.00	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	6,051.00	ft	Discharge	506.89	cfs
Inlet Control HW Elev.	6,051.00	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	6,050.74	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,042.00	ft	Downstream Invert	6,041.00	ft
Length	101.00	ft	Constructed Slope	0.009901	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	4.05	ft
Slope Type	Steep		Normal Depth	3.63	ft
Flow Regime	Supercritical		Critical Depth	5.00	ft
Velocity Downstream	15.66	ft/s	Critical Slope	0.004245	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 6 ft		Rise	6.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,050.74	ft	Upstream Velocity Head	2.50	ft
Ke	0.50		Entrance Loss	1.25	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,051.00	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	48.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
WG-08 - 60" RCP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,051.50	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	6,051.50	ft	Discharge	224.49	cfs
Inlet Control HW Elev.	6,051.50	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	6,051.21	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,044.00	ft	Downstream Invert	6,043.00	ft
Length	148.00	ft	Constructed Slope	0.006757	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	4.24	ft
Slope Type	Mild		Normal Depth	4.36	ft
Flow Regime	Subcritical		Critical Depth	4.24	ft
Velocity Downstream	12.63	ft/s	Critical Slope	0.007011	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,051.21	ft	Upstream Velocity Head	2.37	ft
Ke	0.20		Entrance Loss	0.47	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,051.50	ft	Flow Control	N/A	
Inlet Type	Groove end w/headwall		Area Full	19.6	ft^2
K	0.00180		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

Culvert Calculator Report
WG-11 - DOUBLE 8' x 3' CBC

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,934.50	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,934.50	ft	Discharge	361.13	cfs
Inlet Control HW Elev.	5,934.50	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,934.39	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	5,930.00	ft	Downstream Invert	5,925.00	ft
Length	170.00	ft	Constructed Slope	0.029412	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.30	ft
Slope Type	Steep		Normal Depth	1.21	ft
Flow Regime	Supercritical		Critical Depth	2.51	ft
Velocity Downstream	17.43	ft/s	Critical Slope	0.003469	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 3 ft		Rise	3.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	5,934.39	ft	Upstream Velocity Head	1.26	ft
Ke	0.50		Entrance Loss	0.63	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,934.50	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	48.0	ft^2
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Calculator Report
WG-12 - 60" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,910.00	ft	Headwater Depth/Height	0.80	
Computed Headwater Elevation	5,910.00	ft	Discharge	78.97	cfs
Inlet Control HW Elev.	5,909.59	ft	Tailwater Elevation	5,904.50	ft
Outlet Control HW Elev.	5,910.00	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	5,906.00	ft	Downstream Invert	5,902.00	ft
Length	220.00	ft	Constructed Slope	0.018182	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.25	ft
Slope Type	Steep		Normal Depth	2.25	ft
Flow Regime	Supercritical		Critical Depth	2.52	ft
Velocity Downstream	9.24	ft/s	Critical Slope	0.012272	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,910.00	ft	Upstream Velocity Head	0.99	ft
Ke	0.50		Entrance Loss	0.49	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,909.59	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	19.6	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
WG-13 - 36" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,899.50	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,899.50	ft	Discharge	39.15	cfs
Inlet Control HW Elev.	5,898.18	ft	Tailwater Elevation	5,895.50	ft
Outlet Control HW Elev.	5,899.50	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,895.00	ft	Downstream Invert	5,894.00	ft
Length	200.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	2.04	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.04	ft
Velocity Downstream	7.66	ft/s	Critical Slope	0.018168	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,899.50	ft	Upstream Velocity Head	0.48	ft
Ke	0.50		Entrance Loss	0.24	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,898.18	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	7.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
WG-13 - 42" CMP

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,900.25	ft	Headwater Depth/Height	1.50	
Computed Headwater Elevation	5,900.25	ft	Discharge	60.32	cfs
Inlet Control HW Elev.	5,898.84	ft	Tailwater Elevation	5,895.50	ft
Outlet Control HW Elev.	5,900.25	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,895.00	ft	Downstream Invert	5,894.00	ft
Length	200.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	2.43	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.43	ft
Velocity Downstream	8.45	ft/s	Critical Slope	0.017783	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,900.25	ft	Upstream Velocity Head	0.61	ft
Ke	0.50		Entrance Loss	0.31	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,898.84	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	9.6	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
WG-14 - DOUBLE 8' x 6' CBC

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	5,904.00	ft	Headwater Depth/Height	1.13	
Computed Headwater Elevation	5,901.76	ft	Discharge	689.00	cfs
Inlet Control HW Elev.	5,901.19	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,901.76	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	5,895.00	ft	Downstream Invert	5,891.00	ft
Length	206.00	ft	Constructed Slope	0.019417	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.36	ft
Slope Type	Steep		Normal Depth	2.16	ft
Flow Regime	Supercritical		Critical Depth	3.86	ft
Velocity Downstream	18.22	ft/s	Critical Slope	0.003865	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	8.00	ft
Section Size	8 x 6 ft		Rise	6.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	5,901.76	ft	Upstream Velocity Head	1.93	ft
Ke	0.50		Entrance Loss	0.97	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,901.19	ft	Flow Control	N/A	
Inlet Type	30 to 75° wingwall flares		Area Full	96.0	ft²
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

APPENDIX C

Existing Sub-Basin and Routing Exhibit
Existing Drainage Structure Exhibit
Existing Land Use Exhibit

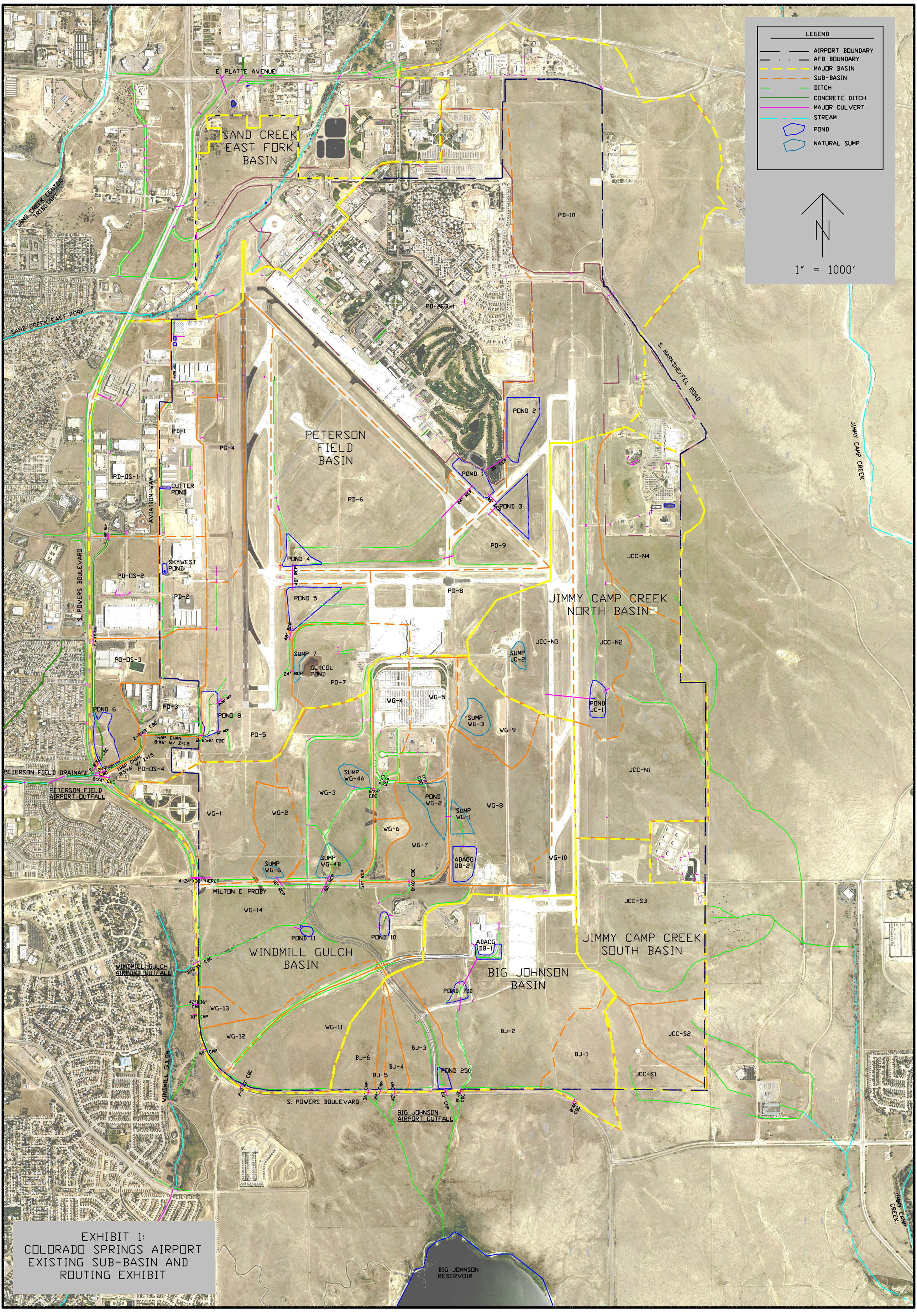


EXHIBIT 1:
COLORADO SPRINGS AIRPORT
EXISTING SUB-BASIN AND
ROUTING EXHIBIT

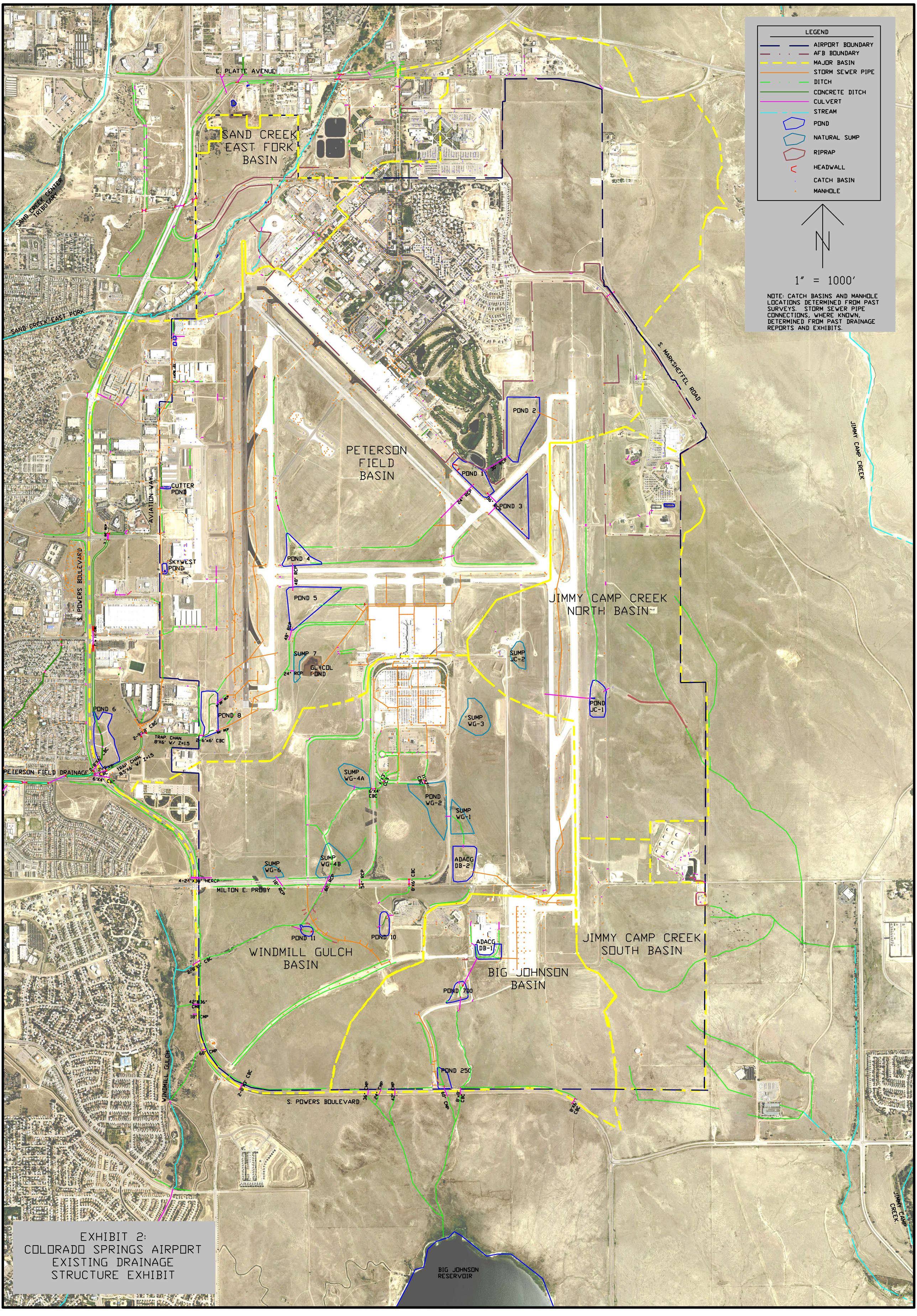


EXHIBIT 2:
COLORADO SPRINGS AIRPORT
EXISTING DRAINAGE
STRUCTURE EXHIBIT

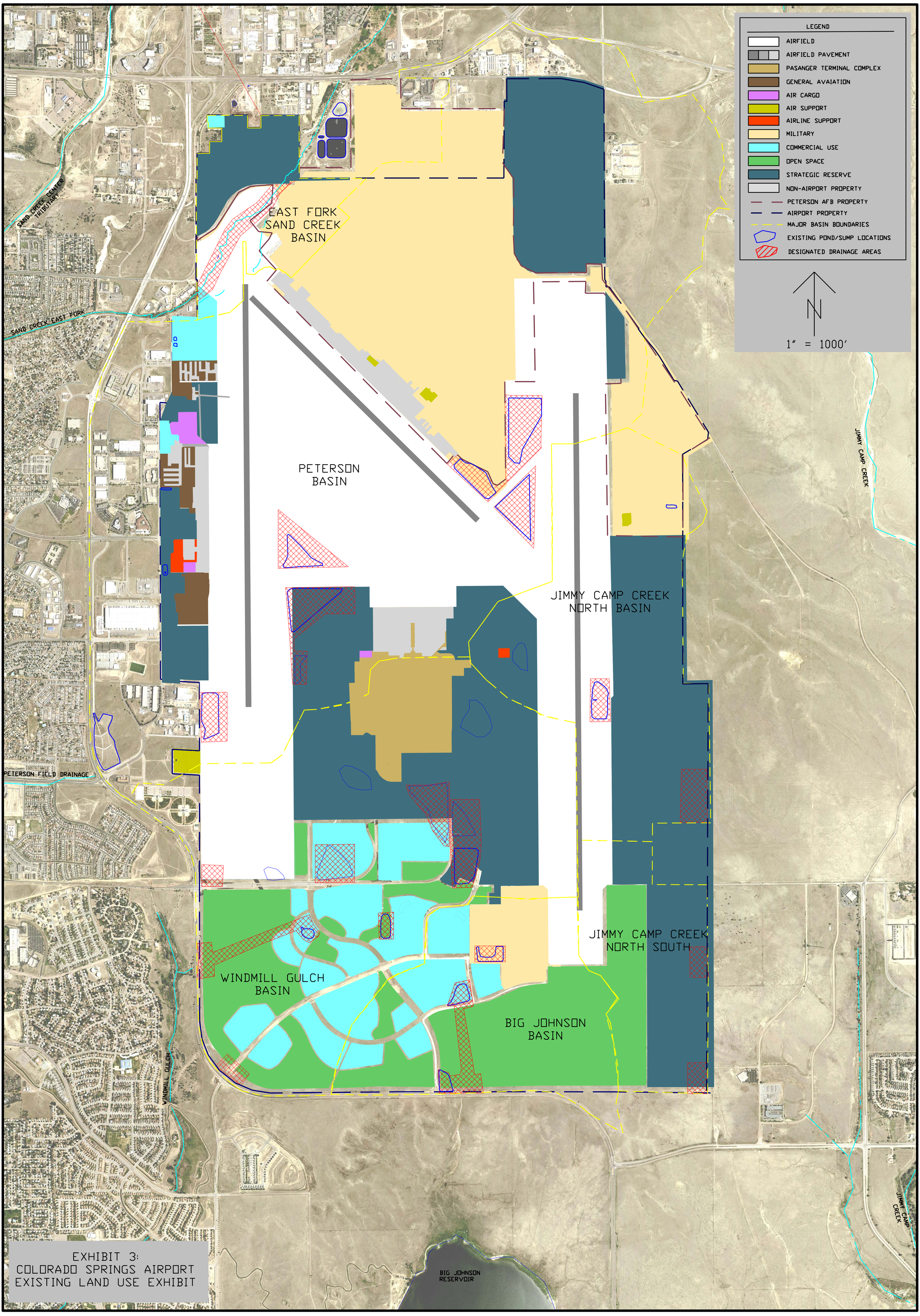


EXHIBIT 3:
COLORADO SPRINGS AIRPORT
EXISTING LAND USE EXHIBIT

APPENDIX D

Recommended Development Plan – Drainage Considerations
Recommended Development Plan – Drainage Impacts Exhibit

APPENDIX D

Recommended Development Plan – Drainage Considerations

The drainage impacts and considerations as a result of the Recommended Development Plan dated May 2013 by Leigh and Fisher are discussed below. These airport improvements include runway expansions, new buildings, and additional access roads on the airfield side. They also include roadway improvements to Milton E. Proby, South Powers Boulevard, and side streets within the industrial park area of the airport on the land side. Exhibit 4 (included in Appendix D) shows conceptual linework for the recommended improvements overlaid on the existing drainage basins and routing for the Colorado Springs Airport. Mentions of ponds and basins below can be referenced to this exhibit.

Airfield Improvements

The largest drainage impact on the airfield side is the expansion of Runway 35L to the south. The additional fill and pavement extends from the Peterson Field Drainage Basin south into the Windmill Gulch Drainage Basin. Either the eastern portion of the Peterson Field Basin needs to be rerouted south through the Windmill Gulch Basin or the northern section of the Windmill Gulch Basin needs to be rerouted up through the Peterson Field Basin. The concept of re-routing the flow from the eastern portion of the Peterson Field Basin through the Windmill Gulch Basin would require a large amount of drainage infrastructure to be built within the Windmill Gulch Basin to accommodate the diversion of approximately three quarters of the Peterson Field Basin to the south. Instead it is recommended to divert the flow the portion of the runway expansion within the Windmill Gulch Basin north to Pond 8. This can be done be either diverting flow around the south end of the runway expansion in an open ditch or under the runway in a pipe. The open ditch would have to be constructed at least 1000' away from the runway making for a longer ditch. Grading may also be more difficult with this option due to the large amounts of fill. A pipe under the runway would have to be sized to accommodate the flows coming from Pond 5, Sump 7 and the northern portion of the Windmill Gulch Basin. Either the open channel or the pipe would need to connect into Pond 8 on the west side of the runway. Pond 8 will have to be expanded to accommodate the increased flows generated from the Windmill Gulch area that will be diverted there as well as the additional impervious area created by the runway expansion. The east edge of Pond 8 will also need to be adjusted to allow for the new access road to fit between the pond and the runway. It is recommended to retain the outlet structure of Pond 8 or replace in kind as needed to allow the drainage infrastructure downstream in the Peterson Field Drainage to function as it currently does under existing conditions.

The diversion of runoff from the northern portion of the Windmill Gulch Basin into the Peterson Field Basin slightly reduces the flows to the south. This small reduction in runoff within the Windmill Gulch Basin should not drastically affect the existing drainage structures within this basin. Any previous recommendations listed in this report for this basin still apply. Existing routing within the Windmill Gulch Basin also should not be impacted, however final toes of slope from the runway fill should be assessed to determine any potential localized impacts.

The addition of buildings and a new access road along the west side of Runway 35L should be analyzed for impacts to existing drainage patterns during final design. Ditches may need to be relocated and culverts may need to be lengthened or adjusted to accommodate the new construction while maintaining the drainage flow patterns through this area to allow the runoff to continue to the Peterson Field Drainage.

Other airfield improvements include access roads and additional small buildings within the Peterson Field, Big Johnson and Jimmy Camp Creek Basins. As each is designed and implemented they will need to be analyzed from a localized drainage perspective such as the need for culverts under new roads at drainage ditches. No large basin impacts are anticipated with these improvements.

Roadway Improvements

The road side improvements include realignments of Milton E. Proby, South Powers Boulevard, and other connecting roads with the Windmill Gulch and Big Johnson Basins. New intersection layouts are also recommended between South Powers Boulevard and Hancock Expressway, Milton E. Proby, Grinnell Street, and Cresterra Parkway. Each intersection and roadway realignment will need to be analyzed on a

case by case basis during design for drainage impacts. The expansion of intersections and widening of roads will cause existing culverts and ditches to be filled in. These will need to be expanded or relocated as needed to perpetuate the existing drainage patterns. The additional impervious area created by the improvements will also need to be analyzed to determine the need for the expansion of existing detention ponds or the creation of new ponds.

In addition to these localized drainage impacts, larger impacts to the existing drainage infrastructure include:

- Pond 250 on the south end of the Big Johnson Basin will need to be relocated and resized with the new intersection layout at Cresterra Parkway.
- The trapezoidal ditches along Hancock Expressway will need to be shifted or possibly designed around with these intersection improvements.
- Pond WG-2 and Sump WG-1 will need to be relocated and resized to accommodate the new road configurations just south of the airport parking lot. New culverts crossings will also be needed to accommodate existing flow patterns and ditches under the proposed road alignments.

Appendix H

TAKEOFF WEIGHT ANALYSIS OF RDP

Colorado Springs Airport

Prepared by:

Flight Engineering, LLC and LeighFisher Inc.

Appendix H

TAKEOFF WEIGHT ANALYSIS OF RDP

Colorado Springs Airport

This appendix summarizes an analysis conducted by Flight Engineering, LLC to determine the allowable takeoff weights for five commercial aircraft that use the Airport on a routine basis, assuming the Recommended Development Plan (RDP) was in place. The RDP summarized in Chapter 6 of the Technical Report would shift the Runway 17R threshold 1,790 feet south and extend the runway to the south 2,500 feet. The combination of the shift and extension would result in a net increase of 710 feet in takeoff run available for both Runway 17R and Runway 35L departures. Because of the obstacle environment with terrain rising to the north, an analysis was conducted of Runway 35L departures to quantify approximate benefits that would accrue to the Airport and airlines using the runway should the RDP be implemented.

Two conditions were analyzed: (1) summer conditions at 85 percent of the reliability temperature which is 87 degrees Fahrenheit for Colorado Springs and (2) winter conditions with a level 1 slush contaminant at 32 degrees Fahrenheit. For each of the conditions, the following aircraft were evaluated against the obstacle environment: Boeing 737-800, Boeing 757-200, Embraer ERJ-190, Canadair CRJ-200 and CRJ-900.

The results of the analysis are summarized in Table H-1 on the following page. As shown in the table, each of the aircraft analyzed would be capable of accommodating an increase in takeoff weight for both conditions. As expected the heavier the aircraft, the greater the weight limit increase in terms of pounds, with the Boeing 757-200 demonstrating the greatest weight limit increase.

Weight limit increases should allow airlines to depart with higher load factors and avoid the inconvenience to passengers that occurs when conditions would dictate that an airplane must depart with fewer passengers than checked in. For example, the Boeing 737-800 takeoff weight limit would increase by approximately 2,580 pounds. Assuming an allowance of 220 pounds per passenger and luggage, the aircraft would be capable of departing with 11 more passengers in summer conditions and 10 more passengers in winter level 1 contaminant conditions.

Table H-1
RUNWAY 35L ALLOWABLE TAKEOFF WEIGHTS – EFFECT OF RUNWAY SHIFT
Colorado Springs Airport

			Summer - 85% Reliability Temperature (87.0°F/30.6°F)			Winter - Level 1 Slush Contaminant (32.0°F/0.0°C)		
Aircraft	Engine type	Maximum structural takeoff weight (lbs)	Existing weight limit (lbs)	Proposed weight limit (lbs)	Delta weight (lbs)	Existing weight limit (lbs)	Proposed weight limit (lbs)	Delta weight (lbs)
B737-800	CFM56-7B26	172,500	145,219	147,799	2,580	135,811	138,061	2,250
B757-200	RB211-535E4	240,000	213,493	217,076	3,583	192,422	196,917	4,495
ERJ-190	CF34-10E6	114,199	95,035	95,847	812	94,765	95,604	839
CRJ-200	CF34-3B1	53,000	43,820	44,050	230	43,090	43,280	190
CRJ-700	CF34-8C1	77,000	65,640	65,980	340	66,200	66,480	280

Notes:

(a) Maximum structural takeoff weight is the manufacturer's upper limit on the allowable takeoff weight regardless of any performance limitations.

(b) Level 1 slush is the lowest level of runway contaminant data produced by the manufacturer, depth varies from 0.05 inches to 0.25 inches.

Source: Flight Engineering, LLC, May 2013.

Appendix I

PUBLIC INVOLVEMENT MATERIALS

Colorado Springs Airport

Prepared by:

Colorado Springs Airport and LeighFisher Inc.

Appendix I

PUBLIC INVOLVEMENT MATERIALS

Colorado Springs Airport

This appendix includes the following documents:

- Copy of a letter from the Airport Advisory Commission to the City of Colorado Springs Planning Department expressing support for the Airport Master Plan Update;

- Copy of the handout available at the public meeting which occurred on Thursday, August 1, 2013;

- Display boards used at the public meeting;

- Copy of the post card mailed to over 1400 addresses announcing the public meeting; and

- Copy of the sign-in sheet from the public meeting.

Colorado Springs Airport

Airport Advisory Commission
Colorado Springs Airport
7770 Milton E. Proby Pkwy., Suite 50
Colorado Springs, CO 80916
Phone: 719.550.1900
www.flycos.com

July 23, 2013

Attention: Mike Schultz, Planner II
City of Colorado Springs Land Use Review

RE: Letter of Support for the Colorado Springs Airport Master Plan Update

The Colorado Springs Airport Advisory Commission would like to express its support of the Colorado Springs Airport's Master Plan Update. This Master Plan Update, which has followed a procedure prescribed by the Federal Aviation Administration (FAA), was conducted with the full participation and input from the Airport Advisory Commission representatives.

As a body, the Commission would like to take this opportunity to state that it believes the current Recommended Development Plan resulting from this study has been formulated after a thorough evaluation of the safety and capacity needs of the Colorado Springs Airport and incorporates the advice rendered by the Commission throughout its development.

Sincerely,

Dr. Pat Boone, Chairman

Dave Elliott, Vice-Chairman

Dr. Chris Thornton, Commissioner

Walter D. Miller, Commissioner

Thomas Hayden, Commissioner

Randy Courduff, Commissioner

Steve Janitell, Commissioner

Absent

Andrew Biancur, Alt. Commissioner

Commissioner Peggy Littleton
Liaison Member

Absent

Rob McDonald, Liaison Member

CC: Linda Bruce, Community Planner, Federal Aviation Administration
Dan Gallagher, Acting Director of Aviation, Colorado Springs Airport

What the RDP Will Achieve

The RDP will move the Airport forward by:

- Decoupling the intersection of Runway 17R-35L and Runway 13-31, enhancing safety and reducing the potential for pilot confusion;
- Improving the operational capability of Runway 17R-35L by providing additional takeoff length, especially for aircraft departing to the north;
- Improving several taxiway intersections to simplify pilot decision making; and
- Implementing other improvements to enhance airfield safety and improve operational efficiency.

Cost Estimate and Phasing

Project cost estimates for the RDP are summarized in Table 1. In total, the plan is estimated to cost approximately $114.5 million. Phases 1 and 2, which total $80.6 million include all of the west airfield improvements excluding the realignment of Taxiway A. Table 1 and the figure inset also indicate in which of the four phases each individual project component is included.

Phase 1, including projects 1-4, involves the improvements necessary to decouple the intersection of Runway ends 17R and 13. Each of these projects is located on the west side of the airfield. Phase 1 also includes projects 15 and 16 which are of immediate interest to Airport management and may be implemented independently of projects 1-4. These projects have independent utility; in the case of project 15 the Airport would improve its capability to accommodate landings during Category II weather conditions. In the case of project 16, the Airport would reduce runway crossings by maintenance and operations vehicles by providing paved service roads that reduce the need to traverse taxiways and runways.

Phase 2, including projects 6 through 8, could be completed in concert with Phase 1; however, they are not necessary to implement the runway decoupling. Phase 3 includes projects 10 through 14 and is primarily focused on improvements to the east side of the airfield. These projects could be completed in concert with major maintenance to Runway 17L-35R or its parallel Taxiway E.

Phase 4, including projects 17-21, would be implemented by the Airport on an opportunistic basis and as the need arises.

Table 1 Project Cost Estimates

Phase 1	
Projects 1-4, 15-16	$67.2M
Phase 2	
Projects 6-8	$13.4M
Phase 3	
Projects 10-14	$12.6M
Phase 4	
Projects 9	$21.3M

Timing

The Airport has an ongoing capital improvement program (CIP) which assigns projects to a given year, currently looking out nine years to 2021. While the majority of the implementation of the RDP is anticipated to be beyond the next five years, the Airport is planning to undertake a number of projects to enable the implementation of the master plan recommendations, beginning in 2018.

Anticipated Funding Sources

A combination of traditional airport funding sources and financing mechanisms including federal Airport Improvement Program (AIP) grants, airport revenue bonds, passenger facility charges, state grants, and cash generated from Airport operations could be used to fund the RDP. The majority of funding would likely come in the form of AIP discretionary grants, which are awarded to airports on the basis of priority and available funding.

Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.

Colorado Springs Airport

2013 AIRPORT MASTER PLAN UPDATE

Recommended Development Plan Summary

COLORADO SPRINGS AIRPORT

The intent of a Master Plan is to provide a conceptual plan for future development of the airport campus over the long-term. This particular Master Plan Update for the Colorado Springs Airport forecasts anticipated demand over the next 20+ years. By doing so, it provides a planning framework that will enable Airport management to implement a series of smaller improvements over time to meet future needs.

This document presents a summary of the Recommended Development Plan (RDP) developed during this study. The Guiding Principles providing focus and direction for the development of this plan include the following:

- The RDP should give priority to safety and security, followed by financial feasibility, operational efficiency, environmental prudence, and social responsibility; the plan should be beneficial to all users of the Airport, and the positive customer experience must be maintained or enhanced.
- Airport development plans should preserve flexibility to permit changes to the plan as industry and local conditions warrant.
- The planning effort will seek to foster consensus among key stakeholders, including Airport users, the Federal Aviation Administration (FAA), the Airport Advisory Commission, and Airport management.
- Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.

The Recommended Development Plan

Phase 1

1. Runway 17R: shorten 1,790' and construct new taxiways
2. Runway 35L: extend 2,500' and construct new taxiways
3. Runway 13: shorten 400' and construct new taxiways
4. Remove existing Taxiway C1
5. Remove existing Taxiway C3
15. Construct new instrument approach lighting system (ALSF-II)
16. Pave vehicle service roads

Phase 2

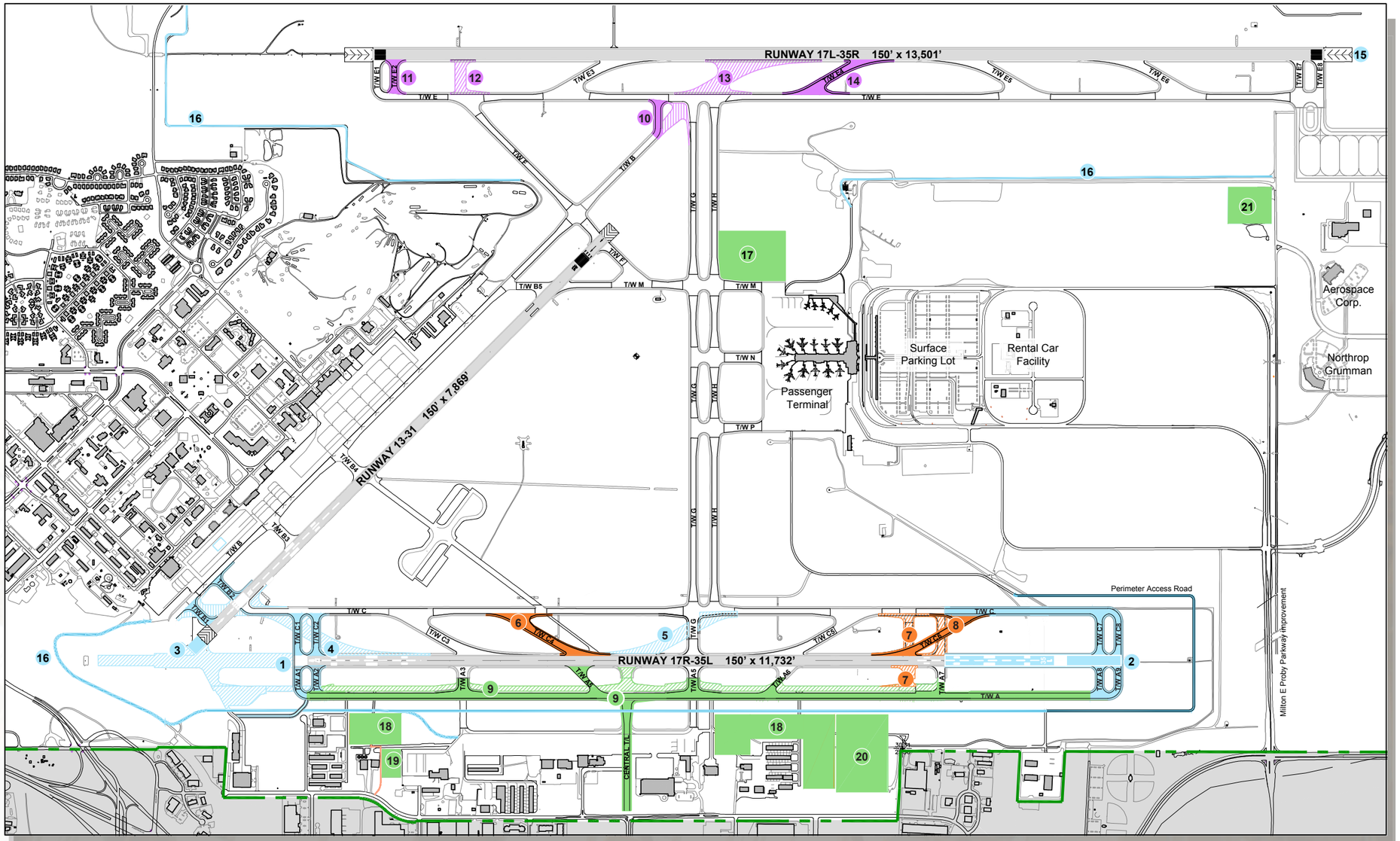
6. Construct new Taxiway C4
7. Remove existing Taxiways C6, C7, and A6
8. Construct new Taxiway C6

Phase 3

10. Realign Taxiway B segment
11. Construct new Taxiway E2
12. Remove existing Taxiway E2
13. Remove existing Taxiway E4
14. Construct new Taxiway E4

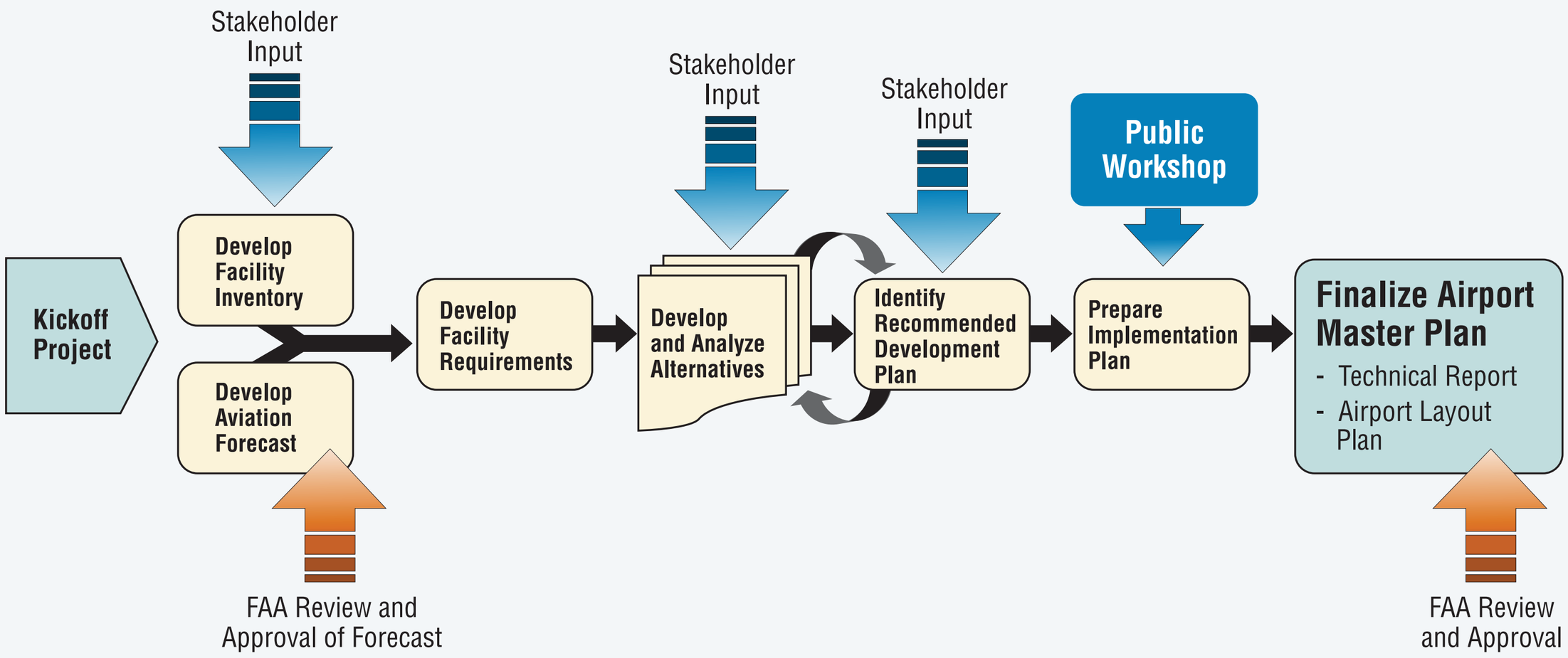
Phase 4

9. Remove existing Taxiway A; realign Taxiway A to 500' from Runway 17R-35L; construct central taxilane
17. Construct deicing pad area
18. General aviation expansion areas
19. Air cargo expansion area
20. MRO expansion area
21. SRE facility



Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.

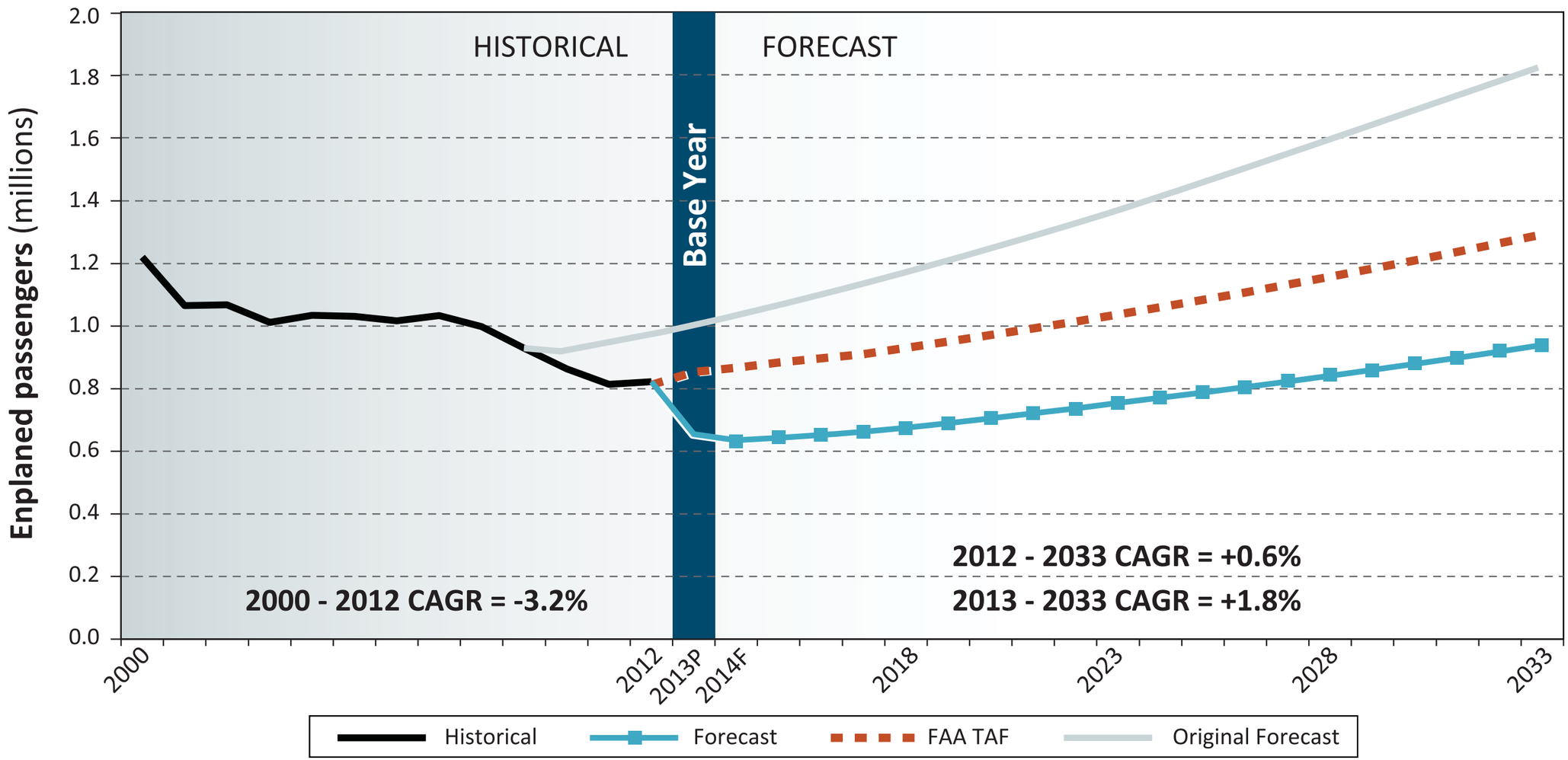
Master Planning Process



Forecast – Enplaned Passengers

COMPARISON OF ENPLANED PASSENGER FORECASTS

Colorado Springs Airport



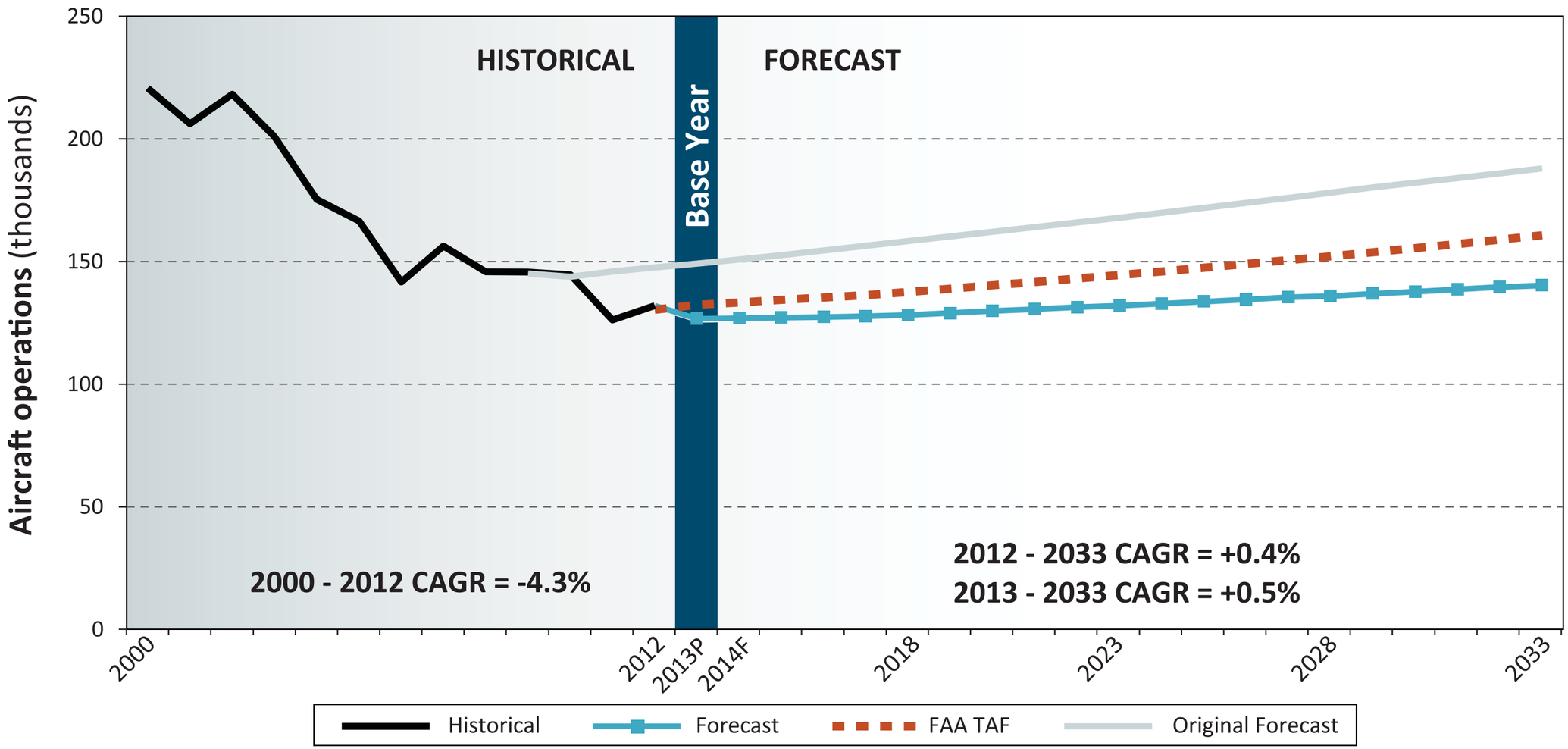
This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.

CAGR = Compound annual growth rate
P = Projected; F = Forecast.
Sources: Historical: Colorado Springs Airport records.
Projected and Forecast: LeighFisher, June 2013.
FAA TAF: Federal Aviation Administration, Terminal Area Forecast, January 2013.

Forecast – Aircraft Operations

COMPARISON OF TOTAL AIRCRAFT OPERATION FORECASTS

Colorado Springs Airport



This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.

CAGR = Compound annual growth rate
P = Projected; F = Forecast.
Sources: Historical: Colorado Springs Airport records.
Projected and Forecast: LeighFisher, June 2013.
FAA TAF: Federal Aviation Administration, Terminal Area Forecast, January 2013.

Forecast Summary

FORECAST UPDATE SUMMARY

Colorado Springs Airport

	Historical		Projected	Forecast			
	2011	2012	2013	2018	2023	2028	2033
Enplaned passengers							
Mainline (a)	231,524	232,538	227,200	246,200	266,200	283,200	305,200
Regional affiliate	435,996	395,893	383,000	407,000	457,000	515,000	576,000
Low-cost carriers	146,816	193,577	44,800	21,800	30,800	42,800	58,800
Total	**814,336**	**822,008**	**655,000**	**675,000**	**754,000**	**841,000**	**940,000**
Compound annual growth rate		0.9%	(20.3%)	0.6%	2.2%	2.2%	2.3%
Air cargo (tons)							
All-Cargo airlines							
Integrated carrier	10,683	10,997	10,750	11,030	11,320	11,620	11,920
Regional feeder	143	138	175	180	185	190	195
Total (b)	**10,826**	**11,135**	**10,925**	**11,210**	**11,505**	**11,810**	**12,115**
Compound annual growth rate		2.9%	(1.9%)	0.5%	0.5%	0.5%	0.5%
Aircraft operations							
Passenger airlines	29,116	27,500	22,360	22,380	24,700	27,260	30,020
All-cargo airlines	1,760	2,040	1,700	1,860	1,910	1,960	2,020
A/DACG	n.a.	552	500	500	500	500	500
General aviation	54,049	56,094	57,360	58,450	59,580	60,730	61,920
Military	36,444	41,278	41,280	41,280	41,280	41,280	41,280
Other (c)	4,773	4,494	4,000	4,250	4,500	4,750	5,000
Total	**126,142**	**131,958**	**127,200**	**128,720**	**132,470**	**136,480**	**140,740**
Compound annual growth rate		4.6%	(3.6%)	0.2%	0.6%	0.6%	0.6%

This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.

(a) Includes charters. In calendar year 2012, charter enplaned passengers represented less than 0.3% of total enplaned passengers. Accordingly, charters do not materially affect the forecast of passenger activity.

(b) Includes enplaned and deplaned cargo in tons.

(c) Includes nonscheduled and empty flights. Other operations accounted for an average of 3.2% of total operations in 2011 and 2012 and are assumed to account for 3.2%-3.6% in future years.

Source: Historical: Colorado Springs Airport records. Projected and Forecast: LeighFisher, June 2013.

The Recommended Development Plan

Phase 1

1. Runway 17R: shorten 1,790' and construct new taxiways
2. Runway 35L: extend 2,500' and construct new taxiways
3. Runway 13: shorten 400' and construct new taxiways
4. Remove existing Taxiway C1
5. Remove existing Taxiway C3
15. Construct new instrument approach lighting system (ALSF-II)
16. Pave vehicle service roads

Phase 2

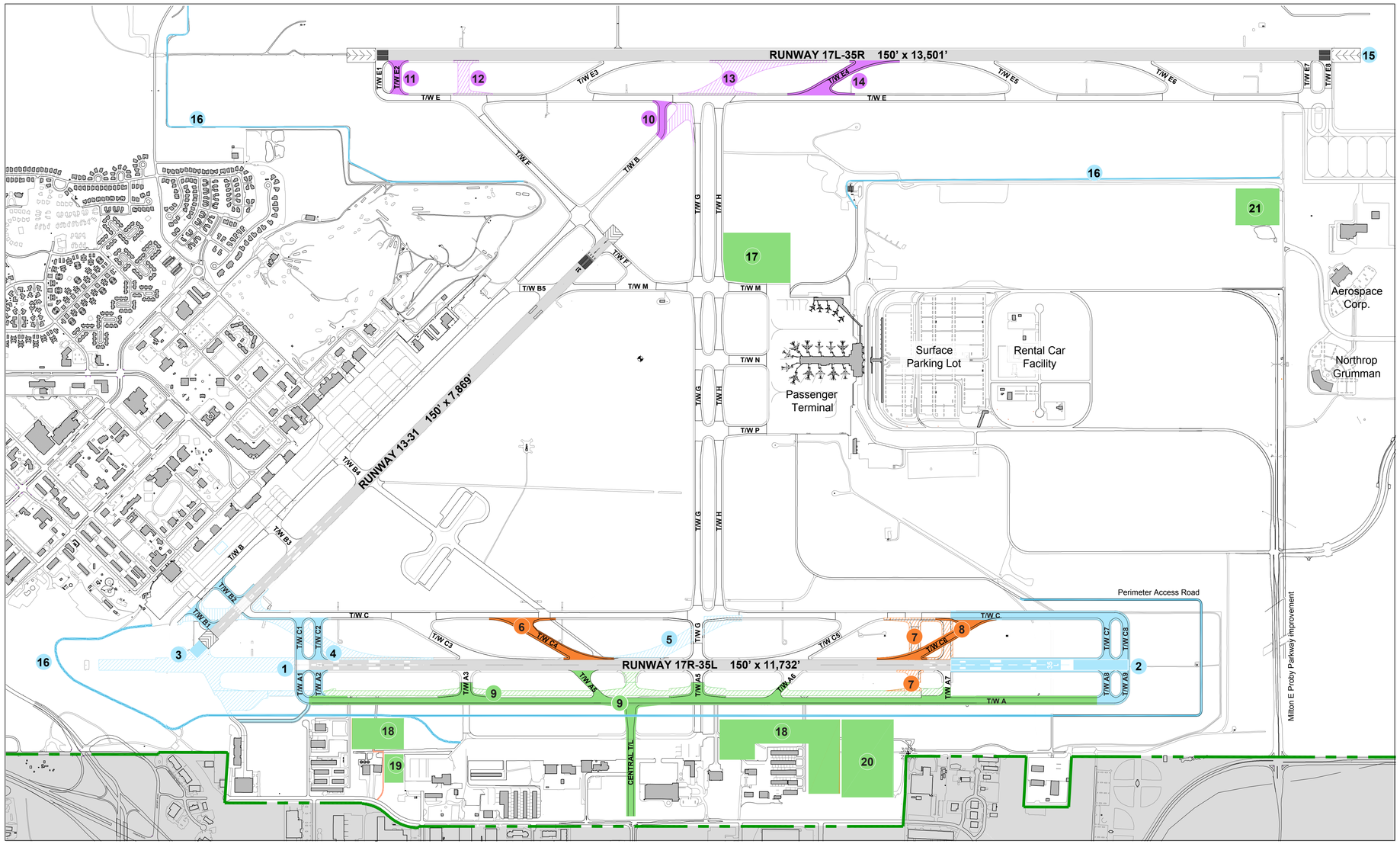
6. Construct new Taxiway C4
7. Remove existing Taxiways C6, C7, and A6
8. Construct new Taxiway C6

Phase 3

10. Realign Taxiway B segment
11. Construct new Taxiway E2
12. Remove existing Taxiway E2
13. Remove existing Taxiway E4
14. Construct new Taxiway E4

Phase 4

9. Remove existing Taxiway A; realign Taxiway A to 500' from Runway 17R-35L; construct central taxilane
17. Construct deicing pad area
18. General aviation expansion areas
19. Air cargo expansion area
20. MRO expansion area
21. SRE facility



Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.

Potential Commercial Airport Overlay Districts With Recommended Development Plan

LEGEND

- Airport boundary
- Residential land use
- Proposed Part 77 surfaces
- Proposed Runway Protection Zone
- Proposed Accident Potential Zone I
- Proposed Accident Potential zone II

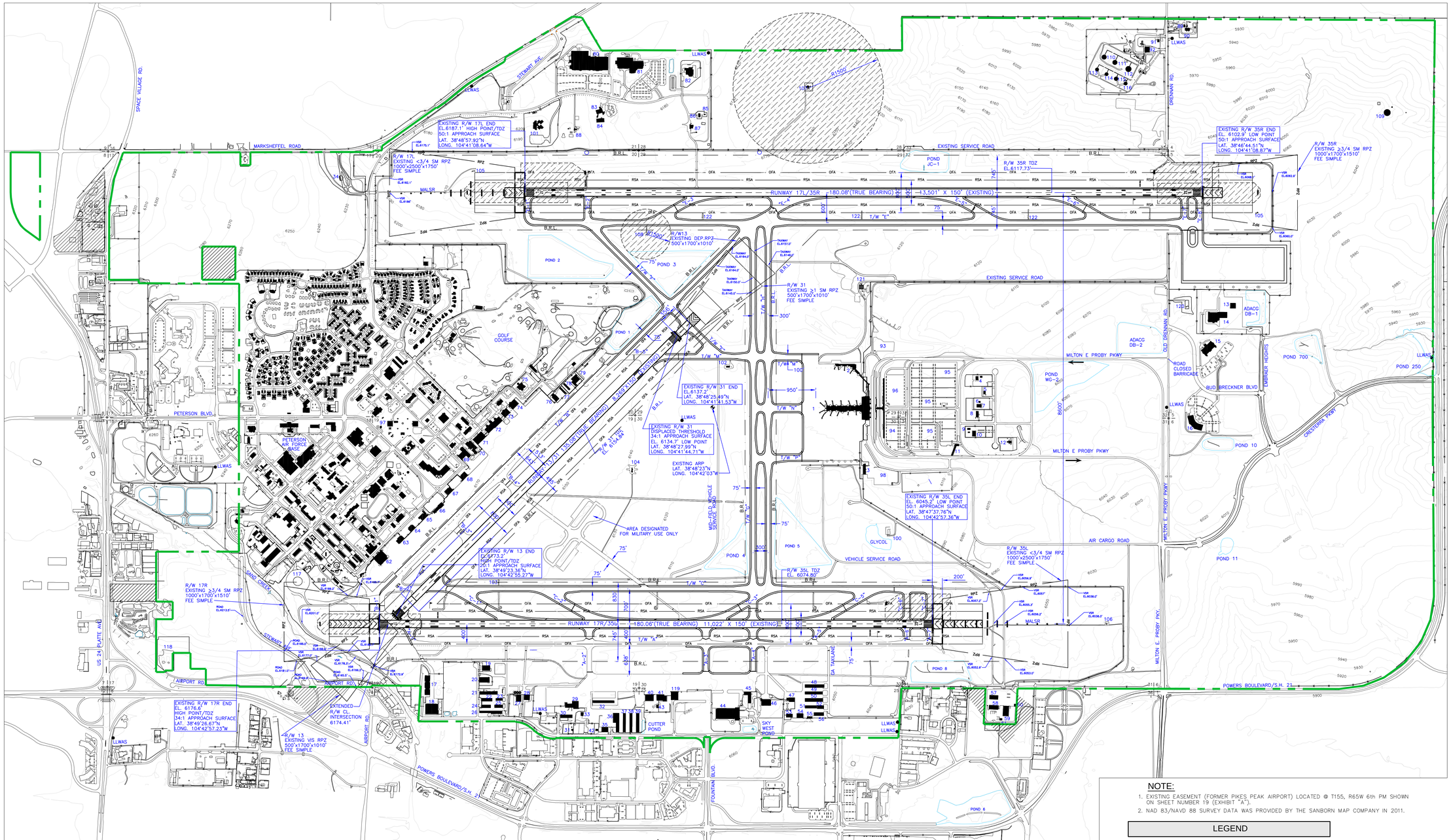
Source: Land use data provided by City of Colorado Springs.

N

.4 0 .4 .8

Graphic Scale in Miles

Leigh|Fisher



NOTE:

1. EXISTING EASEMENT (FORMER PIKES PEAK AIRPORT) LOCATED @ T155, R65W 6th PM SHOWN ON SHEET NUMBER 19 (EXHIBIT "A").
2. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.

DATE: 6/2011 ANNUAL RATE OF CHANGE: 0°7'

HORIZONTAL SCALE

800 0 800 1600

(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

LEGEND

	EXISTING
AIRPORT PROPERTY LINE	
EASEMENTS	
AIRFIELD PAVEMENT	
REMOVED PAVEMENT	
BUILDINGS	
BUILDING RESTRICTION LINES	B.R.L.
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	OFA
RUNWAY PROTECTION ZONE	RPZ
PRECISION OBJECT FREE ZONE	
NAVAID CRITICAL AREA	
SECTION CORNER	14 23 15 22
ROADS AND PARKING AREAS	
GROUND CONTOURS	
PONDS, LAKES, STREAMS, ETC	
FENCE LINE	
AIRPORT BEACON	
AIRPORT REFERENCE POINT	
SUPPLEMENTAL WIND CONE	
APPROACH LIGHTS	
REIL	
PAPI	
GLIDE SLOPE ANTENNA	
LOCALIZER	
RUNWAY THRESHOLD LIGHTS	
POWER POLE	PP
LT POLE	

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
1.	PASSENGER TERMINAL BUILDING (E)	6181.87'
2.	EAST UNIT TERMINAL BUILDING (E)	6148.38'
3.	BELLY CARGO BUILDING (E)	6140.59'
4.	ADVANTAGE RENTAL CAR SERVICE CENTER (E)	6108.42'
5.	ENTERPRISE RENTAL CAR SERVICE CENTER (E)	6105.26'
6.	ALAMO RENTAL CAR SERVICE CENTER (E)	6103.16'
7.	ALAMO RENTAL CAR SERVICE CENTER (E)	6105.68'
8.	AVIS RENTAL CAR SERVICE CENTER (E)	6109.45'
9.	HERTZ RENTAL CAR SERVICE CENTER (E)	6113.69'
10.	HERTZ RENTAL CAR SERVICE CENTER (E)	6114.77'
11.	TOLL PLAZA (E)	6115.97'
12.	BUDGET RENTAL CAR SERVICE CENTER (E)	6095.52'
13.	A/DACG FACILITY (E)	6095.38'
14.	A/DACG FACILITY (E)	6109.20'
15.	AEROSPACE CORPORATION (E)	6097.09'
16.	NORTHROP GRUMMAN (E)	6111.10'
17.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6189.03'
18.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6206.15'
19.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6179.54'
20.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6183.06'
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26.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6152.46'
27.	COLORADO SPRINGS POLICE HANGAR (E)	6153.02'
28.	CORPORATE HANGAR (E)	6155.15'
29.	FEDEX CARGO FACILITY (E)	6144.48'
30.	FEDEX CARGO FACILITY (E)	6140.40'
31.	FORMER RENTAL CAR SERVICE CENTER (R)	6120.41'
32.	COLORADO JET CENTER HANGARS (E)	6126.90'
33.	COLORADO DIVISION OF WILDLIFE HANGAR (E)	6128.56'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
34.	EAST GATE DEVELOPMENT (E)	6232.50'
35.	CUTTER AVIATION (E)	6129.16'
36.	CUTTER AVIATION (E)	6124.66'
37.	CUTTER AVIATION (E)	6113.70'
38.	CUTTER AVIATION (E)	6112.89'
39.	CUTTER AVIATION (E)	6114.50'
40.	COLORADO JET CENTER HANGARS (E)	6141.08'
41.	COLORADO JET CENTER HANGAR (E)	6124.93'
42.	THRIFTY RENTAL CAR SERVICE BUILDING (E)	6117.84'
43.	FUEL FARM (E)	6113.95'
44.	SKYWEST MAINTENANCE FACILITY (E)	6140.37'
45.	CARGO BUILDING (E)	6091.61'
46.	MAINTENANCE HANGAR (E)	6110.97'
47.	J.H.W. INVESTMENT COMPANY (E)	6085.09'
48.	J.H.W. INVESTMENT COMPANY (E)	6077.13'
49.	J.H.W. INVESTMENT COMPANY (E)	6073.65'
50.	J.H.W. INVESTMENT COMPANY (E)	6078.35'
51.	J.H.W. INVESTMENT COMPANY (E)	6071.85'
52.	J.H.W. INVESTMENT COMPANY (E)	6081.48'
53.	J.H.W. INVESTMENT COMPANY (E)	6080.44'
54.	A-CENT AVIATION HANGAR AND OFFICE (E)	6091.69'
55.	J.H.W. INVESTMENT COMPANY (E)	6078.26'
56.	J.H.W. INVESTMENT COMPANY (E)	6081.36'
57.	AIRPORT MAINTENANCE FACILITY (E)	6075.47'
58.	AIRPORT MAINTENANCE FACILITY (E)	6066.43'
59.	EQUIPMENT STORAGE BUILDING (E)	6063.95'
60.	AIRPORT MAINTENANCE FACILITY (E)	6071.85'
61.	AIRPORT MAINTENANCE FACILITY (E)	6045.68'
62.	PETERSON AIR FORCE BASE (HANGAR 1) (E)	6229.13'
63.	PETERSON AIR FORCE BASE (HANGAR 2) (E)	6222.03'
64.	PETERSON AIR FORCE BASE (HANGAR 3) (E)	6217.32'
65.	PETERSON AIR FORCE BASE (HANGAR 4) (E)	6217.54'
66.	PETERSON AIR FORCE BASE (BASE OPS) (E)	6240.66'

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AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
67.	PETERSON AIR FORCE BASE (HANGAR 5) (E)	6216.60'
68.	PETERSON AIR FORCE BASE (HANGAR 6) (E)	6216.00'
69.	AIRCRAFT RESCUE AND FIRE FIGHTING (E)	6213.70'
70.	PETERSON AIR FORCE BASE (E)	6205.44'
71.	PETERSON AIR FORCE BASE (E)	6229.18'
72.	PETERSON AIR FORCE BASE (E)	6240.66'
73.	PETERSON AIR FORCE BASE (E)	6222.61'
74.	PETERSON AIR FORCE BASE (E)	6224.93'
75.	AIRPORT TRAFFIC CONTROL TOWER (E)	6336.75'
76.	PETERSON AIR FORCE BASE (E)	6186.02'
77.	PETERSON AIR FORCE BASE (E)	6175.23'
78.	PETERSON AIR FORCE BASE (E)	6172.67'
79.	PETERSON AIR FORCE BASE (E)	6212.56'
80.	PETERSON AIR FORCE BASE (COMMISSARY) (E)	6246.25'
81.	PETERSON AIR FORCE BASE (E)	6236.21'
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88.	PETERSON AIR FORCE BASE (BUILDING) (E)	6244.09'
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90.	COLORADO INTERSTATE GAS (E)	5958.69'
91.	NuSTAR LOGISTICS (E)	5968.85'
92.	NuSTAR LOGISTICS (E)	5980.58'
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97.	AIRPORT BEACON (E) (TO BE RELOCATED)	6248.85'
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99.	OVERFLOW PARKING LOT (E)	6122.89'

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AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
100.	GLYCOL PRETREATMENT FACILITY (E)	6081.26'
101.	CHILD DEVELOPMENT CENTER (E)	6217.00'
102.	ELECTRICAL VAULT (E)	6137.39'
103.	ELECTRICAL VAULT (E)	6154' (EST.)
104.	RADIO TRANSMITTER SITE (E)	6153.76'
105.	LOCALIZER BUILDING (E)	6073.27'
106.	MIDDLE MARKER (E)/R(DECOMMISSIONED)	6030.66'
107.	ASR-8 (E)	6292.43'
108.	ASOS (E)	6195.46'
109.	WATER TANK (E)	6041.48'
110.	NuSTAR LOGISTICS FUEL TANKS (E)	6029.90'
111.	NuSTAR LOGISTICS FUEL TANKS (E)	6028.90'
112.	NuSTAR LOGISTICS FUEL TANKS (E)	6025.15'
113.	NuSTAR LOGISTICS FUEL TANKS (E)	6037.25'
114.	NuSTAR LOGISTICS FUEL TANKS (E)	6036.75'
115.	NuSTAR LOGISTICS FUEL TANKS (E)	6036.83'
116.	NuSTAR LOGISTICS FUEL TANKS (E)	6034.46'
117.	ARFF TRAINING AREA (E)	6203.06'
118.	COLORADO SPRINGS UTILITIES STOCKPILE (E)	6223.39'
119.	WESTERN PACIFIC MAINTENANCE HANGAR (E)	6145.76'
120.	ELECTRICAL SUBSTATION (E)	6090.11'
121.	AIRLINE FUEL FARM (E)	6135.74'
122.	SENSOR SYSTEM RPU (E)	6142.09'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

SPONSOR APPROVAL

CITY OF COLORADO SPRINGS

DATED: _____

FAA APPROVAL

CONDITIONALLY APPROVED
SUBJECT TO LETTER DATED: _____

FEDERAL AVIATION ADMINISTRATION
DENVER AIRPORTS DISTRICT OFFICE

DATED: _____

CASE NO: _____

Colorado Springs Airport

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number 3-08-0010-49) as provided under Title 49 U.S.C., Section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws."

CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
.	.	.	.

E.R. PROJECT NUMBER:	DATE:
WXW3300	07/2013

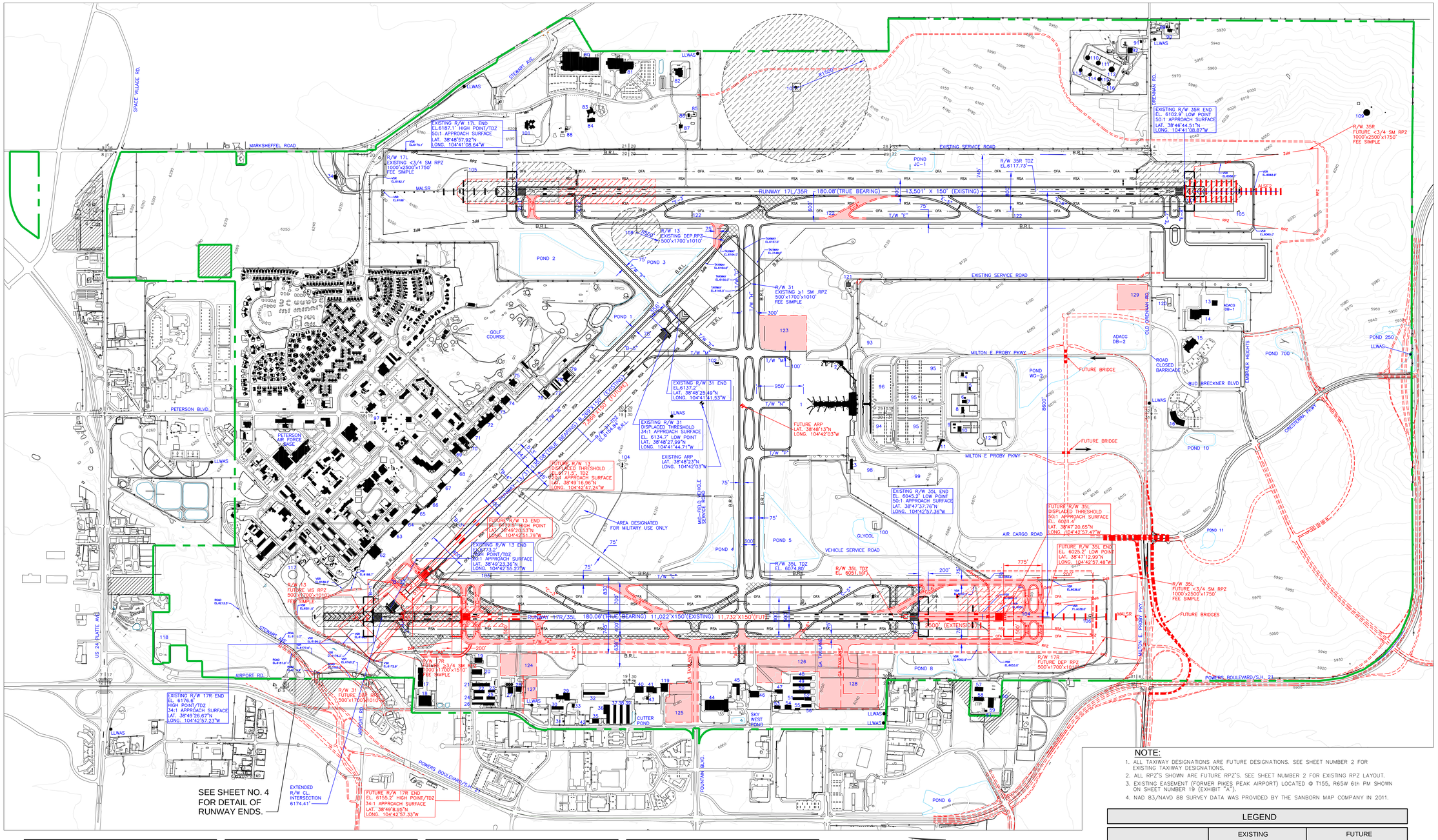
DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	DCC	JAR	KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-C002-ALP_recover.dwg

REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

AIRPORT LAYOUT DRAWING
(EXISTING CONDITIONS)

J:_Aviation Services\DEN_CAD\COS\COS-112 Master Plan\Element-8.0-ALP-Update\PLANS\COS112C-C002-ALP_recover.dwg Jul 29, 2013 1:28pm



NOTE:

1. ALL TAXIWAY DESIGNATIONS ARE FUTURE DESIGNATIONS. SEE SHEET NUMBER 2 FOR EXISTING TAXIWAY DESIGNATIONS.
2. ALL RPZ'S SHOWN ARE FUTURE RPZ'S. SEE SHEET NUMBER 2 FOR EXISTING RPZ LAYOUT.
3. EXISTING EASEMENT (FORMER PIKES PEAK AIRPORT) LOCATED @ T15S, R65W 6th PM SHOWN ON SHEET NUMBER 19 (EXHIBIT "A").
4. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.

LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14 23 15 22	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		

8°41'E

DATE: 6/2011 ANNUAL RATE OF CHANGE: 0°7'

HORIZONTAL SCALE

800 0 800 1600

(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

SPONSOR APPROVAL

CITY OF COLORADO SPRINGS

DATED: _____

FAA APPROVAL

CONDITIONALLY APPROVED
SUBJECT TO LETTER DATED: _____

FEDERAL AVIATION ADMINISTRATION
DENVER AIRPORTS DISTRICT OFFICE

DATED: _____

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102.	ELECTRICAL VAULT (E)	6137.39'
103.	ELECTRICAL VAULT (E)	6154' (EST.)
104.	RADIO TRANSMITTER SITE (E)	6153.76'
105.	LOCALIZER BUILDING (E)	6073.27'
106.	MIDDLE MARKER (E)R)(DECOMMISSIONED)	6030.66'
107	ASR-8 (E)	6292.43'
108.	ASOS (E)	6195.46'
109.	WATER TANK (E)	6041.48'
110.	NuSTAR LOGISTICS FUEL TANKS (E)	6029.90'
111.	NuSTAR LOGISTICS FUEL TANKS (E)	6028.90'
112.	NuSTAR LOGISTICS FUEL TANKS (E)	6025.15'
113.	NuSTAR LOGISTICS FUEL TANKS (E)	6037.25'
114.	NuSTAR LOGISTICS FUEL TANKS (E)	6036.75'
115.	NuSTAR LOGISTICS FUEL TANKS (E)	6036.83'
116.	NuSTAR LOGISTICS FUEL TANKS (E)	6034.46'
117.	ARFF TRAINING AREA (E)	6203.06'
118.	COLORADO SPRINGS UTILITIES STOCKPILE (E)	6223.39'
119.	WESTERN PACIFIC MAINTENANCE HANGAR (E)	6145.76'
120.	ELECTRICAL SUBSTATION (E)	6090.11'
121.	AIRLINE FUEL FARM (E)	6135.74'
122.	SENSOR SYSTEM RPU (E)	6142.09'
123.	DE-ICE PAD (F)	6155' (EST.)
124.	GENERAL AVIATION (F)	6163' (EST.)
125.	GENERAL AVIATION (F)	6111' (EST.)
126.	GENERAL AVIATION (F)	6091' (EST.)
127.	AIR CARGO (F)	6151' (EST.)
128.	MRO/HANGARS (F)	6073' (EST.)
129.	SRE FACILITY (F)	6101' (EST.)

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

Colorado Springs Airport

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number 3-08-0010-49) as provided under Title 49 U.S.C., Section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws."

CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS™

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
.	.	.	.

E.R. PROJECT NUMBER:		DATE:
WVXW3300		07/2013
DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	DCC	JAR	KOC

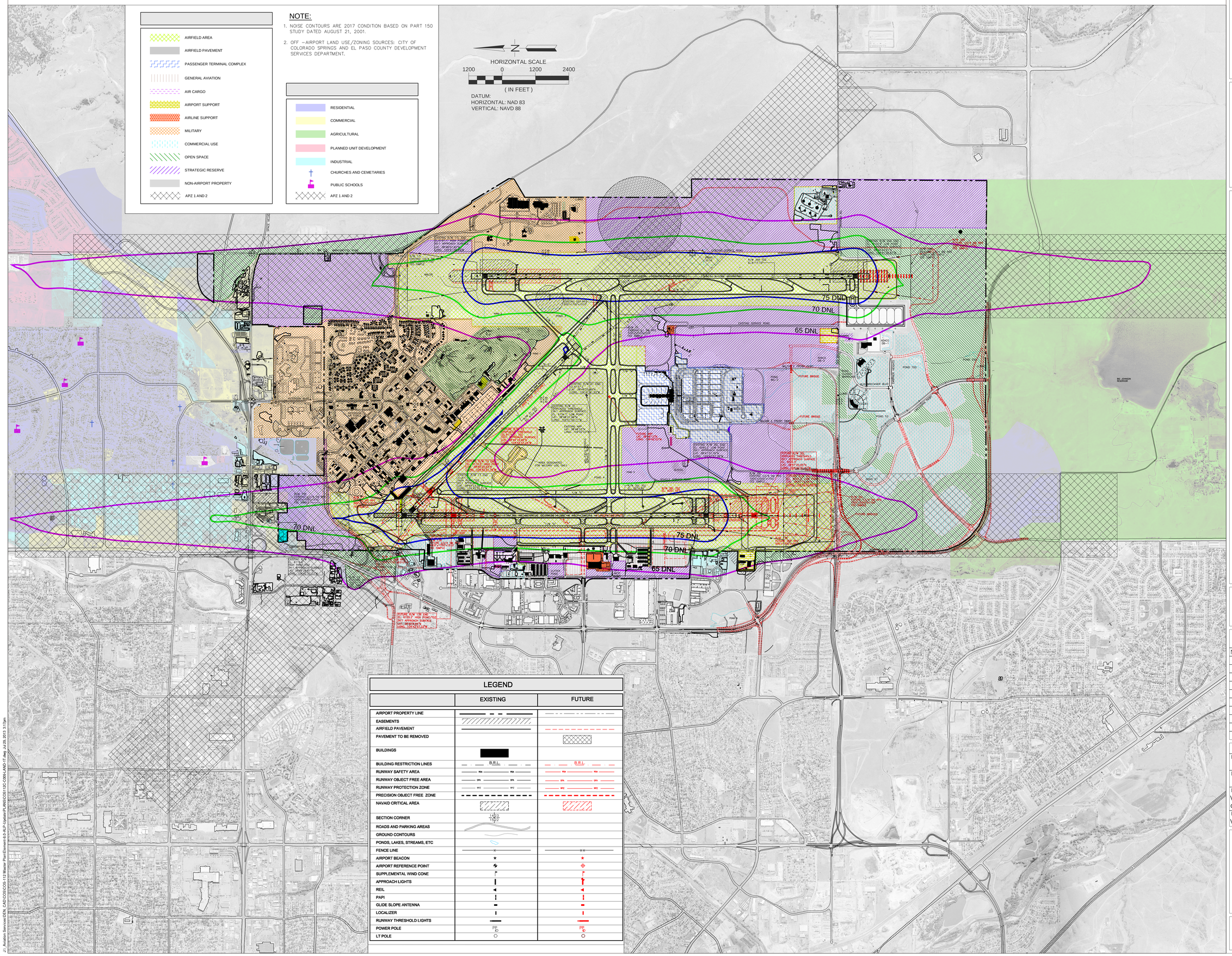
DRAWING PATH\NAME:
\---\PLANS\
COS112C-C002-ALP-FUT.dwg

REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

AIRPORT LAYOUT DRAWING (FUTURE CONDITIONS)

SHEET 3 OF 19

J:_Aviation Services\DEN_CAD\COS\COS-112 Master Plan\Element-8.0-ALP-Update\PLANS\COS112C-C002-ALP-FUT.dwg Jul 25, 2013 3:20pm



Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

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ISSUE RECORD

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	DCC	JAR	KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-C009-LAND-1T.dwg

REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

ON / OFF AIRPORT
LAND USE PLAN

SHEET 18 OF 19

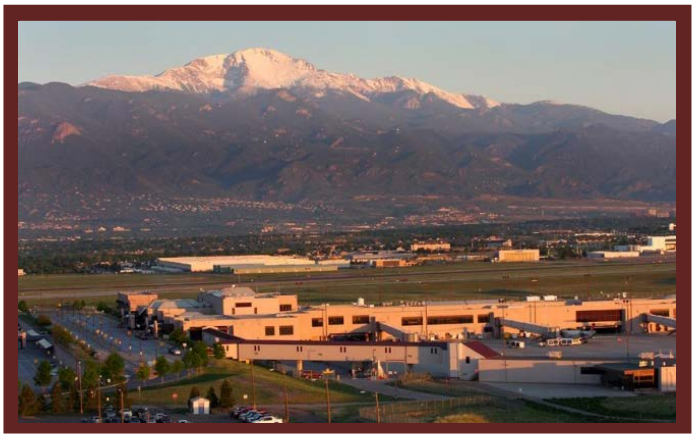
J:_Aviation Services\DEN_CAD\COS\COS-112 Master Plan\Element-8.0-ALP-Update\PLANS\COS112C-C009-LAND-1T.dwg Jul 29, 2013 3:17pm

Colorado Springs Airport

Master Plan Update Open House

Please join us for an opportunity to learn about the Colorado Springs Airport Master Plan Update.

The Airport Master Plan is the framework for the Airport's long-term development through the early 2030s.
We look forward to presenting the Master Plan's recommendations and answering the community's questions.



Colorado Springs Airport

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Please join us for an opportunity to learn about the Colorado Springs Airport Master Plan Update.

The Airport Master Plan is the framework for the Airport's long-term development through the early 2030s.
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What: Colorado Springs Airport
Master Plan Update Open House

When: Thursday, August 1st, 2013
4:00pm – 7:00pm

Where: Colorado Springs Airport
East Unit Terminal
7770 Milton E. Proby Parkway
Colorado Springs, CO 80916

Who: All interested individuals.
Please visit **www.flyCOS.com** and click on the "Master Plan Open House" link on the homepage for more information.
Parking will be validated.

Contact:
Agnes Blachut
P: (719) 550-1902
ablachut@springsgov.com

Colorado Springs Airport

What: Colorado Springs Airport
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Contact:
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P: (719) 550-1902
ablachut@springsgov.com

Colorado Springs Airport

COLORADO SPRINGS AIRPORT

Colorado Springs Airport Master Plan Update
Sign-In Sheet

Welcome to the Colorado Springs Airport Master Plan Public Open House. Thank you for signing in.

Name	Organization	Phone	Email
RICHARD HARVEY	EL PASO COUNTY DEVELOPMENT SERVICES	520-6842	RICHHARVEY@ELPASOCO.COM
Kari Parsons	El Paso County Dev. Services	520 6306	
Evan Boggs	private citizen	719-425-1802	boggs.evan@gmail.com
CHRIS THORNTON	AAC	719-597-6910	crt5118@q.com
Jennifer McCorkle	US Air Force Academy	719 333 8869	jennifer.mccorkle.ctr@us.af.mil
EVERETTE Coppock	SDV COMMAND SOURCE	719-210-0492	EFCoppock3@SDVCommandSource.com
John McGinley	COSA	719-550-1905	Jmcginlis@springsgov.com
Aaron Wood	Colorado jet Center	719-591-2288	aaron@coloradojetcenter.com
Chuck & Laura Kovac	Homes Meant For You Inc	719-291-2036	kovaccreations@peoplepc.com
LAWRENCE STALLA	LOCAL HOMEOWNER & LOCAL PILOT	303-908-5048	stalla5@earthlink.net
JIM SPITLER	CMS-2 Adjacent Landowner	719 667-6877	spitler@highlandcommercial.com
BOB PARKER	AIRPORT OPEN SPACE CR003	719-576-8455	bobparker002@centurylink.net
Alex McKean	RS&H	303 409 7915	alex.mckean@rsandh.com
Mike Baker	RS&H	303 408 2333	michael.baker@rsandh.com

Name	Organization	Phone	Email
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Zan Wagner	Radisson	597-7000	Zan.wagner@Radisson.com
Michele DeVoll	Radisson	597-7000	Michele.devoll@Radisson.com
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Donald Humphrey	Don's Garden Shop	591-1040	don@donsgardenshop.com
Ted Ritschard	WH Pacific	377-8799	tritschard@whpacific.com
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Tony Potterfield	Rampart Aviation	703-296-9278	
Steve Janitell	JHW	596-7324	
Greg Janitell	JHW/FFA	596-7324	GCJanitell@aol.com
George H. Schubert	Schubert Sod Depot	237-2870	—
Lt Col Josh DeMotts	Peterson AFB	719 556 7633	joshua.demotts@us.af.mil
Neil Ralston	COSA	719-550-1931	NRalston@springsgov.com
Agnes Blachut	COSA	550-1902	ablachut@springsgov.com

Appendix J

GLOSSARY OF TERMS

Colorado Springs Airport

Appendix J

GLOSSARY OF TERMS

Colorado Springs Airport

ADVISORY CIRCULAR (AC) - Federal Aviation Administration Advisory Circular. Advisory Circulars are informational publications that provide guidance for complying with aviation regulations and requirements.

AIRPORT TRAFFIC CONTROL TOWER (ATCT) - a facility providing airport traffic control service to an airport and its associated airspace area.

ATC - AIR TRAFFIC CONTROL SERVICE – a service provided for the purpose of promoting the safe, orderly, and expeditious flow of air traffic, including airport, approach, and enroute air traffic control services.

APPROACH END OF RUNWAY – The approach end of runway is the near end of the runway as viewed from the cockpit of a landing airplane.

DECLARED DISTANCE – Declared distances are the runway distances that limit turbine-powered airplane operations and thus the airport operational capacity. The distances are the accelerated stop -distance available (ASDA), the Landing Distance Available (LDA), the Takeoff Distance Available (TODA), and the Takeoff Run Available (TORA).

(1) ASDA is equal to TORA plus the length of the stopway (SWY), if provided.
(2) LDA is equal to the length of runway available and suitable for the landing ground run of airplanes.
(3) TODA is equal to TORA plus the length of the clearway (CWY) if provided.
(4) TORA is equal to the length of runway available and suitable for the takeoff ground run of airplanes.

DISPLACED THRESHOLD – a displaced threshold is a threshold located at a point on the runway other than at the runway end. Except for the approach standards defined in FAR Part 77, approach surfaces are associated with the threshold location.

INSTRUMENT LANDING SYSTEM (ILS) – a system of electronic devices whereby the pilot guides his aircraft to a runway by reference to instruments in the cockpit. In some instances the signals received from the ground can be fed into the automatic pilot for automatically controlled approaches. The ILS consists of a localizer, glideslope and marker beacons, and approach light system.

RUNWAY – a runway is a defined rectangular area on an airport prepared for the landing or takeoff of airplanes.

RUNWAY PROTECTION ZONE (RPZ) – an area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground.

RUNWAY SAFETY AREA (RSA) – a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISUAL RANGE (RVR) – an instrumentally derived value, based on standard calibrations, that represents the horizontal distance a pilot will see down the runway from the approach end.

TAXILANE – a taxilane is the portion of the aircraft parking area used for access between taxiways, aircraft parking positions, hangars, storage facilities, etc. A taxilane is outside the movement area, and is normally not controlled by the Air Traffic Control Tower.

TAXIWAY – a taxiway is a defined path, from one part of an airport to another, selected or prepared for the taxiing of aircraft.

TERMINAL AREA FORECAST (TAF) – historical aviation activity data and FAA's forecasts for airports receiving FAA and contract tower services.

THRESHOLD – the beginning of that portion of the runway available for landing; a displaced threshold is located at a point on the runway beyond the beginning of the runway.

Appendix K

AIRPORT LAYOUT PLAN

Colorado Springs Airport

Prepared by:

Jacobs Engineering Group, Inc.

Appendix K

AIRPORT LAYOUT PLAN

Colorado Springs Airport

This appendix includes a reproduction of the Airport Layout Plan (ALP) sheets that were submitted to FAA as part of the master planning process. The ALP sheets in their original format are sized at 30″ x 42″. The reduced size sheets included herein are not to scale, sized at 11″ x 17″.

CITY OF
COLORADO SPRINGS MUNICIPAL AIRPORT
Airport Master Plan

JACOBS™
707 17TH STREET
SUITE 2400
DENVER COLORADO 80202
PHONE (303) 820-5240

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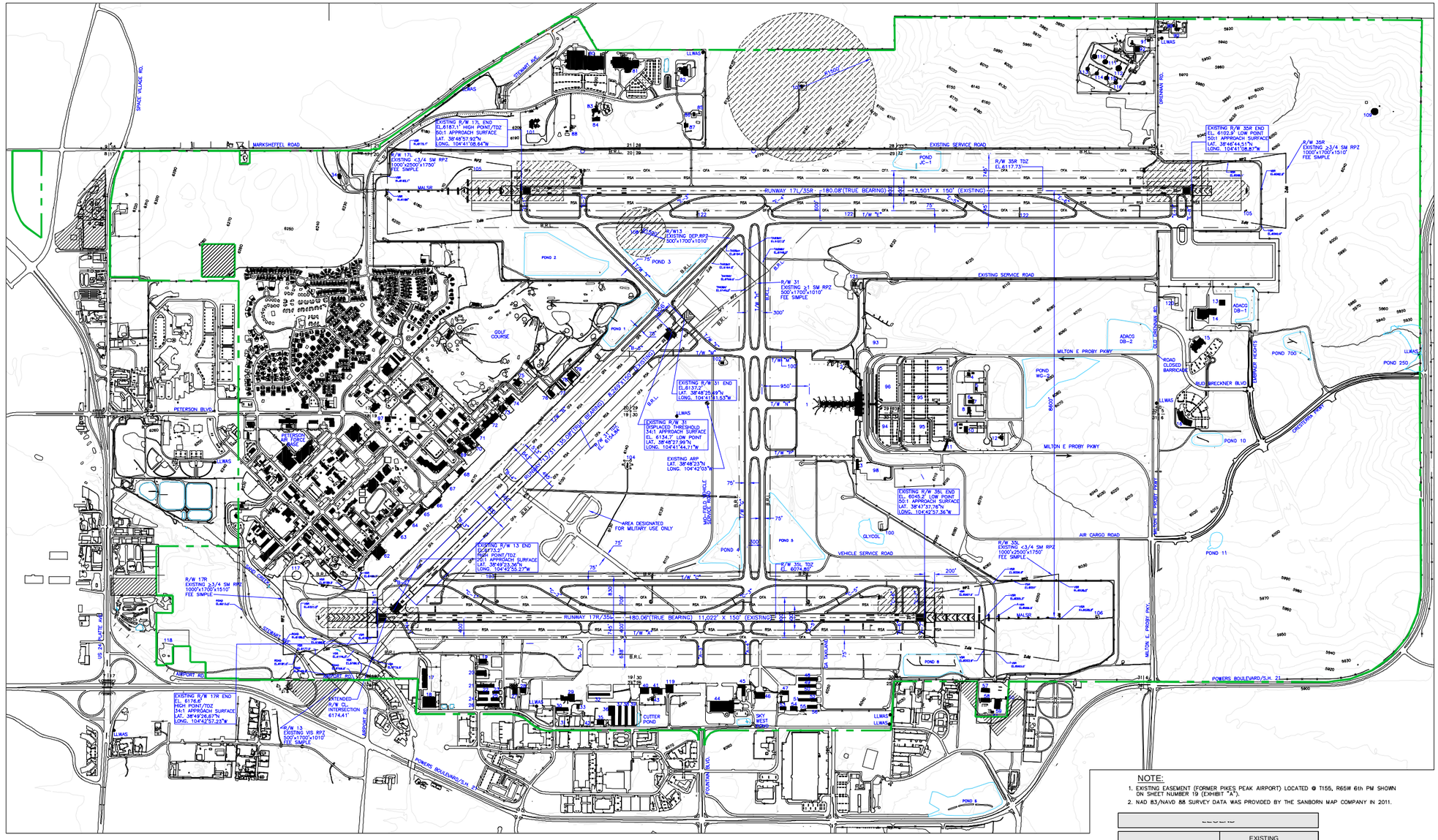
AIRPORT LAYOUT PLAN EXHIBITS

SHEET NO.	TITLE
1	COVER SHEET
2	AIRPORT LAYOUT DRAWING (EXISTING CONDITIONS)
3	AIRPORT LAYOUT DRAWING (FUTURE CONDITIONS)
4	TECHNICAL DATA SHEET
5	TERMINAL/BUILDING AREA PLAN
6	GENERAL AVIATION DEVELOPMENT
7	EAST SIDE DEVELOPMENT PLAN
8	PETERSON AIR FORCE BASE LAYOUT
9	AIRPORT AIRSPACE FAR PART 77 SURFACES
10	OBSTRUCTION DATA TABLES
11	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY 17L
12	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY 35R
13	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY 17R
14	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY 35L
15	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY 13

AIRPORT LAYOUT PLAN EXHIBITS

SHEET NO.	TITLE
16	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY 31
17	ON/OFF AIRPORT LAND USE PLAN
18	AIRPORT EXHIBIT "A" PROPERTY MAP



NOTE:

1. EXISTING EASEMENT (FORMER PIKES PEAK AIRPORT) LOCATED @ T15S, R65W 6th PM SHOWN ON SHEET NUMBER 19 (EXHIBIT "A").
2. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.

	EXISTING
AIRPORT PROPERTY LINE	
EASEMENTS	
AIRFIELD PAVEMENT	
REMOVED PAVEMENT	
BUILDINGS	
BUILDING RESTRICTION LINES	B.R.L.
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	OFA
RUNWAY PROTECTION ZONE	RPZ
PRECISION OBJECT FREE ZONE	
NAVAID CRITICAL AREA	
SECTION CORNER	1023 1022
ROADS AND PARKING AREAS	
GROUND CONTOURS	
PONDS, LAKES, STREAMS, ETC	
FENCE LINE	
AIRPORT BEACON	
AIRPORT REFERENCE POINT	
SUPPLEMENTAL WIND CONE	
APPROACH LIGHTS	
REIL	
PAPI	
GLIDE SLOPE ANTENNA	
LOCALIZER	
RUNWAY THRESHOLD LIGHTS	
POWER POLE	PP
LT POLE	

8°41'E

DATE: 6/2011 ANNUAL RATE OF CHANGE: 0°7'

HORIZONTAL SCALE

800 0 800 1600

(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
1.	PASSENGER TERMINAL BUILDING (E)	6181.89'
2.	EAST UNIT TERMINAL BUILDING (E)	6148.38'
3.	BELLY CARGO BUILDING (E)	6140.59'
4.	ADVANTAGE RENTAL CAR SERVICE CENTER (E)	6108.42'
5.	ENTERPRISE RENTAL CAR SERVICE CENTER (E)	6105.26'
6.	ALAMO RENTAL CAR SERVICE CENTER (E)	6103.16'
7.	ALAMO RENTAL CAR SERVICE CENTER (E)	6105.68'
8.	AVIS RENTAL CAR SERVICE CENTER (E)	6109.40'
9.	HERTIZ RENTAL CAR SERVICE CENTER (E)	6113.69'
10.	HERTZ RENTAL CAR SERVICE CENTER (E)	6114.77'
11.	TOLL PLAZA (E)	6115.97'
12.	BUDGET RENTAL CAR SERVICE CENTER (E)	6095.52'
13.	A/DACG FACILITY (E)	6095.38'
14.	A/DACG FACILITY (E)	6109.20'
15.	AEROSPACE CORPORATION (E)	6097.09'
16.	NORTHROP GRUMMAN (E)	6111.10'
17.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6189.03'
18.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6206.15'
19.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6179.54'
20.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6183.06'
21.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6158.54'
22.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6158.52'
23.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6152.59'
24.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6155.11'
25.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6155.09'
26.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6152.46'
27.	COLORADO SPRINGS POLICE HANGAR (E)	6153.02'
28.	CORPORATE HANGAR (E)	6155.15'
29.	FEDEX CARGO FACILITY (E)	6144.46'
30.	FEDEX CARGO FACILITY (E)	6140.40'
31.	FORMER RENTAL CAR SERVICE CENTER (R)	6120.41'
32.	COLORADO JET CENTER HANGARS (E)	6126.90'
33.	COLORADO DIVISION OF WILDLIFE HANGAR (E)	6128.58'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
34.	EAST GATE DEVELOPMENT (E)	6259.50'
35.	CUTTER AVIATION (E)	6129.36'
36.	CUTTER AVIATION (E)	6124.66'
37.	CUTTER AVIATION (E)	6113.70'
38.	CUTTER AVIATION (E)	6112.89'
39.	CUTTER AVIATION (E)	6114.50'
40.	COLORADO JET CENTER HANGARS (E)	6141.08'
41.	COLORADO JET CENTER HANGAR (E)	6124.92'
42.	THIRFTY RENTAL CAR SERVICE BUILDING (E)	6117.84'
43.	FUEL FARM (E)	6113.99'
44.	SKYWEST MAINTENANCE FACILITY (E)	6140.37'
45.	CARGO BUILDING (E)	6091.62'
46.	MAINTENANCE HANGAR (E)	6110.97'
47.	J.H.W. INVESTMENT COMPANY (E)	6085.09'
48.	J.H.W. INVESTMENT COMPANY (E)	6077.13'
49.	J.H.W. INVESTMENT COMPANY (E)	6073.60'
50.	J.H.W. INVESTMENT COMPANY (E)	6078.30'
51.	J.H.W. INVESTMENT COMPANY (E)	6071.85'
52.	J.H.W. INVESTMENT COMPANY (E)	6081.48'
53.	J.H.W. INVESTMENT COMPANY (E)	6080.44'
54.	A-CENT AVIATION HANGAR AND OFFICE (E)	6091.69'
55.	J.H.W. INVESTMENT COMPANY (E)	6078.26'
56.	J.H.W. INVESTMENT COMPANY (E)	6081.36'
57.	AIRPORT MAINTENANCE FACILITY (E)	6075.47'
58.	AIRPORT MAINTENANCE FACILITY (E)	6066.42'
59.	EQUIPMENT STORAGE BUILDING (E)	6063.95'
60.	AIRPORT MAINTENANCE FACILITY (E)	6071.85'
61.	AIRPORT MAINTENANCE FACILITY (E)	6045.68'
62.	PETERSON AIR FORCE BASE (HANGAR 1) (E)	6229.13'
63.	PETERSON AIR FORCE BASE (HANGAR 2) (E)	6222.02'
64.	PETERSON AIR FORCE BASE (HANGAR 3) (E)	6217.32'
65.	PETERSON AIR FORCE BASE (HANGAR 4) (E)	6217.54'
66.	PETERSON AIR FORCE BASE (BASE OPS) (E)	6240.66'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
67.	PETERSON AIR FORCE BASE (HANGAR 5) (E)	6218.60'
68.	PETERSON AIR FORCE BASE (HANGAR 6) (E)	6216.00'
69.	AIRCRAFT RESCUE AND FIRE FIGHTING (E)	6213.70'
70.	PETERSON AIR FORCE BASE (E)	6205.44'
71.	PETERSON AIR FORCE BASE (E)	6229.18'
72.	PETERSON AIR FORCE BASE (E)	6240.66'
73.	PETERSON AIR FORCE BASE (E)	6222.61'
74.	PETERSON AIR FORCE BASE (E)	6265.18'
75.	AIRPORT TRAFFIC CONTROL TOWER (E)	6336.75'
76.	PETERSON AIR FORCE BASE (E)	6186.02'
77.	PETERSON AIR FORCE BASE (E)	6175.23'
78.	PETERSON AIR FORCE BASE (E)	6172.67'
79.	PETERSON AIR FORCE BASE (E)	6212.56'
80.	PETERSON AIR FORCE BASE (COMMISSARY) (E)	6246.25'
81.	PETERSON AIR FORCE BASE (E)	6236.21'
82.	PETERSON AIR FORCE BASE (BUILDING) (E)	6225.39'
83.	PETERSON AIR FORCE BASE (BUILDING) (E)	6221.65'
84.	PETERSON AIR FORCE BASE (BUILDING) (E)	6219.66'
85.	PETERSON AIR FORCE BASE (BUILDING) (E)	6204.18'
86.	PETERSON AIR FORCE BASE (BUILDING) (E)	6197.17'
87.	ARFF (E)	6209.23'
88.	PETERSON AIR FORCE BASE (BUILDING) (E)	6244.09'
89.	COLORADO INTERSTATE GAS (E)	5946.85'
90.	COLORADO INTERSTATE GAS (E)	5958.69'
91.	NuSTAR LOGISTICS (E)	5968.85'
92.	NuSTAR LOGISTICS (E)	5980.58'
93.	VALET PARKING LOT (E)	6138.82'
94.	SHORT TERM PARKING LOT (E)	6109.08'
95.	LONG TERM PARKING LOT (E)	6101.10'
96.	RENTAL CAR READY/RE TURN LOT (E)	6113.17'
97.	AIRPORT BEACON (E) (TO BE RELOCATED)	6248.85'
98.	EMPLOYEE PARKING LOT (E)	6106.39'
99.	OVERFLOW PARKING LOT (E)	6122.89'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
100.	GLYCOL PRETREATMENT FACILITY (E)	6081.26'
101.	CHILD DEVELOPMENT CENTER (E)	6217.00'
102.	ELECTRICAL VAULT (E)	6137.39'
103.	ELECTRICAL VAULT (E)	6154 (EST.)
104.	RADIO TRANSMITTER SITE (E)	6153.76'
105.	LOCALIZER BUILDING (E)	6073.27'
106.	MIDDLE MARKER (E)(RYDE COMMISSIONED)	6030.66'
107.	ASR-9 (E)	6292.42'
108.	ASOS (E)	6195.46'
109.	WATER TANK (E)	6041.48'
110.	NuSTAR LOGISTICS FUEL TANKS (E)	6029.90'
111.	NuSTAR LOGISTICS FUEL TANKS (E)	6028.90'
112.	NuSTAR LOGISTICS FUEL TANKS (E)	6025.15'
113.	NuSTAR LOGISTICS FUEL TANKS (E)	6037.25'
114.	NuSTAR LOGISTICS FUEL TANKS (E)	6038.75'
115.	NuSTAR LOGISTICS FUEL TANKS (E)	6036.83'
116.	NuSTAR LOGISTICS FUEL TANKS (E)	6034.46'
117.	ARFF TRAINING AREA (E)	6203.06'
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119.	WESTERN PACIFIC MAINTENANCE HANGAR (E)	6145.76'
120.	ELECTRICAL SUBSTATION (E)	6090.11'
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(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

Colorado Springs Airport

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number 3-08-0010-49) as provided under Title 49 U.S.C., Section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
.	.	.	.

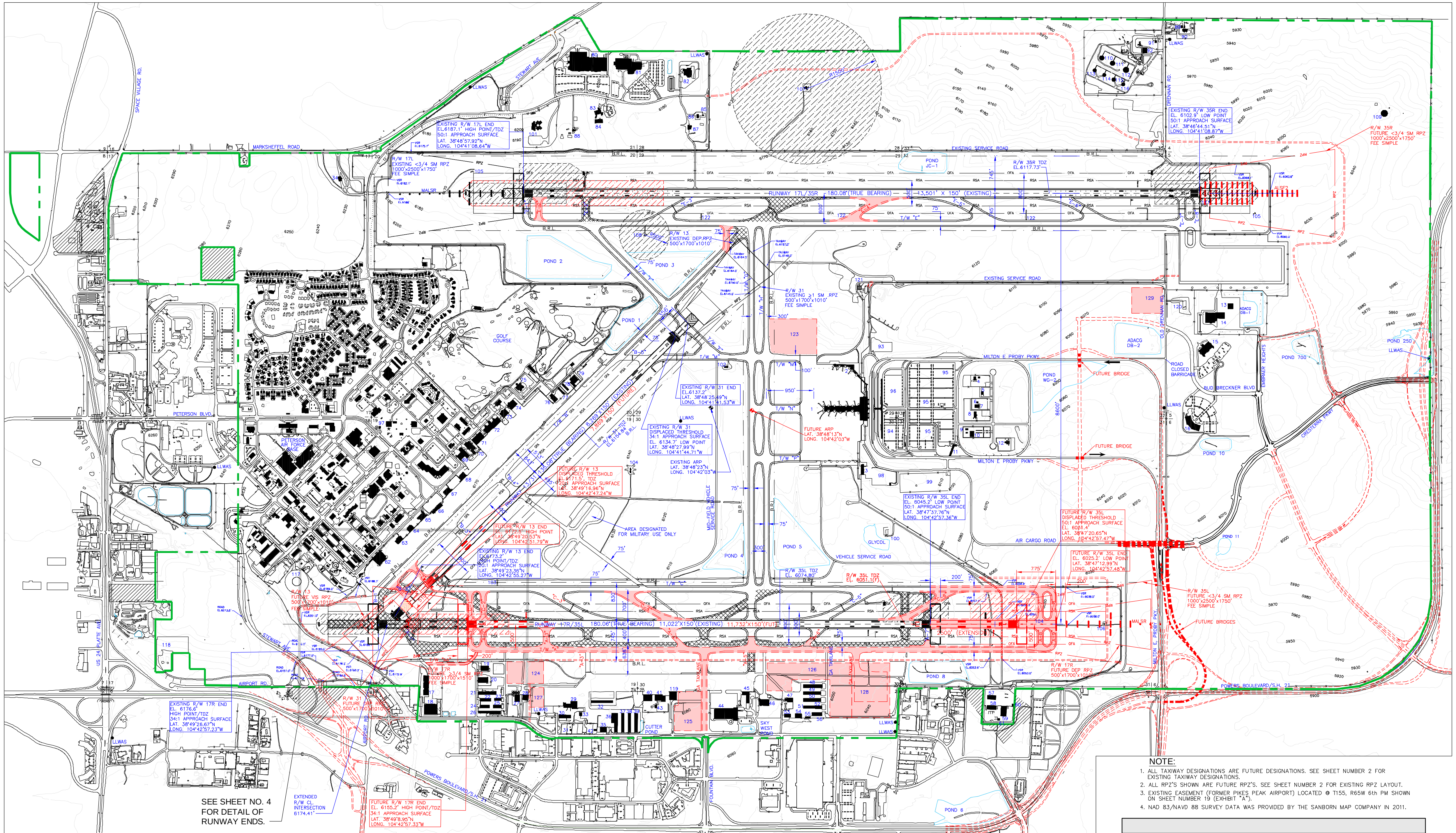
E.R. PROJECT NUMBER:		DATE:
WXW3300		07/2013
DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	DCC	JAR	KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 2-ALP.dwg
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

AIRPORT LAYOUT DRAWING
(EXISTING CONDITIONS)

SHEET 2 OF 18

J:_Aviation Services\EN_CAD\COS\112\15 Master Plan\Elements\ALP\Layout\PLANS\COS-SHEET 2-ALP.dwg Aug 16, 2013 2:20pm



NOTE:

1. ALL TAXIWAY DESIGNATIONS ARE FUTURE DESIGNATIONS. SEE SHEET NUMBER 2 FOR EXISTING TAXIWAY DESIGNATIONS.
2. ALL RPZ'S SHOWN ARE FUTURE RPZ'S. SEE SHEET NUMBER 2 FOR EXISTING RPZ LAYOUT.
3. EXISTING EASEMENT (FORMER PIKES PEAK AIRPORT) LOCATED @ T155, R65W 6th PM SHOWN ON SHEET NUMBER 19 (EXHIBIT "A").
4. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
1.	PASSENGER TERMINAL BUILDING (E)	6181.87'
2.	EAST UNIT TERMINAL BUILDING (E)	6148.38'
3.	BELLY CARGO BUILDING (E)	6140.59'
4.	ADVANTAGE RENTAL CAR SERVICE CENTER (E)	6108.42'
5.	ENTERPRISE RENTAL CAR SERVICE CENTER (E)	6105.26'
6.	ALAMO RENTAL CAR SERVICE CENTER (E)	6103.16'
7.	ALAMO RENTAL CAR SERVICE CENTER (E)	6105.68'
8.	AVIS RENTAL CAR SERVICE CENTER (E)	6109.45'
9.	HERTZ RENTAL CAR SERVICE CENTER (E)	6113.69'
10.	HERTZ RENTAL CAR SERVICE CENTER (E)	6114.77'
11.	TOLL PLAZA (E)	6115.97'
12.	BUDGET RENTAL CAR SERVICE CENTER (E)	6095.52'
13.	A/DACG FACILITY (E)	6095.38'
14.	A/DACG FACILITY (E)	6109.20'
15.	AEROSPACE CORPORATION (E)	6097.09'
16.	NORTHROP GRUMMAN (E)	6111.10'
17.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6189.03'
18.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6206.15'
19.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6179.54'
20.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6183.06'
21.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6158.54'
22.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6158.52'
23.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6152.55'
24.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6155.11'
25.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6155.09'
26.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6152.46'
27.	COLORADO SPRINGS POLICE HANGAR (E)	6153.02'
28.	CORPORATE HANGAR (E)	6155.15'
29.	FEDEX CARGO FACILITY (E)	6144.48'
30.	FEDEX CARGO FACILITY (E)	6140.40'
31.	FORMER RENTAL CAR SERVICE CENTER (R)	6120.41'
32.	COLORADO JET CENTER HANGARS (E)	6126.90'
33.	COLORADO DIVISION OF WILDLIFE HANGAR (E)	6128.56'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
34.	EAST GATE DEVELOPMENT (E)	6232.50'
35.	CUTTER AVIATION (E)	6129.16'
36.	CUTTER AVIATION (E)	6124.66'
37.	CUTTER AVIATION (E)	6113.70'
38.	CUTTER AVIATION (E)	6112.89'
39.	CUTTER AVIATION (E)	6114.50'
40.	COLORADO JET CENTER HANGARS (E)	6141.08'
41.	COLORADO JET CENTER HANGAR (E)	6124.93'
42.	THRIFTY RENTAL CAR SERVICE BUILDING (E)	6117.84'
43.	FUEL FARM (E)	6113.95'
44.	SKYWEST MAINTENANCE FACILITY (E)	6140.37'
45.	CARGO BUILDING (E)	6091.61'
46.	MAINTENANCE HANGAR (E)	6110.97'
47.	J.H.W. INVESTMENT COMPANY (E)	6085.09'
48.	J.H.W. INVESTMENT COMPANY (E)	6077.13'
49.	J.H.W. INVESTMENT COMPANY (E)	6073.65'
50.	J.H.W. INVESTMENT COMPANY (E)	6078.35'
51.	J.H.W. INVESTMENT COMPANY (E)	6071.85'
52.	J.H.W. INVESTMENT COMPANY (E)	6081.48'
53.	J.H.W. INVESTMENT COMPANY (E)	6080.44'
54.	A-CENT AVIATION HANGAR AND OFFICE (E)	6091.69'
55.	J.H.W. INVESTMENT COMPANY (E)	6078.26'
56.	J.H.W. INVESTMENT COMPANY (E)	6081.36'
57.	AIRPORT MAINTENANCE FACILITY (E)	6075.47'
58.	AIRPORT MAINTENANCE FACILITY (E)	6066.43'
59.	EQUIPMENT STORAGE BUILDING (E)	6063.95'
60.	AIRPORT MAINTENANCE FACILITY (E)	6071.85'
61.	AIRPORT MAINTENANCE FACILITY (E)	6045.68'
62.	PETERSON AIR FORCE BASE (HANGAR 1) (E)	6229.13'
63.	PETERSON AIR FORCE BASE (HANGAR 2) (E)	6222.03'
64.	PETERSON AIR FORCE BASE (HANGAR 3) (E)	6217.32'
65.	PETERSON AIR FORCE BASE (HANGAR 4) (E)	6217.54'
66.	PETERSON AIR FORCE BASE (BASE OPS) (E)	6240.66'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
67.	PETERSON AIR FORCE BASE (HANGAR 5) (E)	6216.60'
68.	PETERSON AIR FORCE BASE (HANGAR 6) (E)	6216.00'
69.	AIRCRAFT RESCUE AND FIRE FIGHTING (E)	6213.70'
70.	PETERSON AIR FORCE BASE (E)	6205.44'
71.	PETERSON AIR FORCE BASE (E)	6229.18'
72.	PETERSON AIR FORCE BASE (E)	6240.66'
73.	PETERSON AIR FORCE BASE (E)	6222.61'
74.	PETERSON AIR FORCE BASE (E)	6265.18'
75.	AIRPORT TRAFFIC CONTROL TOWER (E)	6336.75'
76.	PETERSON AIR FORCE BASE (E)	6186.02'
77.	PETERSON AIR FORCE BASE (E)	6175.23'
78.	PETERSON AIR FORCE BASE (E)	6172.67'
79.	PETERSON AIR FORCE BASE (E)	6212.56'
80.	PETERSON AIR FORCE BASE (COMMISSARY) (E)	6246.25'
81.	PETERSON AIR FORCE BASE (E)	6236.21'
82.	PETERSON AIR FORCE BASE (BUILDING) (E)	6225.39'
83.	PETERSON AIR FORCE BASE (BUILDING) (E)	6221.65'
84.	PETERSON AIR FORCE BASE (BUILDING) (E)	6219.66'
85.	PETERSON AIR FORCE BASE (BUILDING) (E)	6204.18'
86.	PETERSON AIR FORCE BASE (BUILDING) (E)	6197.17'
87.	ARFF (E)	6209.23'
88.	PETERSON AIR FORCE BASE (BUILDING) (E)	6244.09'
89.	COLORADO INTERSTATE GAS (E)	5946.85'
90.	COLORADO INTERSTATE GAS (E)	5958.69'
91.	NuSTAR LOGISTICS (E)	5968.85'
92.	NuSTAR LOGISTICS (E)	5980.58'
93.	VALET PARKING LOT (E)	6138.82'
94.	SHORT TERM PARKING LOT (E)	6109.08'
95.	LONG TERM PARKING LOT (E)	6101.10'
96.	RENTAL CAR READY/RETURN LOT (E)	6113.17'
97.	AIRPORT BEACON (E) (TO BE RELOCATED)	6248.85'
98.	EMPLOYEE PARKING LOT (E)	6106.39'
99.	OVERFLOW PARKING LOT (E)	6122.89'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
100.	GLYCOL PRETREATMENT FACILITY (E)	6081.26'
101.	CHILD DEVELOPMENT CENTER (E)	6217.00'
102.	ELECTRICAL VAULT (E)	6137.39'
103.	ELECTRICAL VAULT (E)	6154' (EST.)
104.	RADIO TRANSMITTER SITE (E)	6153.76'
105.	LOCALIZER BUILDING (E)	6073.27'
106.	MIDDLE MARKER (E)(R)(DECOMMISSIONED)	6030.66'
107	ASR-8 (E)	6292.43'
108.	ASOS (E)	6195.46'
109.	WATER TANK (E)	6041.48'
110.	NuSTAR LOGISTICS FUEL TANKS (E)	6029.90'
111.	NuSTAR LOGISTICS FUEL TANKS (E)	6028.90'
112.	NuSTAR LOGISTICS FUEL TANKS (E)	6025.15'
113.	NuSTAR LOGISTICS FUEL TANKS (E)	6037.25'
114.	NuSTAR LOGISTICS FUEL TANKS (E)	6036.75'
115.	NuSTAR LOGISTICS FUEL TANKS (E)	6036.83'
116.	NuSTAR LOGISTICS FUEL TANKS (E)	6034.46'
117.	ARFF TRAINING AREA (E)	6203.06'
118.	COLORADO SPRINGS UTILITIES STOCKPILE (E)	6223.39'
119.	WESTERN PACIFIC MAINTENANCE HANGAR (E)	6145.76'
120.	ELECTRICAL SUBSTATION (E)	6090.11'
121.	AIRLINE FUEL FARM (E)	6135.74'
122.	SENSOR SYSTEM RPU (E)	6142.09'
123.	DE-ICE PAD (F)	6155' (EST.)
124.	GENERAL AVIATION (F)	6163' (EST.)
125.	GENERAL AVIATION (F)	6111' (EST.)
126.	GENERAL AVIATION (F)	6091' (EST.)
127.	AIR CARGO (F)	6151' (EST.)
128.	MRO/HANGARS (F)	6073' (EST.)
129.	SRE FACILITY (F)	6101' (EST.)

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

8°41'E

DATE: 6/2011 ANNUAL RATE OF CHANGE: 0°7'

HORIZONTAL SCALE

800 0 800 1600

(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

SPONSOR APPROVAL

DIRECTOR OF AVIATION,
COLORADO SPRINGS AIRPORT

DATED: ____________

FAA APPROVAL

CONDITIONALLY APPROVED SUBJECT TO LETTER DATED: ____________

FEDERAL AVIATION ADMINISTRATION
DENVER AIRPORTS DISTRICT OFFICE

DATED: ____________

CASE NO: ____________

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14 23 / 15 22	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE	x	xx
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
-	-	-	-

E.R. PROJECT NUMBER: WVXW3300		DATE: 07/2013	
DESIGNED:	DRAWN: DCC	CHECKED: JAR	APPROVED: KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 3-ALP-FUT.dwg

REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

AIRPORT LAYOUT DRAWING (FUTURE CONDITIONS)

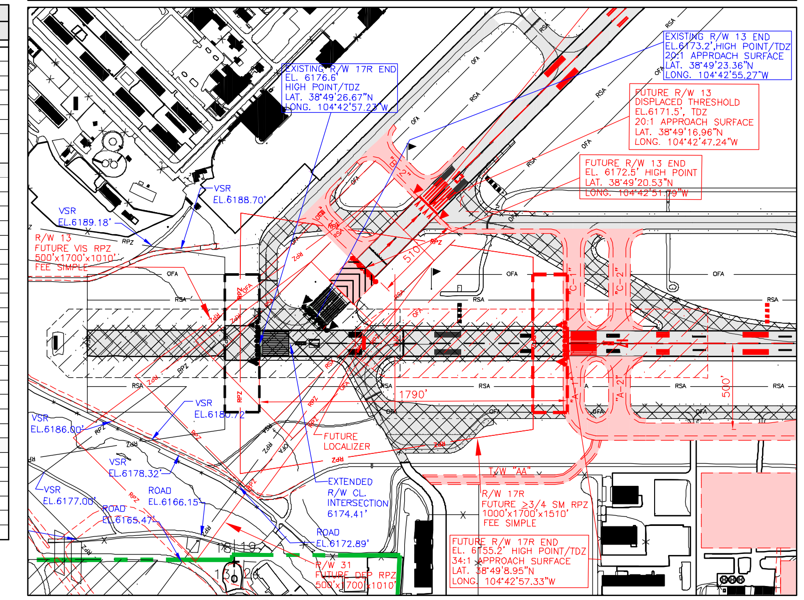
SHEET 3 OF 18

J:_Aviation Services\DEN_CAD\COS\COS-112 Master Plan\Element-8.0-ALP-Update\PLANS\COS112C-SHEET 3-ALP-FUT.dwg Aug 16, 2013 2:19pm

RUNWAY DATA

	RUNWAY 17L		RUNWAY 35R		RUNWAY 17R		RUNWAY 35L		RUNWAY 13		RUNWAY 31	
	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE
APPROACH VISIBILITY MINIMUMS	1,800 RVR	SAME	3/4 MILE	1/4 MILE	3/4 MILE	SAME	1/2 MILE	SAME	VISUAL	SAME	1 MILE	SAME
FAR PART 77 APPROACH SLOPE DESIGN/ACTUAL	50:1	SAME	50:1	SAME	34:1	SAME	50:1	SAME	20:1	SAME	34:1	SAME
FAR PART 77 APPROACH CATEGORY	PIR	SAME	PIR	SAME	NPI	SAME	PIR	SAME	VISUAL	SAME	NPI	SAME
RUNWAY LENGTH	13,501'	SAME	13,501'	SAME	11,022'	11,732'	11,022'	11,732'	8,269'	7,869'	8,269'	7,869'
RUNWAY WIDTH	150'	SAME	150'	SAME	150'	SAME	150'	SAME	150'	SAME	150'	SAME
PAVEMENT TYPE	CONCRETE	SAME	CONCRETE	SAME	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME
APPROACH TYPE	ILS (CAT I), LOC, RNAV(RNP), RNAV(GPS)	SAME	ILS, LOC, RNAV(RNP), RNAV(GPS)	ILS (CAT II), LOC, RNAV(RNP), RNAV(GPS)	RNAV(RNP), RNAV(GPS)	SAME	ILS (CAT I), LOC, NDB RNAV(RNP), RNAV(GPS)	SAME	N/A	SAME	RNAV (GPS)	SAME
PAVEMENT DESIGN STRENGTH												
D (LBS)	175,000	SAME	175,000	SAME	175,000	SAME	175,000	SAME	175,000	SAME	175,000	SAME
2D (LBS)	400,000	SAME	400,000	SAME	340,000	SAME	340,000	SAME	280,000	SAME	280,000	SAME
RUNWAY LIGHTING	HIRL	SAME	HIRL	SAME	HIRL	SAME	HIRL	SAME	MIRL	SAME	MIRL	SAME
RUNWAY MARKING	PRECISION	SAME	PRECISION	SAME	PRECISION	SAME	PRECISION	SAME	VISUAL	SAME	NPI	SAME
PERCENT GRADIENT	−0.62	SAME	0.62	SAME	−1.2	−1.1	1.2	1.1	−0.4	SAME	0.4	SAME
VISUAL APPROACH AIDS	MALSR,PAPI	SAME	REIL,PAPI	REIL,PAPI,ALSF−II	REIL, PAPI	SAME	PAPI/MALSR	SAME	PAPI/REIL	SAME	PAPI/REIL	SAME
INSTRUMENT APPROACH AIDS	ILS,DME,GPS,RNAV	SAME	ILS,DME,GPS,RNAV	SAME	RNAV	ILS/RNAV	ILS,RNAV,NDB	SAME	N.A.	SAME	RNAV	SAME
AIRPORT REFERENCE CODE	C−IV	SAME	C−IV	SAME	C−IV	SAME	C−IV	SAME	C−IV	SAME	C−IV	SAME
CRITICAL AIRCRAFT	B757−200	SAME	B757−200	SAME	B757−200	SAME	B757−200	SAME	C130	SAME	C130	SAME
WINGSPAN (FEET)	125'	SAME	125'	SAME	125'	SAME	125'	SAME	133'	SAME	133'	SAME
APPROACH SPEED (KNOTS)(ESTIMATED)	137	SAME	137	SAME	137	SAME	137	SAME	138	SAME	138	SAME
WEIGHT (POUNDS)	255,000	SAME	255,000	SAME	255,000	SAME	255,000	SAME	155,000	SAME	155,000	SAME
RUNWAY SAFETY AREA WIDTH	500'	SAME	500'	SAME	500'	SAME	500'	SAME	500'	SAME	500'	SAME
RUNWAY SAFETY AREA LENGTH BEYOND END	1000'	SAME	1000'	SAME	1000'	SAME	1000'	SAME	1000'	SAME	1000'	SAME
RUNWAY OBJECT FREE AREA WIDTH	800'	SAME	800'	SAME	800'	SAME	800'	SAME	800'	SAME	800'	SAME
RUNWAY OBJECT FREE AREA LENGTH BEYOND END	1000'	SAME	1000'	SAME	1000'	SAME	1000'	SAME	1000'	SAME	1000'	SAME
RUNWAY OBSTACLE FREE ZONE WIDTH	400'	SAME	400'	SAME	400'	SAME	400'	SAME	400'	SAME	400'	SAME
RUNWAY OBSTACLE FREE ZONE LENGTH BEYOND END	200'	SAME	200'	SAME	200'	SAME	200'	SAME	200'	SAME	200'	SAME
RUNWAY ELEVATIONS												
END ELEVATION	6187.1'	SAME	6102.9'	SAME	6176.6'	6155.2'	6045.2'	6025.2'	6173.2'	6172.5'	6137.2'	SAME
DISPLACED THRESHOLD ELEVATION	N/A	SAME	N/A	SAME	N/A	SAME	N/A	6031.4'	N/A	6171.5'	6134.7'	SAME
TOUCHDOWN ZONE ELEVATION	6187.1'	SAME	6117.7'	SAME	6176.6'	6155.2'	6074.8'	6051.1'	6173.2'	6171.5'	6154.8'	SAME
INTERSECTION	N/A	SAME	N/A	SAME	N/A	SAME	N/A	N/A	N/A	SAME	N/A	SAME
HIGH POINT	6187.1'	SAME	6187.1'	SAME	6176.6'	6155.2'	6176.6'	6155.2'	6173.2'	6172.5'	6173.2'	6172.5'
LOW POINT	6102.9'	SAME	6102.9'	SAME	6045.2'	6025.2'	6045.2'	6025.2'	6134.7'	SAME	6134.7'	SAME

RUNWAYS 13 AND 17R END DETAIL



SCALE 1"=400"

AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION	6187.1'	SAME
AIRPORT REFERENCE POINT LAT.	38° 48' 23"N	38° 48' 13"N
LONG.	104° 42' 03"W	104° 42' 03"W
MEAN MAX. TEMP.(HOTTEST MONTH)	84.8° F	SAME
AIRPORT & TERMINAL NAV. AIDS	DME, ILS, RNAV, NDB	SAME
AIRPORT CATEGORY	COMMERCIAL SERVICE	SAME
AIRPORT REFERENCE CODE	C−IV	SAME
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	STANDARD	SAME

RUNWAY END COORDINATES

RUNWAY	EXISTING	FUTURE
RUNWAY 17L (LAT.)	38° 48' 57.92"	SAME
RUNWAY 17L (LONG..)	104° 41' 08.64"	SAME
RUNWAY 35R (LAT.)	38° 46' 44.51"	SAME
RUNWAY 35R (LONG.)	104° 41' 08.87"	SAME
RUNWAY 17R (LAT.)	38° 49' 26.67"	38° 49' 8.95"
RUNWAY 17R (LONG.)	104° 42' 57.23"	104° 42' 57.33"
RUNWAY 35L (LAT.)	38° 47' 37.76"	38° 47' 12.99"
RUNWAY 35L (LONG.)	104° 42' 57.36"	104° 42' 57.48"
RUNWAY 35L DISPLACED THRESHOLD (LAT.)	N/A	38° 47' 20.65"
RUNWAY 35L DISPLACED THRESHOLD (LONG.)	N/A	104° 42' 57.47"
RUNWAY 13 (LAT.)	38° 49' 23.36"	38° 49' 20.53"
RUNWAY 13 (LONG.)	104° 42' 55.27"	104° 42' 51.79"
RUNWAY 13 DISPLACED THRESHOLD (LAT.)	N/A	38° 49' 16.96"
RUNWAY 13 DISPLACED THRESHOLD (LONG.)	N/A	104° 42' 47.24"
RUNWAY 31 (LAT.)	38° 48' 25.49"	SAME
RUNWAY 31 (LONG.)	104° 41' 41.53"	SAME
RUNWAY 31 DISPLACED THRESHOLD (LAT.)	38° 48' 27.99"	SAME
RUNWAY 31 DISPLACED THRESHOLD (LONG.)	104° 41' 44.71"	SAME

DECLARED DISTANCE (EXISTING)

RUNWAY	TORA	TODA	ASDA	LDA
17L	13,501'	13,501'	13,501'	13,501'
35R	13,501'	13,501'	13,501'	13,501'
17R	11,022'	11,022'	11,022'	11,022'
35L	11,022'	11,022'	11,022'	11,022'
13	8,269'	8,269'	8,269'	8,269'
31	8,269'	8,269'	8,269'	7,913'

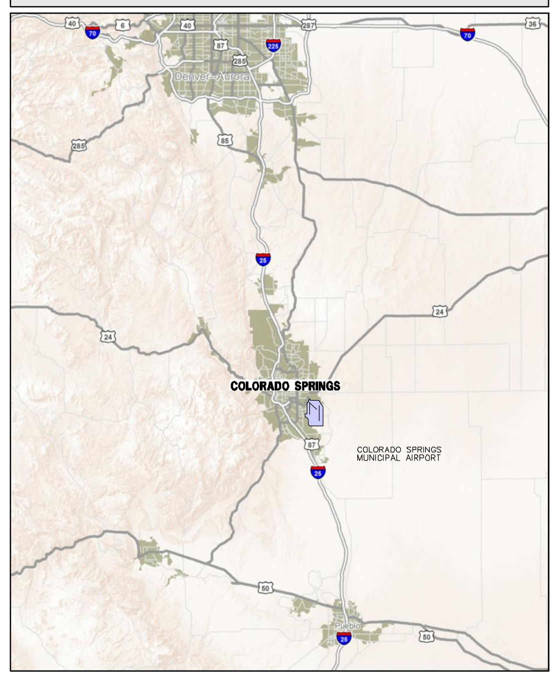
DECLARED DISTANCE (FUTURE)

RUNWAY	TORA	TODA	ASDA	LDA
17R	11,732'	11,732'	11,732'	11,732'
35L	11,732'	11,732'	11,732'	10,957'
13	7,869'	7,869'	7,869'	7,359'
31	7,869'	7,869'	7,869'	7,513'

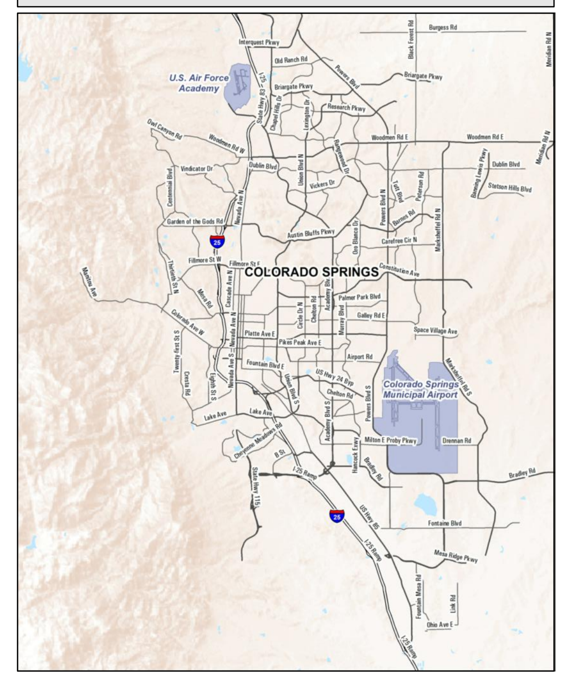
MODIFICATION OF STANDARD

ITEM	STANDARD	EXISTING	APPROVED	NOTES
Taxiway F longitudinal gradient between Taxiway M and Taxiway B (between Sta. 358+25 and Sta. 352+61.95 and between Sta. 351+18.76 to Sta. 352+61.95)	+/- 1.5%	1.7% to 2.0% between Sta. 358+25 and Sta. 352+61.95 and 1.73% between Sta. 351+18.76 to Sta. 352+61.95	Submitted to FAA 05/22/2012; awaiting approval	
Runway 13 and RSA longitudinal gradient for first 200 feet beyond threshold	0% to -3%	0.75%	Submitted to FAA 11/03/2011; awaiting approval	Update to approved MOS on record; Airspace Case 93-ANM/D-063-NRA
Runway 31 longitudinal gradient and vertical curve length in first quarter of runway	+/- 0.8% longitudinal grade and minimum vertical curve length of 1,000 feet for each 1% of grade change	1.87% longitudinal grade and 500-foot vertical curve at Sta. 82+50	Submitted to FAA 11/03/2011; awaiting approval	Update to approved MOS on record; Airspace Case 93-ANM/D-012-NRA
Taxiway MIL longitudinal grade at Runway 13/31	+/- 1.5%	-2.25%	Submitted to FAA 11/03/2011; awaiting approval	Update to approved MOS on record; Airspace Case 93-ANM/D-063-NRA. Remove Taxiway B4 from approved MOS on record as it now meets longitudinal grade requirements.
Taxiway MIL length of lead-in to fillets at Runway 13/31	250-foot lead-in length to fillets	0-foot lead-in length to fillets	Submitted to FAA 11/03/2011; awaiting approval	
Taxiway G longitudinal gradient from centerline to north edge at Taxiway B (between Sta. 176+00 and 173+75)	+/- 1.5%	-1.9%	FAA approved 09/06/2007	

LOCATION MAP



AIRPORT VICINITY MAP



NON-STANDARD CONDITIONS

ITEM	STANDARD	EXISTING	SOURCE	NOTES
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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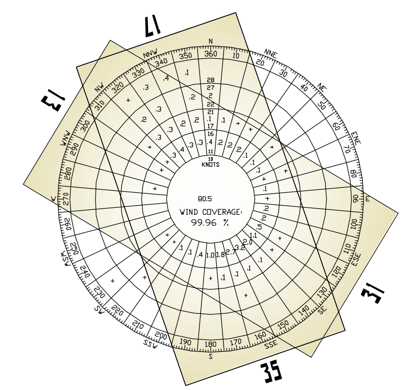
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA		
RUNWAY OBJECT FREE AREA		
RUNWAY PROTECTION ZONE		
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14 23 / 15 22	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		

IFR WIND ROSE

OBSERVATIONS:
PERIOD: 11−01−01 TO 10−31−09
TOTAL OBS: 4,452
STATION: 72466
DATA SOURCE: NATIONAL CLIMATIC CENTER, NOAA
WIND DIRECTIONS ARE TRUE NORTH HEADINGS.
RUNWAY NUMBERS ARE MAGNETIC NORTH HEADINGS.

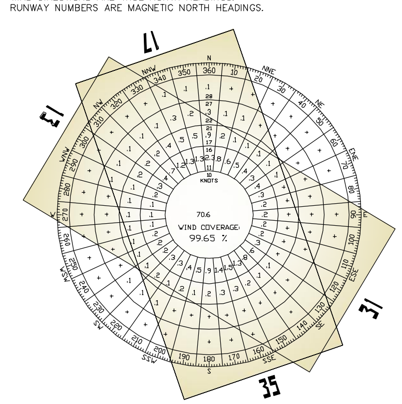


IFR WIND DATA

RUNWAY	10.5 KNOTS	13.0 KNOTS	16.0 KNOTS	20 KNOTS
COMBINED	99.35%	99.74%	99.92%	99.96%
17L/35R	96.62%	98.64%	99.66%	99.95%
13/31	96.76%	98.40%	99.47%	99.89%

ALL WEATHER WIND ROSE

OBSERVATIONS:
PERIOD: 11−01−01 TO 10−31−09
TOTAL OBS: 37,745
STATION: 72466
DATA SOURCE: NATIONAL CLIMATIC CENTER, NOAA
WIND DIRECTIONS ARE TRUE NORTH HEADINGS.
RUNWAY NUMBERS ARE MAGNETIC NORTH HEADINGS.



ALL WEATHER WIND DATA

RUNWAY	10.5 KNOTS	13.0 KNOTS	16.0 KNOTS	20 KNOTS
COMBINED	95.47%	97.58%	98.92%	99.65%
17L/35R	93.09%	96.18%	98.39%	99.38%
13/31	88.79%	93.57%	97.24%	99.00%

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT

COLORADO SPRINGS, COLORADO

Airport Master Plan

JACOBS™

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
-	-	-	-

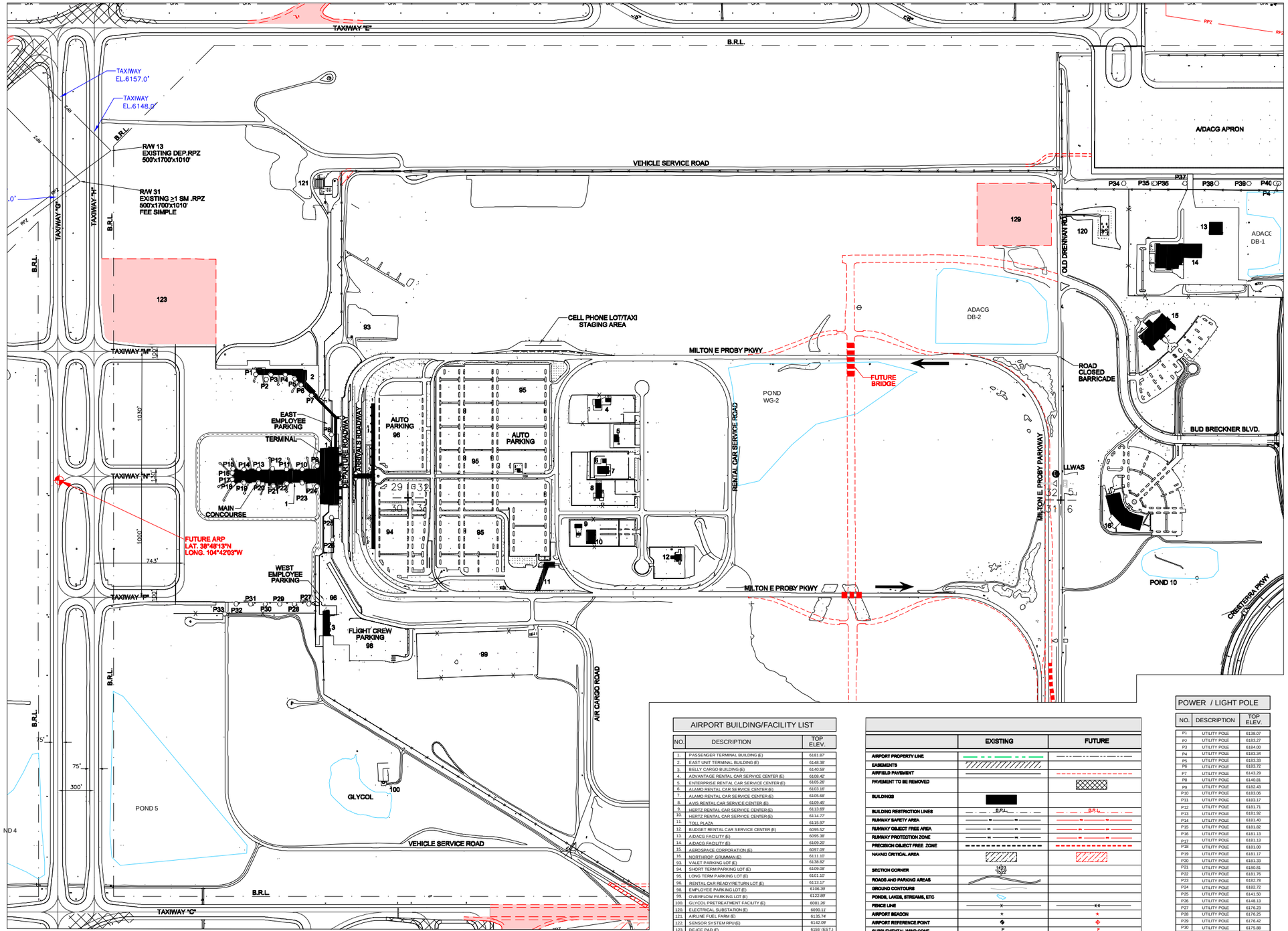
E.R. PROJECT NUMBER: WVXW3300 | DATE: 07/2013

DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	DCC	JAR	KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C−SHEET 4−DATA.dwg
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

TECHNICAL DATA SHEET

J:_Aviation Services\DEN_CAD\COS\COS-112 Master Plan\Element-8.0-ALP-Update\PLANS\COS112C-SHEET 4-DATA.dwg Aug 16, 2013 2:17pm



HORIZONTAL SCALE

300 0 300 600

(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

AIRPORT BUILDING/FACILITY LIST

NO.	DESCRIPTION	TOP ELEV.
1.	PASSENGER TERMINAL BUILDING (E)	6181.87'
2.	EAST UNIT TERMINAL BUILDING (E)	6148.38'
3.	BELLY CARGO BUILDING (E)	6140.59'
4.	ADVANTAGE RENTAL CAR SERVICE CENTER (E)	6108.42'
5.	ENTERPRISE RENTAL CAR SERVICE CENTER (E)	6105.26'
6.	ALAMO RENTAL CAR SERVICE CENTER (E)	6103.16'
7.	ALAMO RENTAL CAR SERVICE CENTER (E)	6105.68'
8.	AVIS RENTAL CAR SERVICE CENTER (E)	6109.45'
9.	HERTZ RENTAL CAR SERVICE CENTER (E)	6113.69'
10.	HERTZ RENTAL CAR SERVICE CENTER (E)	6114.77'
11.	TOLL PLAZA	6115.97'
12.	BUDGET RENTAL CAR SERVICE CENTER (E)	6095.52'
13.	A/DACG FACILITY (E)	6095.38'
14.	A/DACG FACILITY (E)	6109.20'
15.	AEROSPACE CORPORATION (E)	6097.09'
16.	NORTHROP GRUMMAN (E)	6111.10'
93.	VALET PARKING LOT (E)	6138.82'
94.	SHORT TERM PARKING LOT (E)	6109.08'
95.	LONG TERM PARKING LOT (E)	6101.10'
96.	RENTAL CAR READY/RETURN LOT (E)	6113.17'
98.	EMPLOYEE PARKING LOT (E)	6106.39'
99.	OVERFLOW PARKING LOT (E)	6122.89'
100.	GLYCOL PRETREATMENT FACILITY (E)	6081.26'
120.	ELECTRICAL SUBSTATION (E)	6090.12'
121.	AIRLINE FUEL FARM (E)	6135.74'
122.	SENSOR SYSTEM RPU (E)	6142.09'
123.	DE-ICE PAD (F)	6150' (EST.)
129.	SRE FACILITY (F)	6101' (EST.)

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

*MULTIPLE LOCATIONS FOR THESE FACILITIES. INDIVIDUAL ELEVATION INFORMATION INCLUDED IN THE AGIS DATABASE

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA		
RUNWAY OBJECT FREE AREA		
RUNWAY PROTECTION ZONE		
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14 23 1 22	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP 20	PP 20
LT POLE		

POWER / LIGHT POLE

NO.	DESCRIPTION	TOP ELEV.
P1	UTILITY POLE	6138.07
P2	UTILITY POLE	6183.27
P3	UTILITY POLE	6184.00
P4	UTILITY POLE	6183.34
P5	UTILITY POLE	6183.33
P6	UTILITY POLE	6183.72
P7	UTILITY POLE	6143.29
P8	UTILITY POLE	6140.81
P9	UTILITY POLE	6182.43
P10	UTILITY POLE	6183.06
P11	UTILITY POLE	6183.17
P12	UTILITY POLE	6181.71
P13	UTILITY POLE	6181.92
P14	UTILITY POLE	6181.40
P15	UTILITY POLE	6181.82
P16	UTILITY POLE	6181.13
P17	UTILITY POLE	6181.13
P18	UTILITY POLE	6181.00
P19	UTILITY POLE	6181.17
P20	UTILITY POLE	6181.33
P21	UTILITY POLE	6180.81
P22	UTILITY POLE	6181.76
P23	UTILITY POLE	6182.78
P24	UTILITY POLE	6182.72
P25	UTILITY POLE	6141.50
P26	UTILITY POLE	6148.13
P27	UTILITY POLE	6176.23
P28	UTILITY POLE	6176.25
P29	UTILITY POLE	6176.42
P30	UTILITY POLE	6175.88
P31	UTILITY POLE	6176.47
P32	UTILITY POLE	6174.23
P33	UTILITY POLE	6131.62
P34	UTILITY POLE	6228.03
P35	UTILITY POLE	6224.51
P36	UTILITY POLE	6099.51
P37	UTILITY POLE	6219.58
P38	UTILITY POLE	6218.22
P39	UTILITY POLE	6213.94
P40	UTILITY POLE	6086.77
P41	UTILITY POLE	6211.83

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

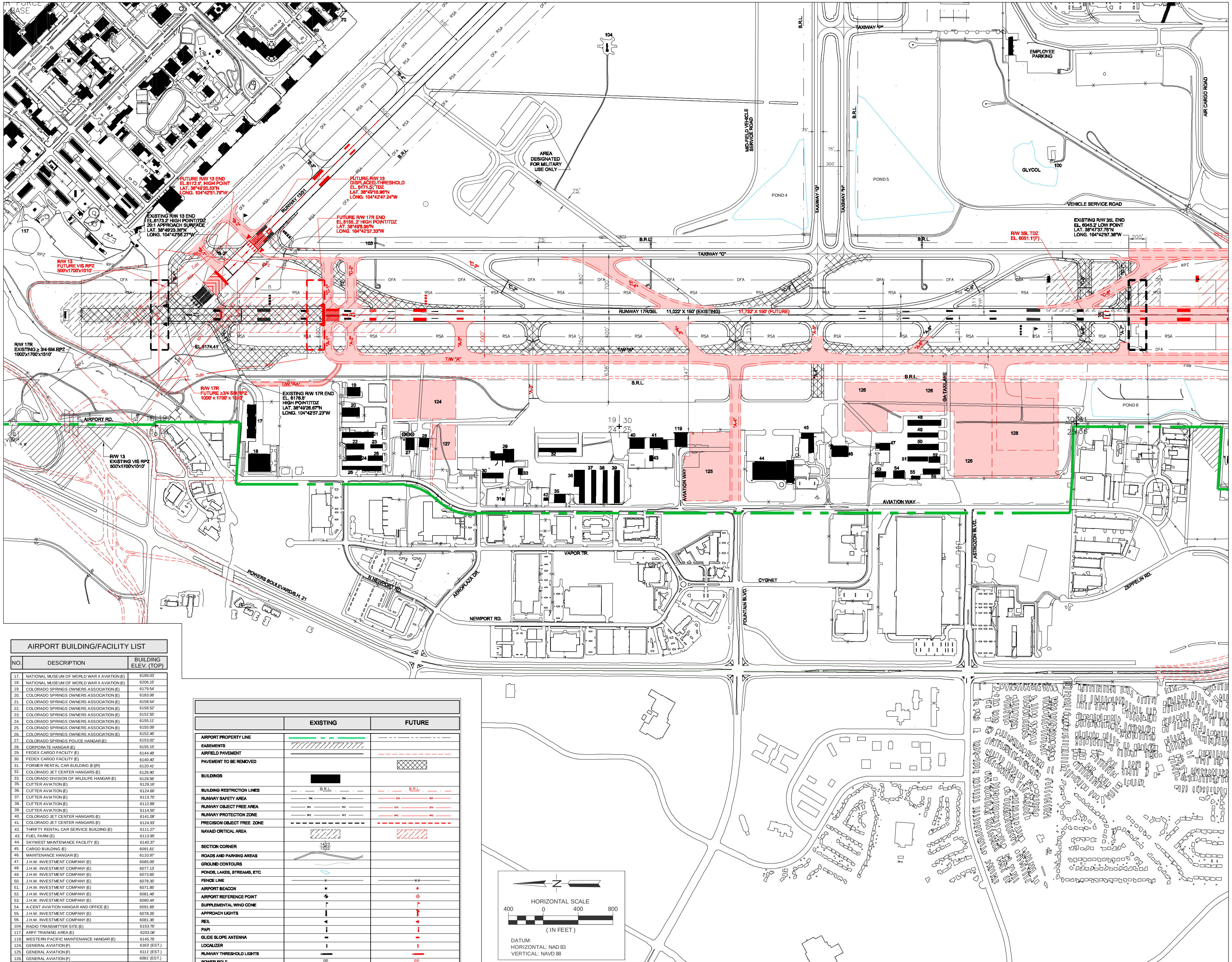
NO.	BY	DATE	DESCRIPTION
-	-	-	-

E.R. PROJECT NUMBER:		DATE:
WXW3300		07/2013
DESIGNED:	DRAWN: DCC	CHECKED: JAR / APPROVED: KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 5-TERM.dwg

REFERENCE DRAWING PATH\NAME:
\---\---\REF\...

TERMINAL/BUILDING AREA PLAN



AIRPORT BUILDING/FACILITY LIST

NO.	DESCRIPTION	BUILDING ELEV. (TOP)
17.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6189.03'
18.	NATIONAL MUSEUM OF WORLD WAR II AVIATION (E)	6206.15'
19.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6179.54'
20.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6183.06'
21.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6158.54'
22.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6158.52'
23.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6152.55'
24.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6155.11'
25.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6155.09'
26.	COLORADO SPRINGS OWNERS ASSOCIATION (E)	6152.46'
27.	COLORADO SPRINGS POLICE HANGAR (E)	6153.02'
28.	CORPORATE HANGAR (E)	6155.15'
29.	FEDEX CARGO FACILITY (E)	6144.48'
30.	FEDEX CARGO FACILITY (E)	6140.40'
31.	FORMER RENTAL CAR BUILDING (E)(R)	6120.41'
32.	COLORADO JET CENTER HANGARS (E)	6126.90'
33.	COLORADO DIVISION OF WILDLIFE HANGAR (E)	6128.56'
35.	CUTTER AVIATION (E)	6129.16'
36.	CUTTER AVIATION (E)	6124.66'
37.	CUTTER AVIATION (E)	6113.70'
38.	CUTTER AVIATION (E)	6112.89'
39.	CUTTER AVIATION (E)	6114.50'
40.	COLORADO JET CENTER HANGARS (E)	6141.08'
41.	COLORADO JET CENTER HANGARS (E)	6124.93'
42.	THRIFTY RENTAL CAR SERVICE BUILDING (E)	6111.27'
43.	FUEL FARM (E)	6113.95'
44.	SKYWEST MAINTENANCE FACILITY (E)	6140.37'
45.	CARGO BUILDING (E)	6091.61'
46.	MAINTENANCE HANGAR (E)	6110.97'
47.	J.H.W. INVESTMENT COMPANY (E)	6085.09'
48.	J.H.W. INVESTMENT COMPANY (E)	6077.13'
49.	J.H.W. INVESTMENT COMPANY (E)	6073.65'
50.	J.H.W. INVESTMENT COMPANY (E)	6078.35'
51.	J.H.W. INVESTMENT COMPANY (E)	6071.85'
52.	J.H.W. INVESTMENT COMPANY (E)	6081.48'
53.	J.H.W. INVESTMENT COMPANY (E)	6080.44'
54.	A-CENT AVIATION HANGAR AND OFFICE (E)	6091.69'
55.	J.H.W. INVESTMENT COMPANY (E)	6078.26'
56.	J.H.W. INVESTMENT COMPANY (E)	6081.36'
104.	RADIO TRANSMITTER SITE (E)	6153.76'
117.	ARFF TRAINING AREA (E)	6203.06'
119.	WESTERN PACIFIC MAINTENANCE HANGAR (E)	6145.76'
124.	GENERAL AVIATION (F)	6163' (EST.)
125.	GENERAL AVIATION (F)	6111' (EST.)
126.	GENERAL AVIATION (F)	6091' (EST.)
127.	AIR CARGO (F)	6151' (EST.)
128.	MRO/HANGARS (F)	6073' (EST.)

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14 23 / 15 22	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		

J:_Aviation Services\DEN_CAD\COS\COS-112 Master Plan\Element-8.0-ALP-Update\PLANS\COS112C-SHEET 6-GENA-1.dwg Aug 16, 2013 2:13pm

Colorado Springs Airport

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COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

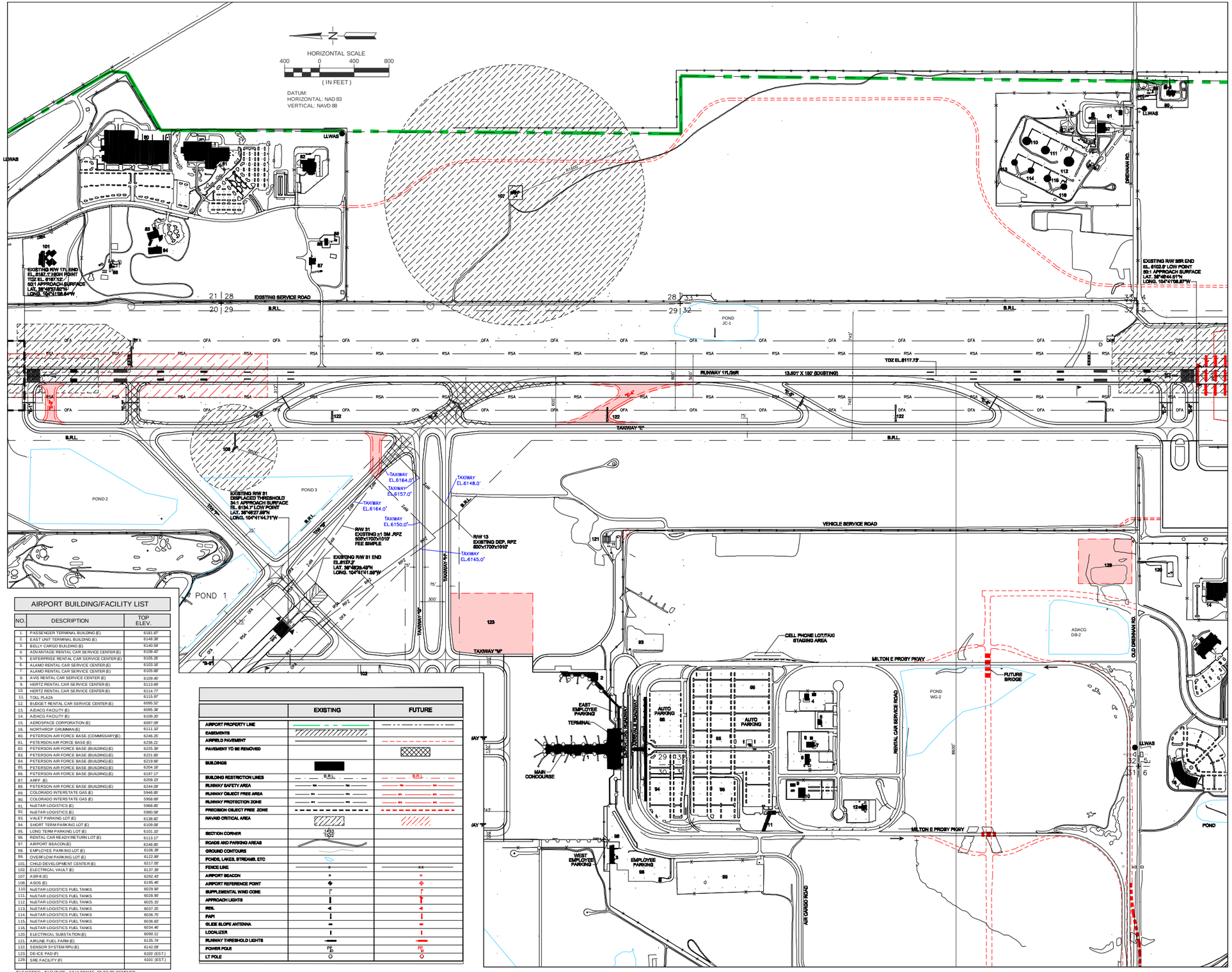
ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
-	-	-	-

E.R. PROJECT NUMBER: WVXW3300		DATE: 07/2013	
DESIGNED:	DRAWN: DCC	CHECKED: JAR	APPROVED: KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 6-GENA-1.dwg
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

GENERAL AVIATION DEVELOPMENT PLAN



AIRPORT BUILDING/FACILITY LIST

NO.	DESCRIPTION	TOP ELEV.
1.	PASSENGER TERMINAL BUILDING (E)	6181.87
2.	EAST UNIT TERMINAL BUILDING (E)	6148.38'
3.	BELLY CARGO BUILDING (E)	6140.59'
4.	ADVANTAGE RENTAL CAR SERVICE CENTER (E)	6108.42'
5.	ENTERPRISE RENTAL CAR SERVICE CENTER (E)	6105.26'
6.	ALAMO RENTAL CAR SERVICE CENTER (E)	6103.38'
7.	ALAMO RENTAL CAR SERVICE CENTER (E)	6105.68'
8.	AVIS RENTAL CAR SERVICE CENTER (E)	6109.40'
9.	HERTZ RENTAL CAR SERVICE CENTER (E)	6113.69'
10.	HERTZ RENTAL CAR SERVICE CENTER (E)	6114.77'
11.	TOLL PLAZA	6115.97'
12.	BUDGET RENTAL CAR SERVICE CENTER (E)	6095.52'
13.	ADACG FACILITY (E)	6095.38'
14.	ADACG FACILITY (E)	6109.20'
15.	AEROSPACE CORPORATION (E)	6097.09'
16.	NORTHROP GRUMMAN (E)	6111.33'
80.	PETERSON AIR FORCE BASE (COMMISSARY)(E)	6246.25'
81.	PETERSON AIR FORCE BASE (E)	6236.21'
82.	PETERSON AIR FORCE BASE (BUILDING) (E)	6225.39'
83.	PETERSON AIR FORCE BASE (BUILDING) (E)	6221.85'
84.	PETERSON AIR FORCE BASE (BUILDING) (E)	6219.66'
85.	PETERSON AIR FORCE BASE (BUILDING) (E)	6204.18'
86.	PETERSON AIR FORCE BASE (BUILDING) (E)	6197.17'
87.	ARFF (E)	6209.23'
88.	PETERSON AIR FORCE BASE (BUILDING) (E)	6244.09'
89.	COLORADO INTERSTATE GAS (E)	5946.85'
90.	COLORADO INTERSTATE GAS (E)	5958.69'
91.	NuSTAR LOGISTICS (E)	5968.85'
92.	NuSTAR LOGISTICS (E)	5980.58'
93.	VALET PARKING LOT (E)	6138.82'
94.	SHORT TERM PARKING LOT (E)	6109.08'
95.	LONG TERM PARKING LOT (E)	6101.10'
96.	RENTAL CAR READY/RETURN LOT (E)	6113.17'
97.	AIRPORT BEACON (E)	6248.85'
98.	EMPLOYEE PARKING LOT (E)	6106.39'
99.	OVERFLOW PARKING LOT (E)	6122.89'
101.	CHILD DEVELOPMENT CENTER (E)	6217.00'
102.	ELECTRICAL VAULT (E)	6137.39'
107.	ASR-8 (E)	6292.43'
108.	ASOS (E)	6195.46'
110.	NuSTAR LOGISTICS FUEL TANKS	6029.90'
111.	NuSTAR LOGISTICS FUEL TANKS	6028.90'
112.	NuSTAR LOGISTICS FUEL TANKS	6025.10'
113.	NuSTAR LOGISTICS FUEL TANKS	6037.25'
114.	NuSTAR LOGISTICS FUEL TANKS	6036.70'
115.	NuSTAR LOGISTICS FUEL TANKS	6036.83'
116.	NuSTAR LOGISTICS FUEL TANKS	6034.46'
120.	ELECTRICAL SUBSTATION (E)	6090.11'
121.	AIRLINE FUEL FARM (E)	6135.74'
122.	SENSOR SYSTEM RPU (E)	6142.09'
123.	DE-ICE PAD (P)	6155' (EST.)
129.	SRE FACILITY (P)	6102' (EST.)

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	1-23 1-22	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
-	-	-	-

E.R. PROJECT NUMBER:		DATE:
WXW3300		07/2013
DESIGNED:	DRAWN: DCC	CHECKED: JAR / APPROVED: KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 7-EAST.dwg
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

EAST SIDE DEVELOPMENT PLAN

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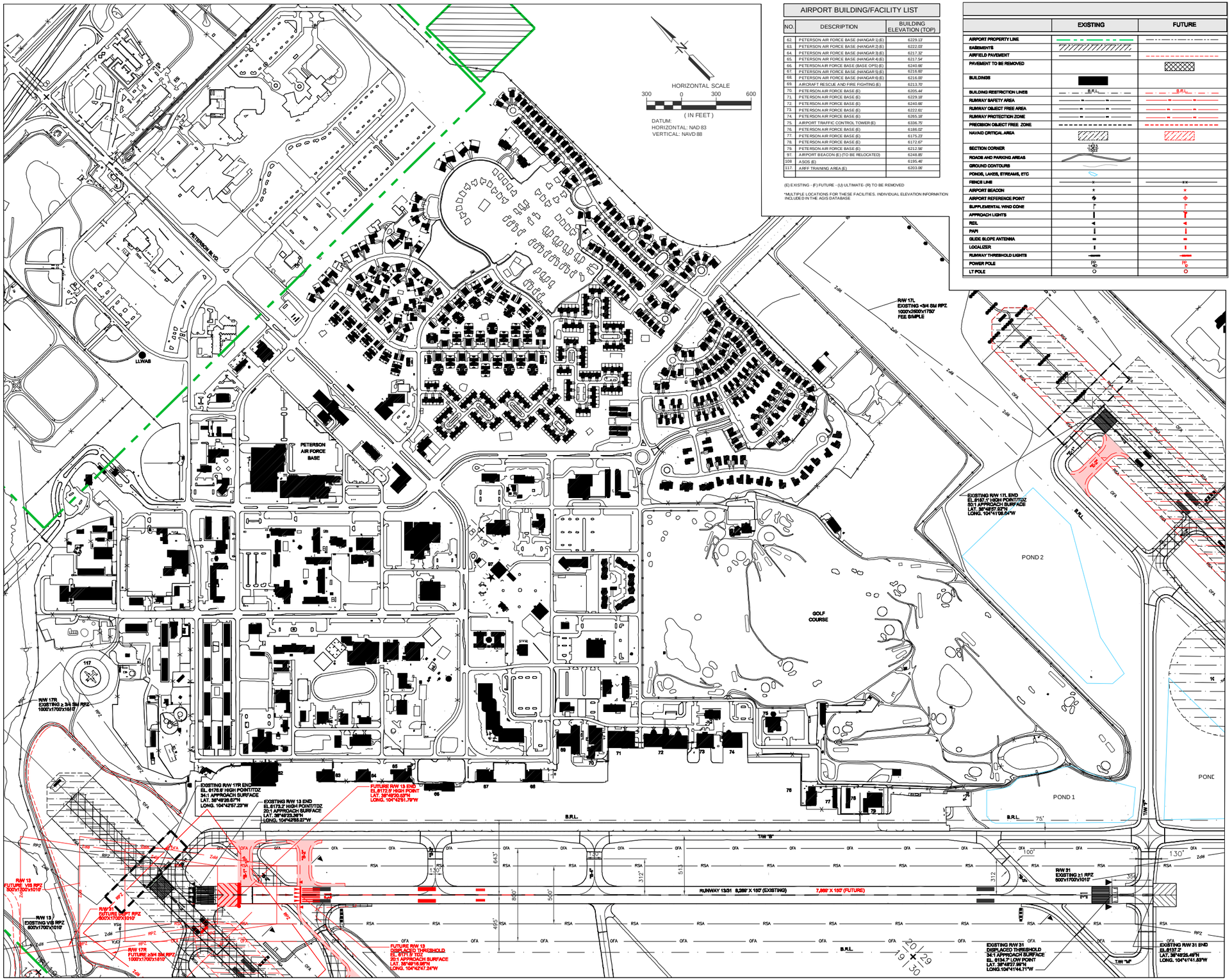

AIRPORT BUILDING/FACILITY LIST

NO.	DESCRIPTION	BUILDING ELEVATION (TOP)
62.	PETERSON AIR FORCE BASE (HANGAR 1) (E)	6229.13'
63.	PETERSON AIR FORCE BASE (HANGAR 2) (E)	6222.03'
64.	PETERSON AIR FORCE BASE (HANGAR 3) (E)	6217.32'
65.	PETERSON AIR FORCE BASE (HANGAR 4) (E)	6217.54'
66.	PETERSON AIR FORCE BASE (BASE OPS) (E)	6240.99'
67.	PETERSON AIR FORCE BASE (HANGAR 5) (E)	6216.99'
68.	PETERSON AIR FORCE BASE (HANGAR 6) (E)	6216.00'
69.	AIRCRAFT RESCUE AND FIRE FIGHTING (E)	6213.70'
70.	PETERSON AIR FORCE BASE (E)	6205.44'
71.	PETERSON AIR FORCE BASE (E)	6229.18'
72.	PETERSON AIR FORCE BASE (E)	6240.99'
73.	PETERSON AIR FORCE BASE (E)	6222.61'
74.	PETERSON AIR FORCE BASE (E)	6265.18'
75.	AIRPORT TRAFFIC CONTROL TOWER (E)	6336.75'
76.	PETERSON AIR FORCE BASE (E)	6186.02'
77.	PETERSON AIR FORCE BASE (E)	6175.23'
78.	PETERSON AIR FORCE BASE (E)	6172.67'
79.	PETERSON AIR FORCE BASE (E)	6212.56'
97.	AIRPORT BEACON (E) (TO BE RELOCATED)	6248.85'
108	ASOS (E)	6195.40'
117.	ARFF TRAINING AREA (E)	6203.00'

(E) EXISTING - (F) FUTURE - (U) ULTIMATE- (R) TO BE REMOVED

*MULTIPLE LOCATIONS FOR THESE FACILITIES. INDIVIDUAL ELEVATION INFORMATION INCLUDED IN THE AGIS DATABASE

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA		
RUNWAY OBJECT FREE AREA		
RUNWAY PROTECTION ZONE		
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14 23 13 24	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP 45	PP 45
LT POLE		

Colorado Springs Airport

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number 3-08-0010-49) as provided under Title 49 U.S.C., Section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

E.R. PROJECT NUMBER: WXW3300		DATE: 07/2013
DESIGNED:	DRAWN: DCC	CHECKED: JAR / APPROVED: KOC

DRAWING PATH\NAME:
\---\PLANS\
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REFERENCE DRAWING PATH\NAME:
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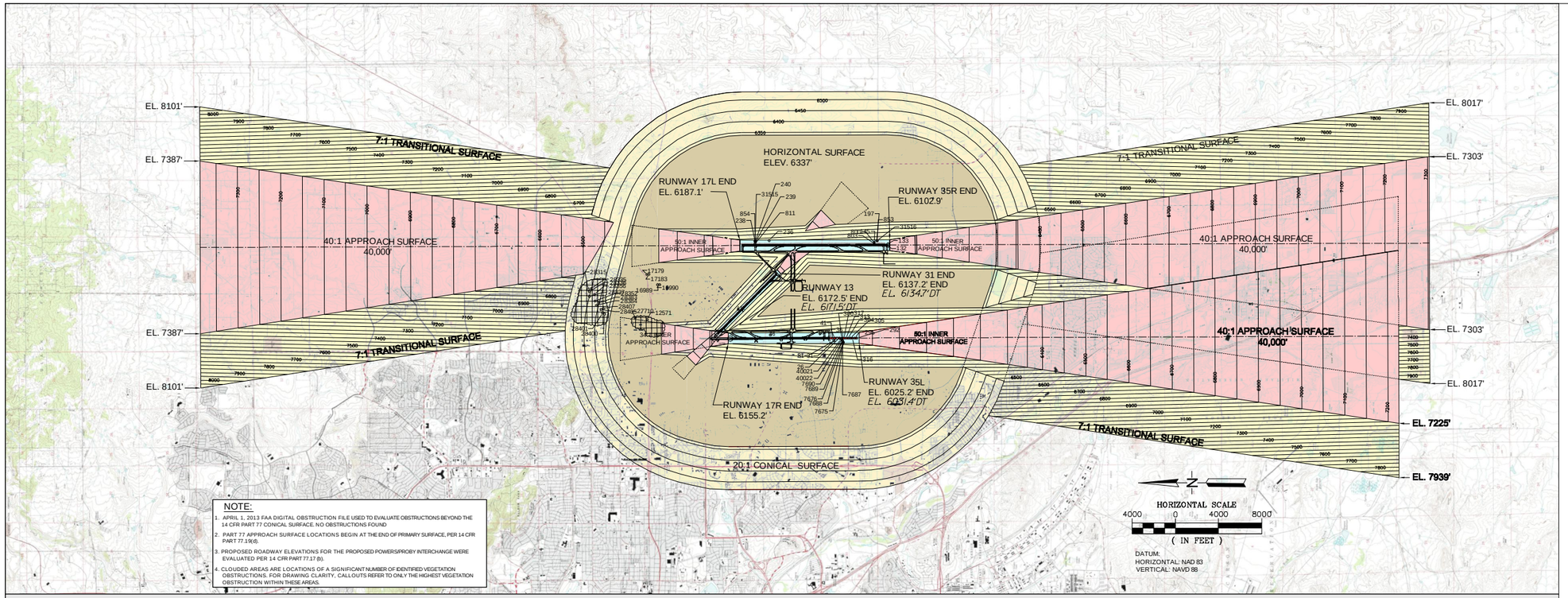
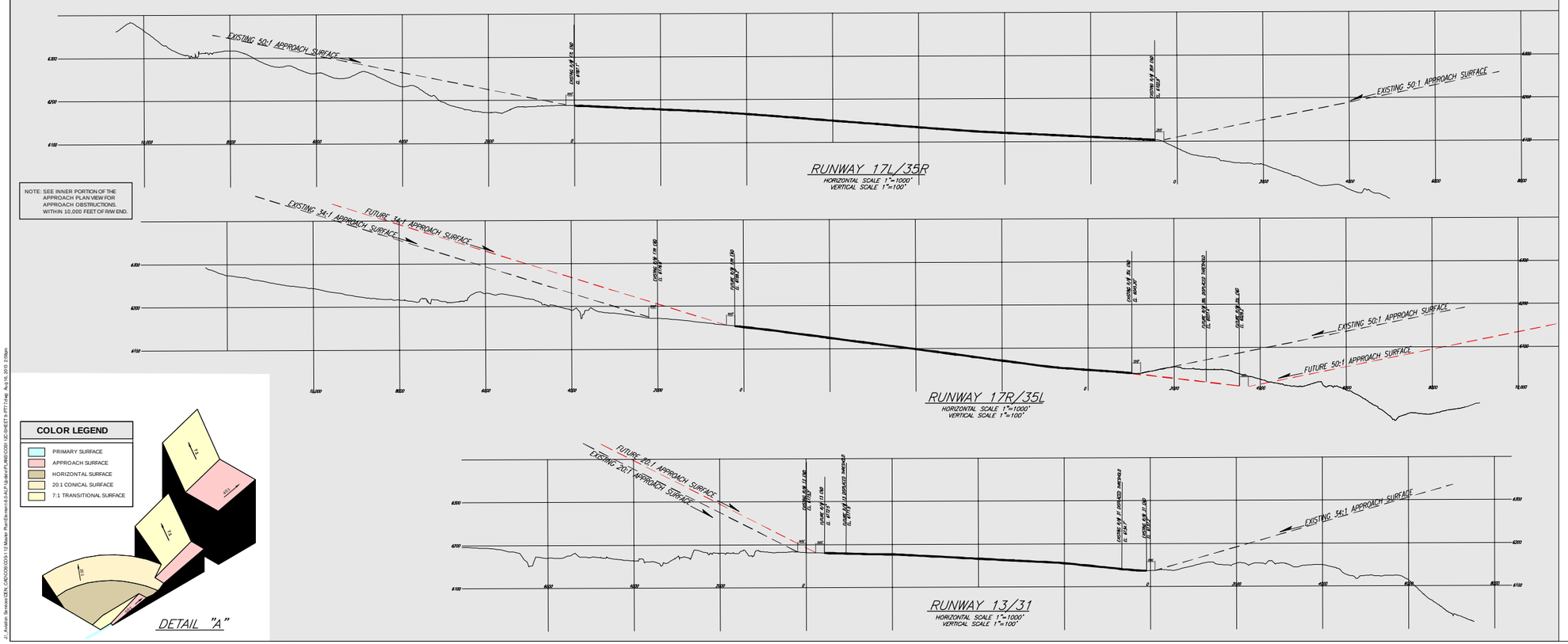
PETERSON AIRFORCE BASE LAYOUT

SHEET 8 OF 18



NOTE:

1. APRIL 1, 2013 FAA DIGITAL OBSTRUCTION FILE USED TO EVALUATE OBSTRUCTIONS BEYOND THE 14 CFR PART 77 CONICAL SURFACE. NO OBSTRUCTIONS FOUND
2. PART 77 APPROACH SURFACE LOCATIONS BEGIN AT THE END OF PRIMARY SURFACE, PER 14 CFR PART 77.19(d).
3. PROPOSED ROADWAY ELEVATIONS FOR THE PROPOSED POWERS/PROBY INTERCHANGE WERE EVALUATED PER 14 CFR PART 77.17 (b).
4. CLOUDED AREAS ARE LOCATIONS OF A SIGNIFICANT NUMBER OF IDENTIFIED VEGETATION OBSTRUCTIONS. FOR DRAWING CLARITY, CALLOUTS REFER TO ONLY THE HIGHEST VEGETATION OBSTRUCTION WITHIN THESE AREAS.



Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
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ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
-	-	-	-

E.R. PROJECT NUMBER:		DATE:
WXW3300		07/2013
DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	DCC	JAR	KOC

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REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

AIRPORT AIRSPACE
FAR PART 77 SURFACES

SHEET 9 OF 18

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RUNWAY END OBSTRUCTION DATA TABLES

SHEET 11

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SHEET 12

[illegible]

SHEET 13

RUNWAY END 17R OBSTRUCTION TABLE

ID NO.	OBJECT DESCRIPTION	ELEVATION OF OBJECT (MSL)	TYPE OF APPROACH	RPZ		PART77 APPROACH (34:1)		TSS (20:1)		DEPARTURE (40:1)		DISPOSITION
				EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	
14	REIL	6177.24	NON-PRECISION	NO	YES	N/A	-25.89	N/A	-59.41	-0.29	-23.70	Fixed by Function
17	REIL	6315.42	NON-PRECISION	NO	YES	N/A	-25.40	N/A	-58.90	0.20	-23.21	Fixed by Function
21	REIL	6174.09	NON-PRECISION	NO	YES	N/A	-19.87	N/A	-46.97	N/A	-19.06	Fixed by Function
22	REIL	6173.55	NON-PRECISION	NO	YES	N/A	-12.42	N/A	-33.93	N/A	-12.81	Fixed by Function
48	Bollard	6189.07	NON-PRECISION	YES	NO	-5.60	N/A	N/A	-86.43	-7.89	-31.30	Remove
49	Bollard	6189.12	NON-PRECISION	YES	NO	-5.60	N/A	N/A	-86.46	-7.88	-31.29	Remove
65	Bollard	6172.34	NON-PRECISION	NO	YES	N/A	-24.59	N/A	-53.78	N/A	-23.34	Remove
68	Bollard	6163.98	NON-PRECISION	NO	YES	N/A	-13.06	N/A	-28.32	N/A	-14.78	Remove
99	Windcone	6176.20	NON-PRECISION	NO	YES	N/A	3.60	N/A	-8.54	N/A	1.21	Fixed by Function
101	Bollard	6161.03	NON-PRECISION	NO	YES	N/A	-4.18	N/A	-11.15	N/A	-7.68	Remove
784	PAPI	6165.91	NON-PRECISION	NO	YES	N/A	-1.91	N/A	-10.71	N/A	-5.02	Fixed by Function
785	PAPI	6165.93	NON-PRECISION	NO	YES	N/A	-1.89	N/A	-10.69	N/A	-5.00	Fixed by Function
786	PAPI	6165.95	NON-PRECISION	NO	YES	N/A	-1.86	N/A	-10.67	N/A	-4.97	Fixed by Function
787	PAPI	6166.05	NON-PRECISION	NO	YES	N/A	-1.76	N/A	-10.56	N/A	-4.87	Fixed by Function
812	Navaid	6166.74	NON-PRECISION	NO	YES	N/A	-1.13	N/A	-9.96	N/A	-4.23	Fixed by Function
825	Tree	6185.96	NON-PRECISION	YES	NO	-8.64	N/A	-21.27	-58.90	-10.93	-24.66	Trim or Remove
833	Tree	6170.16	NON-PRECISION	NO	YES	N/A	-25.61	N/A	-58.90	N/A	-24.53	Trim or Remove
9122	Utility Pole	6206.68	NON-PRECISION	YES	NO	-1.75	N/A	-24.07	-92.21	-1.97	-25.38	Remove
9127	Localizer	6194.89	NON-PRECISION	YES	NO	-10.60	N/A	-30.85	-98.99	-11.26	-34.67	Fixed by Function
9130	Utility Pole	6196.82	NON-PRECISION	YES	NO	-8.42	N/A	-28.50	-96.63	-9.11	-32.52	Remove
9248	Tree	6212.13	NON-PRECISION	YES	NO	-9.69	N/A	-41.38	-109.51	-15.90	-31.31	Trim or Remove
9249	Tree	6207.36	NON-PRECISION	YES	NO	-11.79	N/A	-41.60	-109.74	-18.44	-33.81	Trim or Remove
9250	Tree	6192.69	NON-PRECISION	YES	NO	-11.03	N/A	-30.04	-98.18	-15.83	-35.36	Trim or Remove
10146	Tree	6302.01	NON-PRECISION	NO	NO	N/A	N/A	-113.25	-181.39	1.10	-22.31	None*
11043	Utility Pole	6219.16	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	2.96	Remove
11044	Utility Pole	6222.20	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	8.73	Remove
11045	Utility Pole	6223.08	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	5.80	Remove
11046	Utility Pole	6217.58	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	2.19	Remove
11047	Building	6226.73	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	5.43	Remove
11069	Tree	6240.95	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	14.09	Trim or Remove
11070	Utility Pole	6230.58	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	6.29	Remove
11074	Building	6230.48	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	1.37	Remove
11754	Utility Pole	6284.09	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	11.14	Remove
11755	Utility Pole	6281.67	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	11.84	Remove
11756	Utility Pole	6282.25	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	13.43	Remove
11762	Utility Pole	6255.54	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	8.78	-14.63	Remove
11763	Utility Pole	6256.68	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	10.70	-12.71	Remove
11764	Utility Pole	6254.42	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	7.64	-15.77	Remove
11765	Utility Pole	6255.28	NON-PRECISION	NO	NO	N/A	N/A	N/A	-118.29	9.29	-14.12	Remove
11766	Utility Pole	6247.84	NON-PRECISION	NO	NO	N/A	N/A	N/A	-120.28	4.57	-18.84	Remove
11767	Utility Pole	6247.94	NON-PRECISION	NO	NO	N/A	N/A	N/A	-122.18	3.67	-19.74	Remove
11768	Utility Pole	6248.78	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	5.50	-17.91	Remove
11769	Utility Pole	6249.76	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	5.48	-17.93	Remove
11770	Tree	6247.65	NON-PRECISION	NO	NO	N/A	N/A	N/A	-124.21	2.12	-20.51	Trim or Remove
11779	Tree	6273.07	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	13.51	-9.90	Trim or Remove
11810	Tree	6268.11	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	N/A	3.11	Trim or Remove
11832	Utility Pole	6251.44	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	8.15	-15.26	Remove
11850	Tree	6240.99	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	7.70	-15.71	Trim or Remove
12098	Tree	6286.24	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	14.28	-9.13	Trim or Remove
12100	Tree	6296.07	NON-PRECISION	NO	NO	N/A	N/A	N/A	-158.85	9.41	-14.00	Trim or Remove
12103	Building	6292.56	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	1.98	-21.43	Remove
12105	Utility Pole	6293.48	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	1.95	-21.46	Remove
12106	Utility Pole	6293.50	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	1.14	-22.27	Remove
12264	Tree	6306.09	NON-PRECISION	NO	NO	N/A	N/A	-115.28	-183.43	2.12	-21.29	None*
12274	Tree	6298.45	NON-PRECISION	NO	NO	N/A	N/A	-105.36	-173.50	3.27	-20.14	None*
12395	Utility Pole	6315.37	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	4.18	-19.23	Remove
12421	Utility Pole	6321.99	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	11.98	-11.43	Remove
12422	Utility Pole	6312.55	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	2.50	-20.91	Remove
12425	Utility Pole	6316.69	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	5.44	-17.97	Remove
12426	Utility Pole	6315.53	NON-PRECISION	NO	NO	N/A	N/A	N/A	-188.41	4.36	-19.06	Remove
12432	Utility Pole	6315.36	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	5.34	-18.07	Remove
12460	Tree	6314.69	NON-PRECISION	NO	NO	N/A	N/A	-113.13	-181.27	7.50	-15.91	None*
12483	Tree	6310.98	NON-PRECISION	NO	NO	N/A	N/A	N/A	-173.54	9.51	-13.90	None*
12506	Utility Pole	6316.00	NON-PRECISION	NO	NO	N/A	N/A	N/A	-194.09	1.75	-21.66	Remove
12530	Tree	6329.81	NON-PRECISION	NO	NO	N/A	N/A	-125.53	-193.67	8.86	-14.55	None*
12545	Utility Pole	6316.36	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	2.09	-21.32	Remove
12550	Utility Pole	6318.89	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	2.26	-21.15	Remove
12571	Tree	6338.67	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	14.66	-9.21	None*
31518	REIL	6173.25	NON-PRECISION	NO	YES	N/A	-19.16	N/A	-45.17	N/A	-18.58	Fixed by Function
40024	Road	6195.98	NON-PRECISION	YES	NO	-23.08	N/A	N/A	-135.98	-36.70	-60.11	None
40026	VSR	6200.97	NON-PRECISION	YES	NO	-14.03	N/A	-83.54	-151.68	-35.12	-58.53	None
40028	VSR	6190.72	NON-PRECISION	YES	NO	1.52	N/A	N/A	-85.48	-11.58	-34.99	None
40029	VSR	6188.69	NON-PRECISION	YES	NO	14.52	N/A	N/A	-68.94	0.66	-22.75	None
40030	VSR	6199.18	NON-PRECISION	YES	NO	10.26	N/A	N/A	-76.53	-2.89	-26.30	None
40031	VSR	6199.64	NON-PRECISION	YES	NO	8.25	N/A	N/A	-80.27	-4.53	-27.94	None
40032	VSR	6204.28	NON-PRECISION	YES	NO	-6.49	N/A	-40.43	-108.57	-16.36	-39.77	None
40033	VSR	6212.08	NON-PRECISION	YES	NO	-5.39	N/A	N/A	-112.18	-14.26	-37.67	None
40034	VSR	6212.95	NON-PRECISION	YES	NO	-8.16	N/A	N/A	-117.49	-16.48	-39.89	None
40035	VSR	6212.26	NON-PRECISION	YES	NO	-4.19	N/A	N/A	-110.25	-13.21	-36.62	None
40041	VSR	6195.94	NON-PRECISION	YES	NO	-0.02	N/A	-23.60	-91.74	-12.11	-35.52	None
40042	VSR	6169.41	NON-PRECISION	NO	YES	N/A	-27.90	N/A	-57.35	N/A	-26.58	None

SHEET 15

RUNWAY END 13 OBSTRUCTION TABLE

ID NO.	OBJECT DESCRIPTION	ELEVATION OF OBJECT (MSL)	TYPE OF APPROACH	RPZ		PART 77 APPROACH (20:1)		TSS (20:1)		DEPARTURE (40:1)		DISPOSITION
				EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	
14	REIL	6177.24	VISUAL	YES	YES	-8.73	-28.01	-18.74	-62.48	-7.34	-16.63	Fixed by Function
17	REIL	6177.72	VISUAL	YES	YES	-0.14	-19.43	-10.15	-53.90	-2.81	-12.09	Fixed by Function
21	REIL	6174.09	VISUAL	NO	YES	N/A	-8.29	N/A	-42.76	N/A	-8.34	Fixed by Function
22	REIL	6173.55	VISUAL	NO	YES	N/A	-1.75	N/A	-36.22	N/A	-5.34	Fixed by Function
65	Bollard	6172.34	VISUAL	YES	YES	-10.98	-30.26	-20.96	-64.73	-10.92	-20.20	Remove
66	Bollard	6168.89	VISUAL	NO	YES	N/A	-42.62	N/A	-77.09	-18.83	-28.11	Remove
100	Bollard	6167.82	VISUAL	NO	YES	N/A	N/A	N/A	-22.42	N/A	N/A	Remove
835	Tree	6171.58	VISUAL	NO	YES	N/A	N/A	N/A	-77.61	-17.74	-27.02	Trim or Remove
836	Tree	6172.14	VISUAL	NO	YES	N/A	N/A	N/A	-76.59	-16.95	-26.23	Trim or Remove
837	Tree	6171.02	VISUAL	NO	YES	N/A	-43.55	N/A	-78.02	-18.22	-27.50	Trim or Remove
8970	Tree	6177.14	VISUAL	NO	YES	N/A	N/A	-51.24	-94.99	-23.65	-32.93	Trim or Remove
8971	Tree	6181.50	VISUAL	YES	YES	-47.23	-66.51	-57.22	-100.98	-24.46	-33.74	Trim or Remove
9197	Utility Pole	6191.25	VISUAL	NO	YES	N/A	N/A	-55.44	-99.18	-18.69	-27.97	Remove
9211	Building	6173.47	VISUAL	YES	YES	-60.31	N/A	-70.31	-114.06	-35.02	-44.30	Remove
31518	REIL	6173.25	VISUAL	NO	YES	N/A	-2.58	N/A	-37.05	N/A	-5.90	Fixed by Function
40028	VSR	6180.72	VISUAL	YES	NO	-42.06	-61.34	-52.06	-95.81	-23.75	-31.55	None
40038	Road	6165.47	VISUAL	YES	NO	-47.84	N/A	-85.92	-129.67	-46.82	-56.10	None
40039	VSR	6166.15	VISUAL	YES	YES	-41.67	N/A	-75.90	-119.65	-41.47	-50.75	None
40040	VSR	6172.89	VISUAL	YES	YES	-24.34	N/A	-51.16	-94.92	-25.74	-35.02	None
40041	VSR	6185.94	VISUAL	YES	YES	-18.98	N/A	-51.18	-94.93	-19.22	-28.50	None
40042	VSR	6169.41	VISUAL	YES	YES	-14.17	-40.70	-31.41	-75.17	-17.60	-26.88	None
40043	VSR	6178.32	VISUAL	YES	NO	-37.67	N/A	-50.11	-93.87	-23.73	-33.01	None
40044	Road	6169.90	VISUAL	YES	NO	-88.32	-107.60	-98.32	-142.07	-50.81	-60.09	None
40045	VSR	6172.32	VISUAL	YES	NO	-85.90	-105.18	-95.90	-139.65	-48.39	-57.67	None
40046	VSR	6177.11	VISUAL	YES	NO	-73.96	N/A	-83.95	-127.71	-40.02	-49.30	None
40047	VSR	6172.36	VISUAL	YES	NO	-76.04	-97.55	-88.27	-132.03	-45.67	-54.95	None

SHEET 16

RUNWAY END 31 OBSTRUCTION TABLE

ID NO.	OBJECT DESCRIPTION	ELEVATION OF OBJECT (MSL)	TYPE OF APPROACH	RPZ		PART 77 APPROACH (34:1)		TSS (20:1)		DEPARTURE (40:1)		DISPOSITION
				EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	
17269	ASR	6292.43	NON-PRECISION	NO	NO	N/A	N/A	N/A	N/A	30.74	SAME	None
40053	Taxiway	6164.34	NON-PRECISION	YES	YES	-37.70	SAME	-84.56	SAME	-35.92	SAME	None
40054	Taxiway	6145.17	NON-PRECISION	YES	YES	-39.17	SAME	-89.43	SAME	-36.66	SAME	None
40055	Taxiway	6149.78	NON-PRECISION	YES	YES	-29.18	SAME	-77.16	SAME	-27.15	SAME	None
40056	Taxiway	6164.21	NON-PRECISION	YES	YES	-23.01	SAME	-73.32	SAME	-20.51	SAME	None
40057	Taxiway	6154.77	NON-PRECISION	YES	YES	N/A	N/A	-55.29	SAME	-11.45	SAME	None
40058	Taxiway	6144.60	NON-PRECISION	YES	YES	-26.93	SAME	-69.83	SAME	-25.99	SAME	None
40059	Taxiway	6148.03	NON-PRECISION	YES	YES	N/A	N/A	-63.19	SAME	-24.96	SAME	None

SHEET 14

RUNWAY END 35L OBSTRUCTION TABLE

ID NO.	OBJECT DESCRIPTION	ELEVATION OF OBJECT (MSL)	TYPE OF APPROACH	RPZ		PART 77 APPROACH (50:1)		TSS (34:1)		DEPARTURE (40:1)		DISPOSITION
				EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	
26	MALSR	6059.44	PRECISION	YES	NO	0.66	N/A	-5.73	N/A	-7.73	N/A	Fixed by Function
31	MALSR	6055.21	PRECISION	YES	NO	0.84	N/A	-3.48	N/A	-6.46	N/A	Fixed by Function
36	MALSR	6050.77	PRECISION	YES	NO	0.79	N/A	-1.47	N/A	-5.41	N/A	Fixed by Function
41	MALSR	6046.21	PRECISION	YES	NO	0.62	N/A	0.44	N/A	-4.47	N/A	Fixed by Function
81	Bollard	6043.39	PRECISION	YES	NO	-5.04	N/A	-6.57	N/A	-10.85	N/A	Remove
83	Bollard	6044.08	PRECISION	YES	NO	-1.32	N/A	-1.41	N/A	-6.36	N/A	Remove
291	MALSR	6042.94	PRECISION	YES	YES	-48.27	N/A	-69.93	-5.39	-64.78	17.72	Fixed by Function
292	MALSR	6043.61	PRECISION	YES	YES	-47.55	N/A	-69.19	-4.65	-64.04	N/A	Fixed by Function
295	MALSR	6059.87	PRECISION	YES	YES	-27.29	N/A	-47.04	17.50	-42.78	N/A	Fixed by Function
300	MALSR	6063.17	PRECISION	YES	NO	-0.01	N/A	-8.47	N/A	-9.50	N/A	Fixed by Function
302	MALSR	6064.76	PRECISION	YES	NO	-2.40	N/A	-12.74	N/A	-12.89	N/A	Fixed by Function
303	MALSR	6063.52	PRECISION	YES	NO	-7.65	N/A	-19.88	N/A	-19.14	N/A	Fixed by Function
304	MALSR	6062.98	PRECISION	YES	NO	-12.18	N/A	-26.29	N/A	-24.68	N/A	Fixed by Function
305	MALSR	6061.68	PRECISION	YES	NO	-17.49	N/A	-33.48	N/A	-30.98	N/A	Fixed by Function
306	MALSR	6062.93	PRECISION	YES	YES	-20.23	N/A	-38.10	26.44	-34.72	N/A	Fixed by Function
7519	Building	6030.66	PRECISION	NO	YES	N/A	-9.97	-110.80	-46.26	-101.36	-18.85	Remove
7675	Building	6065.86	PRECISION	YES	NO	0.18	N/A	-9.47	N/A	-9.94	N/A	Remove
7676	Building	6066.26	PRECISION	YES	NO	0.19	N/A	-9.63	N/A	-10.02	N/A	Remove
7687	Utility Pole	6059.05	PRECISION	YES	NO	-5.73	N/A	-14.94	N/A	-15.62	N/A	Remove
7688	Utility Pole	6056.39	PRECISION	YES	NO	-9.18	N/A	-18.77	N/A	-19.28	N/A	Remove
7689	Utility Pole	6059.86	PRECISION	YES	NO	-4.92	N/A	-14.13	N/A	-19.28	N/A	Remove
7690	Utility Pole	6058.61	PRECISION	YES	NO	-5.40	N/A	-14.25	N/A	-15.10	N/A	Remove
31519	Middle Marker	6035.12	PRECISION	NO	YES	N/A	-5.68	-106.59	-42.06	-97.11	-14.61	Fixed by Function
40016	VSR	6052.94	PRECISION	YES	NO	-12.16	N/A	N/A	N/A	-22.14	N/A	Fixed by Function
40017	VSR	6067.18	PRECISION	YES	NO	3.23	N/A	N/A	N/A	-16.45	N/A	Fixed by Function
40018	VSR	6056.91	PRECISION	YES	NO	-11.62	N/A	N/A	N/A	-22.45	N/A	Fixed by Function
40019	VSR	6052.95	PRECISION	YES	NO	-16.78	N/A	N/A	N/A	-27.91	N/A	Fixed by Function
40020	VSR	6037.06	PRECISION	YES	YES	-58.15	11.86	-81.68	-17.15	-75.65	6.85	Fixed by Function
40021	VSR	6069.92	PRECISION	YES	NO	8.08	N/A	-9.75	N/A	-11.08	N/A	Fixed by Function
40022	VSR	6068.18	PRECISION	YES	NO	4.68	N/A	-13.93	N/A	-14.89	N/A	Fixed by Function
40023	VSR	6055.27	PRECISION	YES	NO	-10.30	N/A	-26.75	N/A	-26.33	N/A	Fixed by Function
40048	VSR	6057.47	PRECISION	YES	NO	-18.63	N/A	N/A	N/A	-31.36	N/A	Fixed by Function
40049	VSR	6036.73	PRECISION	YES	NO	-58.47	N/A	-82.01	N/A	-75.98	N/A	Fixed by Function

AIRPORT AIRSPACE FAR PART 77 OBSTRUCTION TABLES

SHEET 9

OBSTRUCTION TABLE

[illegible]

LEGEND

(blue) = OBJECTS PENETRATING ASSOCIATED SURFACES.

(green) = OBJECTS BELOW ASSOCIATED SURFACES.

NOTE:

1. ALL ROAD/TRAVERSE WAYS UNDER THE APPROACH SURFACE WERE EVALUATED FOR POTENTIAL OBSTRUCTIONS PER 14CFR PART 77.17(b).
2. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.
3. APRIL 1, 2013 FAA DIGITAL OBSTRUCTION FILE USED TO EVALUATE OBSTRUCTIONS BEYOND THE 14 CFR PART 77 CONICAL SURFACE. NO OBSTRUCTIONS FOUND.
4. EACH NUMBERED OBSTRUCTION LISTED IN THE TABLES ON THIS SHEET IS A PENETRATION OF AT LEAST ONE OF THE SURFACES OUTLINED WITHIN EACH OF THE TABLES. ALL NEGATIVE PENETRATIONS SHOWN IN THE TABLES ON THIS SHEET ARE LOCATED WITHIN THE EXTENTS OF THE ASSOCIATED OBSTRUCTION SURFACES, BUT ARE NOT PENETRATIONS OF THE SURFACE.

* ALL OFF–AIRPORT TREE OBSTRUCTIONS ARE TO BE TRIMMED OR REMOVED IN COORDINATION WITH LOCAL LAND OWNERS ONLY.

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT

COLORADO SPRINGS, COLORADO

Airport Master Plan

JACOBS™

ISSUE RECORD

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E.R. PROJECT NUMBER: WVXW3300 | DATE: 07/2013

DESIGNED: | DRAWN: DCC | CHECKED: JAR | APPROVED: KOC

DRAWING PATH\NAME: \---\PLANS\ COS112C–SHEET 10–OBST–DATA.dwg

REFERENCE DRAWING PATH\NAME: \---\---\XREF\...

OBSTRUCTION DATA TABLES

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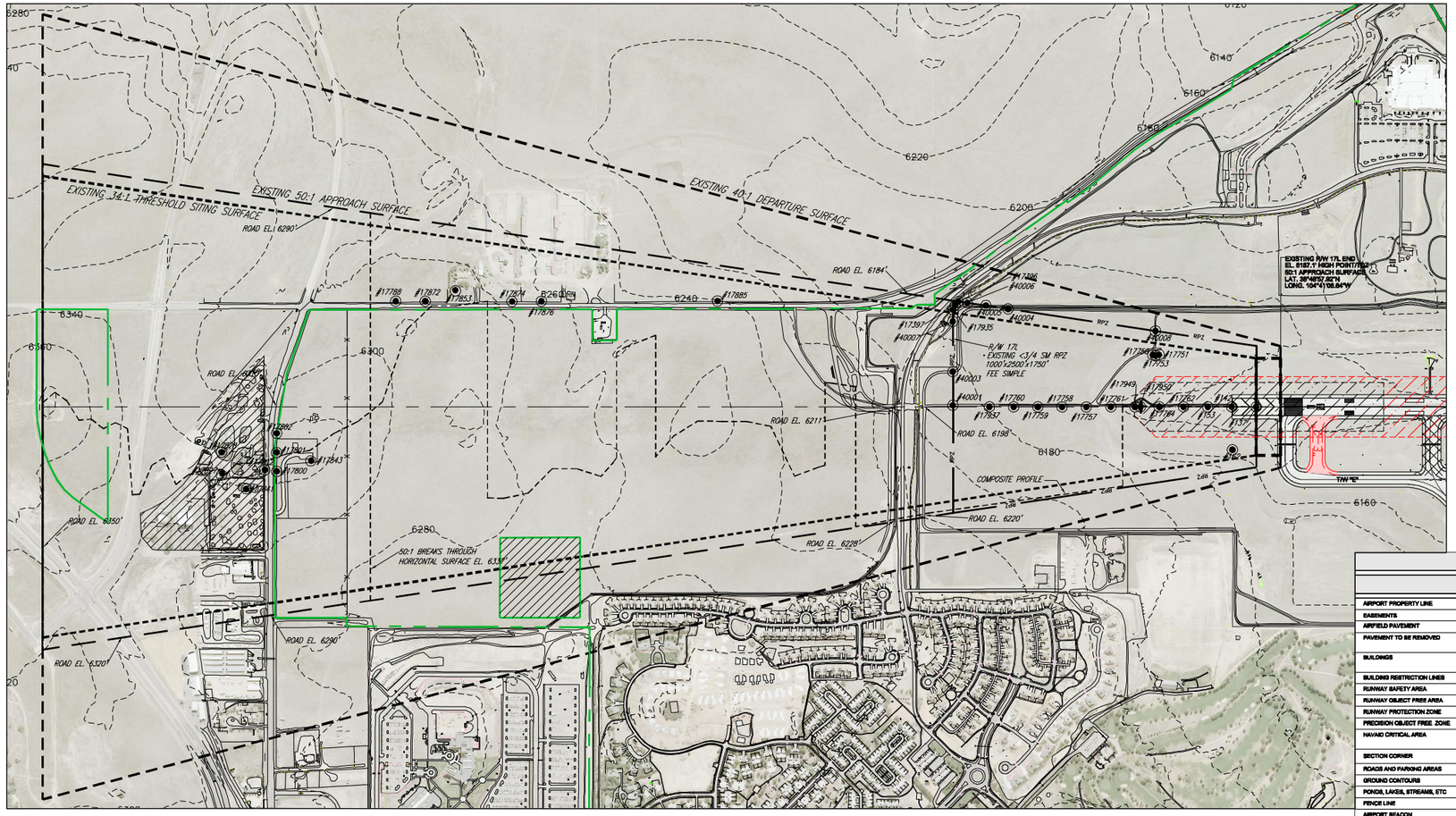
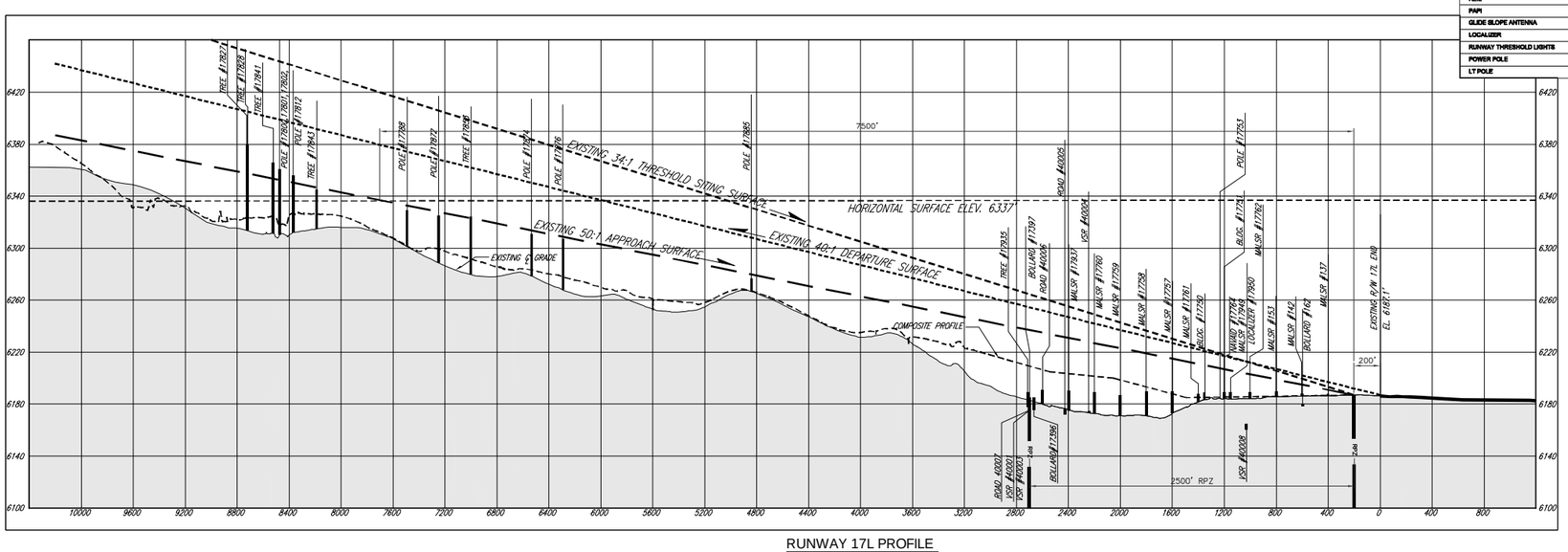


RUNWAY 17L PLAN VIEW



RUNWAY 17L PROFILE

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

NOTE:

1. ALL ROAD/TRAVERSE WAYS UNDER THE APPROACH SURFACE WERE EVALUATED FOR POTENTIAL OBSTRUCTIONS PER 14 CFR PART 77.17(b). ROADS AND TRAVERSE WAYS DO NOT PENETRATE APPROACH SURFACES.
2. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.
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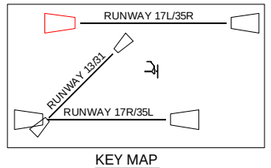
	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA RSA	RSA RSA
RUNWAY OBJECT FREE AREA	OFA OFA	OFA OFA
RUNWAY PROTECTION ZONE	RPZ RPZ	RPZ RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14S3 T6S2	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		

VERTICAL SCALE
80 40 0 40
(IN FEET)

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88



KEY MAP

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

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ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
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E.R. PROJECT NUMBER: WVXW3300 | DATE: 07/2013

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	DCC	JAR	KOC

DRAWING PATH\NAME:
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COS112C-SHEET 11-17L-APPR-DEPT-TSS.dwg

REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACES PLAN AND PROFILE VIEWS FOR RUNWAY 17L

SHEET 11 OF 18

NOTE:

1. ALL ROAD/TRAVERSE WAYS UNDER THE APPROACH SURFACE WERE EVALUATED FOR POTENTIAL OBSTRUCTIONS PER 14 CFR PART 77.17(b). ROADS AND TRAVERSE WAYS DO NOT PENETRATE APPROACH SURFACES.
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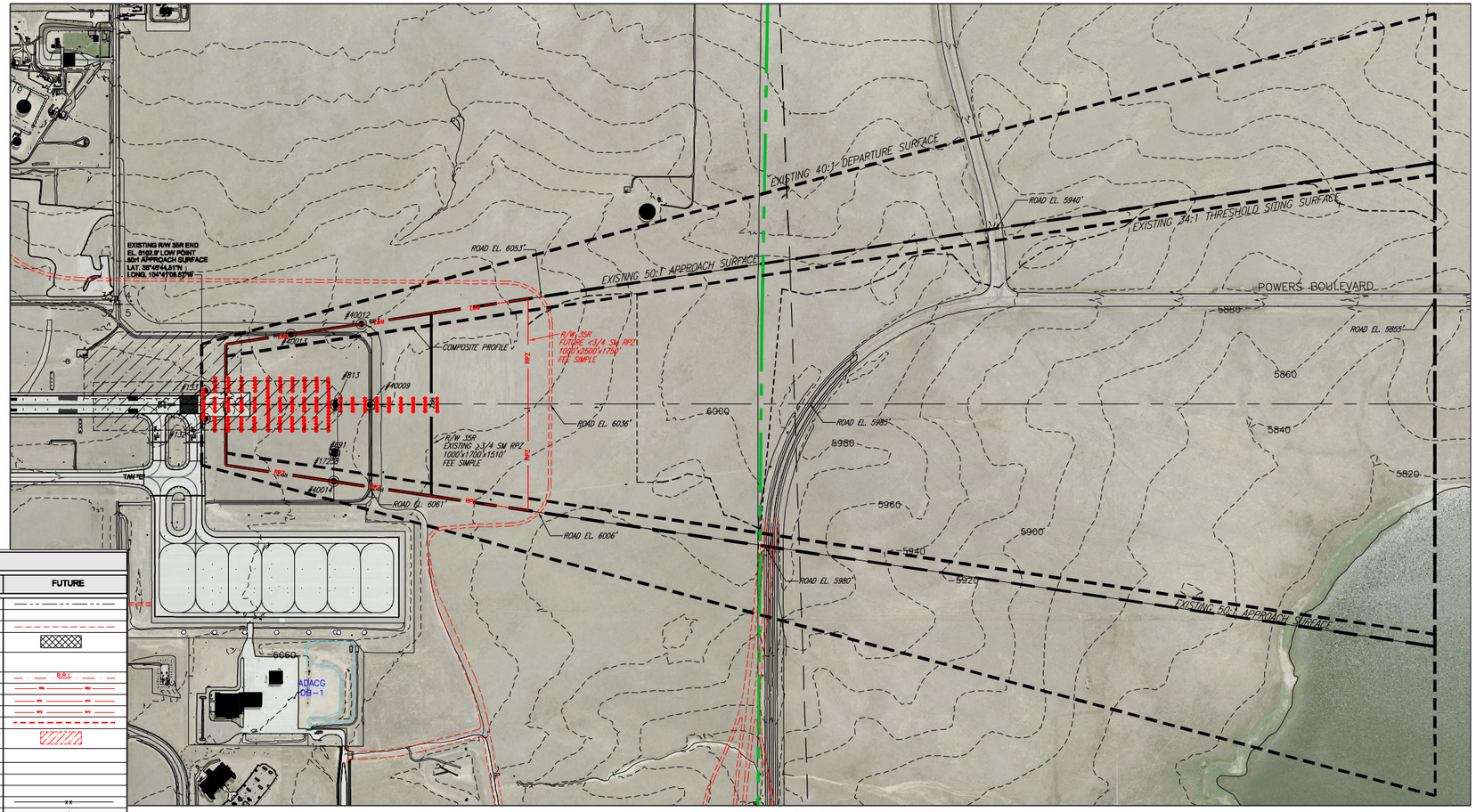
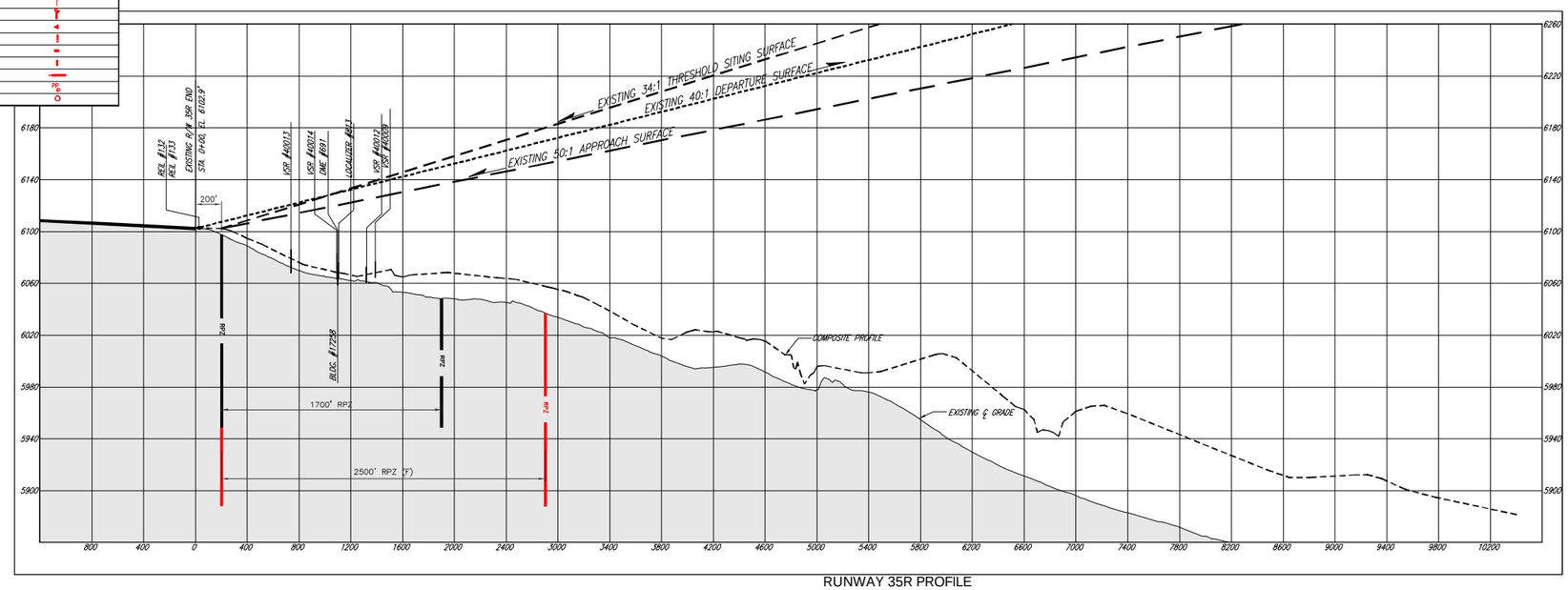
HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88



RUNWAY 35R PLAN VIEW

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	1/4 S3 T13S	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		

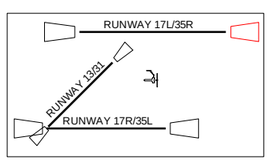


VERTICAL SCALE
80 40 0 40
(IN FEET)

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

RUNWAY 35R PROFILE



KEY MAP

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

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ISSUE RECORD

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E.R. PROJECT NUMBER:			DATE:
WVXW3300			07/2013
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COS112C-SHEET 12-35R-APPR-DEPT-TSS.dwg
REFERENCE DRAWING PATH\NAME:
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INNER PORTION OF THE APPROACH AND DEPARTURE SURFACES PLAN AND PROFILE VIEWS FOR RUNWAY 35R

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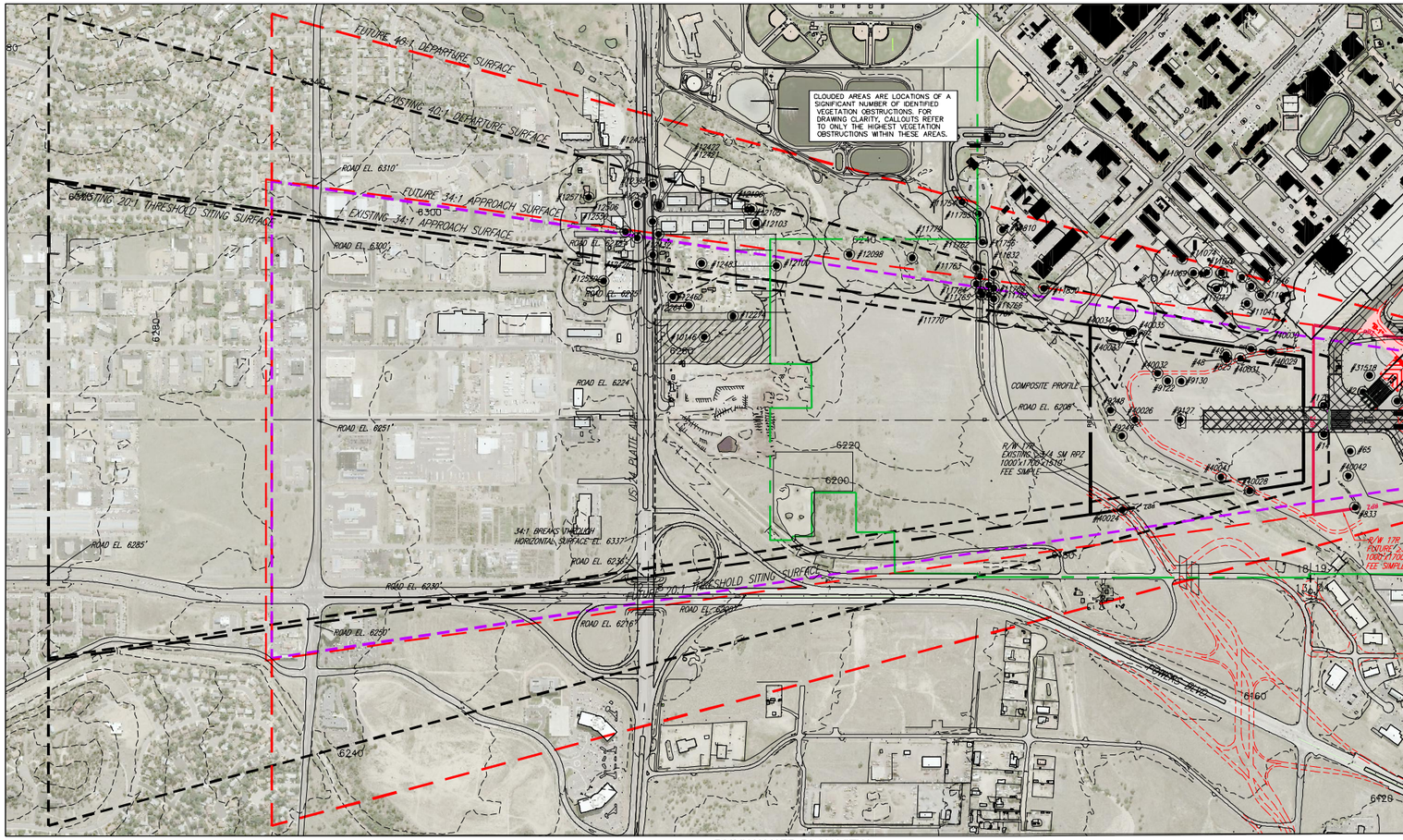
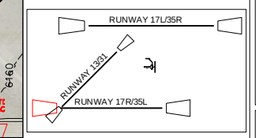
NOTE:

1. ALL ROAD/TRAVERSE WAYS UNDER THE APPROACH SURFACE WERE EVALUATED FOR POTENTIAL OBSTRUCTIONS PER 14CFR PART 77.17(b). SEVERAL ON-AIRPORT, ACCESS CONTROLLED VEHICLE SERVICE ROADS PENETRATE FUTURE APPROACH SURFACES AND ARE IDENTIFIED IN THIS DRAWING AND IN SHEET 10.
2. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.
3. OBJECTS THAT PENETRATE THE DEPARTURE SURFACE ONLY AND DO NOT LIE UNDER THE EXTENTS OF THE OTHER OBSTRUCTION SURFACES SHOWN ON THIS SHEET, MAY BE DEPICTED IN THE PROFILE VIEW AS AN OBSTRUCTION TO OTHER SURFACES. REFER TO THE PLAN VIEW ON THIS SHEET AND THE RESPECTIVE OBSTRUCTION TABLES ON SHEET 10 FOR CLARIFICATION AS TO WHICH SURFACES EACH POTENTIAL OBSTRUCTION PENETRATES.
4. ALL EXISTING AND FUTURE RPZ'S APPROACH AND DEPARTURE SURFACES FOR RUNWAY 13 ARE SHOWN ON SHEET 15.



RUNWAY17R PLAN VIEW

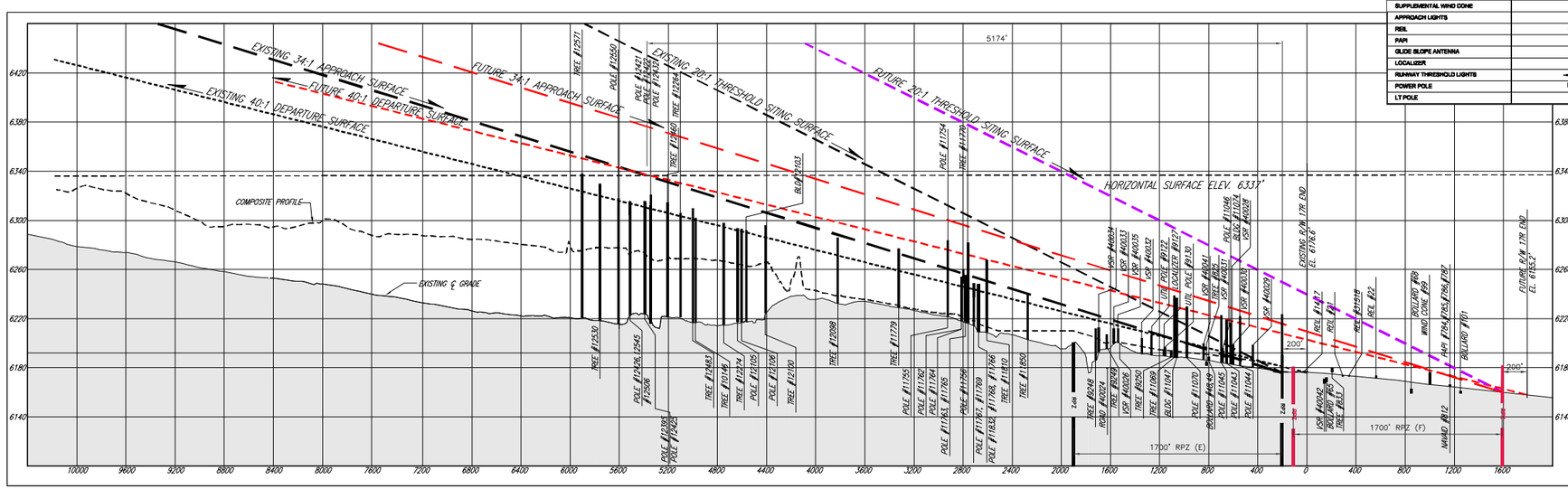


KEY MAP

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	1323 1324	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		



RUNWAY 17R PROFILE

VERTICAL SCALE
80 40 0 40
(IN FEET)

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

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ISSUE RECORD

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E.R. PROJECT NUMBER: WVXW3300
DATE: 07/2013

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	DCC	JAR	KOC

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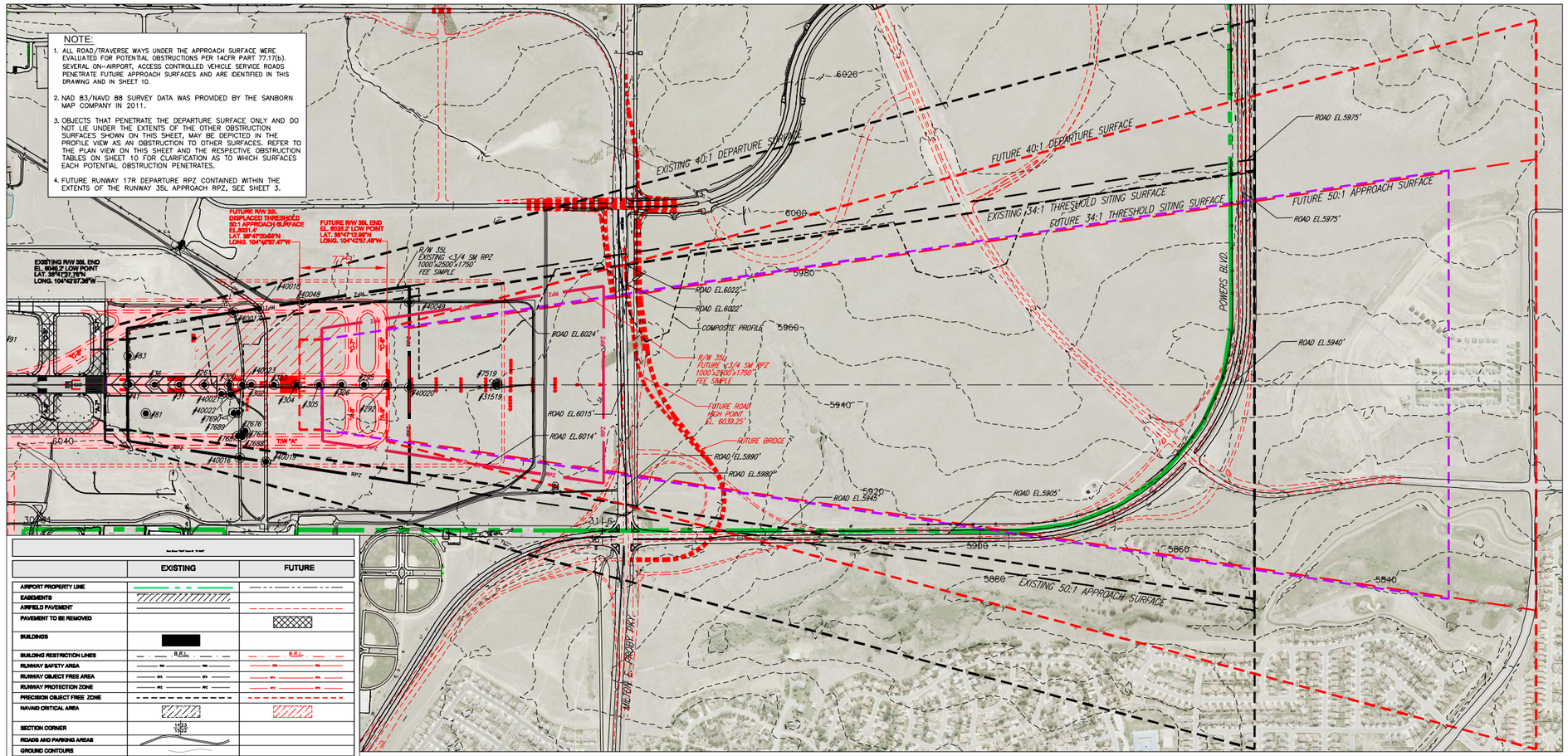
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACES PLAN AND PROFILE VIEWS FOR RUNWAY17R

SHEET 13 OF 18

NOTE:

1. ALL ROAD/TRAVERSE WAYS UNDER THE APPROACH SURFACE WERE EVALUATED FOR POTENTIAL OBSTRUCTIONS PER 14CFR PART 77.17(b). SEVERAL ON-AIRPORT, ACCESS CONTROLLED VEHICLE SERVICE ROADS PENETRATE FUTURE APPROACH SURFACES AND ARE IDENTIFIED IN THIS DRAWING AND IN SHEET 10.
2. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.
3. OBJECTS THAT PENETRATE THE DEPARTURE SURFACE ONLY AND DO NOT LIE UNDER THE EXTENTS OF THE OTHER OBSTRUCTION SURFACES SHOWN ON THIS SHEET, MAY BE DEPICTED IN THE PROFILE VIEW AS AN OBSTRUCTION TO OTHER SURFACES. REFER TO THE PLAN VIEW ON THIS SHEET AND THE RESPECTIVE OBSTRUCTION TABLES ON SHEET 10 FOR CLARIFICATION AS TO WHICH SURFACES EACH POTENTIAL OBSTRUCTION PENETRATES.
4. FUTURE RUNWAY 17R DEPARTURE RPZ CONTAINED WITHIN THE EXTENTS OF THE RUNWAY 35L APPROACH RPZ, SEE SHEET 3.

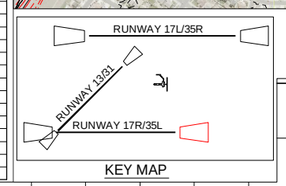


RUNWAY 35L PLAN VIEW

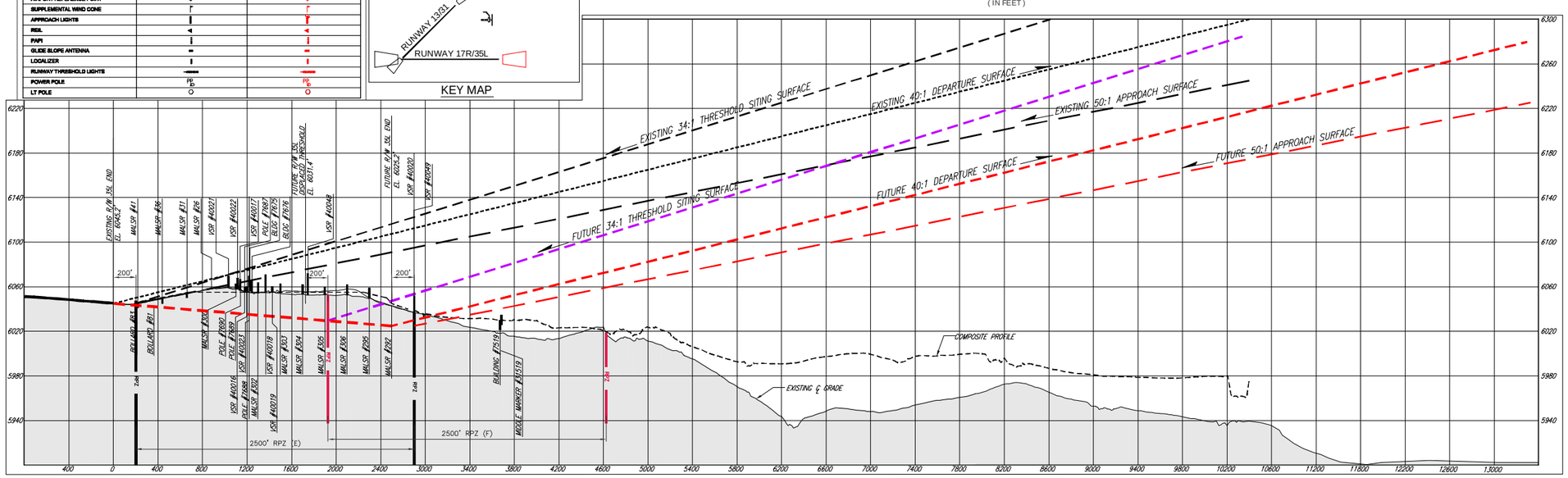
HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	1/4 1/4 1/4 1/4	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		



KEY MAP



RUNWAY 35L PROFILE

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

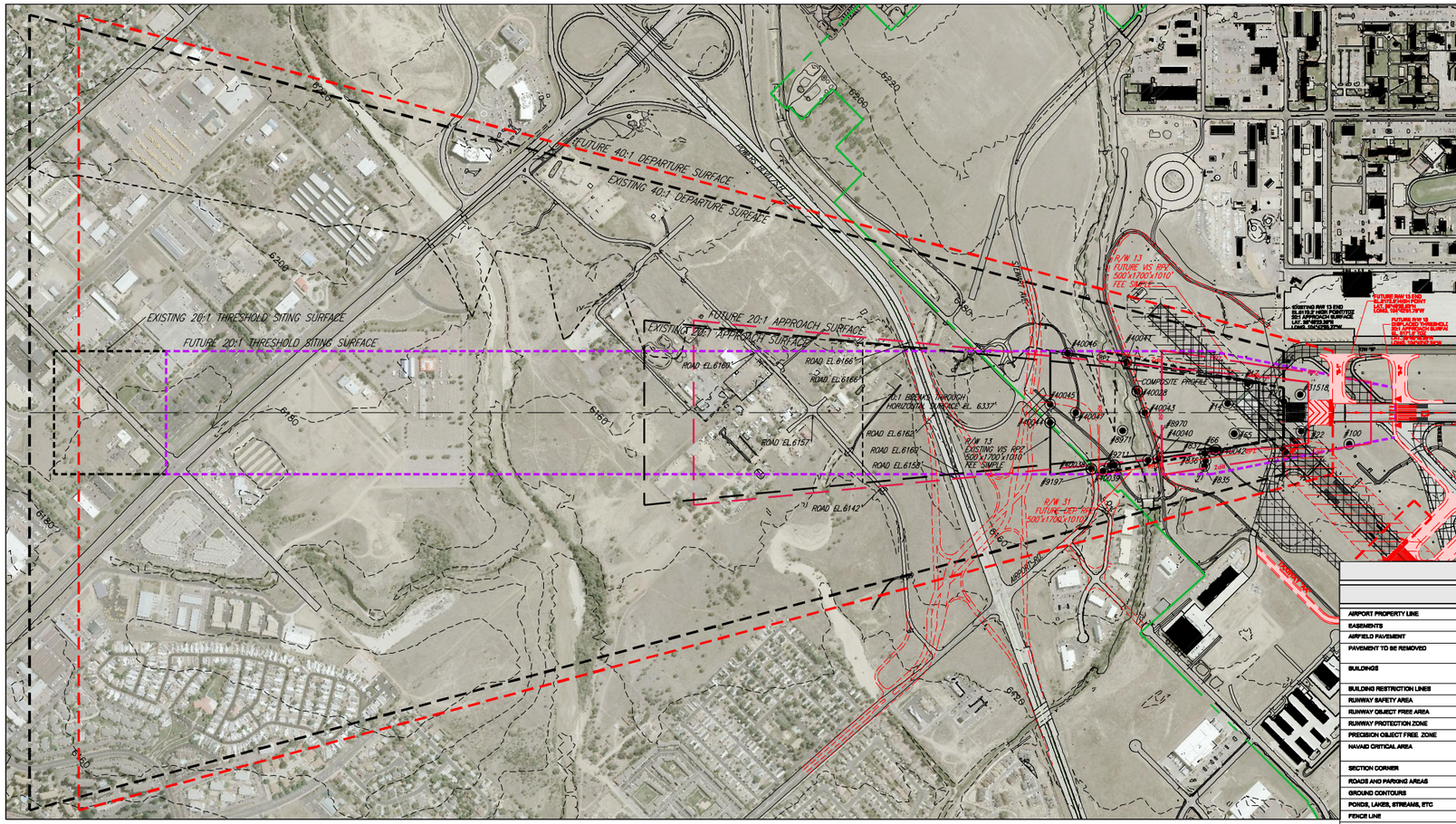
NO.	BY	DATE	DESCRIPTION
.	.	.	.

E.R. PROJECT NUMBER: WVXW3300		DATE: 07/2013
DESIGNED:	DRAWN: DCC	CHECKED: JAR / APPROVED: KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 14-35L-APPR-DEPT-TSS.dwg
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACES PLAN AND PROFILE VIEWS FOR RUNWAY35L

SHEET 14 OF 18



RUNWAY 13 PLAN VIEW

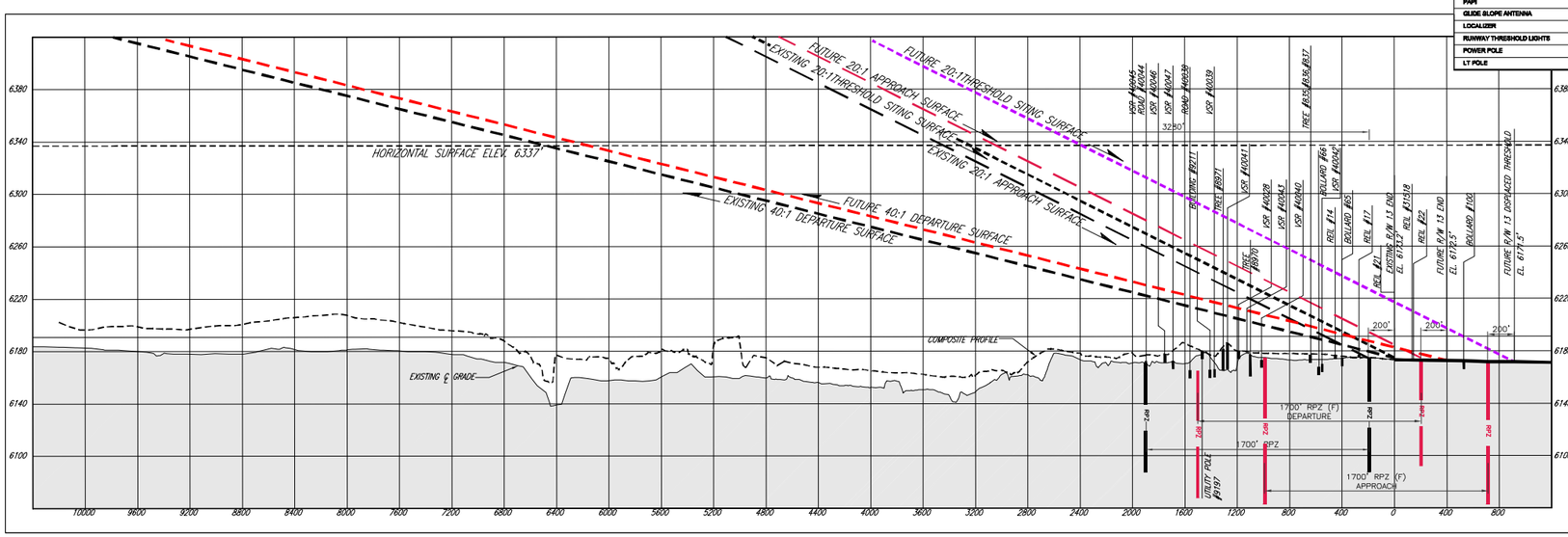
NOTE:

1. ALL ROAD/TRAVERSE WAYS UNDER THE APPROACH SURFACE WERE EVALUATED FOR POTENTIAL OBSTRUCTIONS PER 14 CFR PART 77.17(b). ROADS AND TRAVERSE WAYS DO NOT PENETRATE APPROACH SURFACES.
2. NAD 83/NAVD 88 SURVEY DATA WAS PROVIDED BY THE SANBORN MAP COMPANY IN 2011.
3. OBJECTS THAT PENETRATE THE DEPARTURE SURFACE ONLY AND DO NOT LIE UNDER THE EXTENTS OF THE OTHER OBSTRUCTION SURFACES SHOWN ON THIS SHEET, MAY BE DEPICTED IN THE PROFILE VIEW AS AN OBSTRUCTION TO OTHER SURFACES. REFER TO THE PLAN VIEW ON THIS SHEET AND THE RESPECTIVE OBSTRUCTION TABLES ON SHEET 10 FOR CLARIFICATION AS TO WHICH SURFACES EACH POTENTIAL OBSTRUCTION PENETRATES.
4. ALL EXISTING AND FUTURE RPZ'S/APPROACH AND DEPARTURE SURFACES FOR RUNWAY 17R ARE SHOWN ON SHEET 13.

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

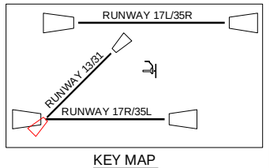
	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA RSA	RSA RSA
RUNWAY OBJECT FREE AREA	OFA OFA	OFA OFA
RUNWAY PROTECTION ZONE	RPZ RPZ	RPZ RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SRICTION CORNER	14253 15622	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP 25	PP 25
LT POLE		



RUNWAY 13 PROFILE

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88



KEY MAP

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
.	.	.	.

E.R. PROJECT NUMBER: WVXW3300
DATE: 07/2013

DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	DCC	JAR	KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 15-12-APPR-DEPT-TSS.dwg
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACES PLAN AND PROFILE VIEWS FOR RUNWAY 13

HORIZONTAL SCALE
400 0 400 800
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88

NOTE:

1. ALL ROAD/TRAVERSE WAYS UNDER THE APPROACH SURFACE WERE EVALUATED FOR POTENTIAL OBSTRUCTIONS PER 14 CFR PART 77.17(b). ROADS AND TRAVERSE WAYS DO NOT PENETRATE APPROACH SURFACES.
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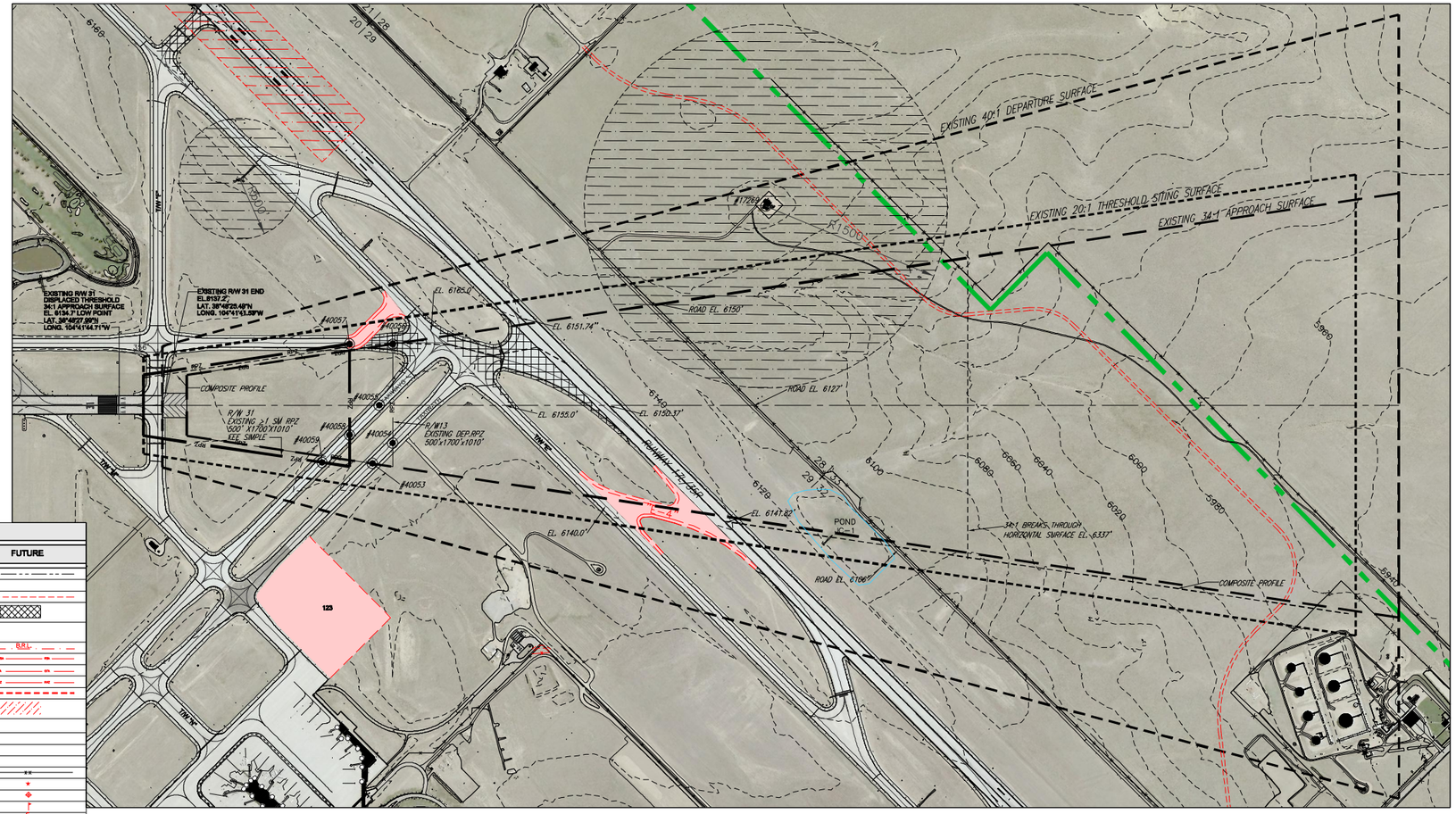
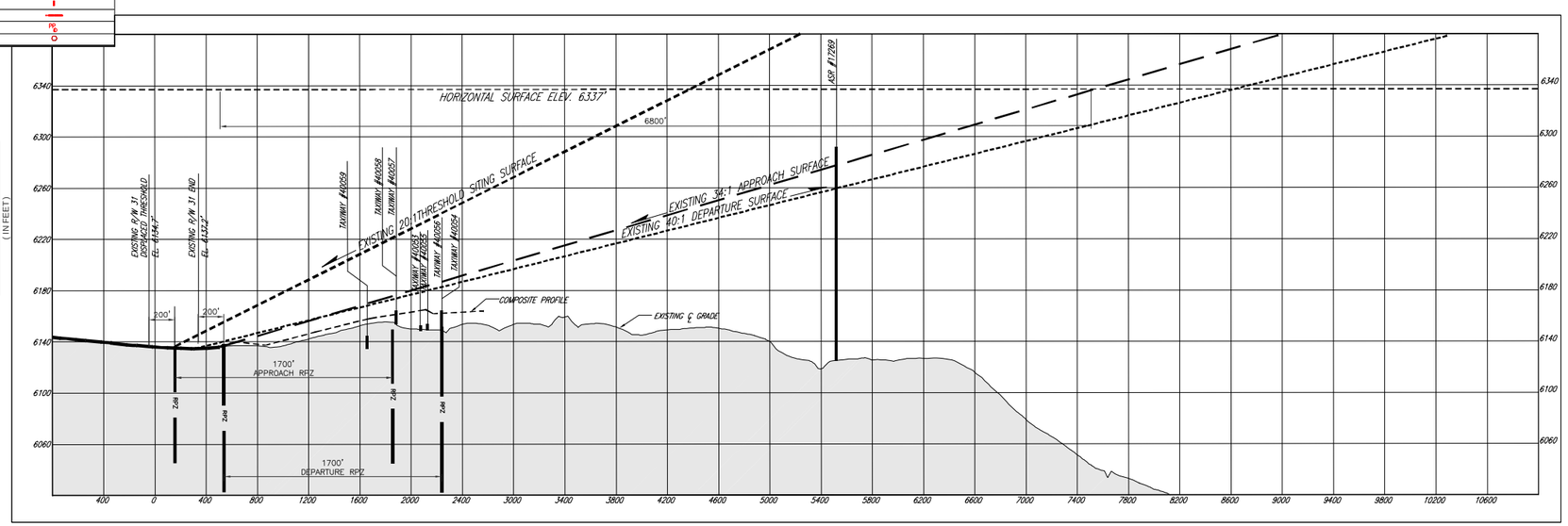
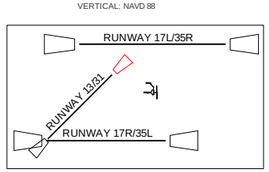
	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	ROFA	ROFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	1423 1522	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE		
AIRPORT BEACON		
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
RSIL		
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE		



RUNWAY 31 PLAN VIEW



RUNWAY 31 PROFILE



KEY MAP

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Airport Master Plan

JACOBS

ISSUE RECORD

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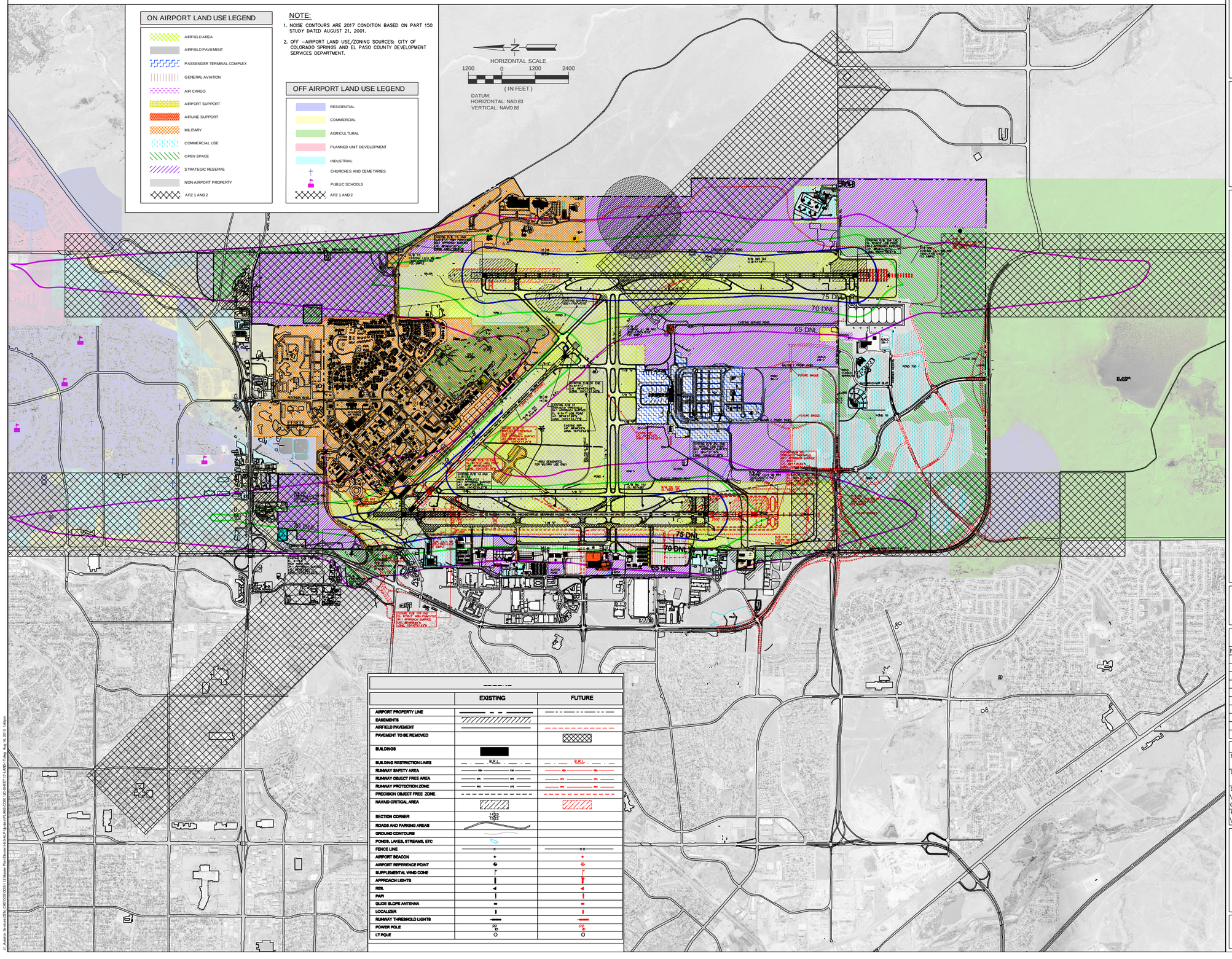
-	-	-	-

E.R. PROJECT NUMBER: WVXW3300
DATE: 07/2013
DESIGNED: DRAWN: DCC CHECKED: JAR APPROVED: KOC
DRAWING PATH\NAME: \---\PLANS\ COS112C-SHEET 16-30-APPR-DEPT-TSS.dwg
REFERENCE DRAWING PATH\NAME: \---\---\XREF\...

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACES PLAN AND PROFILE VIEWS FOR RUNWAY 31



Colorado Springs Airport

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-	-	-	-

E.R. PROJECT NUMBER:		DATE:
WXXW3300		07/2013
DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	DCC	JAR	KOC

DRAWING PATH\NAME:
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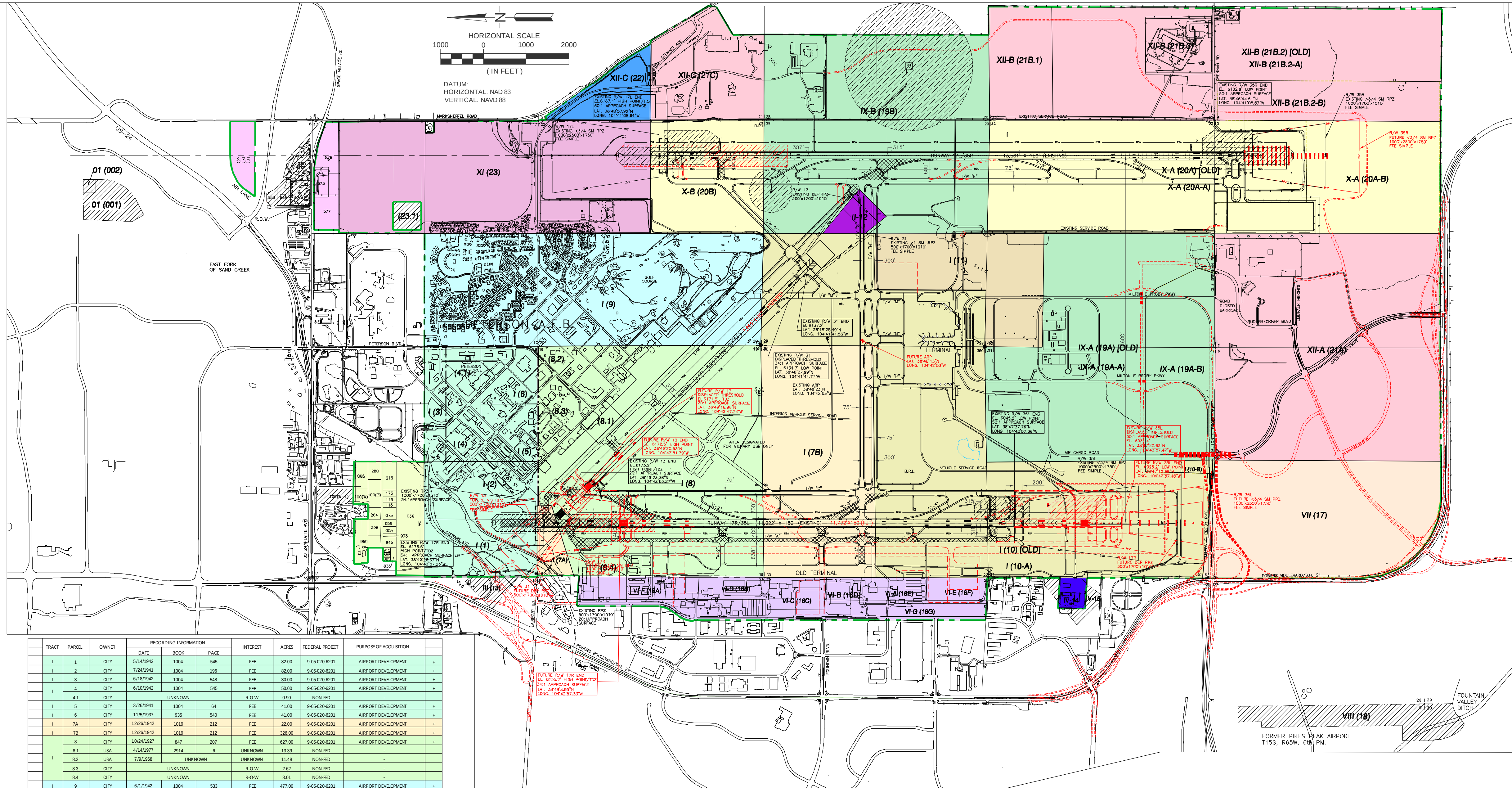
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

ON / OFF AIRPORT LAND USE PLAN

SHEET 17 OF 18



	TRACT	PARCEL	OWNER	RECORDING INFORMATION			INTEREST	ACRES	FEDERAL PROJECT	PURPOSE OF ACQUISITION	
				DATE	BOOK	PAGE					
	I	1	CITY	5/14/1942	1004	545	FEE	82.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	2	CITY	7/24/1941	1004	196	FEE	82.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	3	CITY	6/18/1942	1004	548	FEE	30.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	4	CITY	6/10/1942	1004	545	FEE	50.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
		4.1	CITY	UNKNOWN			R-O-W	0.90	NON-FED	-	
	I	5	CITY	3/26/1941	1004	64	FEE	41.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	6	CITY	11/5/1937	935	540	FEE	41.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	7A	CITY	12/26/1942	1019	212	FEE	22.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	7B	CITY	12/26/1942	1019	212	FEE	326.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	8	CITY	10/24/1927	847	207	FEE	627.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
		8.1	USA	4/14/1977	2914	6	UNKNOWN	13.39	NON-FED	-	
		8.2	USA	7/9/1968	UNKNOWN		UNKNOWN	11.48	NON-FED	-	
		8.3	CITY	UNKNOWN			R-O-W	2.62	NON-FED	-	
		8.4	CITY	UNKNOWN			R-O-W	3.01	NON-FED	-	
	I	9	CITY	6/1/1942	1004	533	FEE	477.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	I	10	CITY	5/18/1942	1004	516	FEE	890.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
		10-A	CITY	-				879.00	-	-	
BP		10-B	CITY	*Released for Business Park development.*				11.00	-	-	
	I	11	CITY	3/15/1943	1019	339	FEE	160.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
	II	12	CITY	11/19/1963	1988	989	FEE	18.60	9-05-020-6205	APPROACH PROTECTION (RPZ)	+
	III	13	PRIVATE	11/12/1964	2043	961	AVIG. EASEMENT	11.50	9-05-020-6205	APPROACH PROTECTION (RPZ)	
	IV	14	CITY	5/3/1961	1857	152	FEE	10.00	9-05-020-6206	APPROACH PROTECTION (RPZ)	+
	V	15	PRIVATE	8/5/1960	1842	143	AVIG. EASEMENT	19.50	9-05-020-6206	APPROACH PROTECTION (RPZ)	
	VI-F	16A	CITY	7/22/1968	2244	688	FEE (1/2)	34.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY	7/22/1968	2244	682	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY	7/22/1968	2244	684	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
	VI-D	16B	CITY	7/18/1966	2140	308	FEE (1/2)	20.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY	7/18/1966	2140	311	FEE (1/2)		8-08-0010-01	AIRPORT DEVELOPMENT	+
	VI-C	16C	CITY	9/9/1970	2363	759	FEE (1/4)	23.00	NON-FED	-	+
			CITY	7/30/1965	2086	33	FEE (1/2)		NON-FED	-	+
			CITY	7/30/1965	2086	34	GIFT (1/2)		NON-FED	-	+
	VI-B	16D	CITY	7/18/1966	2140	308	FEE (1/2)	10.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY	7/18/1966	2140	311	FEE (1/2)		8-08-0010-01	AIRPORT DEVELOPMENT	+
	VI-A	16E	CITY	6/1/1967	2182	725	FEE	20.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
	VI-E	16F	CITY	7/22/1968	2244	688	FEE (1/2)	16.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY	7/22/1968	2244	682	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY	7/22/1968	2244	684	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
	VI-G	16G	CITY	1/10/1968	2217	5	FEE (1/4)	77.00	NON-FED	-	+
			CITY	9/9/1970	2363	759	FEE (1/4)		NON-FED	-	+
			CITY	12/21/1972	2548	401	FEE (1/4)		NON-FED	-	+
			CITY	1/15/1973	2553	928	FEE (1/4)		NON-FED	-	+
	VII	17	CITY	11/6/1970	2374	7	FEE	327.00	8-08-0010-02	APPROACH PROTECTION/AIRPORT DEV.	
		17	CIDC	10/8/1985	5072	143	UNKNOWN	17.80	NON-FED	-	
BP		17	CITY	*Released for Business Park development.*				309.20	-	-	+
	VII	18	PRIVATE	UNKNOWN			AVIG. EASEMENT	67.00	8-08-0010-02	APPROACH PROTECTION/AIRPORT DEV.	
	IX-A	19A	CITY	7/19/1974	2691	839	FEE	574.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
		19A-A	CITY	-				415.00	-	-	
BP		19A-B	CITY	*Released for Business Park development.*				159.00	-	-	
	IX-A	19B	CITY	7/19/1974	2691	839	FEE	544.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
	X-A	20A	CITY	12/17/1976	2882	189	FEE	644.53	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
		20A-A	CITY	-				418.00	-	-	
BP		20A-B	CITY	*Released for Business Park development.*				226.00	-	-	
	X-B	20B	CITY	12/17/1976	2882	189	FEE	161.92	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
BP	XII-A	21A	CITY	12/23/1977	2993	386	FEE	640.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
	XII-B	21B.1	CITY	12/23/1977	2993	386	FEE	90.00	8-08-0010-07	APPROACH PROTECTION/AIRPORT DEV.	+
	XII-B	21B.2	CITY	12/23/1977	2993	386	FEE	550.00	8-08-0010-08	APPROACH PROTECTION/AIRPORT DEV.	+
		21B.2-A	CITY	-				438.00	-	-	
BP		21B.2-B	CITY	*Released for Business Park development.*				112.00	-	-	

	TRACT	PARCEL	OWNER	RECORDING INFORMATION			INTEREST	ACRES	FEDERAL PROJECT	PURPOSE OF ACQUISITION	
				DATE	BOOK	PAGE					
	XII-C	21C	CITY	12/23/1977	2993	386	FEE	160.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
	XII-C	21C	CIDC	10/8/1985	5072	143	FEE	17.18	NON-FED	-	
	XII-C	22	CITY	10/8/1985	5072	142	FEE	53.16	NON-FED	-	+
	XI	23	CITY	9/11/1975	2776	520	FEE	541.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
		23	USA	7/30/1979	3207	902	AVIG. EASEMENT	170.86	NON-FED	-	
		23.1	SCHOOL DIST. 11	2/17/1967	2166	982	UNKNOWN	11.20	NON-FED	-	
	01	001	PRIVATE	9/28/1995	6608	1404	DEV. RIGHTS	23.94	3-08-0010-20	NOISE COMPATIBILITY	
	01	002	PRIVATE	9/28/1995	6608	1404	DEV. RIGHTS	2.54	3-08-0010-23	NOISE COMPATIBILITY	
*	03	575	CITY	7/23/1992	6013	81	FEE	5.00	3-08-0010-12	NOISE COMPATIBILITY	+
	03	576	CITY	7/23/1992	6013	81	FEE	10.86	3-08-0010-19	APPROACH PROTECTION	+
	03	577	CITY	7/23/1992	6013	81	FEE	15.66	NON-FED	-	+
	03	560	CITY	10/19/1993	6286	1498	FEE	6.50	3-08-0010-15	NOISE COMPATIBILITY	
EX			PRIVATE	7/17/1996	RECEPTION NO. 96088831		AVIG. EASEMENT	7.74	NON-FED	-	
	03	520	CITY	7/28/1993	6223	308	FEE	9.97	3-08-0010-15	NOISE COMPATIBILITY	
EX			PRIVATE	12/1/1995	6774	1228	AVIG. EASEMENT	6.00	NON-FED	-	
	03	545	CITY	7/1/1993	6205	538	FEE	2.26	3-08-0010-17	NOISE COMPATIBILITY	
EX			PRIVATE	12/1/1995	6774	1230	AVIG. EASEMENT	4.00	NON-FED	-	
	03	ROW	EL PASO CTY	6/2/1999	RECEPTION NO. 99087783		R-O-W	0.35	NON-FED	-	
	03	553	PRIVATE	UNKNOWN	UNKNOWN		DEV. RIGHTS	2.94	3-08-0010-17	NOISE COMPATIBILITY	
*	03	635	CITY	1/5/1999	RECEPTION NO. 99001268/69		FEE	19.62	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	036	CITY	7/8/1992	6005	798	FEE	39.55	3-08-0010-12	NOISE COMPATIBILITY	+
*	08	215	CITY	10/13/1993	6282	1357	FEE	4.62	3-08-0010-17	NOISE COMPATIBILITY	+
*	08	175	CITY	7/30/1993	6225	457	FEE	0.92	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	145	CITY	5/18/1992	5978	1129	FEE	0.92	3-08-0010-14	NOISE COMPATIBILITY	+
*	08	115	CITY	7/10/1996	RECEPTION NO. 96085758		FEE	0.92	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	075	CITY	7/8/1996	RECEPTION NO. 96088833		FEE	1.85	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	055	CITY	7/17/1996	RECEPTION NO. 96088832		FEE	1.23	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	005	CITY	4/22/1993	6157	951	FEE	1.23	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	975	CITY	6/5/1992	5988	639	FEE	0.46	3-08-0010-12	NOISE COMPATIBILITY	+
*	08	945	CITY	6/16/1992	5993	740	FEE	1.71	3-08-0010-12	NOISE COMPATIBILITY	+
*	08	835	CITY	5/13/1992	5976	1131	FEE	1.00	3-08-0010-12	NOISE COMPATIBILITY	+
*	08	915	CITY	3/19/1992	5949	565	FEE	0.44	3-08-0010-17	NOISE COMPATIBILITY	+
*	08	885	CITY	7/31/1992	6016	715	FEE	0.44	3-08-0010-14	NOISE COMPATIBILITY	+
*	08	865	CITY	2/8/1993	6118	1311	FEE	0.44	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	950	CITY	6/23/1992	5997	492	FEE	9.33	3-08-0010-14	NOISE COMPATIBILITY	+
*	08	396	CITY	1/21/1998	RECEPTION NO. 98007480		FEE	2.77	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	264	CITY	7/28/1993	6223	306	FEE	1.85	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	100(B)	CITY	4/13/1994	6424	1122	FEE	4.62	3-08-0010-17	NOISE COMPATIBILITY	+
*	08	100(W)	CITY	1/3/1994	6350	195	FEE	10.00	3-08-0010-14	NOISE COMPATIBILITY	+
		100(W)	CITY	*Retained*				2.50	3-08-0010-14	NOISE COMPATIBILITY	+
EX		100(W-1)	PRIVATE	10/16/1996	RECEPTION NO. 96132238		AVIG/ACCESS ESMT	7.13	-	-	
*	08	280	CITY	9/14/1993	6259	494	FEE	2.77	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	068	CITY	10/8/1996	6259	494	FEE	4.46	3-08-0010-14	NOISE COMPATIBILITY	+

NOTES:

1. All graphic information, except for boundary lines, Tables, notes and details about land parcels, was Imported from data provided by Isbill Assoc., Inc. (file name: cos-alp.Dwg, dated: 6/16/97)
2. This is not a plat nor boundary survey. The information presented was assembled from land transactions of records provided by the city of Colorado Springs and its consultants.
3. Recorded information after 980701 contains reception numbers in place of book and pages.
4. All property disclosure brought forward from the 2005 Exhibit "A".
5. Multiple plats exist within the Colorado Springs Airport boundary:

   Colorado Springs Airport and Industrial Park Filing No. 1 – Reception No. 94150256
   Colorado Springs Airport and Industrial Park Filing No. 2 – Reception No. 94150257
   Colorado Springs Airport Filing No. 1 – Reception No. 201029279
   Colorado Springs Airport Filing No. 1A – Reception No. 209712938
6. Multiple parcels purchased by Colorado Springs Airport have been disposed of through conversion to AIP Eligible uses, exchanged as part of the Noise Land Reuse Plan or released for development of the Airport Business Park. Disposed of parcels are identified in the parcel table with the following symbols:

   * These Noise Land parcels have been disposed through conversion to AIP-eligible land use for approach and departure protection. Noise Land Reuse Plan Accepted by FAA on June 30, 2010.

   EX These Noise Land parcels have been disposed through exchange. Noise Land Reuse Plan accepted by FAA on June 30, 2010.

   BP These parcels have been released for long-term development associated with the Airport Business Park. FAA Land Release for Leasing Plan accepted on January 10, 2006.

   \+ These parcels have been included to calculate the acres owned by the City of Colorado Springs. Sales and transactions listed below the initial purchase of the indicated parcels have been subtracted from the acreage calculation. The acreage calculated from the data totals 7,253 acres.

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED		
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	OFA	OFA
RUNWAY PROTECTION ZONE	RPZ	RPZ
PRECISION OBJECT FREE ZONE		
NAVAID CRITICAL AREA		
SECTION CORNER	14 23 / 15 22	
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		
FENCE LINE	x	x x
AIRPORT BEACON	★	★
AIRPORT REFERENCE POINT		
SUPPLEMENTAL WIND CONE		
APPROACH LIGHTS		
REIL	◄	◄
PAPI		
GLIDE SLOPE ANTENNA		
LOCALIZER		
RUNWAY THRESHOLD LIGHTS		
POWER POLE	PP	PP
LT POLE	○	○

Colorado Springs Airport

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CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JACOBS™

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
-	-	-	-

E.R. PROJECT NUMBER: WVXW3300			DATE: 07/2013
DESIGNED:	DRAWN: DCC	CHECKED: JAR	APPROVED: KOC

DRAWING PATH\NAME:
\---\PLANS\
COS112C-SHEET 18-EXHA-NEW.dwg
REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

AIRPORT EXHIBIT "A"
PROPERTY MAP

SHEET 18 OF 18

J:_Aviation Services\DEN_CAD\COS\COS-112 Master Plan\Element-8.0-ALP-Update\PLANS\COS112C-SHEET 18-EXHA-NEW.dwg Aug 16, 2013 1:44pm