

Black Hills Airport – Clyde Ice Field

Master Plan Supplemental Analysis Kickoff
January 6, 2020



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Agenda

- Introductions
- Roles & Responsibilities
- Airport Master Plans
- Completed Components
- Project Status
- Remaining Schedule & Tasks
- Questions



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Roles & Responsibilities

- City of Spearfish
 - Provide Guiding Principles
 - Make Decisions
 - Review and Approve Master Plan & ALP



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Roles & Responsibilities

- KLJ Planning Team
 - Manage Study
 - Complete Technical Work
 - Provide Analysis



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Roles & Responsibilities

> MP Advisory Committee

> Why Me?

> Role in Decision

> Stake in the Outcome

> Valued Resource

> Identify Key Issues

> Provide Feedback

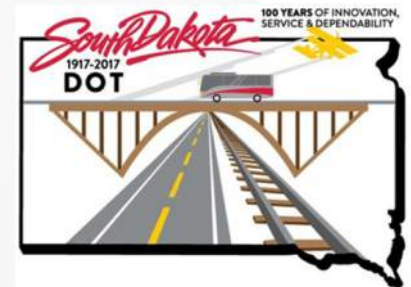
Dusty Lee
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Ray Jilek
Travis Lantis
Jason Woolston
Paul Pankonin



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Roles & Responsibilities

- FAA & SD Office of Aeronautics
 - Provide Technical Guidance
 - Approve Aviation Forecasts
 - Review Master Plan
 - Approve ALP



Jon Becker, SDDOT Planner
Sandy DePottey, FAA Planner



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Airport Master Planning

> What is an Airport Master Plan?

“An Airport Master Plan is a comprehensive study of an airport and usually describes the short-, medium- and long-term development plans to meet future aviation demand”

Federal Aviation Administration (FAA)

Advisory Circular 150/5070-6B, Airport Master Plans



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Project Schedule

- **Prior Work**
 - Initial Master Plan (2014-2017)
 - Focused Study (2017-2019) (Cultural, RPZ Analysis, Wetlands)
- **Supplemental Study (2019-2020) (Runway Analysis – Alternatives)**
 - Kickoff – Review Completed Items
 - Runway Analysis – by Feb 2020
 - Preferred Alternative – Airfield Layout by Feb 2020
 - Preferred Alternative – Terminal/Hangar Areas by May 2020
 - Implementation Plan – by Jul 2020
 - Airport Layout Plan – by Jul 2020



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Components Completed

- Airport Master Plan initiated in 2014
 - Chapters 1-6 with Appendices except R - Runway Protection Zone Analysis
 - Airport Layout Plan
- Proposed Crosswind Runway 5/23
 - Instrument approach for Runway 23
- Cultural Survey
 - Cultural impacts with proposed Runway 5/23



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Existing Conditions

- Airport dedicated in 1934 (mail/passenger service until 1961)
- **Access from I-90 is circuitous**
- Wind data shows a need for a paved crosswind runway
 - Runway 8-26 and Runway 5-23 were examined
 - **Runway 5-23 alignment was determined to be best**
- 24,189 people living in Lawrence County (2010)
- Major employers are in health care, education and retail



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Existing Conditions (cont.)

- Airport designed for Turboprop aircraft (ARC B-II)
- Runways
 - Runway 13-31 – 6,401' x 75' paved
 - Runway 8-26 – 3,851' x 100' turf
 - Runway 4-22 – 2,060' x 120' turf
- Two apron areas (22,100 sy and 15,500 sy)
- Three published approaches (two straight in and one circling)



Legend

Existing Airport Property

1. Eagle Aviation
2. Hangar
3. CAP
4. Hangar
5. Black Hills Aero
6. Hangar
7. T-Hangar
8. T-Hangar
9. T-Hangar
10. Hangar
11. Hangar
12. Hangar
13. Hangar
14. T-Hangar
15. T-Hangar
16. Hangar



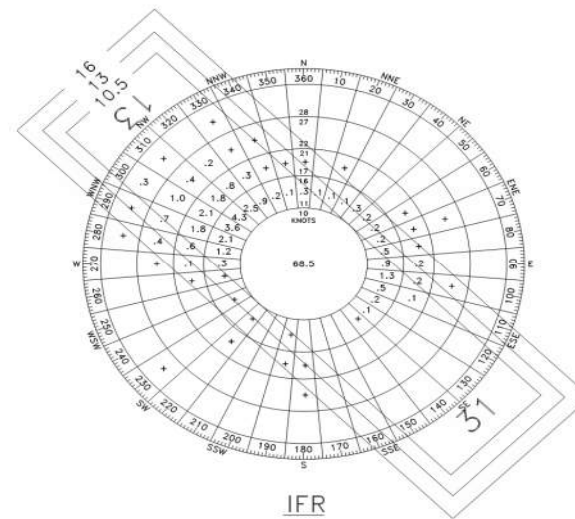
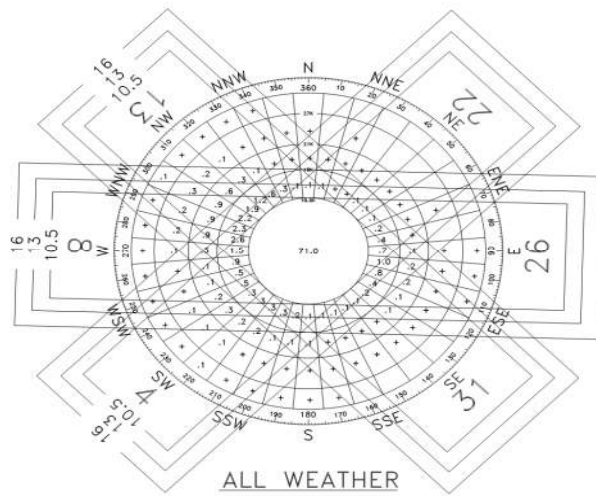
*Intended for Planning Purposes Only

**Black Hills Airport - Clyde Ice Field
Spearfish, South Dakota
Exhibit 2-2 Airfield Map**



J:\airport\10514104\MP_GIS_mxd\Exhibit_2-2_Airfield_Map.mxd APT 3/12/2015

Wind Coverage



Runway	All Weather Windrose Data			IFR Weather Windrose Data		
	10.5 Knots	13.0 Knots	16.0 Knots	10.5 Knots	13.0 Knots	16.0 Knots
13 - 31	91.91%	95.62%	97.96%	96.18%	98.43%	99.65%
4 - 22	80.96%	88.16%	94.93%			
8 - 26	93.39%	96.54%	98.60%			
Combined	99.66%	99.86%	99.96%	96.18%	98.43%	99.65%

Source: National Climactic Data Center All Weather - 63,693 Observations IFR - 4,213 Observations
 AWOS III - Black Hills Airport - Clyde Ice Field; 10/2008 to 01/2017 + = Less than 0.05%



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Forecast

Based Aircraft Fleet Mix Forecast						
Metric	2014	2019	2024	2029	2034	CAGR
Single-Engine	65	67	69	70	70	0.37%
Multi-Engine	4	6	7	9	11	5.19%
TurboJet	0	1	2	3	4	9.68%
Helicopter	0	0	0	0	0	NA
Other	3	3	3	3	4	1.45%
Total Based Aircraft	72	76	81	85	89	1.09%

Critical Design Aircraft Operations						
FAA ARC	2014	2019	2024	2029	2034	CAGR
A-I	6,772	7,174	7,427	7,839	8,261	1.00%
A-II	2,888	3,032	3,192	3,338	3,592	1.10%
B-I	1,313	1,479	1,659	1,838	1,939	1.97%
B-II	2,543	2,751	3,081	3,321	3,574	1.72%
C-I	55	59	79	101	108	3.43%
C-II	124	148	174	202	233	3.20%
D-I	28	30	47	51	54	3.34%
D-II	97	118	142	169	198	3.63%
Total	13,820	14,791	15,801	16,859	17,958	1.32%



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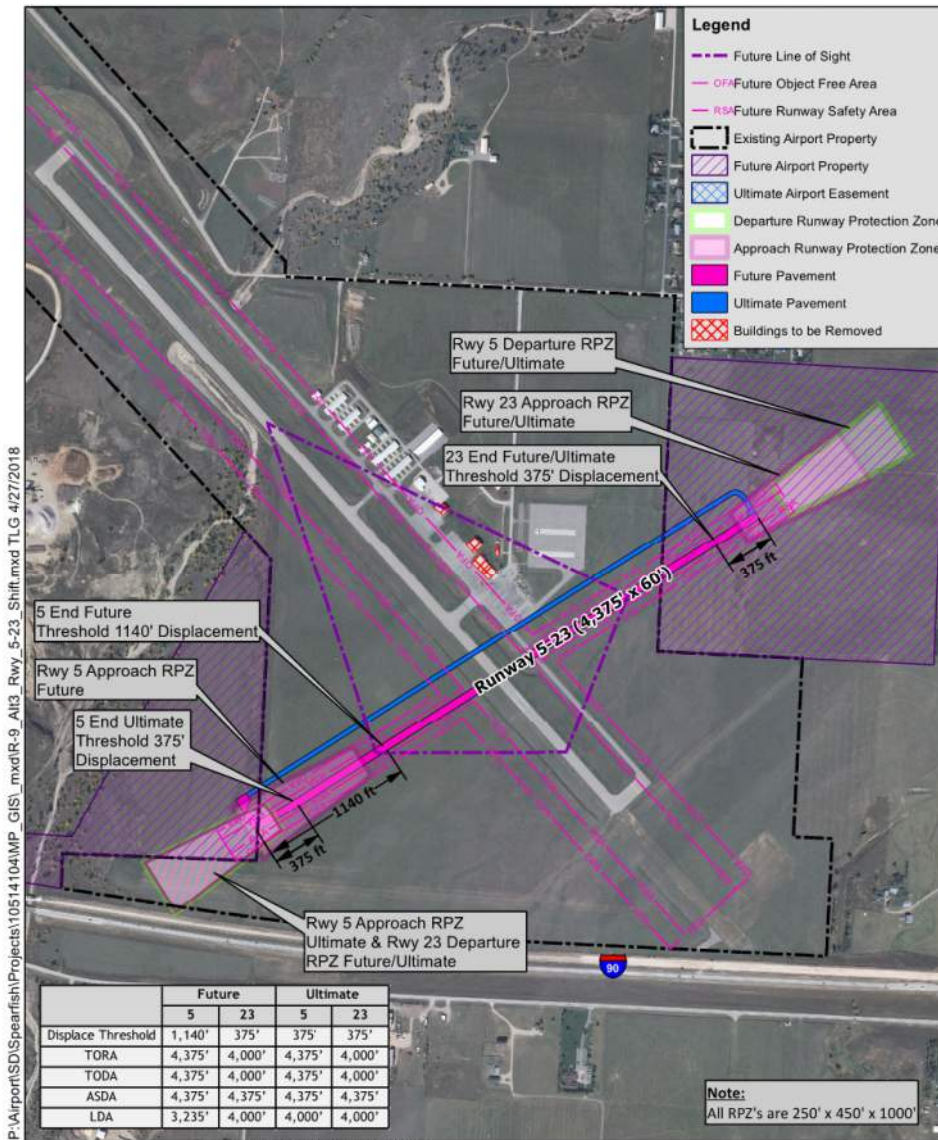
Crosswind Runway Analysis (Appendix N)

- Winds analysis shows the most severe crosswinds at 200° to 230° alignment particularly May through September.
- Options examined
 - Runway 4/22
 - Runway 8/26
 - Runway 5/23
 - Runway 13/31 Widening
 - Alternate Airports
- Runway 5/23 was preferred (threshold adjusted for 5 RPZ)

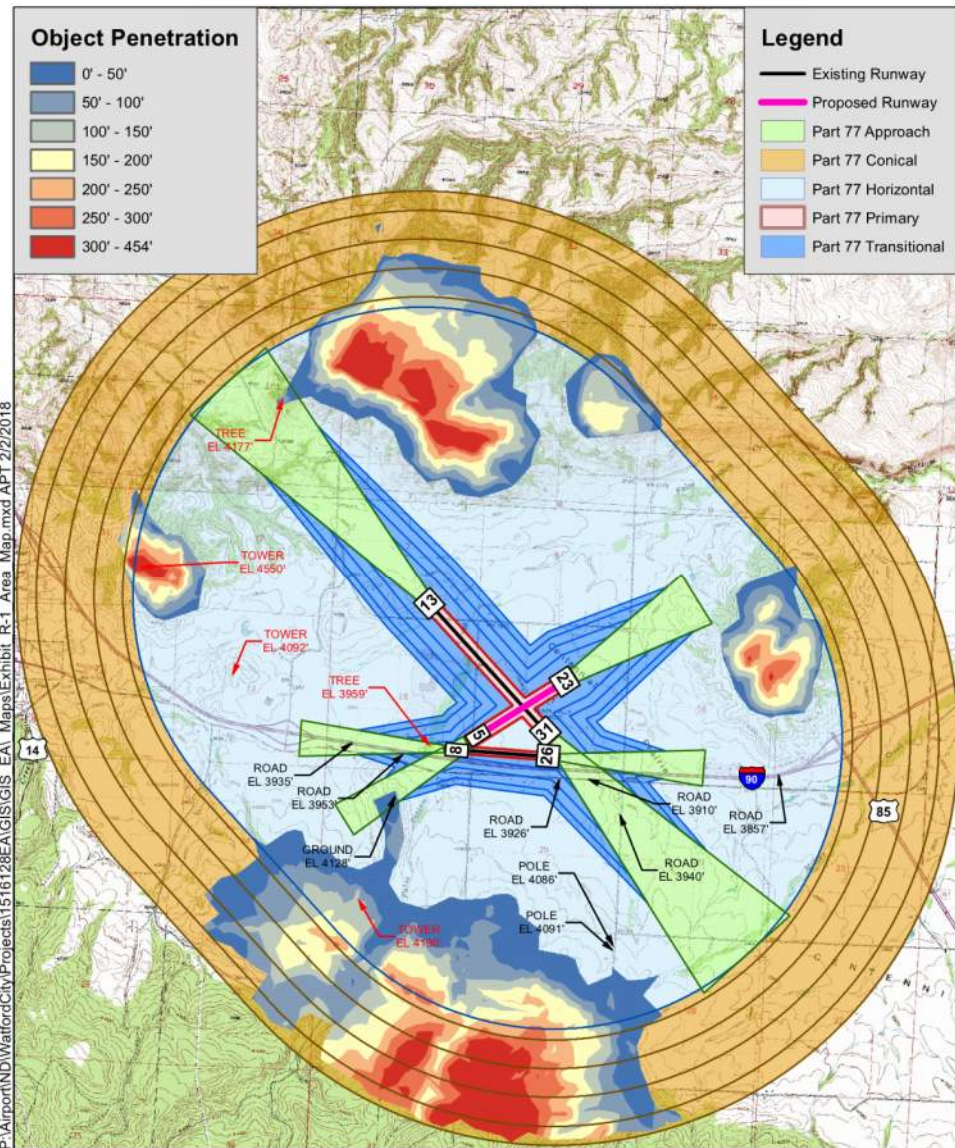


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Preferred Alternative was Runway 5/23



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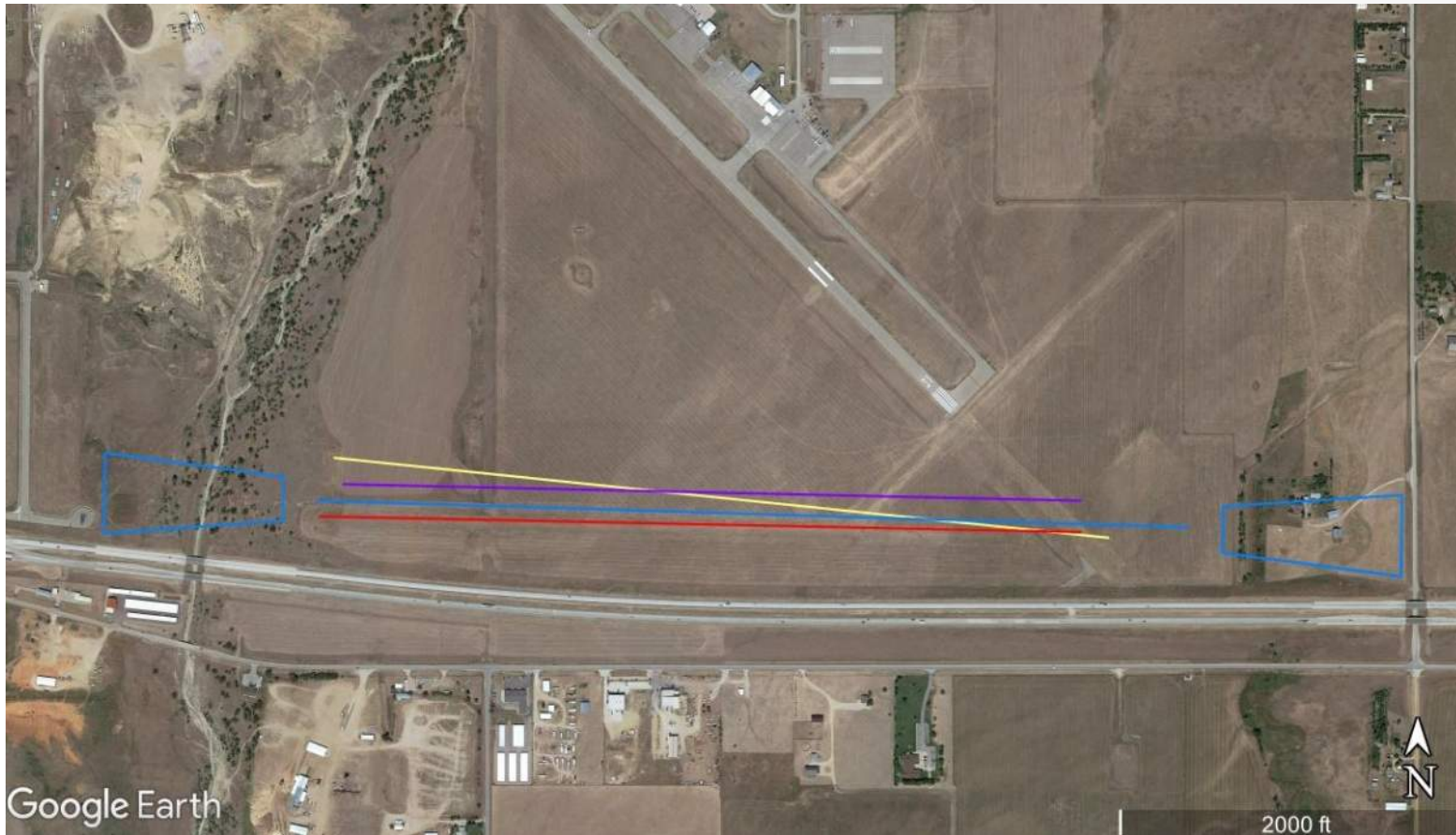
Runway Analysis

- Runway 8/26
 - Threshold Locations
 - Length (Displaced Threshold)
 - RPZ Clearance
 - Wind Coverage
 - Interaction with Runway 31
- Runway 5/23
 - Confirm Cultural Mitigation Options



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Runway 8/26 Alignment



- Option 1 (Red)
 - 4,330' long
 - 8 End RPZ over I-90
- Option 2 (Purple)
 - 4,200' long
- Option 3 (Yellow)
 - 4,450' long
- Option 4 (Blue)
 - 4,950' long
 - 26 End RPZ at Rainbow Road
 - Environmental restrictions to the west.



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Wind Speed (knots)	Observations better using 13/31					Observations better using 8/26					Total
	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	OVER		
1	3	7	11	0	0	0	0	0	0	21	
2	2	23	9	1	0	0	0	0	0	35	
3	4	25	24	2	1	0	0	0	0	56	
4	2	39	28	3	0	0	0	0	0	72	
5	7	50	27	1	0	0	0	0	0	85	
6	4	32	32	5	0	0	0	0	0	73	
7	2	31	34	9	0	0	0	0	0	76	
8	2	27	50	34	0	0	0	0	0	113	
9	0	23	56	53	11	0	0	0	0	143	
10	2	29	70	56	10	0	0	0	0	167	
11	4	42	63	39	2	0	0	0	0	150	
12	6	36	29	20	0	0	0	0	0	91	
13	4	27	24	8	1	0	0	0	0	64	
14	9	23	4	5	1	0	0	0	0	42	
15	6	22	7	1	3	0	0	0	0	39	
16	3	19	5	6	2	0	0	0	0	35	
17	4	18	5	5	4	0	0	0	0	36	
18	5	21	9	7	6	1	0	0	0	49	
19	2	28	20	10	9	1	0	0	0	70	
20	3	35	45	20	9	0	0	0	0	112	
21	4	40	31	19	10	1	0	0	0	105	
22	7	28	13	13	4	1	0	0	0	66	
23	5	17	5	8	2	0	0	0	0	37	
24	2	34	9	7	1	0	0	0	0	53	
25	6	43	18	8	0	0	0	0	0	75	
26	3	46	43	12	1	0	0	0	0	105	
27	8	30	31	13	2	0	0	0	0	84	
28	5	33	40	22	3	0	0	0	0	103	
29	5	25	39	24	4	0	0	0	0	97	
30	5	24	39	34	3	0	0	0	0	105	
31	3	23	38	30	2	0	0	0	0	96	
32	2	28	39	22	0	0	0	0	0	91	
33	1	27	32	9	4	1	0	0	0	74	
34	4	25	13	2	0	0	0	0	0	44	
35	2	15	10	5	0	0	0	0	0	32	
36	2	10	6	0	0	0	0	0	0	18	
Total 13/31	138	1005	958	361	52	1	0	0	0	2515	
Total 8/26	0	0	0	100	4	0	0	0	0	104	
Neither Total	0	0	0	52	39	4	0	0	0	95	

Wind Speed (knots)	Observations better using 13/31					Observations better using 5/23					Total
	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	OVER		
1	3	7	11	0	0	0	0	0	0	21	
2	2	23	9	1	0	0	0	0	0	35	
3	4	25	24	2	1	0	0	0	0	56	
4	2	39	28	3	0	0	0	0	0	72	
5	7	50	27	1	0	0	0	0	0	85	
6	4	32	32	5	0	0	0	0	0	73	
7	2	31	34	9	0	0	0	0	0	76	
8	2	27	50	34	0	0	0	0	0	113	
9	0	23	56	53	11	0	0	0	0	143	
10	2	29	70	56	10	0	0	0	0	167	
11	4	42	63	39	2	0	0	0	0	150	
12	6	36	29	20	0	0	0	0	0	91	
13	4	27	24	8	1	0	0	0	0	64	
14	9	23	4	5	1	0	0	0	0	42	
15	6	22	7	1	3	0	0	0	0	39	
16	3	19	5	6	2	0	0	0	0	35	
17	4	18	5	5	4	0	0	0	0	36	
18	5	21	9	7	6	1	0	0	0	49	
19	2	28	20	10	9	1	0	0	0	70	
20	3	35	45	20	9	0	0	0	0	112	
21	4	40	31	19	10	1	0	0	0	105	
22	7	28	13	13	4	1	0	0	0	66	
23	5	17	5	8	2	0	0	0	0	37	
24	2	34	9	7	1	0	0	0	0	53	
25	6	43	18	8	0	0	0	0	0	75	
26	3	46	43	12	1	0	0	0	0	105	
27	8	30	31	13	2	0	0	0	0	84	
28	5	33	40	22	3	0	0	0	0	103	
29	5	25	39	24	4	0	0	0	0	97	
30	5	24	39	34	3	0	0	0	0	105	
31	3	23	38	30	2	0	0	0	0	96	
32	2	28	39	22	0	0	0	0	0	91	
33	1	27	32	9	4	1	0	0	0	74	
34	4	25	13	2	0	0	0	0	0	44	
35	2	15	10	5	0	0	0	0	0	32	
36	2	10	6	0	0	0	0	0	0	18	
Total 13/31	138	1005	958	361	52	1	0	0	0	2515	
Total 5/23	0	0	0	152	28	2	0	0	0	182	
Neither Total	0	0	0	0	15	2	0	0	0	17	



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Runway Combination Crosswind Analysis

Wind Observations & Operations for Runway Combination 8/26 & 13/31				
Runway	May-September Wind Observations	Percentage Wind is Favorable	May-September Operations	May-September IFR Operations
8/26	104	3.83%	172	69
13/31	2515	92.67%	4154	1662
Neither Runway	95	3.50%	157	63
Total	2714	100%	4483	1794

Wind Observations & Operations for Runway Combination 5/23* & 13/31				
Runway	May-September Wind Observations	Percentage Wind is Favorable	May-September Operations	May-September IFR Operations
5/23	182	6.71%	301	120
13/31	2515	92.67%	4154	1662
Neither Runway	17	0.63%	28	11
Total	2714	100%	4483	1793



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Next Steps

- Runway Analysis
- Preferred Airfield Layout (MPAC & Open House Meeting)
- Terminal/Hangar Area Layout Alternatives (MPAC Meeting)
- Implementation Plan (MPAC & Open House Meeting)
- Update Airport Layout Plan



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Questions/Comments

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