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APPENDIX A:
OPERATIONAL NEEDS AND PERFORMANCE DOCUMENTATION

Airlake Airport • 22100 Hamburg Ave • Lakeville, MN 55044 • (952) 469-4414

To Whom it may concern,

I am writing this letter to provide documented support of the proposed runway extension at the Airlake Airport (LVN). We operate the FBO at the airport that provides the following services: Part 145 Repair Station, Flight School, Jet Center providing transient services and Part 135 charters. We have also completed construction of a 33,000 square foot hangar at LVN and anticipate it will grow our business with new transient aircraft operators utilizing our facilities. Until the runway extends to 4,850 feet, my business growth will continue to be limited. Regardless of the certified maximum takeoff weight (MTOW), the mid-size jets in our existing fleet are under-performing because of the existing runway length and has a consistent impact to our business operations.

Existing Fleet Mix

The following table outlines our current four (4) aircraft and the historical operations that have been conducted at LVN:

Aircraft (Qty)	Based at LVN?	Primary Mission	MTOW (lbs.)	Operations			
				2022	2023	2024	2025
Citation 650 (2)	Yes	Part 91/135	23,000	27	118	29[(1)]	27[(2)]
Citation 501 (1)	Yes	Part 91	11,850	26	0	0	0
HA-420 HondaJet (1)	Yes	Part 91	11,244	0	16	51	43
			Total Operations:	53	134	80	70

1: 2024 one of the Citation 650s was down for maintenance until the end of calendar year

2: One of the Citation 650s was down due to hail damage (same aircraft down for maintenance in 2024)

Limiting Factors to Operations

When assuming the fleet mix of our aircraft and LVN's mean max temperature of 82.3 degrees (July), the existing runway length of 4,099 feet is prohibitive to the Citation 650. The table below summarizes our fleet's existing capability in terms of useful load, and the net improvement if the proposed runway extension to 4,850 feet were to occur. I am also including aircraft performance charts, as attachments to this letter, to support the calculations in the table.

	Max Useful Load % & MTOW (lbs.) (4,099' TORA/TODA)	Max Useful Load % & MTOW (lbs.) (4,850' TORA/TODA)	Net Useful Load % & MTOW (lbs.) Improvement
Citation 650	62% / 20,500	93% / 22,230	31% / 1,730
Citation 501	100% / 11,850	100% / 11,850	0% / 0
HA-420 HondaJet	Restricted based on SOP, not MTOW (Runways less than 4,800 in length cannot be used if runway is wet/contaminated), even with Part 91 operations		

Historical Operations

An example of our limited operations involves the use of our Citation 650. Currently, we must limit our fuel on-board at LVN and fly to either FCM or STP to get the required amount of fuel for the remainder of our mission. On a regular basis, we are picking up our passengers from FCM or STP instead of LVN because of the runway length. Our passengers live in the metropolitan area near LVN and are inconvenienced due to the runway length by having to

travel to an adjacent airport to be picked up. A summary of our historical FCM and STP operations are noted in the table below:

		Citation 650	Citation 501	HA-420 HondaJet	Total
2024	FCM	183	0	0	183
	ANE	0	0	0	0
	STP	16	0	0	16
	MSP	0	0	3	3
2025	FCM	135	0	0	135
	ANE	0	0	0	0
	STP	0	0	0	0
	MSP	2	0	0	2
Total		436	0	3	439

LVN's existing runway length of 4,099 feet limits the Citation 650 stage length to nonstop destinations like DSM (187 NM). If the airport extended the runway to 4,850 feet, the stage length capability would be improved to a nonstop destination such as DFW (750 NM) and would provide four times the current stage length capability for our clients. Other nonstop destinations our clients commonly request include GON (1,094 NM), JAX (1,010 NM), FMY (1,215 NM), FXE (1,275 NM), PBI (1,250 NM), PWM (990 nm), SLC (860 NM). Our GON and JAX destinations are based on the new Citation 650 that was acquired March of 2023. When considering the existing limited runway length at LVN, and the resulting need to operate more at FCM and STP, the runway extension would allow our aircraft to operate more frequently at LVN as our desired airport of origin for our customers. It would also afford us the flexibility to rent space in our new 33,000 square foot hangar to additional transient aircraft operators. Until the runway is extended, my business growth potential is limited in getting more based aircraft in leasing my hangar space to other potential tenants than my own aircraft.

Aloft's Near-Term Growth

It is important to note that Executive Aviation's operations at FCM and STP, noted in the table below, will shift to primarily operate at LVN once the runway extension is in place. The primary focus of these operations is to support our clientele closer to the LVN market, and the extension will remove the inconvenience of asking them to drive to either FCM or STP for services. Once the runway is extended, we plan to market our 33,000 square foot hangar to additional transient aircraft to utilize our facilities, of which these operations are not currently realized at LVN because of the runway length. The additional "business growth operations" noted in the table below accounts for unrealized operations from a historical perspective because of recent maintenance down-time of our existing fleet over the last few years, of which have been online and in-use as of early 2025. The table also forecasts a conservative five percent growth at LVN in 2028 assuming the Runway 12-30 extension is in place. The potential growth for my business is much larger than five percent in 2028 and only accounts for natural business growth. Once the extension is in-place, I can adequately market my large hangar to other potential tenants and that part of my business is intangible.

ALOFT AVIATION

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	2025[1]	2027 Growth[2]			Projected 2028 Growth
		Ops From MAC Airports	Business Growth Ops	Total[2]	
Citation 650	27	+137	+131[4]	268	295[3]
King Air 90	0	+0	+0	0	50[5]
Citation 501	0	+0	+100	100	110[3]
HA-420	43	+3	50	53[6]	64[7]
	70	**+140**	**+272**	**421**	**519**

1: MACNOMS Data through December 31, 2025
2: Total forecast 2027 operations including 2025 historical, leakage to other MAC airports, and anticipated growth through 2027
3: Runway 12-30 extension is in-place with a conservative 10% growth factor from 2027 pre-runway extension growth
4: Accounts for 2024 activity level if aircraft were not down for maintenance in 2024 or out for hail damage in 2025, plus anticipated 10% growth in business out to 2027 regardless of runway length
5: Charter business cannot grow until runway is extended, as charter operations require 65% runway utilization calculations and is too limited to operate my King Air 90 business charter at LVN.
6: Operations will remain relatively the same until runway is extended, as Honda Jet requires 4,800 feet without operational restrictions (cannot operate on runways less than 4,800 feet if the pavement is wet or contaminated)
7: Anticipate 20% growth in operations once the runway is extended

Aloft's Impact to City of Lakeville

Currently, the City of Lakeville is the fastest growing city in the state with a current population of over 72,000 residents, over 1,200 businesses, and is the second largest industrial park in the metro area. Most of our clientele come from the industrial park activity, and we anticipate continued growth beyond our current projections as this part of the metropolitan area continues to thrive. To address this increase in demand, we have made significant investment in our business, the airport, and surrounding community by constructing our 33,000 square foot hangar and is currently operational. However, unless the runway is extended to 4,850 feet, that growth will be severely limited based on the capability of our aircraft and lack of appropriate runway length.

Summary

In summary, we have experienced several limiting factors at LVN that have prohibited our growth at the airport including hangar space availability and the limiting-nature of the current runway length of 4,099 feet. With our hangar now open for use, the remaining limitation is solely the runway length. I am including an attachment of aircraft performance charts for your consideration in reviewing this letter as well. Thank you for your time.

Sincerely,

Adam Forsberg; President
adam@aloft-aviation.com
(218) 839-1067

June 17, 2026

Citation VII Runway Capability Comparison

Office Use Only — Planning Estimate

Aircraft / Operating Assumptions

Item	Value
Aircraft	Cessna Citation VII
Empty Weight	14,000 lb
Structural MTOW	23,000 lb
Payload (Crew / Bags / 2 Passengers)	900 lb
Flap Configuration	Flaps 20°
Temperature	57°F
Field Elevation	975 ft MSL
Runway Condition	Dry
Estimated Usable Fuel Capacity	7,330 lb

Runway Performance Comparison

Runway Length	Estimated Takeoff Weight	Estimated Fuel Available
4,099 ft	20,500 lb	5,600 lb
4,850 ft	22,230 lb	7,330 lb

Fuel Load Increase

Additional Fuel Available: **1,730 lb**

Percentage Increase: **30.9% Increase in Available Fuel Load**

Visual Comparison



Operational Summary

The 4,850 ft runway provides significantly improved operational flexibility and near full-fuel capability under the stated conditions. The 4,099 ft runway requires a meaningful fuel reduction and reduced range capability.

Planning estimate only — not AFM-approved performance data.

Technical Memorandum

To:	Federal, State, and Local Governments and Resource Agencies
From:	Mead & Hunt on behalf of the Metropolitan Airports Commission
Date:	September 4, 2026
Subject:	Airlake Airport – Cessna Citation 650 Runway Length Requirements

Introduction

The Metropolitan Airports Commission (MAC) is currently preparing an Environmental Assessment (EA) for a runway extension project at Airlake Airport (LVN) and must demonstrate project justification to obtain federal capital improvement funding. To that end the fixed base operator (FBO) on the field, Aloft Aviation, provided aircraft performance information for their Cessna Citation C650 aircraft (N682RS, N700LW) based at LVN. This memorandum validates the runway length requirements provided by Aloft in two separate ways.

The first section of this memorandum confirms that the runway length requirements for the same takeoff weights provided by Aloft are consistent with the values from the runway length charts provided in Section IV of the C650 Airplane Flight Manual (AFM). The second section analyzes required operating weights for the typical stage lengths of C650 operations to and from MAC reliever airports to substantiate the need for operating at the takeoff weights that require a longer runway at LVN.

Aloft C650 Runway Length Validation

The Aloft information was compared to the FAA Approved AFM published by Cessna for the same model aircraft to corroborate their needs while also considering additional variables. Notable variables used by Aloft Aviation for their runway length determination include:

- Flap Configuration: Flaps 20°
- Field Elevation: 975 feet Mean Sea Level (MSL)
- Temperature: 57°F / 13.9°C

Given these conditions, Aloft Aviation provided the maximum operating takeoff weights associated with the existing and proposed runway lengths at LVN as shown in **Table 1**.

Table 1: C650 Takeoff Requirements - Aloft Aviation

Takeoff Weight	Runway Length
20,500 pounds	4,099 feet (existing)
22,230 pounds	4,850 feet (proposed)

Notes: Maximum Takeoff Weight: 23,000 pounds

To verify these maximum operating takeoff weights, Figure 4-26 in the AFM was referenced. The tables from this figure in the AFM use 20-degree flaps and a field elevation of 1,000 feet, closely following the actual field elevation at LVN. The tables in the AFM provide performance data in weight and temperature increments and so interpolation is required to estimate maximum operating takeoff weights equivalent to those provided by Aloft Aviation. The required runway lengths determined by consulting the AFM are shown in **Table 2** and are within five percent of the runway lengths given by Aloft Aviation for both takeoff weights. Therefore, the values provided by Aloft Aviation are reasonable estimates of maximum takeoff weights for the existing and proposed runway lengths at LVN.

Table 2: C650 Takeoff Requirements - AFM Comparison			
Takeoff Weight	**Runway Length (Aloft Aviation)**	**Runway Length (AFM Calculation)**	**AFM v Aloft Difference**
20,500 pounds	4,099 feet	4,280 feet	+4.4%
22,230 pounds	4,850 feet	4,796 feet	-1.1%

However, the temperature used by Aloft Aviation in their calculations is 57°F. This is considerably lower than the temperature typically used when determining runway length needs. FAA Advisory Circular (AC) 150/5325-4B, *Runway Length Requirements for Airport Design*, is the primary guidance used to determine runway length justification at FAA eligible airports. This guidance prescribes using the mean maximum temperature for the hottest month of the year to determine runway length needs to account for adverse impacts to aircraft performance caused by hotter weather. In the Airlake Airport 2035 Long-Term Comprehensive Plan (LTCP), a temperature of 82.3°F (27.9°C) was used to determine runway length needs. Therefore, the same analysis was completed applying a temperature of 27.9°C to the C650 AFM performance charts and the results are shown below in **Table 3**. Although this is a notable increase in the required runway length, this estimate more closely follows the FAA runway length requirement methodology that accounts for the decrease in aircraft performance during warmer weather conditions.

Table 3: C650 Takeoff Requirements – 27.9°C Comparison			
Takeoff Weight	**Aloft Aviation at 13.9°C**	**AFM Calculation at 13.9°C**	**AFM Calculation at 27.9°C**
20,500 pounds	4,099 feet	4,280 feet	4,692 feet
20,975 pounds	Not provided	4,423 feet	4,850 feet
22,230 pounds	4,850 feet	4,796 feet	5,308 feet

In addition to accounting for the impacts of temperature on runway length, the slope or gradient of the runway should also be incorporated into the calculation. The distances provided by Aloft appear to use a flat runway, however, the 9.1-foot height difference between the two thresholds of Runway 12/30 is the approximate equivalent of a 0.2 percent gradient when departing on Runway 30. Figure 4-25 in the C650 AFM provides guidance to allow for adjustments based on runway gradient. As the chart in the AFM provides adjustments of 1.0 percent gradients and greater, interpolation can be used to determine the

adjustment for a 0.2 percent gradient. On average, this results in an average increase of 5.5 percent in runway length compared to a flat runway. The results of accounting for both the greater temperature and uphill runway gradient are shown in **Table 4**.

Table 4: C650 Takeoff Requirements at 27.9°C and 0.2% Gradient		
Takeoff Weight	**AFM Calculation at 13.9°C / 0.2%**	**AFM Calculation at 27.9°C / 0.2%**
20,500 pounds	4,450 feet	4,950 feet
20,975 pounds	4,700 feet	5,150 feet
22,230 pounds	5,050 feet	5,600 feet

C650 Runway Length Requirements for Various Stage Lengths

The impact of stage lengths on runway length was examined to further evaluate the operational needs of the C650. The C650 is frequently operated within the MAC system airports and is one of several other transient large aircraft expected at LVN in the future. Operations data gathered from the MAC Noise and Operations Monitoring System (MACNOMS) was filtered to include only operations by the C650 throughout the MAC reliever airport system from 2022 through 2025. Where the origin or destination airports were available from MACNOMS, the frequency of various stage lengths traveled by the C650 was estimated in 200-nautical mile increments as shown in **Table 5**. For ease of reference, MSP was used to determine the distance to each origin/destination airport as it is at the approximate geographic center of the MAC airport system.

Table 5: Frequency of Operations by Stage Length	
Distance Grouping (Nautical Miles)	**Percentage of Total Operations**
1,200 – 1,400	18.7%
1,000 - 1,200	14.2%
800 - 1,000	12.1%
600 - 800	10.0%
400 - 600	4.2%
200 - 400	7.9%
< 200	32.9%
Total	100.0%

Notes: Excluded operations between MAC airports

To determine the runway length needs of the C650 for these various stage lengths, the required takeoff weight must first be established. The fuel burn rate of the C650 is 251 gallon per hour (gph) at cruise, but the duration of flight for each stage length grouping must be determined to estimate the weight of fuel for the trip. A sample of 2,152 C650 operations, all occurring in 2025 across 45 United States airports, were

downloaded from the FAA Traffic Flow Management System Counts (TFMSC) database to determine the average speed at which these aircraft travel.

When the total nautical miles traveled were divided by the total duration of these trips, an average trip speed of 0.12 minutes per nautical mile flown was revealed. This is used below to determine the duration of a trip and subsequently calculate the total fuel burn for an operation. This calculation must also account for the 45 minutes of reserve fuel and the fuel for an alternate airport required for both general aviation (14 CFR 91.167) and for commuter and on-demand (14 CFR 135.223) operations under IFR conditions. Once the total required trip fuel is determined, it can be converted to weight using the FAA standard 6.7 pounds per gallon. The total fuel weight can then be added to the 14,000 pounds empty weight of the aircraft found in the letter provided by Aloft. Finally, as the C650 can seat over ten passengers in certain configurations, a payload of 2,000 pounds is used to account for six passengers, two crew members, and any associated baggage or cargo. This process results in the takeoff weight for each stage length and is shown in **Table 6**.

Table 6: C650 Takeoff Weight per Stage Length

Distance (NM)	Duration (Hours)	Trip Burn (Gallons)	45 Min Reserve (Gallons)	20 Min Alternate (Gallons)	Total Fuel Weight[1]	Aircraft Empty Weight	Payload	Aircraft Takeoff Weight (lbs)
1,400	2.8	703	188	84	6,530	14,000	2,000	22,530
1,200	2.4	602	188	84	5,857	14,000	2,000	21,857
1,000	2.0	502	188	84	5,185	14,000	2,000	21,185
800	1.6	402	188	84	4,512	14,000	2,000	20,512
600	1.2	301	188	84	3,839	14,000	2,000	19,839
400	0.8	201	188	84	3,167	14,000	2,000	19,167
200	0.4	100	188	84	2,494	14,000	2,000	18,494

Notes: [1]FAA standard for Jet A fuel is 6.7 pounds per gallon.

Using the established takeoff weight for each of these trip distances, a runway length calculation can now be conducted. To provide runway length calculations that are comparable in methodology to the other Aloft operations discussed above, a temperature of 82.3°F (27.9°C) and 20-degree flaps were used for each takeoff calculation. As flaps change the camber of the wing to increase both lift and drag, the use of flaps during takeoff tends to result in an aircraft getting off the ground in a shorter length of runway, with the tradeoff of having a slower initial climb due to the increased drag. Therefore, the runway takeoff lengths listed in **Table 7** are shorter than what would be required at lower flap settings. Like the runway lengths in the first section, these runway lengths are adjusted to account for the 0.2 percent runway gradient when departing on Runway 30. These results also further support the results of the Aloft specific operations shown previously in Table 4.

As shown in **Table 7**, additional runway length beyond the existing 4,099 feet at LVN would be required for the C650 in all stage length scenarios when accounting for the runway gradient departing on Runway 30. Based on the frequency of various stage lengths, over half of all C650 operations are conducted at stage lengths requiring greater than the proposed 4,850-foot runway length. Based on this review and

analysis of the publicly available performance chart information, the MAC concurs with Aloft Aviation's performance calculations and the associated need for additional runway length at LVN. The MAC also reasonably expects that operations by other similar aircraft types considered as part of the runway extension justification for LVN would have similar stage length frequencies and associated runway length requirements.

Table 7: C650 Runway Length Requirements by Stage Length

Distance (NM)	Takeoff Weight (lbs)	Base Runway Length (ft)	Gradient Adjusted Runway Length (ft)	Percentage of C650 Operations
1,400	22,530	5,428	5,780	18.7%
1,200	21,857	5,160	5,420	14.2%
1,000	21,185	4,919	5,200	12.1%
800	20,512	4,696	4,950	10.0%
600	19,839	4,476	4,700	4.2%
400	19,167	4,266	4,450	7.9%
200	18,494	4,047	4,220	32.9%

TAKEOFF FIELD LENGTH - FEET
(CABIN AND COCKPIT BLEED AIR OFF *)

FLAPS - 20°
1000 FEET

CONDITIONS: RUNWAY GRADIENT - ZERO
LANDING GEAR - DOWN
ANTI-ICE SYSTEMS - OFF
APR SYSTEM - ARMED
SPEED BRAKES - RETRACT
INOPERATIVE ENGINE - WINDMILLING AFTER V1
OPERATIVE ENGINE - TAKEOFF THRUST

SOME CONDITIONS DO NOT MEET CLIMB REQUIREMENTS. OBTAIN ALLOWABLE WEIGHT FROM MAXIMUM TAKEOFF WEIGHT TABLES.

WEIGHT = 23000 LBS — VENR = 165 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	HEADWINDS 10 KTS DIST FT	HEADWINDS 20 KTS V1 KIAS	HEADWINDS 20 KTS DIST FT	HEADWINDS 30 KTS V1 KIAS	HEADWINDS 30 KTS DIST FT	VR KIAS	V2 KIAS
-25	124	5170	125	4350	126	4100	126	3850	126	3620	127	137
-20	124	5270	125	4440	126	4180	126	3930	126	3690	127	137
-15	124	5360	125	4520	125	4260	126	4010	126	3770	127	137
-10	124	5450	125	4600	125	4340	126	4090	126	3840	127	137
-5	123	5550	125	4690	125	4420	126	4170	126	3920	127	137
0	123	5640	125	4780	125	4510	126	4250	126	3990	127	136
5	123	5740	125	4860	125	4590	125	4320	126	4070	127	136
10	123	5830	125	4950	125	4670	125	4400	126	4150	127	136
15	123	5960	124	5060	125	4780	125	4510	126	4250	126	136
20	123	6150	124	5220	124	4930	125	4650	125	4380	126	136
25	123	6370	124	5420	124	5120	125	4840	125	4560	126	135
30	123	6780	124	5770	125	5460	125	5150	125	4860	126	135
33	124	7050	125	6000	125	5680	125	5360	126	5060	126	135
35	124	7240	125	6160	125	5830	126	5510	126	5220	126	135

WEIGHT = 22500 LBS — VENR = 165 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	HEADWINDS 10 KTS DIST FT	HEADWINDS 20 KTS V1 KIAS	HEADWINDS 20 KTS DIST FT	HEADWINDS 30 KTS V1 KIAS	HEADWINDS 30 KTS DIST FT	VR KIAS	V2 KIAS
-25	123	5020	124	4220	125	3980	125	3740	125	3510	126	136
-20	123	5110	124	4300	125	4050	125	3810	125	3580	126	136
-15	123	5200	124	4380	124	4130	125	3890	125	3650	126	136
-10	123	5290	124	4460	124	4210	125	3960	125	3720	126	136
-5	122	5380	124	4550	124	4290	125	4040	125	3800	126	136
0	122	5470	124	4630	124	4370	125	4110	125	3870	126	136
5	122	5560	124	4710	124	4450	124	4190	125	3940	126	136
10	122	5650	124	4790	124	4530	124	4270	125	4020	126	136
15	122	5780	123	4900	124	4630	124	4370	125	4110	126	135
20	122	5950	123	5060	123	4780	124	4510	124	4240	125	135
25	121	6150	123	5230	123	4940	123	4660	124	4390	125	134
30	122	6520	123	5550	123	5250	124	4950	124	4660	124	134
35	123	6960	124	5920	124	5600	124	5290	124	5000	124	134
37	123	7150	124	6090	124	5760	125	5440	125	5170	125	134

WEIGHT = 22000 LBS — VENR = 165 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	HEADWINDS 10 KTS DIST FT	HEADWINDS 20 KTS V1 KIAS	HEADWINDS 20 KTS DIST FT	HEADWINDS 30 KTS V1 KIAS	HEADWINDS 30 KTS DIST FT	VR KIAS	V2 KIAS
-25	122	4870	123	4090	124	3850	124	3620	124	3400	125	135
-20	122	4950	123	4170	124	3930	124	3690	124	3470	125	135
-15	122	5040	123	4250	123	4000	124	3770	124	3540	125	135
-10	122	5130	123	4330	123	4080	124	3840	124	3610	125	135
-5	121	5210	123	4410	123	4150	124	3910	124	3680	125	135
0	121	5300	123	4490	123	4230	124	3990	124	3750	125	135
5	121	5390	123	4570	123	4310	123	4060	124	3820	125	135
10	121	5480	123	4650	123	4390	123	4130	124	3890	125	135
15	121	5590	122	4750	123	4480	123	4230	124	3980	125	135
20	121	5760	122	4900	122	4620	123	4360	123	4110	124	134
25	120	5950	122	5060	122	4780	122	4510	123	4250	124	133
30	121	6270	122	5330	122	5040	122	4760	123	4480	123	133
35	121	6690	122	5690	123	5380	123	5080	123	4790	123	133
37	122	6870	123	5850	123	5530	123	5220	123	4940	123	133
39	122	7060	123	6010	123	5690	123	5380	123	5110	123	132

WEIGHT = 21500 LBS — VENR = 165 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	HEADWINDS 10 KTS DIST FT	HEADWINDS 20 KTS V1 KIAS	HEADWINDS 20 KTS DIST FT	HEADWINDS 30 KTS V1 KIAS	HEADWINDS 30 KTS DIST FT	VR KIAS	V2 KIAS
-25	121	4720	122	3970	123	3730	123	3510	123	3290	124	134
-20	121	4800	122	4040	122	3810	123	3580	123	3360	124	134
-15	121	4880	122	4120	122	3880	123	3650	123	3430	124	134
-10	120	4970	122	4190	122	3950	123	3720	123	3490	124	134
-5	120	5050	122	4270	122	4020	123	3790	123	3560	124	134
0	120	5140	122	4350	122	4100	123	3860	123	3630	124	134
5	120	5220	122	4420	122	4170	122	3930	123	3700	124	134
10	120	5300	122	4500	122	4250	122	4000	123	3770	124	134
15	120	5420	121	4600	122	4340	122	4090	123	3850	124	134
20	120	5580	121	4740	121	4470	122	4220	122	3970	123	133
25	119	5760	121	4890	121	4630	121	4360	122	4110	123	133
30	119	6030	120	5120	121	4850	121	4570	122	4300	122	132
35	120	6420	121	5460	121	5160	122	4870	122	4590	122	131
39	120	6780	121	5770	122	5450	122	5150	122	4880	122	131
40	121	6880	122	5850	122	5530	122	5230	122	4970	122	131
41	121	6980	122	5930	122	5610	122	5320	122	5050	122	131

WEIGHT = 21000 LBS — VENR = 165 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	HEADWINDS 10 KTS DIST FT	HEADWINDS 20 KTS V1 KIAS	HEADWINDS 20 KTS DIST FT	HEADWINDS 30 KTS V1 KIAS	HEADWINDS 30 KTS DIST FT	VR KIAS	V2 KIAS
-25	120	4570	121	3840	122	3620	122	3400	122	3190	123	134
-20	120	4650	121	3920	121	3690	122	3470	122	3250	123	134
-15	119	4730	121	3990	121	3760	122	3530	122	3320	123	134
-10	119	4810	121	4060	121	3830	122	3600	122	3380	123	134
-5	119	4890	121	4130	121	3900	122	3670	122	3450	123	133
0	119	4970	121	4210	121	3970	122	3740	122	3510	123	133
5	119	5050	121	4280	121	4040	121	3810	122	3580	123	133
10	119	5130	120	4360	121	4110	121	3870	122	3640	123	133
15	119	5240	120	4450	121	4200	121	3960	122	3730	123	133
20	119	5390	120	4580	120	4330	121	4080	121	3840	123	133
25	118	5570	120	4730	120	4470	120	4220	121	3970	122	132
30	118	5830	119	4950	120	4680	120	4410	120	4150	121	131
35	118	6160	120	5240	120	4950	120	4670	121	4400	121	130
40	119	6600	120	5610	120	5300	121	5000	121	4740	121	130
41	119	6690	120	5690	121	5380	121	5080	121	4820	121	130
43	120	6880	121	5850	121	5530	121	5250	121	4990	121	130

WEIGHT = 20500 LBS — VENR = 165 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	HEADWINDS 10 KTS DIST FT	HEADWINDS 20 KTS V1 KIAS	HEADWINDS 20 KTS DIST FT	HEADWINDS 30 KTS V1 KIAS	HEADWINDS 30 KTS DIST FT	VR KIAS	V2 KIAS
-25	119	4430	120	3720	120	3500	121	3290	121	3080	123	133
-20	118	4510	120	3790	120	3570	121	3350	121	3150	123	133
-15	118	4580	120	3860	120	3640	121	3420	121	3210	123	133
-10	118	4660	120	3930	120	3700	121	3480	121	3270	123	133
-5	118	4730	120	4000	120	3770	121	3550	121	3330	123	133
0	118	4810	120	4070	120	3840	120	3620	121	3400	122	133
5	118	4890	119	4140	120	3910	120	3680	121	3460	122	133
10	118	4970	119	4210	120	3980	120	3750	121	3520	122	133
15	118	5070	119	4300	120	4060	120	3830	120	3600	122	132
20	118	5220	119	4430	119	4180	120	3940	120	3710	122	132
25	117	5380	119	4570	119	4320	119	4070	120	3830	121	131
30	117	5630	118	4780	119	4510	119	4260	119	4010	120	130
35	117	5910	118	5020	119	4740	119	4470	119	4210	120	129
40	118	6320	119	5370	119	5080	119	4790	120	4520	120	129
43	118	6600	119	5600	119	5300	120	5010	120	4760	120	129
45	118	6790	119	5780	120	5460	120	5190	120	4930	120	129

* FOR CABIN AND COCKPIT BLEED AIR ON, INCREASE ABOVE DISTANCES 100 FEET.

Figure 4-26 (Sheet 3)

Determinations

@ 13.9 °C

Temp		10	13.9	15
	22,500	4,790	4,876	4,900
	22,000	4,650	4,728	4,750

@ 22,230 LBS

Weight		22,000	22,230	22,500
	22,230	4,728	**4,796**	4,876

@ 13.9 °C

Temp		10	13.9	15
	20,500	4,210	**4,280**	4,300
	21,000	4,360	4,430	4,450

@ 20,975 LBS

Weight		20,500	20,975	21,000
	20,975	4,280	**4,423**	4,430

@ 27.9 °C

Temp		25	27.9	30
	22,500	5,230	5,416	5,550
	22,000	5,060	5,217	5,330

@ 22,230 LBS

Weight		22,000	22,230	22,500
	22,230	5,217	**5,308**	5,416

@ 27.9 °C

Temp		25	27.9	30
	20,500	4,570	**4,692**	4,780
	21,000	4,730	4,858	4,950

@ 20,975 LBS

Weight		20,500	20,975	21,000
	20,975	4,692	**4,850**	4,858

@ 27.9 °C

Temp °C		25	27.9	30
	19,000	4,110	4,214	4,290
	18,000	3,790	3,883	3,950

@ 18,494 LBS

Weight		18,000	18,494	19,000
	18,494	3,883	**4,047**	4,214

@ 27.9 °C

Temp °C		25	27.9	30
	20,000	4,410	4,526	4,610
	19,000	4,110	4,214	4,290

@ 19,167 LBS

Spare Math Cells

Delta

Length	Ratio
110	0.78
100	0.78

Delta

Weight	Ratio
148	0.46

Delta

Length	Ratio
90	0.78
90	0.78

Delta

Weight	Ratio
150	0.95

Delta

Length	Ratio
320	0.58
270	0.58

Delta

Weight	Ratio
199	0.46

Delta

Length	Temp
210	0.58
220	0.58

Delta

Weight	Ratio
166	0.95

Delta

Length	Ratio
180	0.58
160	0.58

Delta

Weight	Ratio
332	0.49

Delta

Length	Ratio
200	0.58
180	0.58

Delta

Notes

Ratio is the % of applied number compared to total between the nearest two options

Since there is not 22,230 is the doc, the weight had to be accounted for after the specific temp was completed.

This calculation is for the AFM-indicated takeoff weight for a 4,850-foot runway length at mean max temp (20,975 lbs).

Since there is not 22,230 is the doc, the weight had to be accounted for after the specific temp was completed.

Tables

57 °F

MTOW	Aloft Rwy	AFM Rwy	Difference
20,500	4,099	4,280	4.4%
22,230	4,850	4,796	-1.1%

82.3 °F

MTOW	AFM Rwy
20,500	4,692
20,975	4,850
22,230	5,308

Direct from doc

Interpolation

Weight		19,000	19,167	20,000	Weight	Ratio
	19,167	4,214	**4,266**	4,526	312	0.17

		@ 27.9 °C				**Delta**
Temp °C		25	27.9	30	Length	Ratio
	20,000	4,410	4,526	4,610	200	0.58
	19,000	4,110	4,214	4,290	180	0.58

		@ 19,839 LBS				**Delta**
Weight		19,000	19,839	20,000	Weight	Ratio
	19,839	4,214	**4,476**	4,526	312	0.84

		@ 27.9 °C				**Delta**
Temp °C		25	27.9	30	Length	Ratio
	21,000	4,730	4,858	4,950	220	0.58
	20,500	4,570	4,692	4,780	210	0.58

		@ 20,512 LBS				**Delta**
Weight		20,500	20,512	21,000	Weight	Ratio
	20,512	4,692	**4,696**	4,858	166	0.02

		@ 27.9 °C				**Delta**
Temp °C		25	27.9	30	Length	Ratio
	21,500	4,890	5,023	5,120	230	0.58
	21,000	4,730	4,858	4,950	220	0.58

		@ 21,185 LBS				**Delta**
Weight		21,000	21,185	21,500	Weight	Ratio
	21,185	4,858	**4,919**	5,023	166	0.37

		@ 27.9 °C				**Delta**
Temp °C		25	27.9	30	Length	Ratio
	22,000	5,060	5,217	5,330	270	0.58
	21,500	4,890	5,023	5,120	230	0.58

		@ 21,857 LBS				**Delta**
Weight		21,500	21,857	22,000	Weight	Ratio
	21,857	5,023	**5,161**	5,217	193	0.71

		@ 27.9 °C				**Delta**
Temp °C		25	27.9	30	Length	Ratio
	23,000	5,420	5,623	5,770	350	0.58
	22,500	5,230	5,416	5,550	320	0.58

		@ 22,530 LBS				**Delta**
Weight		22,500	22,530	23,000	Weight	Ratio
	22,530	5,416	**5,428**	5,623	207	0.06

Metropolitan Airports Commission
6040 - 28th Avenue South, Minneapolis, MN 55450 • 612-726-8100 • metroairports.org

September 4, 2026

Federal Aviation Administration
Great Lakes Region Office
2300 East Devon Avenue
Des Plaines, IL 60018

RE: Airlake Airport (LVN), Minnesota **VIA EMAIL ONLY**
Primary Service Area Economic Development

To whom it may concern:

The purpose of this letter is to further substantiate the need to extend the runway at Airlake Airport (LVN) from 4,099 feet to 4,850 feet, based on recent and expected socioeconomic growth in the Airport's primary service area. The proposed runway extension project at LVN will serve growing demand in the rapidly expanding South Twin Cities Metropolitan area. A longer runway will enhance and better balance aviation activity across the Metropolitan Airports Commission (MAC) airport system, thereby relieving congestion in the air and on the ground at and around other MAC airports. The project will also advance the MAC's legislative mandate to "develop the full potentialities of the metropolitan area as an aviation center."

The MAC owns and operates the Minneapolis-St. Paul International Airport (MSP) and a system of six reliever airports, including LVN. Aircraft operations at LVN outpaced operations growth at all five other MAC reliever airports from 2020 to 2025, growing at a compound annual growth rate (CAGR) of 6.5%, as shown below. The MAC expects this growth trend to continue for the foreseeable future.

Total Aircraft Operations at MAC Reliever Airports, 2020-2025			
Airport	**2020**	**2025**	**CAGR 2020-2025**
Lake Elmo Airport (21D)	29,799	38,997	5.53%
Anoka County Blaine Airport (ANE)	70,852	65,288	-1.62%
Flying Cloud Airport (FCM)	124,382	150,645	3.91%
Airlake Airport (LVN)	**31,314**	**42,921**	**6.51%**
Crystal Airport (MIC)	39,509	46,087	3.13%
St. Paul Downtown Airport (STP)	30,188	40,618	6.12%

Source: MAC Annual Reports to the Legislature

Airlake Airport is located in Dakota County near its border with Scott County in the South Twin Cities Metropolitan area and primarily serves aircraft operators in these two counties. Growth in operations and demand at the Airport has largely been driven by strong demographic and economic growth in these two South Twin Cities Metro counties.

As shown in the table below, growth in population, employment, and gross regional product (GRP) in Dakota and Scott Counties over the past ten years has outpaced growth in these metrics for both the remainder of the Twin Cities Metro and the State of Minnesota.

Socioeconomic Growth in the Airlake Airport Service Area, 2015-2025				
Area	**Year**	**Population**	**Employment**	**Gross Regional Product (GRP)**
South Twin Cities Metro	**2015**	559,821	485,904	31,251.623
	2025	615,990	545,884	38,244.112
	CAGR 2015-2025	**0.96%**	**1.17%**	**2.04%**
Remainder of Twin Cities Metro	**2015**	2,464,175	2,004,057	199,827.813
	2025	2,589,678	2,206,051	240,764.228
	CAGR 2015-2025	**0.50%**	**0.96%**	**1.88%**
State of Minnesota	**2015**	5,510,274	3,662,636	344,844.420
	2025	5,804,646	4,005,238	415,493.848
	CAGR 2015-2025	**0.52%**	**0.90%**	**1.88%**

Source: Woods & Poole Economics, Inc.
Notes: GRP expressed in millions of 2017 dollars. South Twin Cities Metro consists of Dakota and Scott Counties. Remainder of Twin Cities Metro consists of Hennepin, Ramsey, Anoka, Washington, and Carver Counties. CAGR = compound annual growth rate.

Most of the Airport property lies within the city of Lakeville, which is the seventh largest city in the Twin Cities Metropolitan Area and the ninth largest city in the state of Minnesota. Lakeville has grown dramatically in recent years, with its population increasing by over 13% from 2020 to 2025, and employment increasing by over 30% from 2015 to 2025. The city is host to one of the largest industrial parks in Minnesota, has convenient access to Interstate 35, and has a diverse business base.

The Airport also serves several other large and growing business and residential communities in the South Metro, including Burnsville, Farmington, Rosemount, and Apple Valley. As shown in the tables on the following page, population and employment growth in these communities have greatly outpaced the most recent Metropolitan Council regional development forecasts since 2020 in nearly all cases.

Strong socioeconomic growth in the Airlake Airport service area has and will continue to drive increased use of the Airport by larger turboprop and corporate jet aircraft requiring a longer runway. The MAC expects that extending the runway at LVN will result in a significant portion of large corporate aircraft activity currently occurring at other reliever airports being reallocated to LVN. This reallocation is expected to take place primarily between LVN and the two closest reliever airports, Flying Cloud Airport (FCM) in Eden Prairie Minnesota and the St. Paul Downtown Airport (STP). A detailed accounting of large turboprop and corporate jet aircraft operations conducted at these three airports from 2022 to 2025 is included in an attachment to this letter.

Recent and Projected Population Growth, 2020-2030					
	Actual			Projected by Met Council in 2023 Using 2020 as Base Year	
City or Region	2020	2025	CAGR 2020-2025	2030	CAGR 2020-2030
City					
Lakeville	69,490	78,810	2.55%	79,900	1.41%
Burnsville	64,317	66,725	0.74%	66,400	0.32%
Apple Valley	56,374	56,865	0.17%	57,800	0.25%
Rosemount	25,650	29,535	2.86%	31,400	2.04%
Farmington	23,654	25,074	1.17%	24,600	0.39%
Region					
South Twin Cities Metro	590,810	623,731	1.09%	642,368	0.84%
Remainder of Twin Cities Metro	2,572,294	2,661,823	0.69%	2,760,929	0.71%

Source: Metropolitan Council Forecasts and Estimates; CAGR = compound annual growth rate.

Recent and Projected Employment, 2020-2030					
	Actual			Projected by Met Council in 2023 Using 2020 as Base Year	
City or Region	2020	2024	CAGR 2020-2024	2030	CAGR 2020-2030
City					
Lakeville	15,929	21,928	8.32%	23,100	3.79%
Burnsville	29,778	34,138	3.48%	36,100	1.94%
Apple Valley	13,015	17,065	7.01%	15,800	1.96%
Rosemount	7,072	8,319	4.14%	9,600	3.10%
Farmington	4,438	5,042	3.24%	5,400	1.98%
Region					
South Twin Cities Metro	216,433	255,262	4.21%	265,037	2.05%
Remainder of Twin Cities Metro	1,333,577	1,519,790	3.32%	1,552,321	1.53%

Source: Metropolitan Council Forecasts and Estimates; CAGR = compound annual growth rate.

As shown in the attachment, there were approximately 19,000 operations conducted at FCM and STP in 2025 by LVN's critical aircraft for runway length that could be accommodated by an extended runway at LVN. Given the recent and projected growth in the South Twin Cities Metro and Lakeville, it is reasonable to expect that LVN will absorb at least 1,000 of these operations within the five years following the proposed runway extension.

The MAC expects that with an extended runway, LVN will meet the growing aviation customer demand because its location will more efficiently meet customer needs, reduce drive time, and provide overall convenience to the flying public.

If you have any questions, please contact me at 612-725-8371 or via email at Bridget.Rief@mspmac.org.

Sincerely,



Bridget M. Rief, P.E.
Vice President – Planning and Development

Operations at FCM, LVN, and STP by large aircraft with an MTOW greater than 12,500 pounds and less than or equal to 60,000 pounds (2022-2025)																		
			2025				2024				2023				2022			
Aircraft	**Type**	**MTOW**	**FCM**	**LVN**	**STP**	**Total**	**FCM**	**LVN**	**STP**	**Total**	**FCM**	**LVN**	**STP**	**Total**	**FCM**	**LVN**	**STP**	**Total**
Learjet 24	Jet	13,000	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	2	0	0	**2**
Embraer EMB-110 Bandeirante	Turboprop	13,010	2	0	0	**2**	0	0	0	**0**	0	0	2	**2**	2	0	0	**2**
Cessna CitationJet CJ3	Jet	13,870	331	6	211	**548**	346	4	288	**638**	282	0	241	**523**	267	6	165	**438**
Beechcraft King Air 300	Turboprop	14,000	618	2	112	**732**	680	0	268	**948**	674	6	172	**852**	803	2	145	**950**
Beechcraft King Air 350	Turboprop	15,000	150	0	168	**318**	209	4	231	**444**	481	6	323	**810**	493	8	380	**881**
Cessna Citation II/Bravo	Jet	15,100	276	0	65	**341**	217	8	107	**332**	264	0	133	**397**	246	0	136	**382**
Learjet 31	Jet	15,500	10	0	18	**28**	26	0	20	**46**	26	0	6	**32**	7	0	8	**15**
Swearingen Merlin IV/Metroliner	Turboprop	15,999	18	0	0	**18**	12	0	0	**12**	21	0	2	**23**	4	0	2	**6**
Raytheon Beechjet 400	Jet	16,100	904	0	552	**1456**	939	0	619	**1558**	970	4	673	**1647**	1213	4	684	**1901**
Cessna Citation V/Ultra/Encore	Jet	16,300	235	4	124	**363**	213	4	184	**401**	337	1	289	**627**	393	0	184	**577**
Beechcraft 1900D	Turboprop	17,120	365	0	213	**578**	419	0	164	**583**	361	0	10	**371**	398	0	13	**411**
Embraer Phenom 300	Jet	18,000	878	4	582	**1464**	569	4	734	**1307**	647	33	578	**1258**	857	4	581	**1442**
Pilatus PC-24	Turboprop	18,300	53	0	65	**118**	28	0	44	**72**	18	0	58	**76**	58	0	40	**98**
Learjet 35	Jet	18,300	6	0	50	**56**	12	0	54	**66**	14	0	42	**56**	14	0	60	**74**
Dassault Falcon 10	Jet	18,740	90	0	2	**92**	168	0	10	**178**	135	0	4	**139**	195	0	16	**211**
Learjet 55	Jet	19,500	2	0	7	**9**	49	0	11	**60**	22	0	20	**42**	2	0	12	**14**
Saberliner 65	Jet	20,172	2	0	0	**2**	0	0	0	**0**	0	0	2	**2**	0	0	2	**2**
Cessna Citation Excel	Jet	20,200	1580	6	857	**2443**	1389	4	1132	**2525**	1331	2	1038	**2371**	1497	0	1211	**2708**
Learjet 40	Jet	21,000	3	0	2	**5**	6	0	32	**38**	16	0	23	**39**	28	0	29	**57**
Learjet 45	Jet	21,500	529	0	270	**799**	514	0	319	**833**	342	0	256	**598**	421	0	288	**709**
Learjet 60	Jet	22,750	58	0	118	**176**	70	0	99	**169**	172	0	122	**294**	53	0	86	**139**
Cessna Citation III/VI/VII	Jet	23,000	222	27	36	**285**	245	34	88	**367**	114	158	150	**422**	162	29	114	**305**
Israel Aircraft 1124/1125	Jet	23,500	2	0	30	**32**	4	0	18	**22**	8	0	28	**36**	12	0	13	**25**
Hawker Siddeley 125	Jet	25,000	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	5	0	0	**5**
Gulfstream G150	Jet	26,100	18	0	72	**90**	14	0	78	**92**	2	0	75	**77**	4	0	90	**94**
Embraer EMB-120 Brasilia Twin	Turboprop	26,433	6	0	0	**6**	9	0	2	**11**	2	0	0	**2**	2	0	0	**2**
Hawker 800XP	Jet	28,000	186	0	167	**353**	181	0	252	**433**	212	0	219	**431**	340	0	290	**630**

Dassault Falcon 20	Jet	28,660	18	0	12	**30**	16	0	25	**41**	31	0	32	**63**	78	0	18	**96**
Cessna Citation Sovereign	Jet	30,300	420	0	411	**831**	617	0	393	**1010**	731	0	442	**1173**	945	0	495	**1440**
Cessna Citation Latitude	Jet	30,800	1282	2	587	**1871**	1075	0	574	**1649**	1092	0	579	**1671**	916	0	773	**1689**
Hawker 1000	Jet	31,100	50	0	6	**56**	23	0	1	**24**	30	0	8	**38**	22	0	11	**33**
Gulfstream Galaxy G200	Jet	35,650	45	0	147	**192**	218	0	192	**410**	211	0	189	**400**	221	0	208	**429**
Embraer EMB-545 Legacy	Jet	35,724	182	0	50	**232**	104	0	43	**147**	76	0	40	**116**	68	0	42	**110**
Cessna Citation X	Jet	36,100	187	0	184	**371**	203	0	252	**455**	297	0	263	**560**	276	0	331	**607**
Aerospatiale ATR-42-300	Turboprop	36,825	0	0	0	**0**	4	0	0	**4**	0	0	0	**0**	0	0	2	**2**
Embraer EMB-550 Legacy	Jet	38,360	250	0	275	**525**	111	0	264	**375**	130	0	287	**417**	112	0	385	**497**
Bombardier Challenger 300	Jet	38,850	455	0	378	**833**	446	0	518	**964**	407	0	423	**830**	532	0	444	**976**
Cessna Citation Longitude	Jet	39,500	250	0	241	**491**	187	0	188	**375**	216	0	121	**337**	117	0	70	**187**
Hawker 4000	Jet	39,500	1	0	2	**3**	0	0	18	**18**	8	0	38	**46**	4	0	32	**36**
Gulfstream G280	Jet	39,600	66	0	156	**222**	31	0	188	**219**	14	0	144	**158**	16	0	165	**181**
Dassault Falcon 50	Jet	39,700	214	0	107	**321**	139	0	154	**293**	123	0	182	**305**	178	0	225	**403**
Bombardier Challenger 350	Jet	40,600	689	0	233	**922**	671	4	259	**934**	566	0	204	**770**	453	0	240	**693**
Dassault Falcon 2000	Jet	42,400	868	0	618	**1486**	517	0	818	**1335**	407	0	859	**1266**	299	0	939	**1238**
Bombardier Challenger 600	Jet	47,600	189	2	106	**297**	216	0	217	**433**	161	6	229	**396**	97	0	142	**239**
Saab 2000	Turboprop	50,706	0	0	44	**44**	0	0	4	**4**	4	0	4	**8**	2	0	4	**6**
		Total	**11710**	**53**	**7278**	**19041**	10897	66	8862	**19825**	10955	216	8510	**19681**	**11814**	**53**	**9075**	**20942**

APPENDIX B:
RUNWAY EXIT DISTANCE ANALYSIS

Technical Memorandum

To: Eric Gilles, Metropolitan Airports Commission
From: Mead & Hunt, Inc.
Date: December 5, 2022
Subject: Airlake Airport Runway Exit Distance Analysis

Purpose

In support of the on-going Environmental Assessment (EA) at Airlake Airport (LVN), this memorandum presents an analysis of the location and use of current taxiway exits for Runway 12/30 at the Airport using Virginia Tech's Runway Exit Design Interactive Model (REDIM 3.0.10). The results of this analysis indicate that relocating Taxiway A2/B2 outside the middle third of the runway would not provide significant safety or capacity benefits that outweigh adverse cost and environmental factors, as the existing runway exit configuration provides a similar level of safety and capacity to the other alternatives.

This memorandum consists of the following sections:

- Analysis Conditions
- Exit Point of Curvature Location
- Operational Fleet Mix
- Existing Runway 12-30 Exit Taxiway Aircraft Assignment Analysis
- Runway 30 Exit Taxiway Aircraft Assignment Analysis for Alternate Taxiway A2 Locations
- Runway Occupancy Time Analysis
- Runway Occupancy Time Data Tables

Analysis Conditions

REDIM is a tool that can be used to analyze existing and future runway exit locations based on airport fleet mix and environmental conditions. The tool estimates the distance down a given runway at which a landing aircraft will slow to a speed where it can exit the runway at a safe speed. The following conditions were applied to this runway exit distance analysis for the existing conditions at LVN:

- Landing distance available
    - RW 12 – 4,099'
    - RW 30 – 3,865'
    - The applied runway length was measured from the runway displaced threshold to the opposing end of the paved surface. For RW 30 landings, this distance extends beyond the published RW 12 end to the end of the paved surface.
- RW Width – 75'
- RW Elevation – 961' above mean sea level
- Airport Temperature – 48°F (annual average)
- Wet conditions – 20% of operations (6 days per month annual average rainfall)

Exit Point of Curvature Location

The analysis was done to the level where the fuselage of a landing aircraft has exited the runway. This includes any time spent taxiing along the runway to reach an exit. The runway at LVN has five connecting taxiways, the first and last of which exist beyond the displaced threshold at each end of RW 12/30. The REDIM tool uses the beginning of the Exit Taxiway Point of Curvature as the measure for exit points along the runway. This point is 200' from the end of the taxiway lead-in line, where the exit taxiway curve line is tangent to the runway centerline. The distances for each exit taxiway are as follows:

Distance to exit TW Curvature	TW A5	TW A4	TW A3	TW A2	TW A1
Point of Curvature RW 12	4,007'	3,522'	2,159'	1,512'	N/A
Point of Curvature RW 30	N/A	35'	1,398'	2,035'	3,773'**

** This indicates aircraft crossing beyond the published RW 12 end to the end of the paved surface.

Operational Fleet Mix

LVN serves a variety of aircraft types, including helicopters, single-engine piston, twin-engine piston, turboprop, and jet-powered aircraft. This analysis drew on three years of LVN operational data collected by the Metropolitan Airports Commission Noise and Operations Monitoring System (MACNOMS) from 2019 to 2021. There were 76,800 operation records in this data set, of which 44,760[1] (58%) were conducted by fixed wing aircraft. The operational fleet mix summarized in the table below aggregates operations by like aircraft types that can be matched to an existing aircraft type available for simulation modeling in the REDIM database. The aggregation captured 90% (40,044) of these operations including all counted operations, by type, that represented more than 1% of fixed wing traffic.

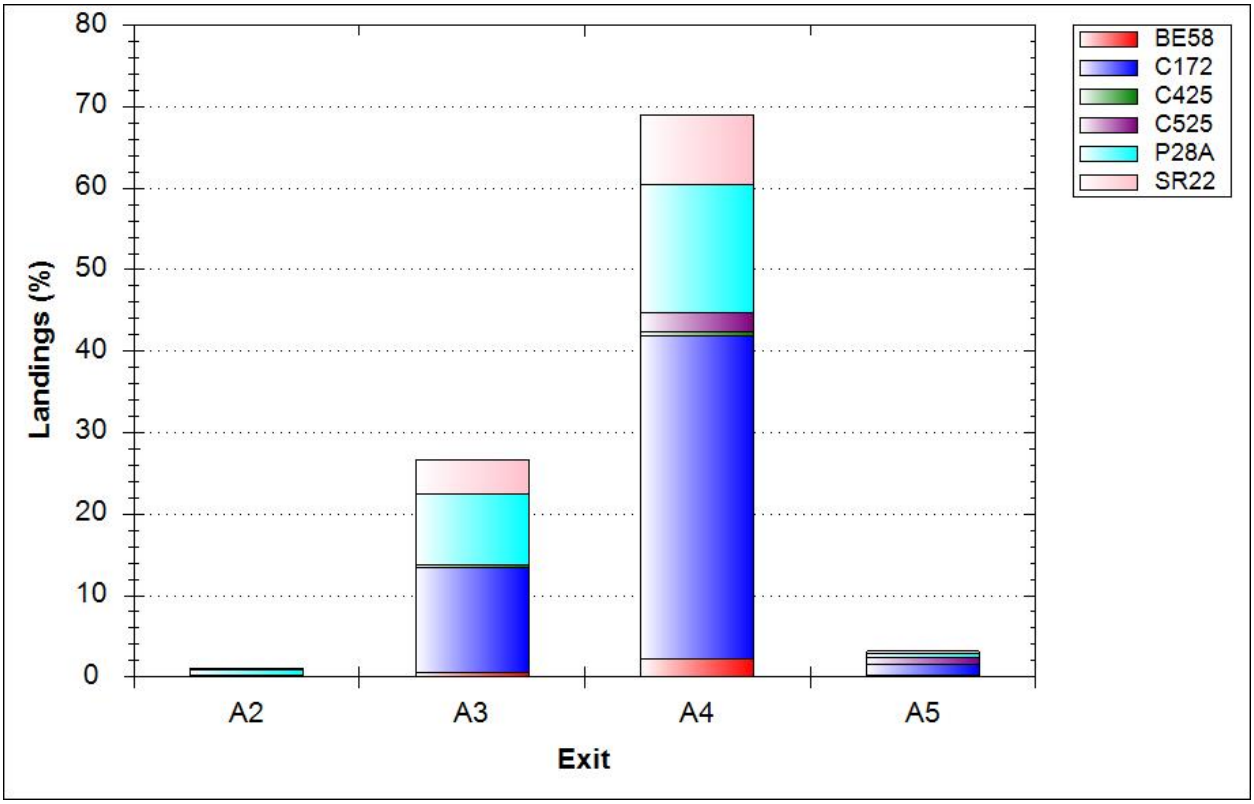
Representative aircraft type	Aircraft operations (2019-2021)	% of fleet
Cessna 172	21,816	54.1%
Piper PA28	10,546	25.9%
Cirrus SR22	5,220	13.2%
Cessna C650 Citationjet	962	3.0%
Cessna 425	432	1.0%
Beechcraft BE 58	1,068	2.9%
Total	**40,044**	**100.0%**

[1] 34% of this traffic is recorded on RW 12, with the remaining 66% on RW 30.

Existing Runway 12-30 Exit Taxiway Aircraft Assignment Analysis

RW 12 Analysis

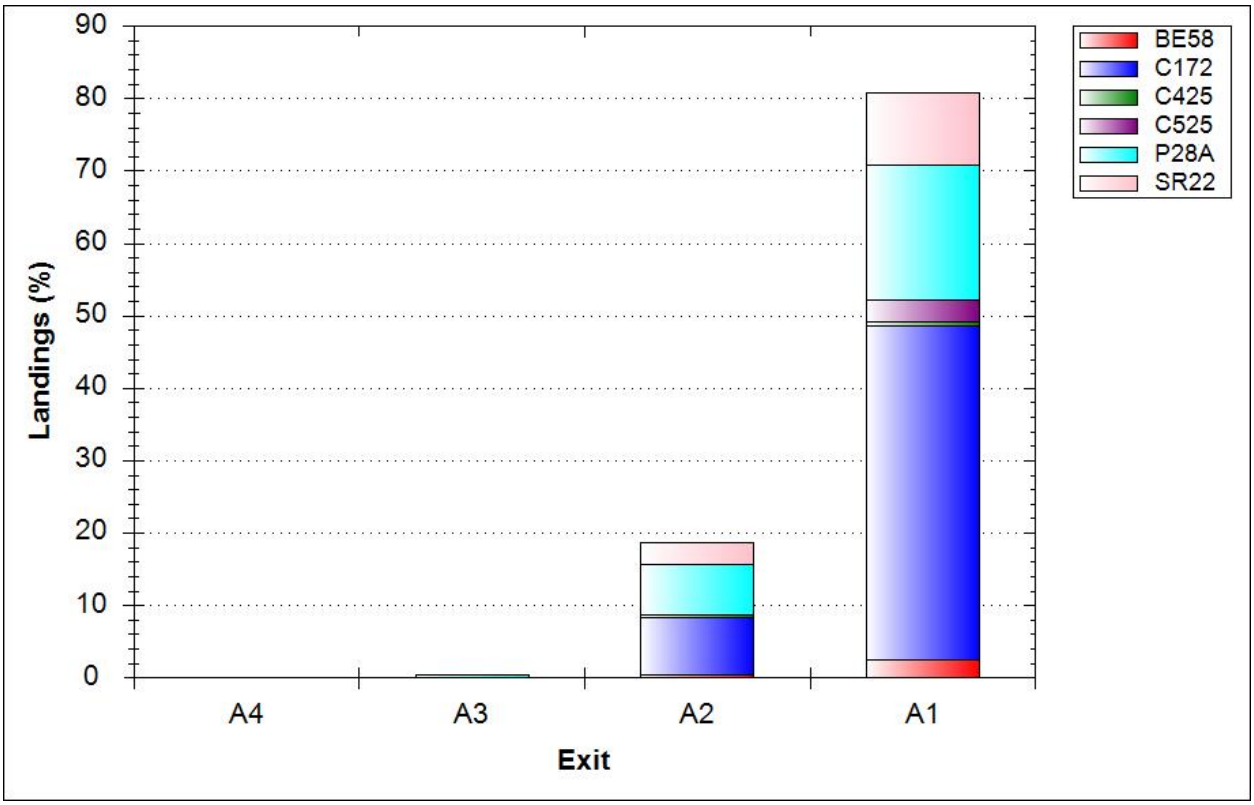
The simulation shows a majority (69.0%) of aircraft landing on RW 12 is likely to exit the runway at TW A4, with another 26.7% exiting earlier at TW A3. This includes over 97% of the C172 type of aircraft, the most common aircraft type at LVN. While overall only 3.1% of aircraft in the simulation are likely to exit at the end of the runway beyond the RW 30 displaced threshold, 24.5% of the C525 and comparable jet types are likely to exit the runway at TW A5.



Aircraft Type	TW A2	TW A3	TW A4	TW A5	% of fleet
BE58	0.7%	21.0%	73.0%	5.3%	2.9%
C172	0.1%	23.7%	73.6%	2.6%	54.1%
C425	6.5%	34.0%	56.3%	3.3%	1.0%
C525		1.9%	73.6%	24.5%	3.0%
P28A	2.9%	33.4%	61.3%	2.4%	25.9%
SR22	1.6%	32.3%	64.6%	1.5%	13.2%
Weighted Exit Mix	**1.1%**	**26.7%**	**69.0%**	**3.1%**	
Exit Point of Curvature	**1,512'**	**2,159'**	**3,522'**	**4,007'**	

RW 30 Analysis

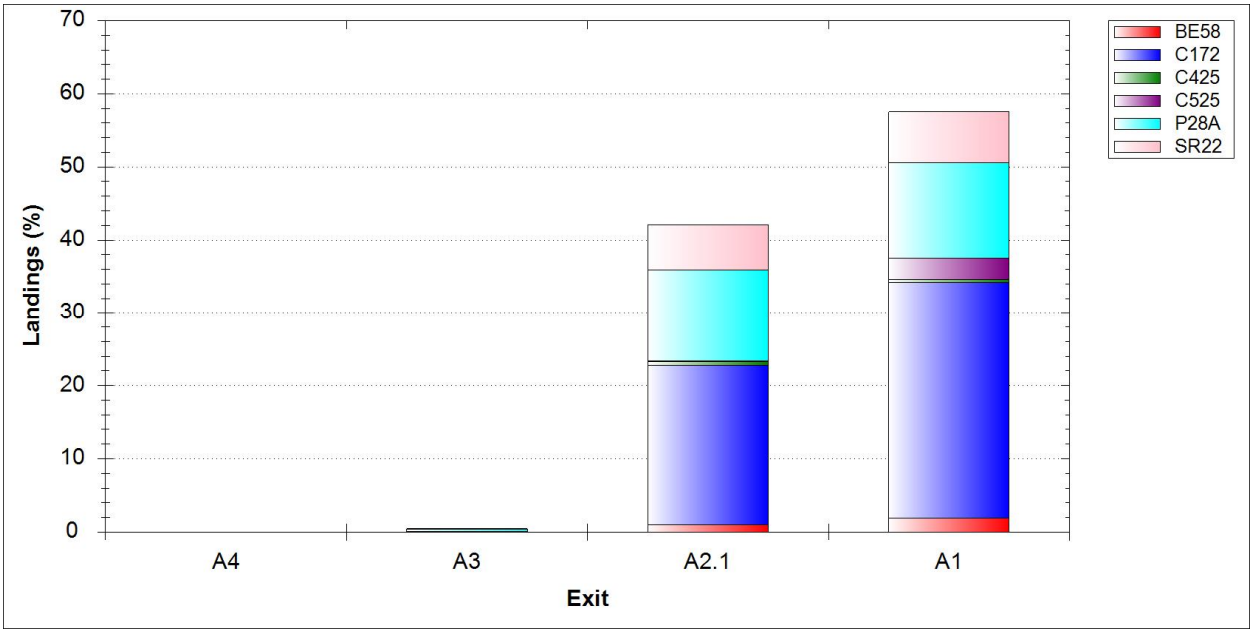
The simulation shows a majority (80.8%) of aircraft landing on RW 30 is likely to exit the runway at TW A1 beyond the RW 12 displaced threshold, with 99.0% of the C525 corporate jet types and 85.2% of the C172, the most common type, using TW A1. Notably, the Piper P28A type aircraft, which make up 25.9% of the fixed wing operations at LVN, use TW A2 26.5% of the time. The Cirrus SR22 type aircraft, representing the third most common aircraft type at LVN, show similar numbers with 23.9% of operations using TW A2 to exit.



Aircraft Type	TW A4	TW A3	TW A2	TW A1	% of fleet
BE58		0.4%	14.7%	84.9%	2.9%
C172		0.0%	14.8%	85.2%	54.1%
C425		3.4%	29.0%	67.6%	1.0%
C525			1.0%	99.0%	3.0%
P28A		1.2%	26.5%	72.2%	25.9%
SR22		0.6%	23.9%	75.4%	13.2%
Weighted Exit Mix	**0.0%**	**0.4%**	**18.8%**	**80.8%**	
Exit Point of Curvature	**35'**	**1,398'**	**2,035'**	**3,773'**	

Alternative 1 (TW A2.1)

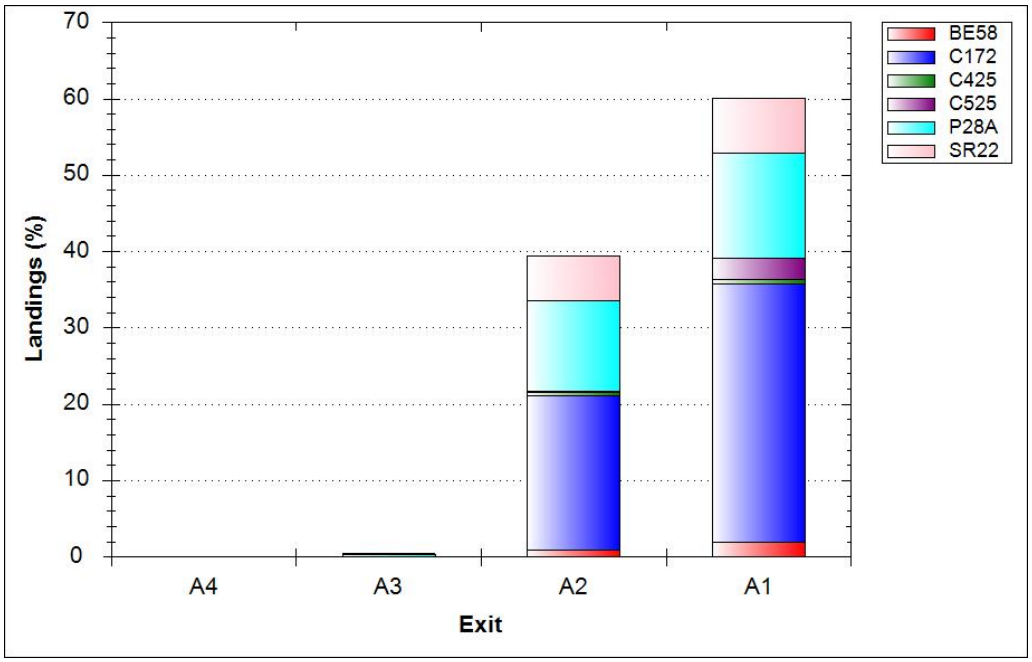
The new distance from the RW 30 displaced threshold to the TW A2.1 exit is 2,325', which the simulation estimates 42.0% of aircraft landing on RW 30 would use to exit the runway, compared to 18.8% for the existing TW A2 location. TW A1 would continue to be used by most landing aircraft, seeing 57.5% of exiting traffic, compared to 80.8% in the existing condition. The simulation still has over 95% of C525 type jets exiting via TW A1 at the end of the paved surface.



Aircraft Type	A4	A3	A2.1	A1	% of fleet
BE58		0.4%	33.3%	66.4%	2.9%
C172		0.0%	40.4%	59.6%	54.1%
C425		3.5%	49.6%	46.9%	1.0%
C525			4.2%	95.8%	3.0%
P28A		1.2%	48.2%	50.6%	25.9%
SR22		0.6%	46.9%	52.5%	13.2%
Weighted Exit Mix	**0.0%**	**0.4%**	**42.0%**	**57.5%**	
Exit Point of Curvature	**35'**	**1,398'**	**2,325'**	**3,773'**	

Alternative 2 (TW A2.2)

The new distance from the RW 30 displaced threshold to the TW A2.2 exit is 2,684', which the simulation estimates 70.0% of aircraft landing on RW 30 would use to exit the runway, compared to 18.8% for the existing TW A2 location. Meanwhile, TW A1 would be used by fewer landing aircraft, seeing 29.5% of exiting traffic compared to 80.8% in the existing condition. The simulation shows most of each aircraft type using TW A2.2, except 82.0% of C525 type jets exiting via TW A1 at the end of the paved surface.



Aircraft Name	A4	A3	A2.2	A1	% of fleet
BE58		0.4%	59.3%	40.3%	2.9%
C172		0.0%	71.8%	28.2%	54.1%
C425		3.5%	68.9%	27.6%	1.0%
C525			18.0%	82.0%	3.0%
P28A		1.2%	72.0%	26.8%	25.9%
SR22		0.6%	73.3%	26.1%	13.2%
Weighted Exit Mix	**0.0%**	**0.4%**	**70.0%**	**29.5%**	
Exit Point of Curvature	**35'**	**1,398'**	**2,685'**	**3,773'**	

Runway Occupancy Time Analysis

The REDIM tool also creates outputs for average time spent on a given runway for the different tested aircraft types and their respective assigned exits, known as Runway Occupancy Time (ROT). At LVN, these times become exaggerated on RW 30 landings between TW A2 and TW A1, reflecting the long rollout between the exits. This analysis looks at the differences in unweighted ROT between the various alternatives and future runway configurations. The analyses were done both to the fuselage out level, where the plane has left the runway, and the clear hold bar level. These produce marginally different ROTs given the distance between the edge of the runway and a hold bar.

Weighted for the representative fleet mix, the average time spent on the runway (ATO) for aircraft landing on RW 30 with the current exit taxiway configuration is 51.1 seconds, with much of that weighted average time owing to the high ROT experienced by the C172 using TW A1. The overall weighted average is lower when the simulation is applied to Alternative 1, at a new weighted average ATO ROT of 46.7 seconds. This is a 4.4 second (8.6%) reduction in weighted average ROT. For Alternative 2, the new weighted average ATO ROT is 48.2 seconds, a 2.9 second (5.7%) reduction in weighted average ROT. This reduction in weighted average ROT would not provide significant safety or capacity benefits that outweigh adverse cost and environmental factors associated with relocating TW A2, as the existing runway exit configuration provides a similar level of safety and capacity to the other alternatives

Runway Occupancy Time Tables[3]

RW 12

Fuselage Out (ATO)

Aircraft Type	A2	A3	A4	A5
BE58	22.1	27.7	43.0	44.1
C172	21.2	31.0	54.8	58.2
C425	20.1	25.7	40.3	41.3
C525		25.8	38.6	41.4
P28A	21.3	29.3	48.6	49.7
SR22	21.1	29.2	48.1	50.5
Average	**21.2**	**28.1**	**45.6**	**47.5**

Clear Hold Bar (ADO)

Aircraft Type	A2	A3	A4	A5
BE58	31.4	36.0	51.5	52.5
C172	27.3	38.7	63.3	66.5
C425	29.3	34.6	49.3	50.5
C525		34.0	47.3	50.1
P28A	28.3	36.7	56.5	57.5
SR22	28.2	37.1	56.4	58.8
Average	**28.9**	**36.2**	**54.1**	**56.0**

[3] All times expressed in seconds.

RW 30

Fuselage Out (ATO)

Aircraft Type	A4	A3	A2	A1
BE58		19.7	26.5	46.8
C172		19.4	29.2	60.2
C425		18.2	24.7	44.1
C525			25.9	41.5
P28A		19.9	27.9	53.6
SR22		19.6	27.8	52.6
Average		**19.4**	**27.0**	**49.8**

Clear Hold Bar (ADO)

Aircraft Type	A4	A3	A2	A1
BE58		27.7	36.7	55.0
C172		24.9	40.1	68.0
C425		26.3	35.8	52.4
C525			35.5	50.2
P28A		26.8	38.2	60.6
SR22		26.4	38.4	60.3
Average		**26.4**	**37.5**	**57.8**

RW 30 ALT 1, TW A2.1 (290ft ∆)

Fuselage Out (ATO)

Aircraft Type	A4	A3	A2.1	A1
BE58		19.7	29.4	47.4
C172		19.4	33.6	61.3
C425		18.3	27.8	44.5
C525			27.5	42.5
P28A		19.9	31.8	54.1
SR22		19.5	31.6	53.4
Average		**19.4**	**30.3**	**50.5**

Clear Hold Bar (ADO)

Aircraft Type	A4	A3	A2.1	A1
BE58		27.7	37.6	56.2
C172		24.8	41.5	69.8
C425		26.4	36.7	53.8
C525			36.2	51.3
P28A		26.8	39.4	62.0
SR22		26.3	39.6	61.7
Average		**26.4**	**38.5**	**59.1**

RW 30 ALT 2, TW A2.2 (690ft ∆)

Fuselage Out (ATO)

Aircraft Type	A4	A3	A2.2	A1
BE58		19.7	33.5	46.1
C172		19.4	39.8	59.7
C425		18.3	31.8	43.1
C525			30.4	42.0
P28A		19.9	37.0	52.2
SR22		19.5	36.6	51.9
Average		**19.36**	**34.8**	**49.2**

Clear Hold Bar (ADO)

Aircraft Type	A4	A3	A2.2	A1
BE58		27.7	41.8	54.9
C172		24.8	48.0	68.3
C425		26.4	40.8	52.2
C525			38.8	50.8
P28A		26.8	44.7	60.1
SR22		26.3	44.7	60.3
Average		**26.4**	**43.1**	**57.8**

Weighted Average Runway 30 Occupancy Times[4]

	ADO	ATO
Existing	59.3	51.1
Alt 1	54.9	46.7
Alt 2	56.4	48.2

[4] Weighted by the distribution of the fleet mix by exit assignment, for the total average occupancy time on RW 30.

Exit Taxiway Aircraft Assignment Analysis for Alternative Taxiway A2 Locations for Future Runway 30

The EA currently being developed by MAC and FAA is considering extensions to RW 12-30 at both ends to provide a total ultimate runway length of 4,850 feet. The RW 12 displaced threshold would be shifted slightly to the east to allow the approach surface to clear an adjacent railroad, and the RW 30 threshold would be maintained in its existing location. The maintained threshold location for RW 30 means that only the proposed alternatives for TW A2 see their point of curvature distances change. The FAA has expressed concern regarding TW A2 in this scenario because it would be located within the middle third of RW 12-30. According to FAA AC 150/5300-13B, *Airport Design*, it is a recommended practice to locate exit taxiways outside the middle third of the runway.

TW A2 is primarily used as an exit taxiway by aircraft landing on RW 30, as demonstrated by the preceding analysis. This analysis considers exit taxiway aircraft assignments for RW 30 landings given two alternate locations for Taxiway A2. Alternative 1 would relocate TW A2 290’ closer to the RW 12 end, which is the furthest distance that the taxiway can be moved without impacting an intermittent stream south of RW 12-30. Under this alternative, the relocated TW A2 centerline would just barely be outside the middle third of the ultimate runway length, although a portion of the eastern edge of the paved taxiway surface would be within the middle third of the runway. Alternative 2 would relocate TW A2 650’ closer to the RW 12, which is the furthest distance that the taxiway can be moved without impacting the RW 12 precision approach path indicator (PAPI). Under this alternative, the relocated TW B2 would impact the intermittent stream south of the runway, which would likely require compensatory wetland mitigation and other protective measures to comply with federal and state environmental regulations.

The following alternative Distance to Exit Taxiway Curvatures were used for this analysis. In the future condition following the proposed runway extension, the location of the other exit taxiways relative to the RW 30 displaced threshold will not change from the existing condition.

Distance to exit TW Curvature – Future RW 30	**TW A4**	**TW A3**	**TW A2**	**TW A1**
Existing Condition	35’	1,398’	2,035’	3,773’
Alternative 1 – Relocate TW A2 to west by 290’	35’	1,398’	2,325’	3,773’
Alternative 2 – Relocate TW A2 to west by 650’	35’	1,398’	2,685’	3,773’

APPENDIX C:
STREAM RELOCATION TECHNICAL DOCUMENTATION

Building a Better World for All of Us®

MEMORANDUM

TO: R. Evan Barrett, AICP, CM

FROM: Tim Wegwerth, PE (Lic. MN, WI)

DATE: July 16, 2026

RE: Intermittent Stream Relocation Alternatives
SEH No. MAC00 165551 14.00

As part of the Airlake Airport's Environmental Assessment preliminary design effort, this memorandum presents and evaluates five alternatives for realigning an existing intermittent stream that currently traverses the Airlake Airport property and airfield. The existing stream enters at the west end of the airport, flows east within a swale parallel to the runway, and passes through two parallel culverts beneath the runway and Taxiway A before exiting at the north end near the existing general aviation apron. Planned extensions to Runway 12-30 and the general aviation apron will shift airfield infrastructure into direct conflict with the existing stream alignment, thereby necessitating its relocation.

To achieve this realignment, five alternatives were developed to be considered as potential routes for the proposed stream relocation (see attached Figure 1 for a visual depiction of the alignments). Each alternative is described and evaluated with respect to constructability, cost, operational safety, compatibility with future airport development, and overall environmental performance. Also, reference the attached figures and cross-sections attached to this memo for additional layout and visual representation of each alternative considered, where survey and topographical information was collected from previous project efforts.

ALTERNATIVE 1

Description

Alternative 1 most closely follows the existing stream alignment, minimizing deviations from current conditions. The proposed realignment shifts only at locations necessary to accommodate the planned apron expansion and taxiway connector improvements, while generally maintaining the existing corridor. The stream crosses the new taxiway connector at approximately the same location as the existing crossing, continues to flow within the existing swale parallel to the runway, and utilizes the existing culvert beneath the runway.

Considerations

Alternative 1 benefits from strong constructability and minimal disturbance due to its close adherence to the existing stream corridor, minimizing earthwork, utility conflicts, and modifications to established drainage patterns. Costs are expected to be relatively low compared to the other alternatives, given the reuse of existing infrastructure, including the existing culvert crossing. However, retaining the existing culvert alignment introduces several drawbacks: additional bends are required in the stream alignment upstream and downstream to tie into the structure, and the culvert itself contains a bend, both of which are not ideal for stream continuity and habitat quality. Replacement of the culvert is anticipated with the completion of the project due to the age and material of the pipe and it would be more cost prohibitive to

try and match the current layout. Lastly, relocation of the existing aircraft viewing area would be required due to the shift of the stream to the west of the apron expansion area and shoreline buffer requirement.



Photo 1 - View from Txy A looking north at Aircraft Viewing Area

ALTERNATIVE 2

Description

Alternative 2 follows a similar alignment to Alternative 1, generally maintaining the existing stream corridor with adjustments at the proposed apron and taxiway improvements. However, this alternative replaces the existing culvert beneath the runway with a new crossing shifted slightly to the west to reduce jogs in the alignment. The proposed culvert maintains a continuous straight alignment, eliminating the bend present in the existing pipe.

Considerations

Alternative 2 maintains many of the advantages of Alternative 1, including favorable constructability, relatively low cost, and minimal disruption to established drainage patterns. The replacement and slight relocation of the culvert introduce additional construction effort, which is anticipated regardless of the alternative selected, but improves the overall stream alignment by reducing the need for bends and

eliminating the existing bend within the pipe. The proposed concrete culvert provides a smoother interior surface compared to the existing corrugated metal pipe, which can improve flow conditions, support better stream function, and reduce long-term maintenance needs. Considerations will be taken into account during final design to reduce the pooling of water within the areas adjacent to airfield pavements and protected surfaces. Similarly to Alternative 1, Alternative 2 will require the relocation of the airport's aircraft viewing area to accommodate the relocated stream (See Photo 1). Operational and safety impacts remain limited due to the alignment's similarity to existing conditions.

ALTERNATIVE 3

Description

Alternative 3 deviates substantially from the existing stream alignment, rerouting the channel along the perimeter of the airfield generally following Highview Avenue and 220th Street. This alignment shifts the stream away from the runway environment but introduces new interactions with surrounding infrastructure, including crossings at driveways serving the MAC maintenance building, proximity to an existing fuel farm, and routing around the Runway 12 localizer and an FAA-owned facility.

Considerations

Alternative 3 presents greater constructability challenges due to its significant deviation from the existing alignment and its routing along Highview Avenue and 220th Street. Construction in these areas would require coordination with roadway right of way considerations, utilities, and multiple pieces of adjacent infrastructure, increasing both complexity and cost. A couple of key infrastructure interactions include:

- Lengthens the overall stream length by approximately 520' which reduces the overall stream profile and grades slightly, therefore slowing the flow of water through the stream section. Given the routing of this alternative is directly off the approach/departure end of the runway, any amount of standing water is highly discouraged due to a higher potential of attracting wildlife, specifically birds/waterfowl. The larger anticipated impact of this route is the necessary excavation needed for grading into the existing topography. We estimate a minimum of 6' depth cuts for the bulk of the stream profile and cross-section which would entail extremely high volumes of material needing to be excavated and hauled off site.

- Proximity of stream and necessary shoreland buffer to FAA navigational aid infrastructure and associated equipment (See Photo 2). This includes the Runway 30 localizer antenna array, it's associated equipment and power building, and access road off of Highview Ave. The proximity of the stream with these structures will likely not meet FAA requirements for work adjacent to their infrastructure and require additional project cost and coordination above what is expected from the agency and what is allowable within the design requirements.



Photo 2 - FAA NAVAID Shelter, Localizer Antenna Array, and area of MCES Interceptor line.

- Stream location will interact with and cross over the Metropolitan Council's MCES sanitary sewer interceptor line in a couple of locations along the proposed stream alignment and reduce cover over their utility. Additionally, there are existing fire hydrants, watermain, and other private utilities in the stream alignment and cross section. The small window where the MCES interceptor and FAA localizer antenna array are at their closest point to each other and Highview Ave will likely prove to be an area of high conflict for grading and constructing the proposed stream. With an anticipated excavation depth of approximately 6', there will be conflicts and cover issues with the interceptor line and electrical utilities that would likely require relocation or adjustment (See Photo 2).
- The MAC Maintenance facility and associate fueling area are located along 220th Street and given their tight proximity to the roadway, there is very limited space to provide the necessary stream profile, cross section, and the required buffer space.



Photo 3 – 220th St, looking west by MAC Maintenance facility



Photo 4 – 220th St, looking east by MAC Maintenance facility

While the alignment reduces direct interaction with the airfield, it introduces operational and safety considerations associated with proximity to landside facilities and critical infrastructure, including the fuel farm, navigation aids, and an FAA-owned building that quickly prove difficult to overcome.

ALTERNATIVE 4

Description

Alternative 4 is similar to Alternative 3 but follows a shorter perimeter route generally along 220th Street and remains closer to the runway blast pad rather than extending to Highview Avenue. Like Alternative 3, this alignment introduces interactions with surrounding infrastructure, including crossings at driveways serving the MAC maintenance facility, proximity to an existing fuel farm, and routing around the Runway 12 localizer. However, the addition of a culvert helps achieve grading requirements associated with the localizer antenna array and avoids direct interaction with the FAA-owned facility.

Considerations

Alternative 4 shares many of the challenges associated with Alternative 3 but over a somewhat shorter alignment along 220th Street and closer to the runway 12 blast pad. Constructability remains more complex than Alternatives 1 and 2 due to roadway right of way interactions, utility coordination, and proximity to existing facilities, though it avoids direct impacts to the FAA-owned building, reducing some coordination requirements. It is anticipated that the portion of the stream routing through the RSA and across the runway will need to be in storm sewer culvert infrastructure. Costs are expected to remain elevated relative to the first two alternatives due to the need for new crossings and corridor development.

The alignment introduces a different set of operational considerations related to its proximity to both landside infrastructure and airfield features.

ALTERNATIVE 5

Description

Alternative 5 follows a similar alignment to Alternative 2, however shifts the stream alignment south as it parallels Runway 12-30. This alternative would keep the stream cross-section outside of the FAA localizer critical area, which is a design and performance parameter of the localizer navigation system. While introducing additional excavation, it is an option that needs to be considered for meeting FAA design criteria.

Considerations

Alternative 5 maintains many of the advantages of Alternative 2, including similar alignment to the existing stream but allows adherence to the FAA design requirements for the localizer critical area. This shift increases excavation impacts and the replacement and slight relocation of the culvert introduce additional construction effort, which is anticipated regardless of the alternative selected, but improves the overall stream alignment by reducing the need for bends and eliminating the existing bend within the pipe. Like Alternative 2, considerations will be taken into account during final design to reduce the pooling of water within the areas adjacent to airfield pavements and protected surfaces. Similarly to Alternative 1 & Alternative 2, Alternative 5 will require the relocation of the airport's aircraft viewing area to accommodate the relocated stream (See Photo 1). Operational and safety impacts will be improved as stream access will be more accessible and outside of critical airfield surfaces and restricted areas.

RECOMMENDATION

Each of the five alternatives presents a viable approach to realigning the existing stream, but they differ notably in complexity, cost, and overall performance. Alternatives 1 and 2 both maintain the stream within or near its existing corridor, minimizing disruption to established drainage patterns and reducing construction complexity and cost. Alternative 1 benefits from reusing the existing culvert alignment; however, the required alignment bends result in less favorable conditions for long-term stream function and maintenance. Even with replacing the culvert in kind will require stream geometry that is unfavorable. Alternative 2 builds upon these advantages while addressing those shortcomings through replacement of the culvert, providing a straighter alignment and improved hydraulic conditions within a similar overall footprint.

Alternatives 3 and 4 move the stream out to the roadway corridors, with their primary advantage being increased separation from airfield pavements and operations. However, this shift introduces a different set of challenges. These options would be more complex and costly to construct due to the need to work around roads, utilities, and nearby facilities such as the fuel farm and maintenance access points. Despite the benefit of added distance from airfield infrastructure, neither Alternative 3 nor Alternative 4 is as favorable as the options that keep the stream closer to its current alignment.

Based on the comparative evaluation, **Alternative 2** provides the most balanced approach by maintaining the benefits of the existing alignment while improving stream conditions, constructability at key crossings, and long-term performance. We would also recommend reviewing if the portion of the stream that parallels Runway 12-30 could also be in storm sewer pipe to improve grading and site topography while

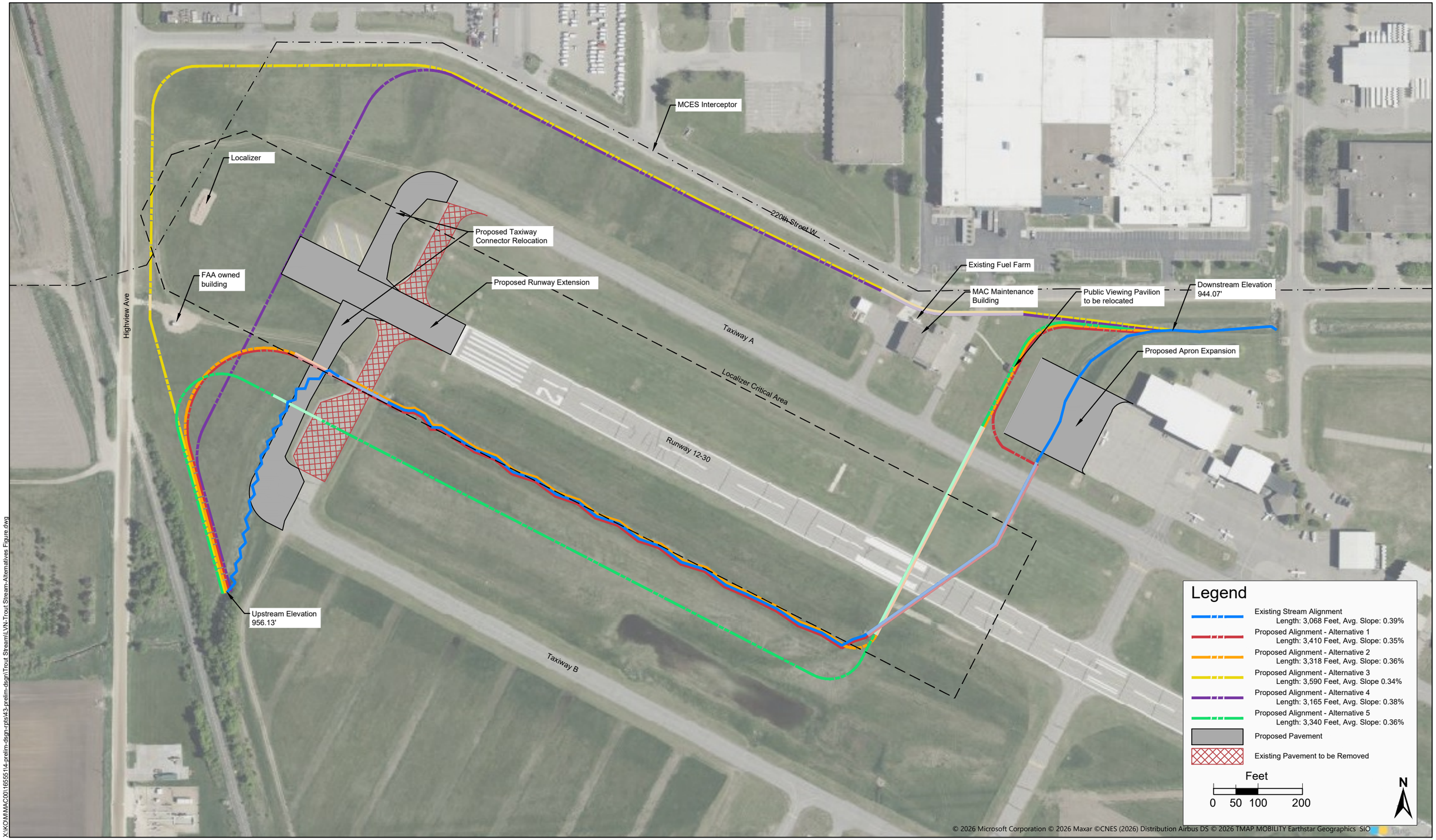
improving the overall airfield safety and mitigation of interaction with wildlife. This additional storm sewer pipe would likely also benefit the stream's temperature. If FAA requirements no longer allow the stream alignment and associated grades to remain within the localizer critical area, Alternative 5 would be the recommended route for the same reasons listed for our Alternative 2.

Unnamed Intermittent Stream Relocation

Figure 1

Airlake Airport
Lakeville, Minnesota

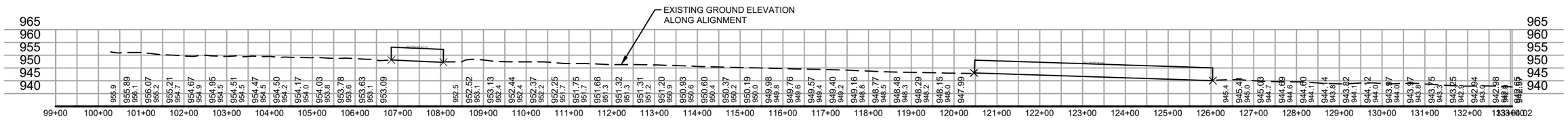
Unnamed Intermittent Stream Relocation
07/2026; MAC00 165551



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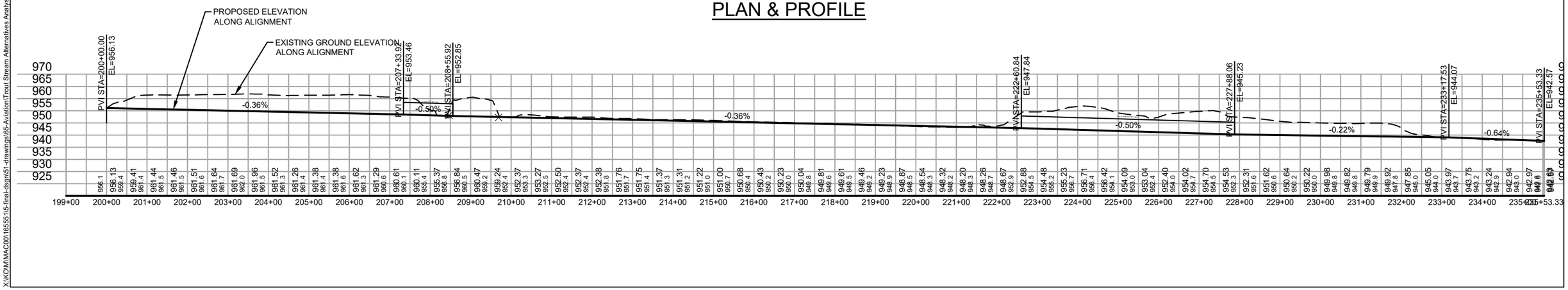
EXISTING STREAM ALIGNMENT
PLAN & PROFILE



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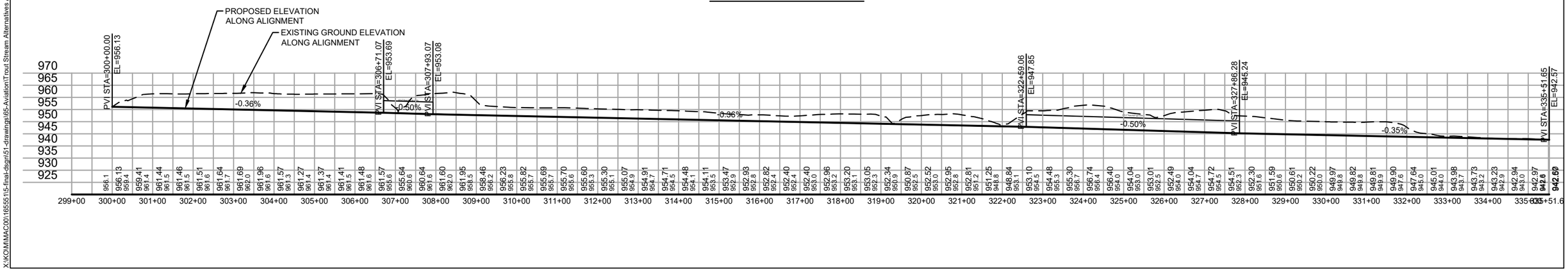
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PLAN & PROFILE



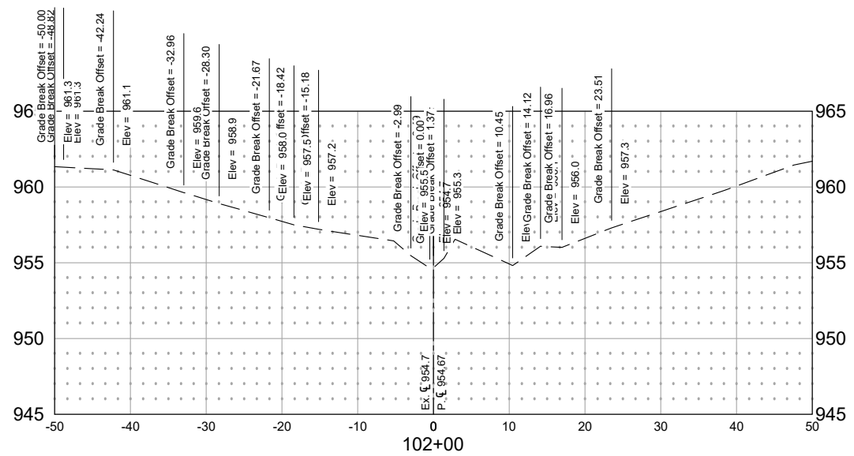
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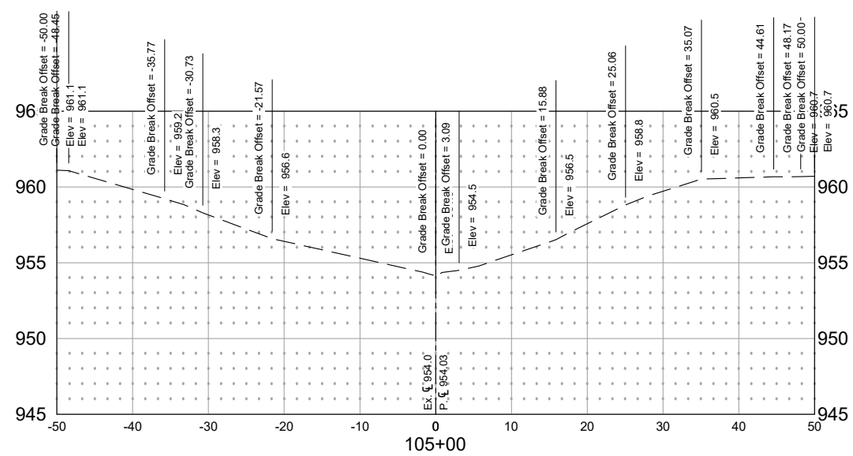


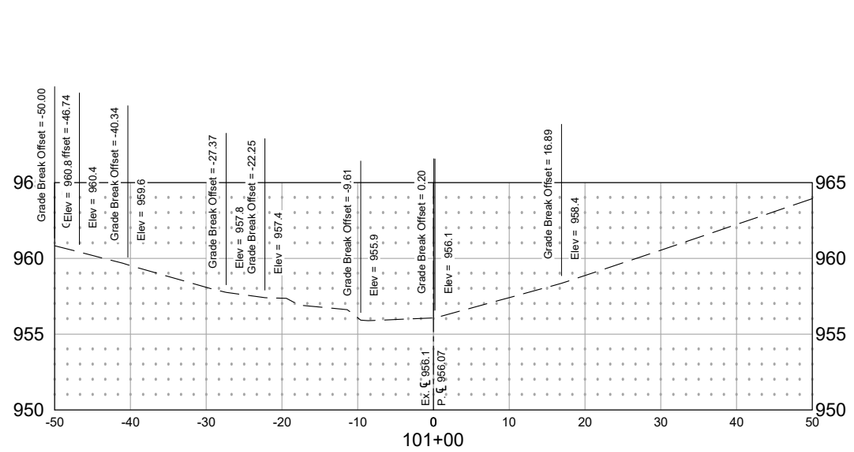
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PLAN & PROFILE

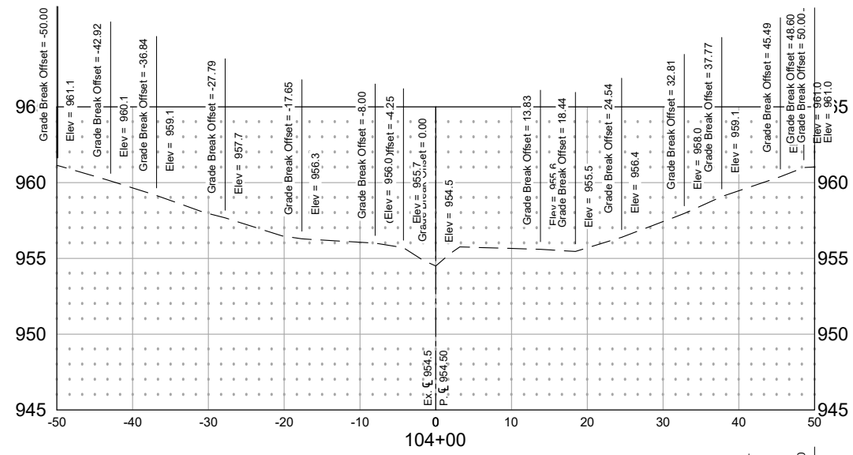


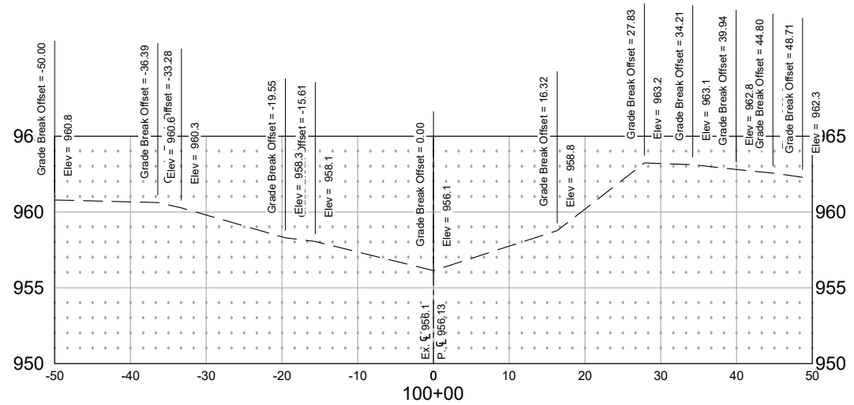
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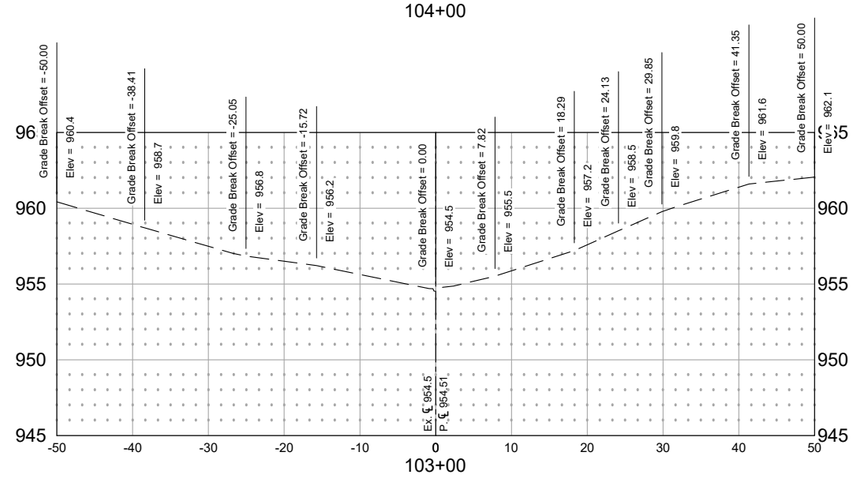




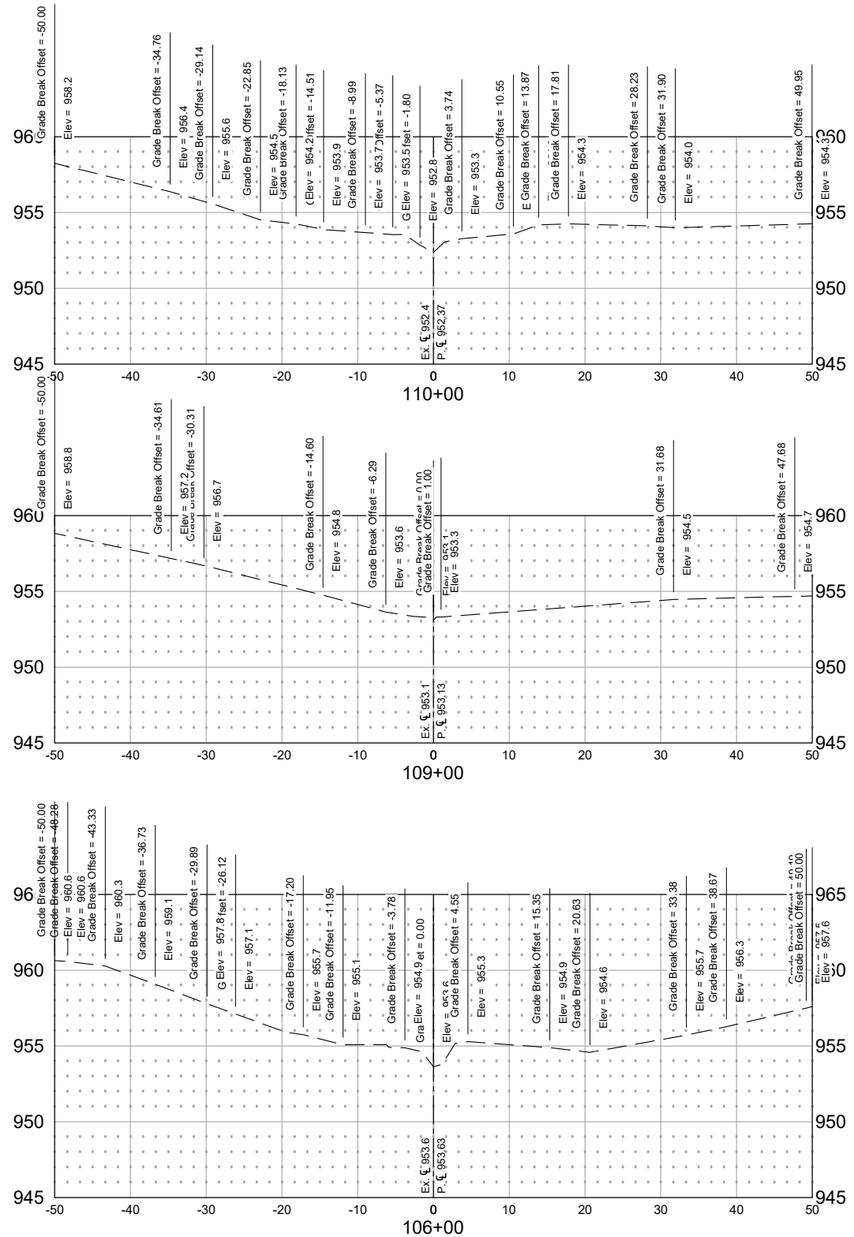








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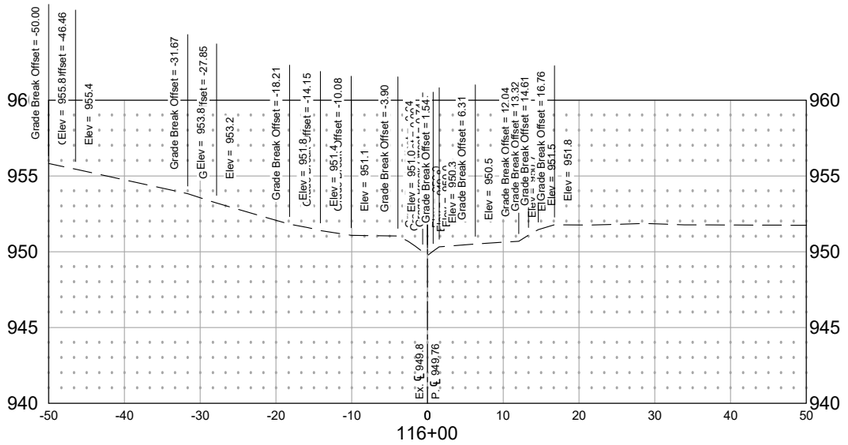
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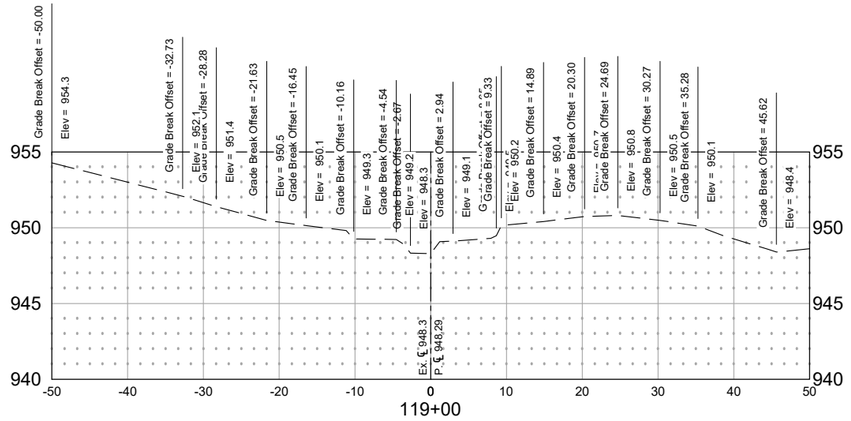
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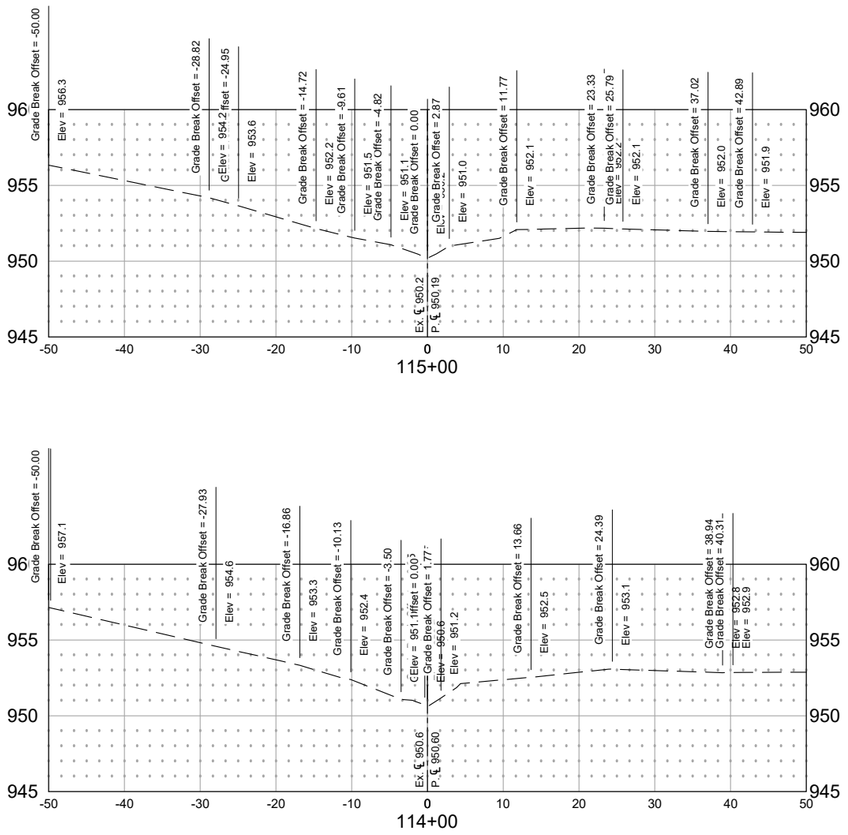
Airlake Airport
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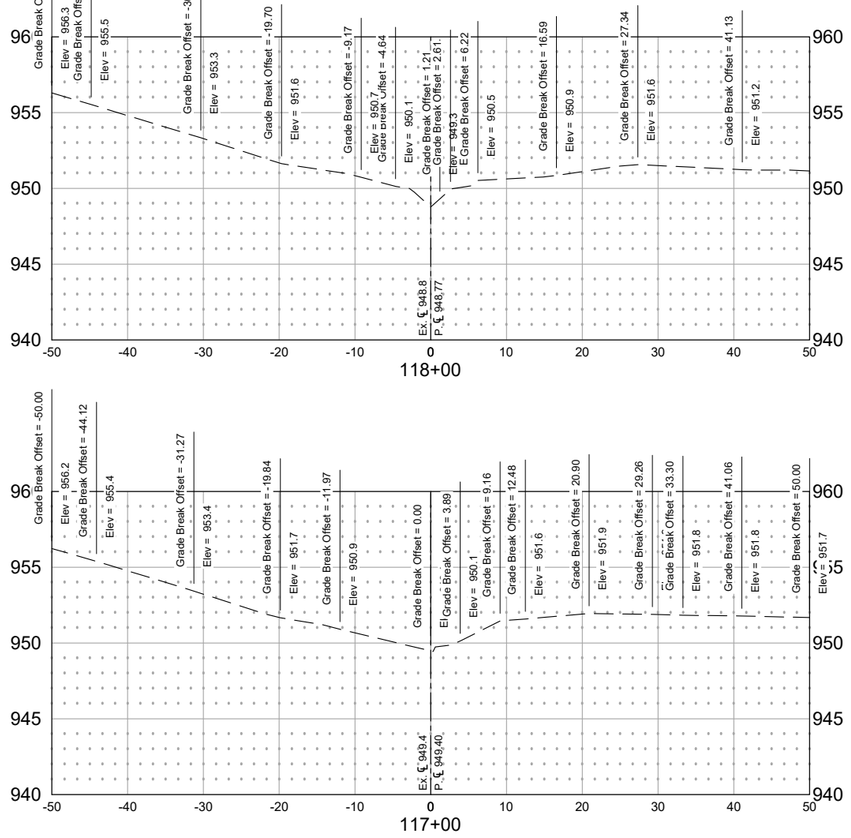
Figure 5.3

Existing Stream Cross Sections
07/2026; MAC00 165551

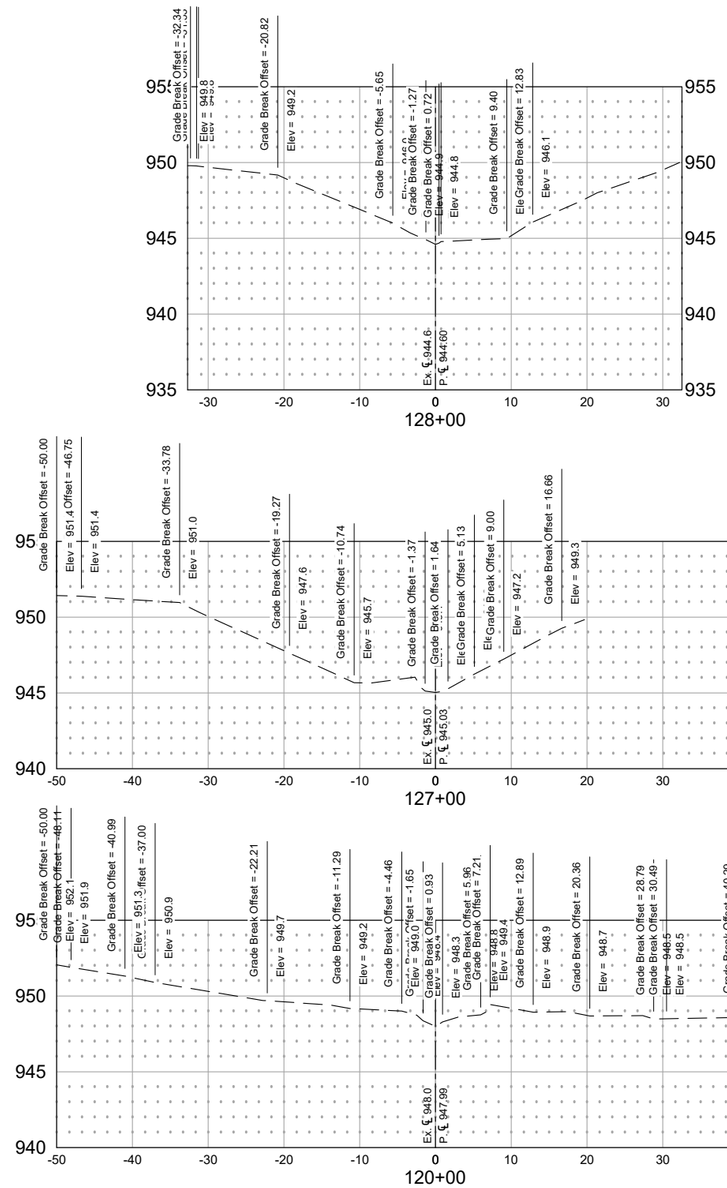








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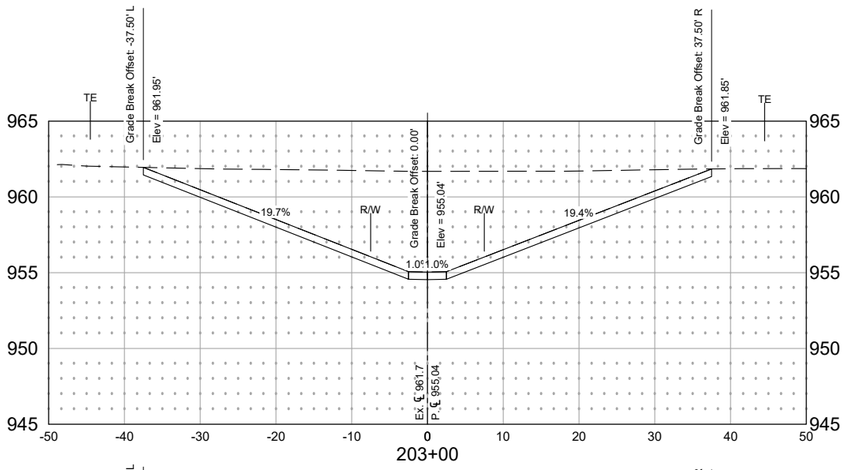
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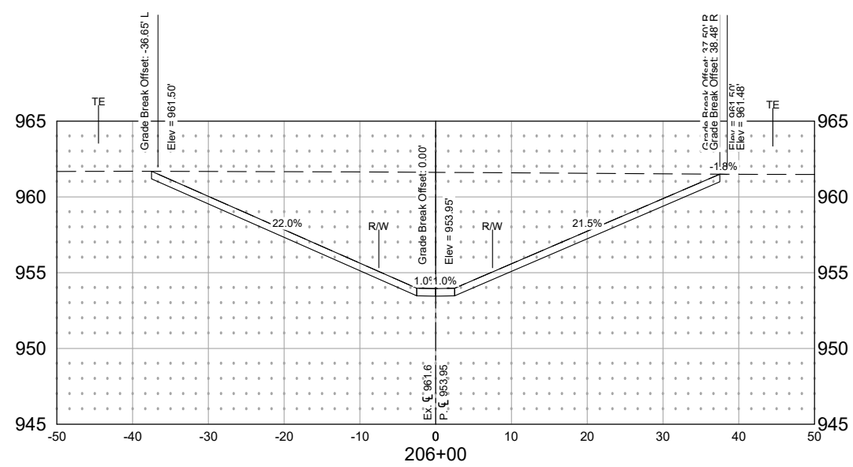
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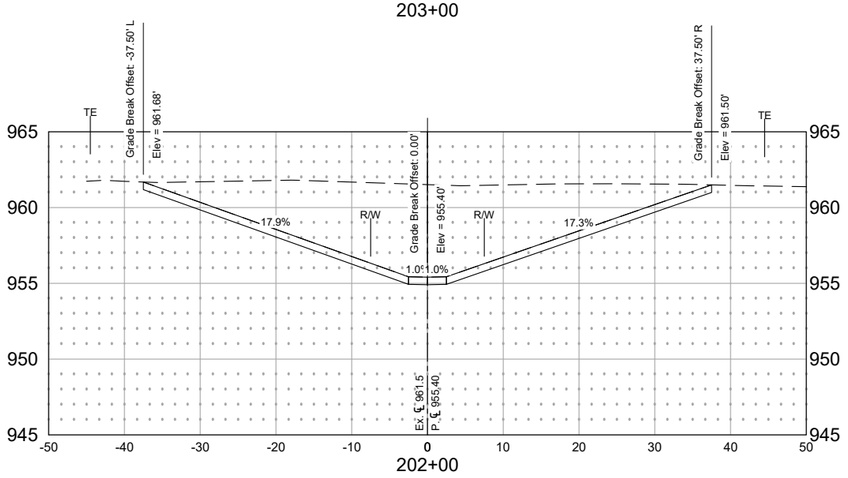
Airlake Airport
Lakeville, Minnesota

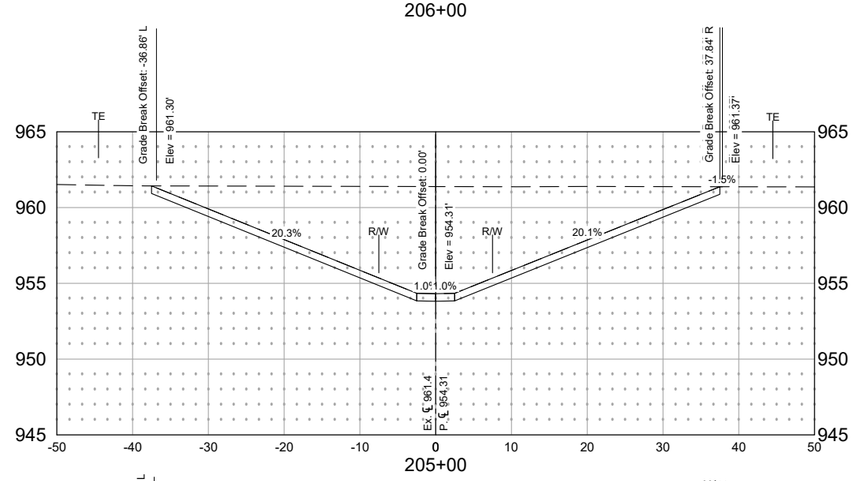
Figure 6.1

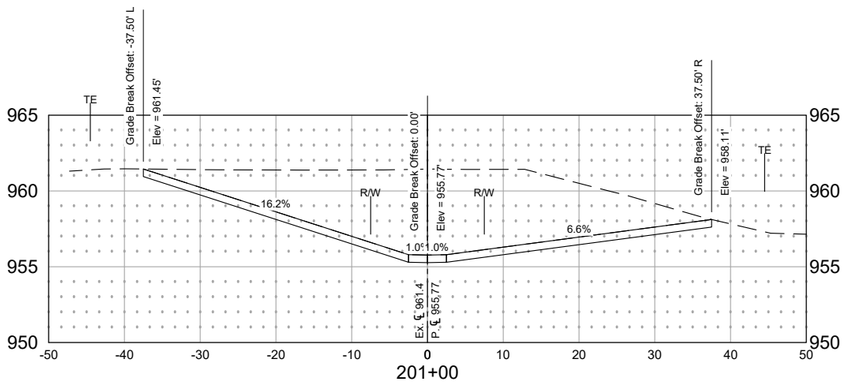
Proposed Stream Cross Sections - Alternative 2
07/2026; MAC00 165551

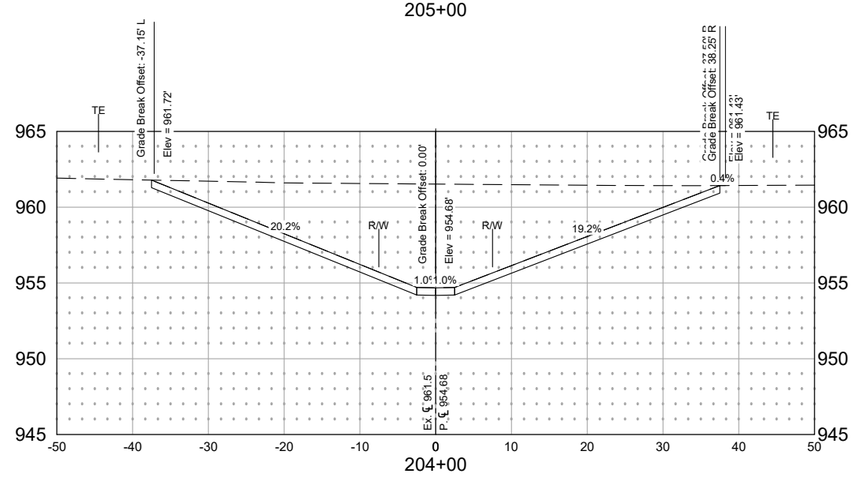




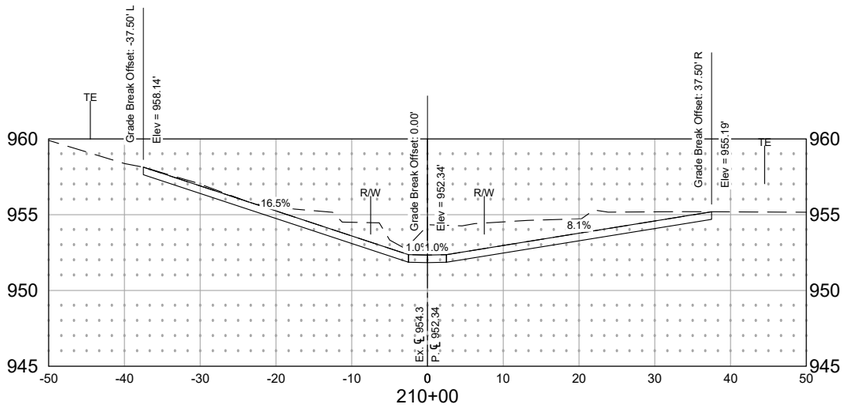


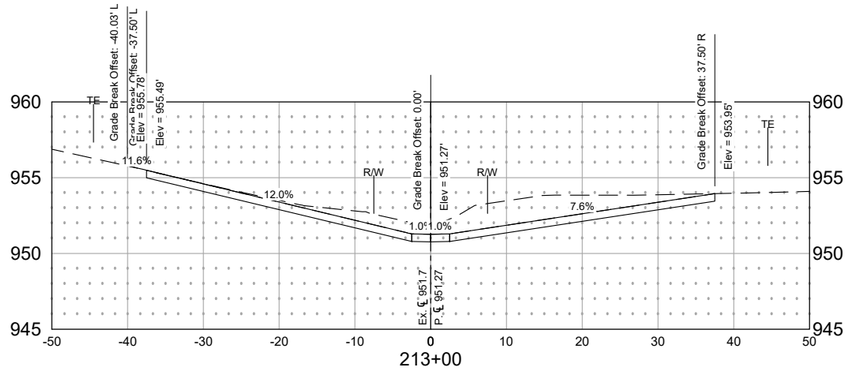


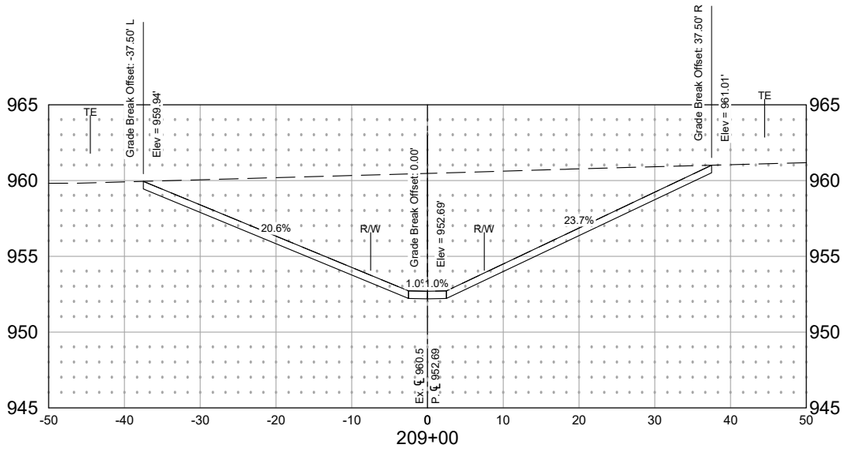


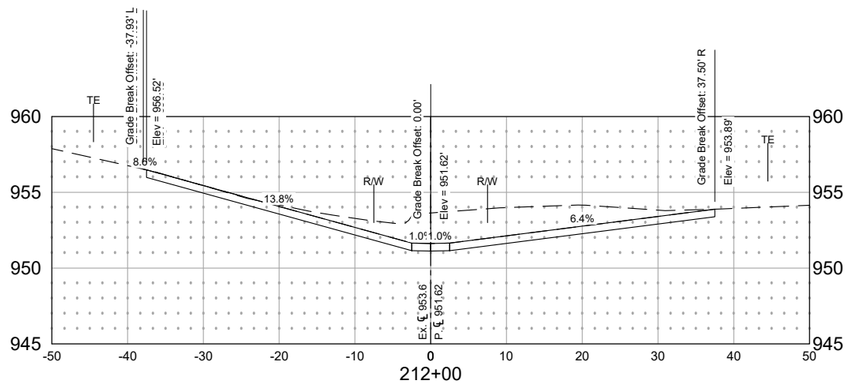


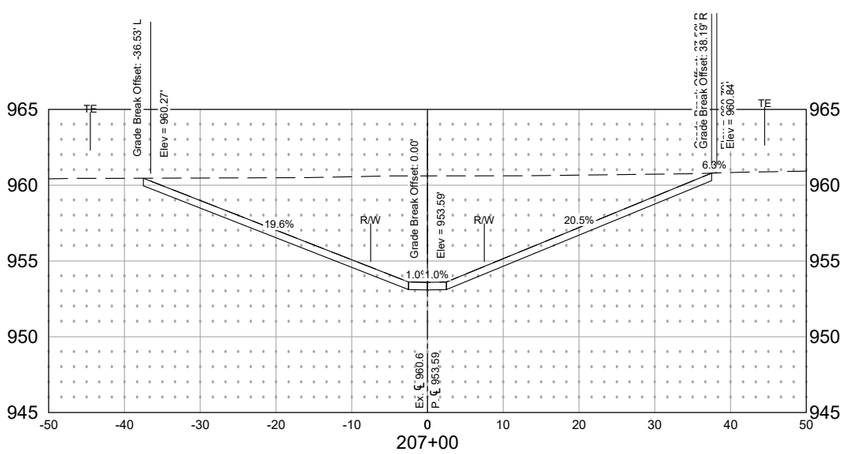
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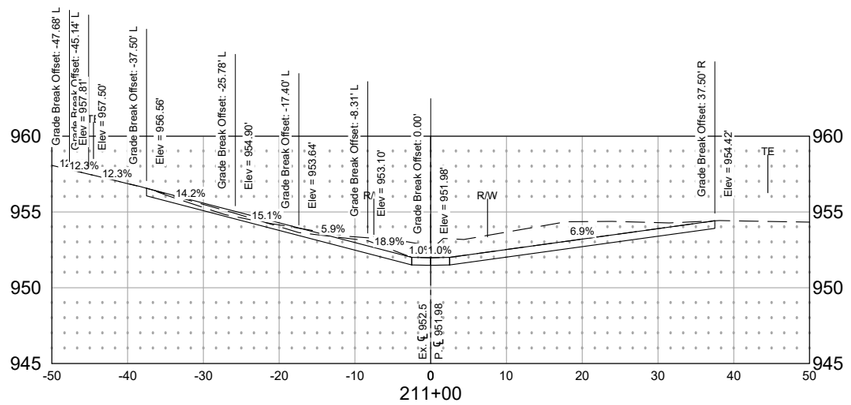




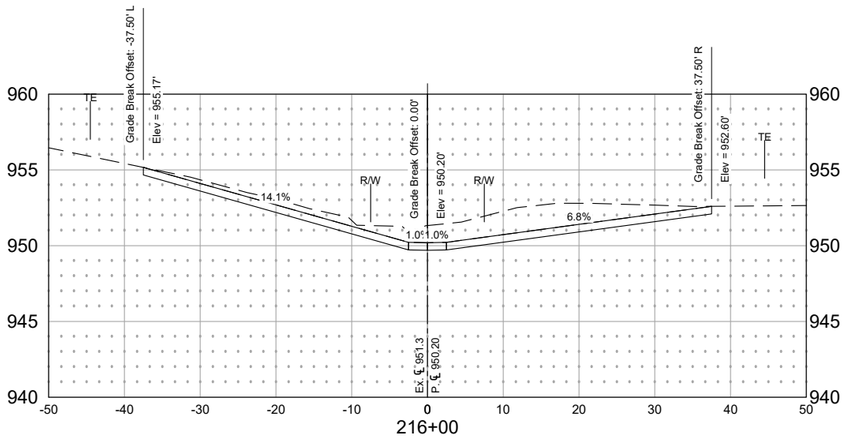


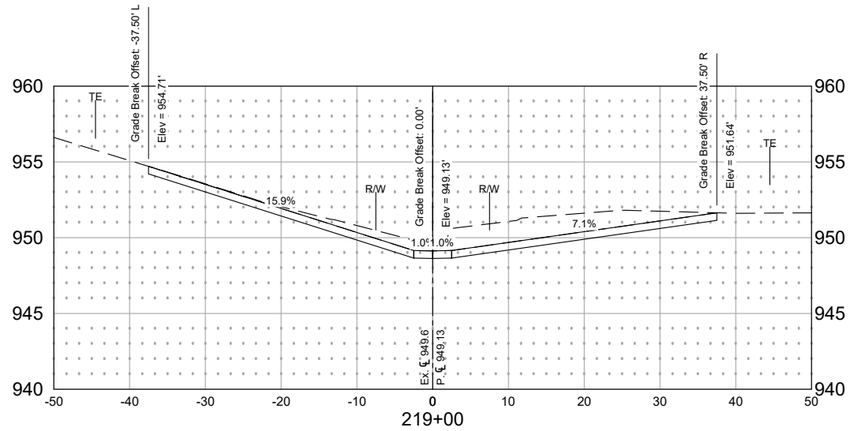


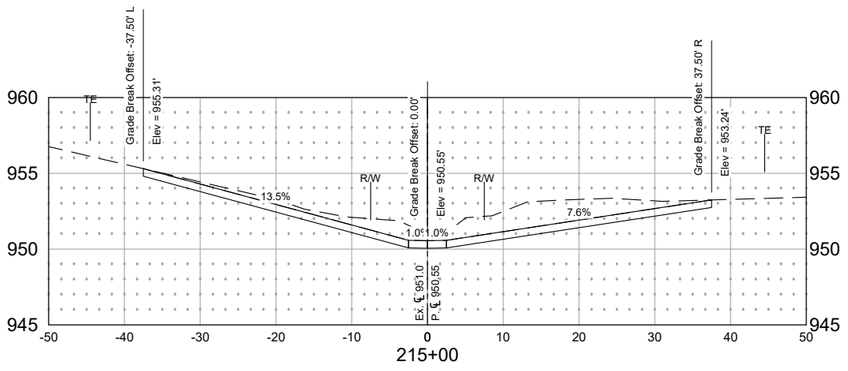


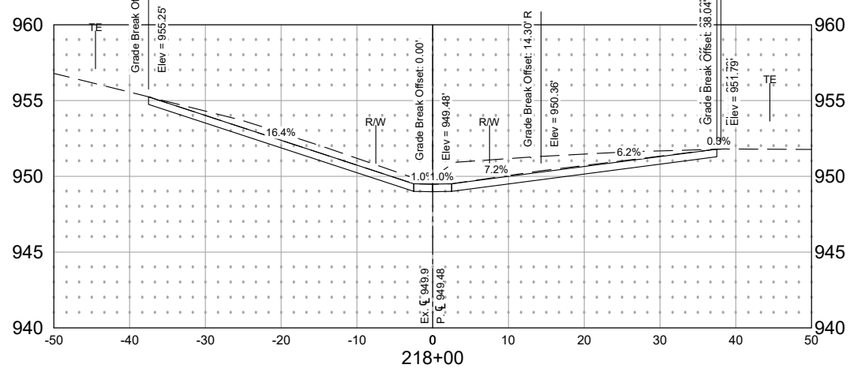


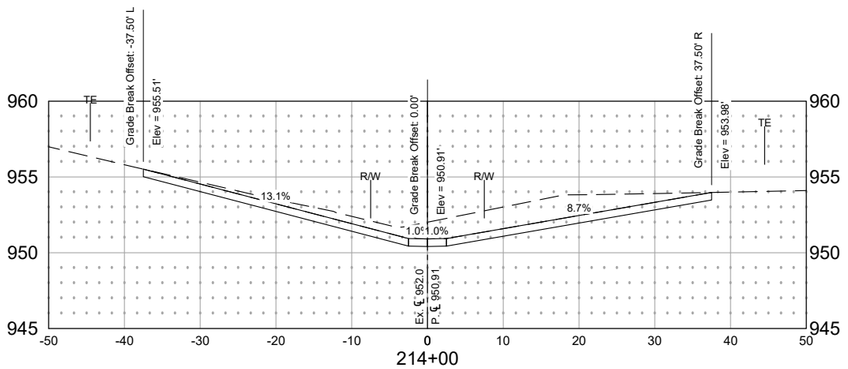
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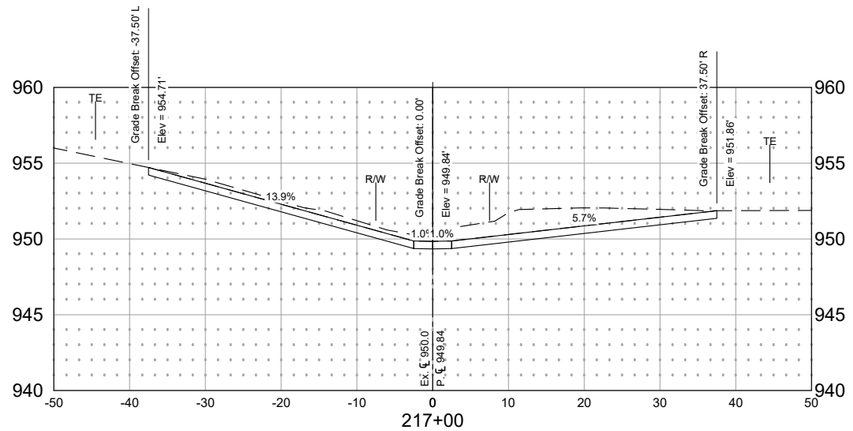












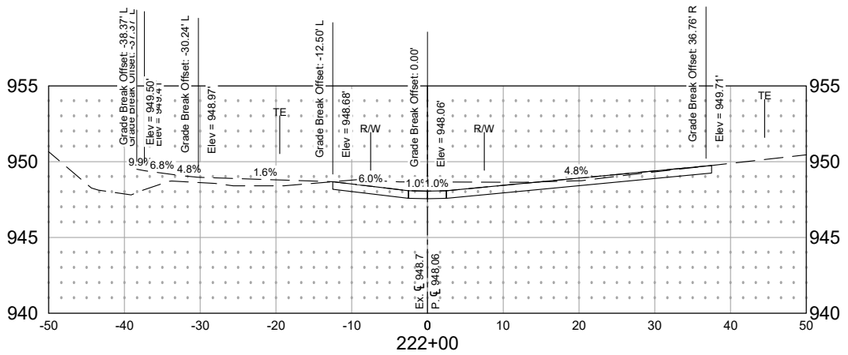
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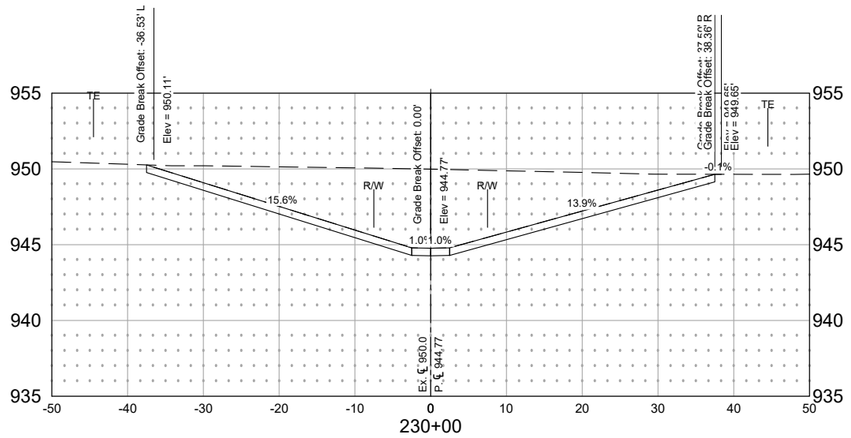
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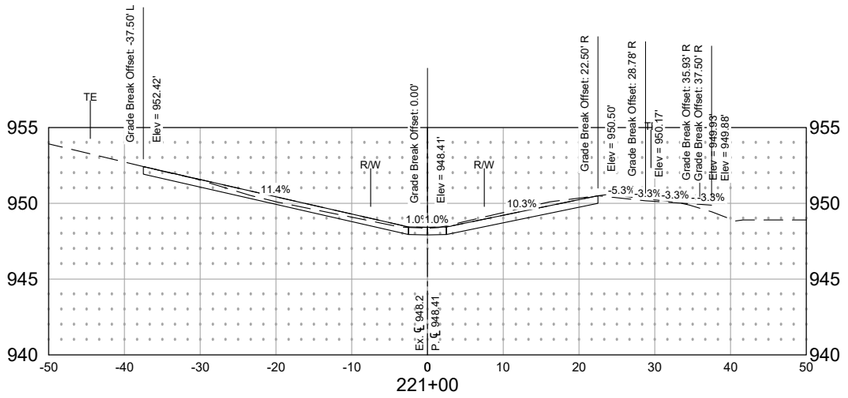
Airlake Airport
Lakeville, Minnesota

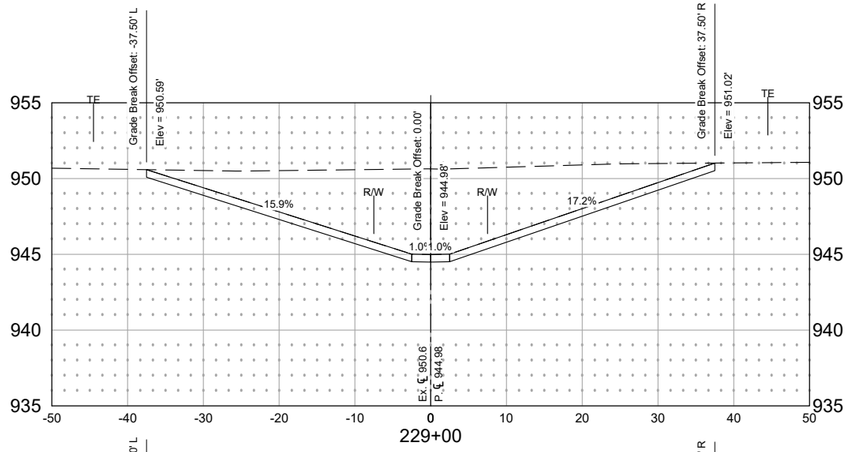
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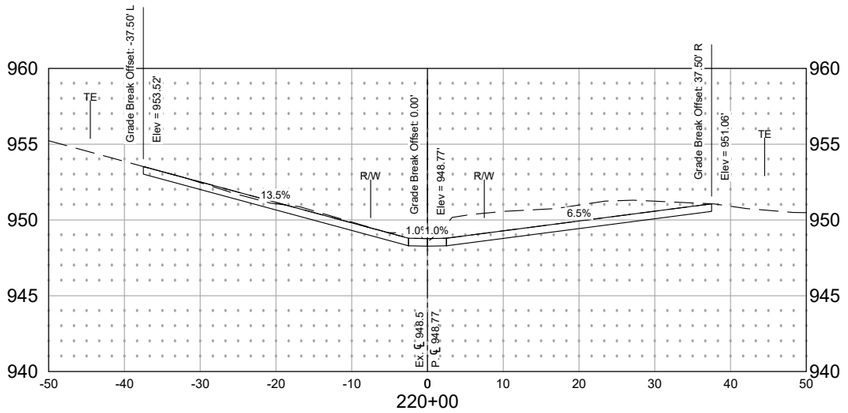
Proposed Stream Cross Sections - Alternative 2
07/2026; MAC00 165551

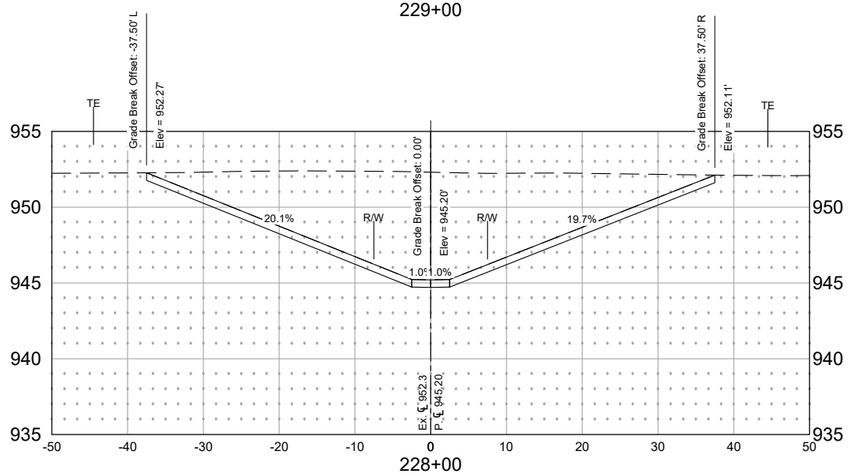












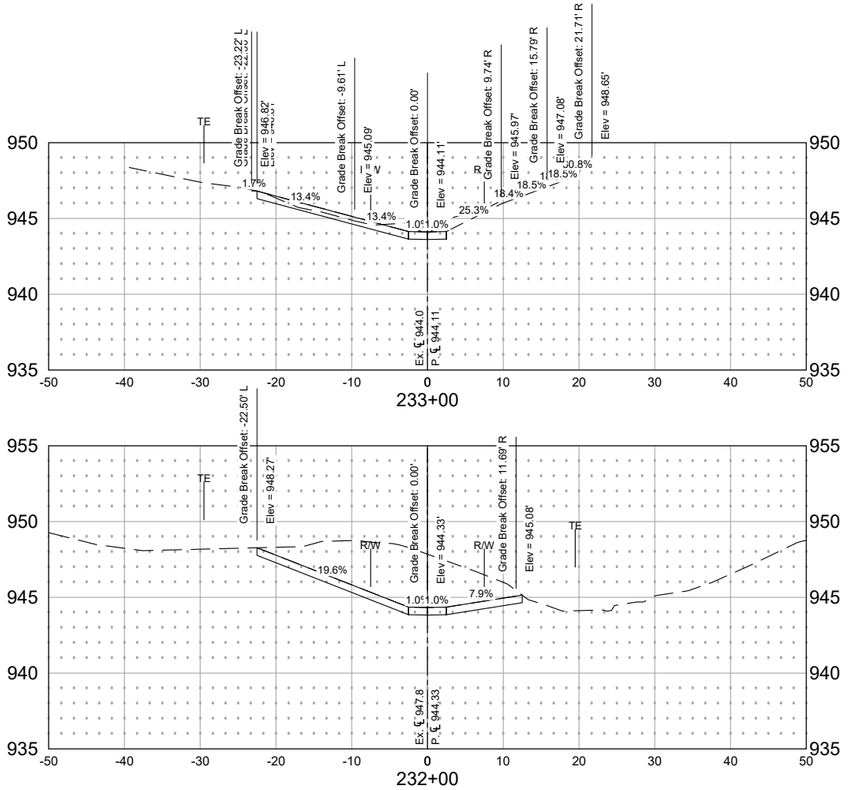
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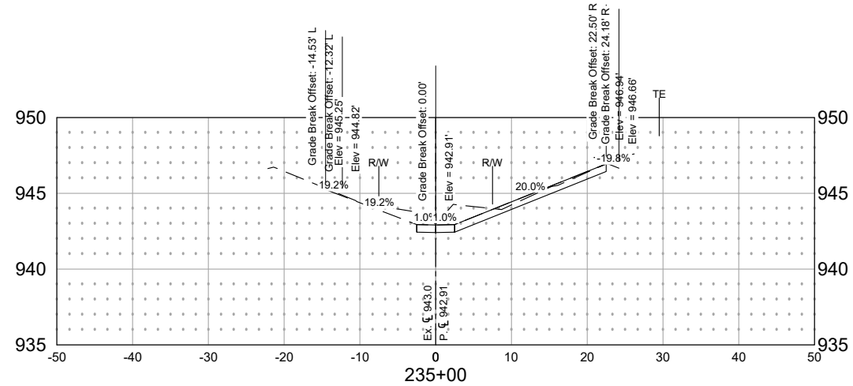
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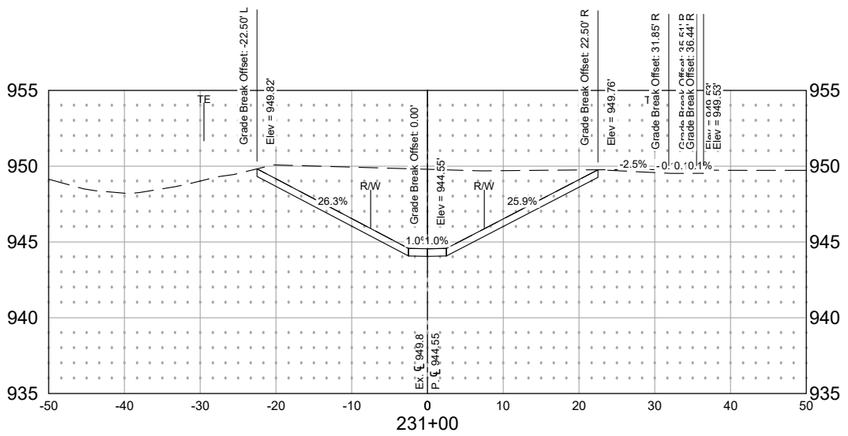
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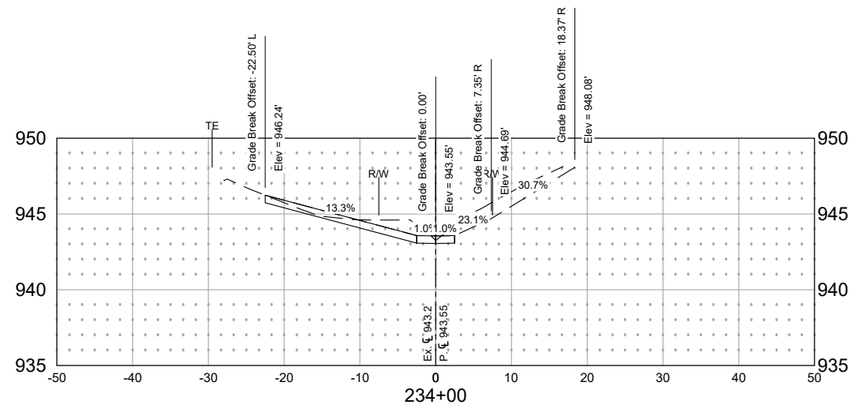
Airlake Airport
Lakeville, Minnesota

Proposed Stream Cross Sections - Alternative 2
07/2026; MAC00 165551

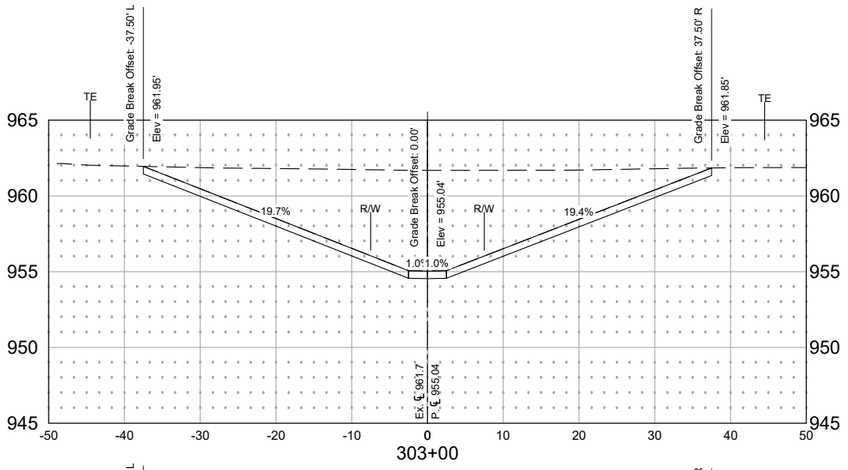


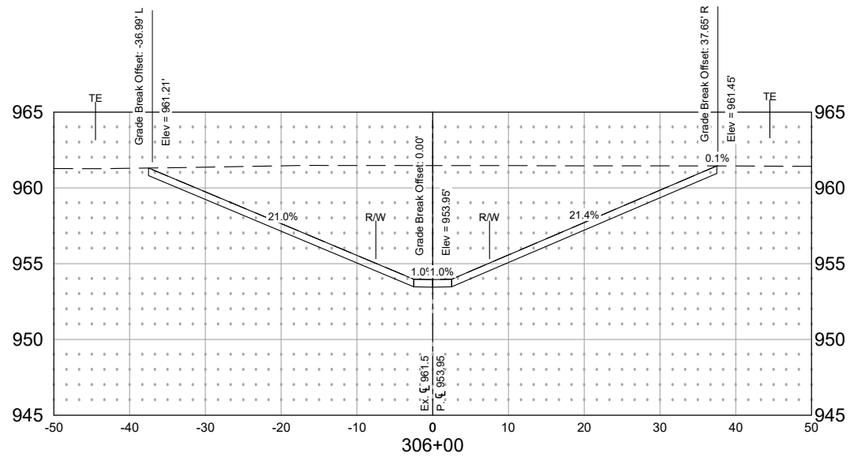


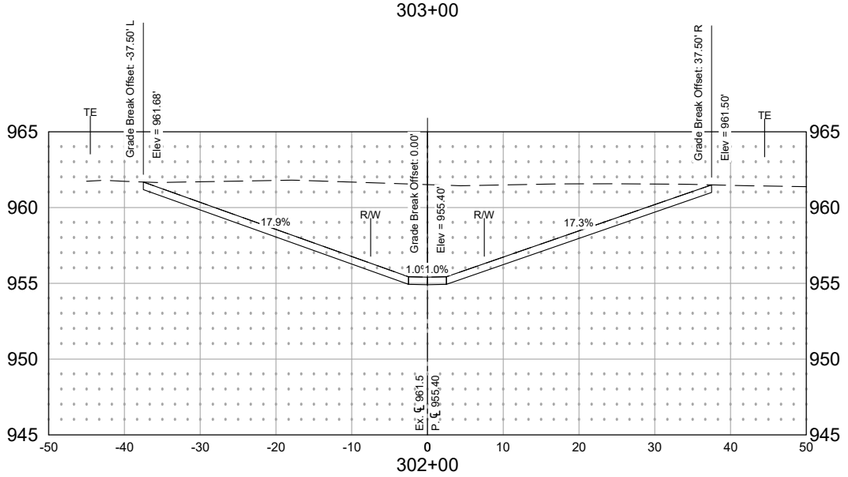


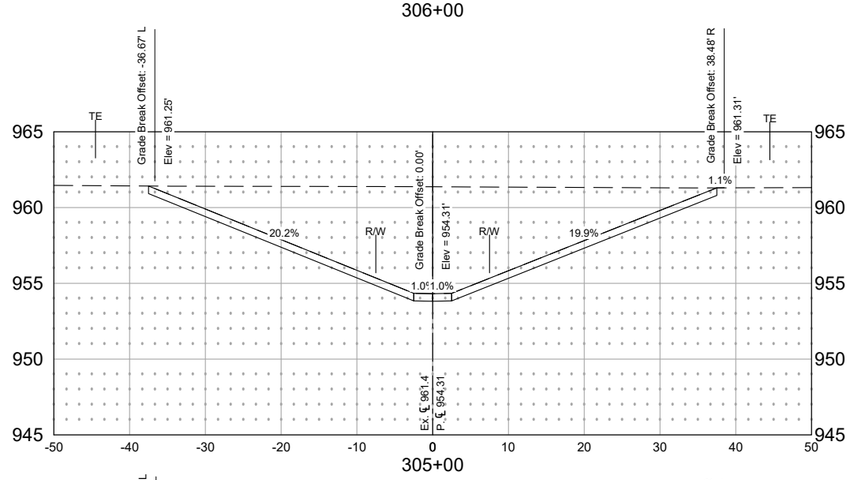


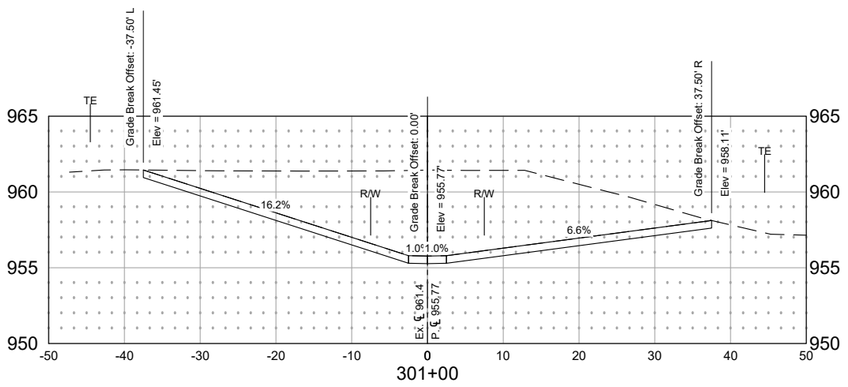
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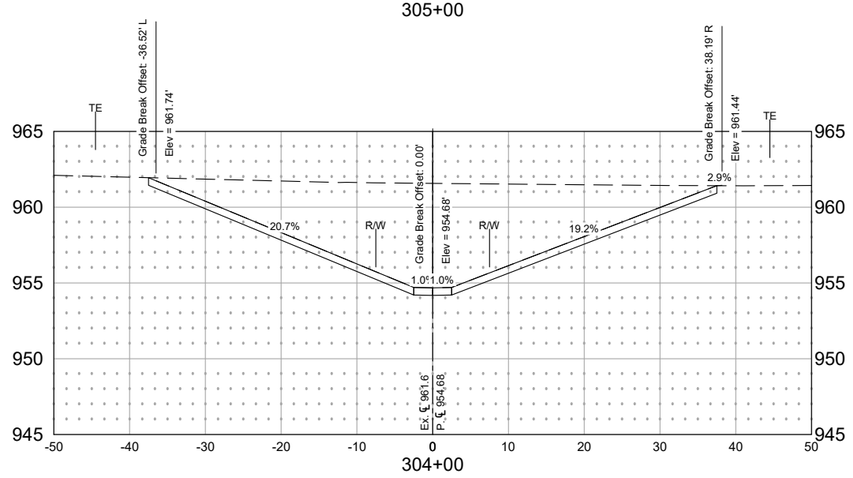












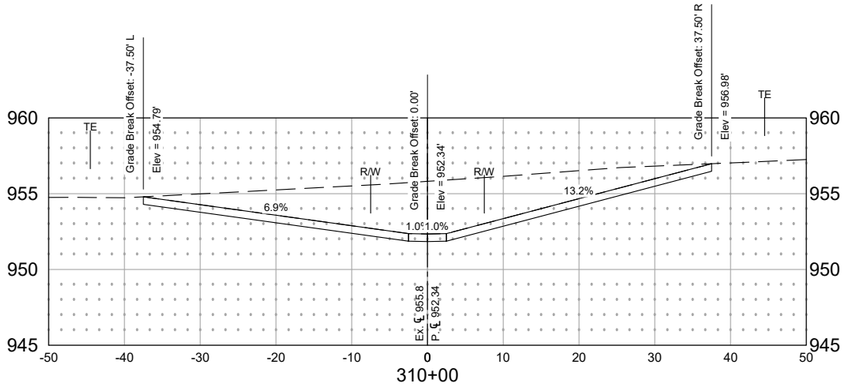
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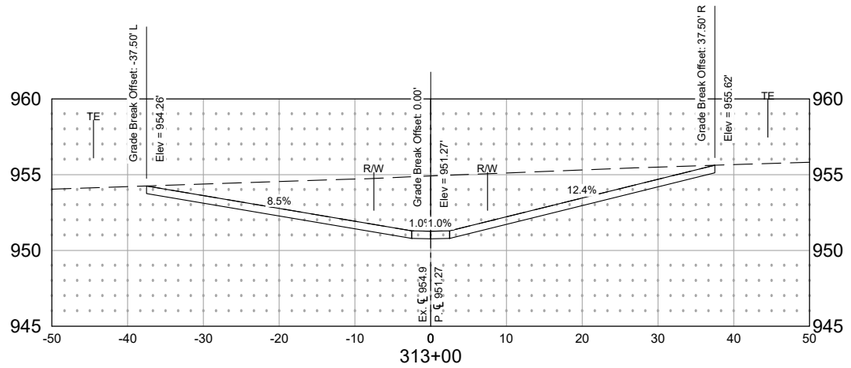
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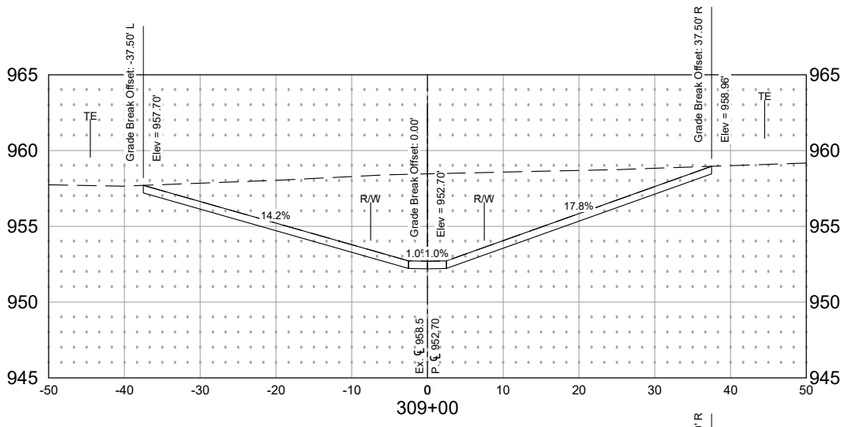
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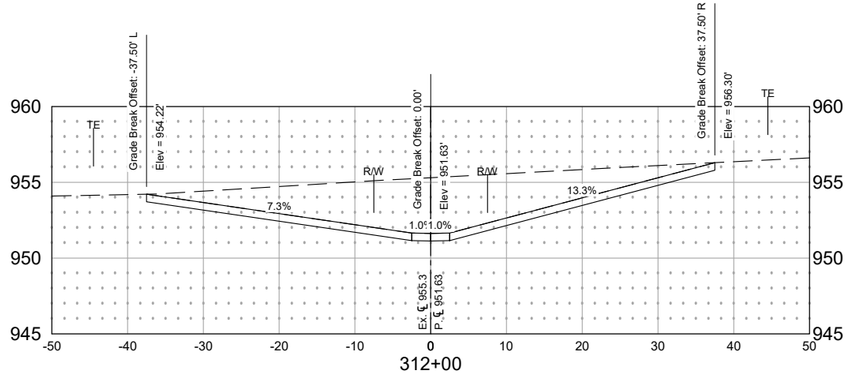
Airlake Airport
Lakeville, Minnesota

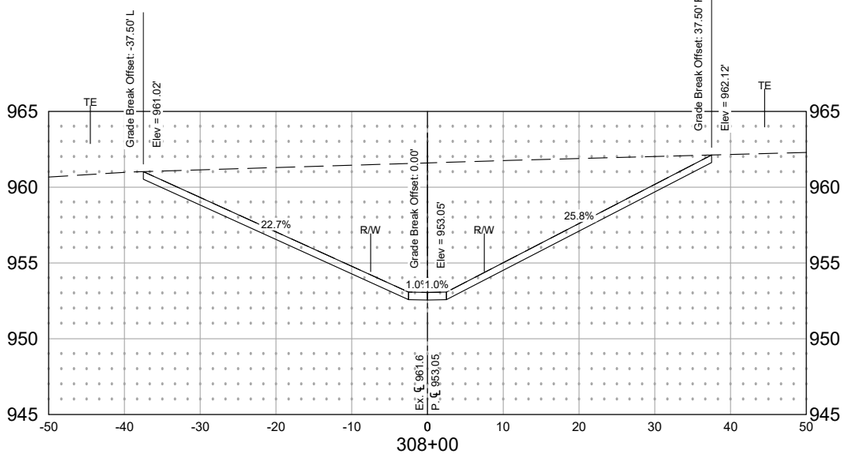
Proposed Stream Cross Sections - Alternative 5
07/2026; MAC00 165551

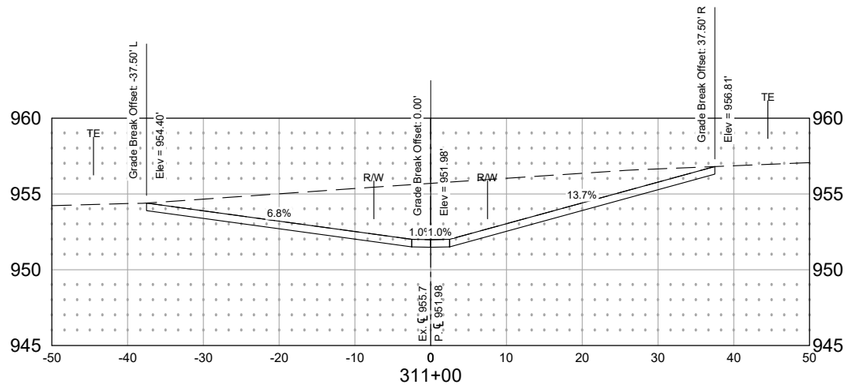




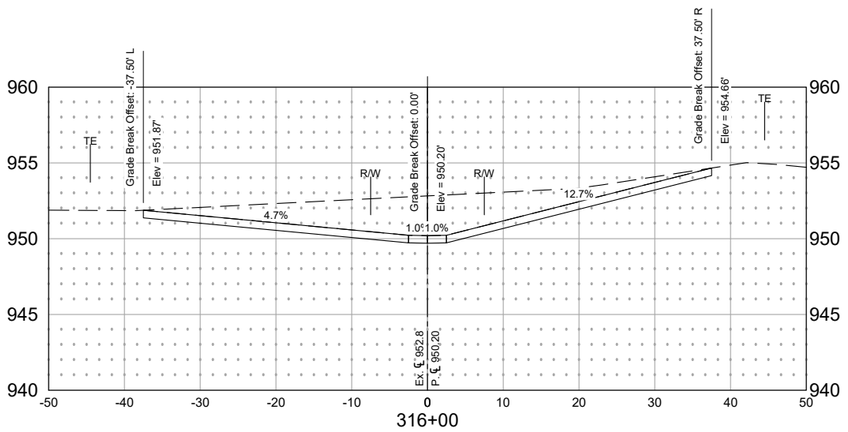


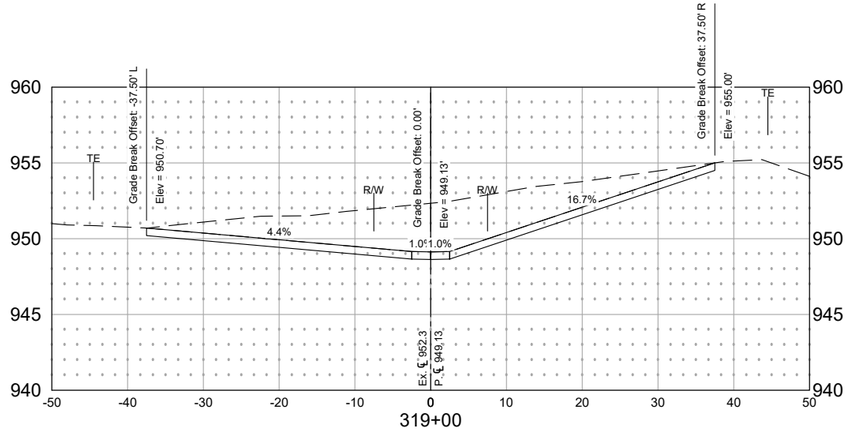


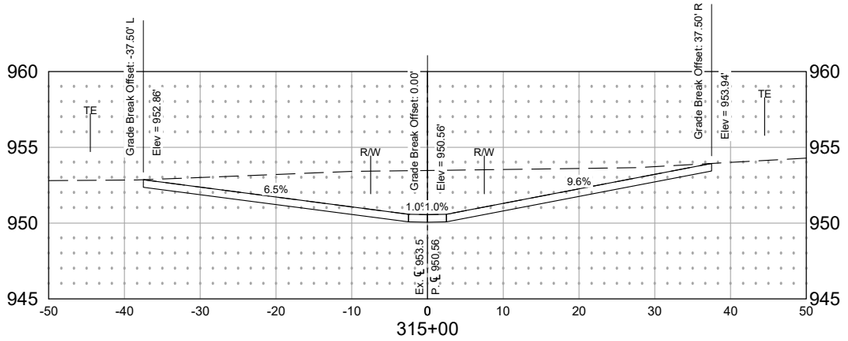


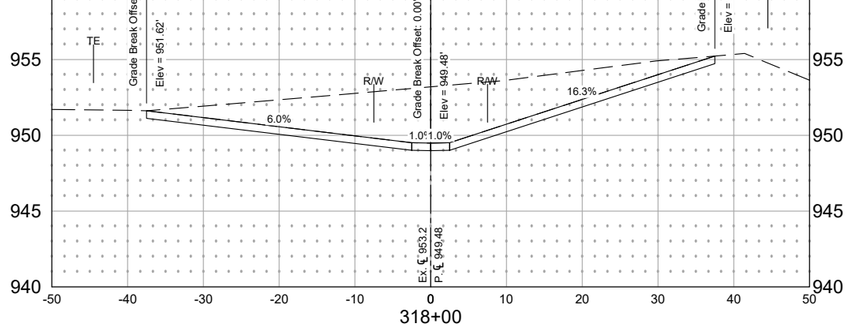


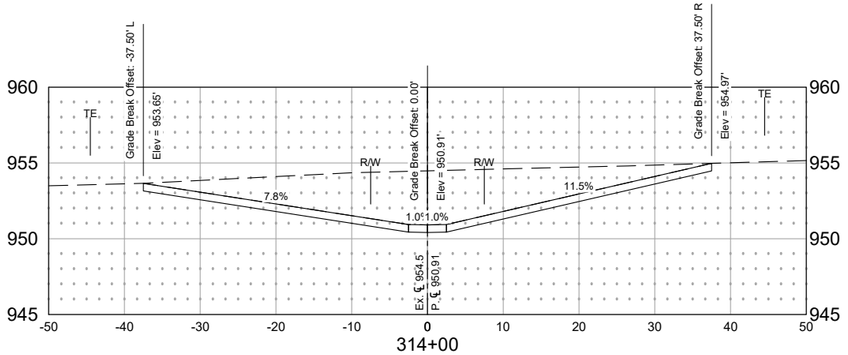
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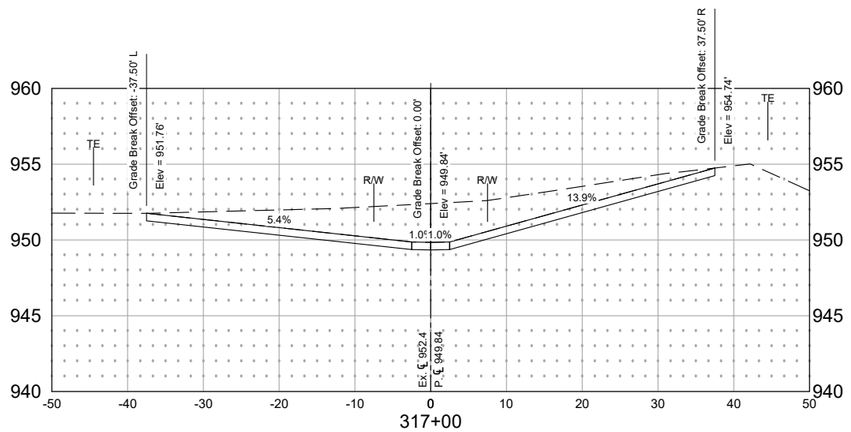




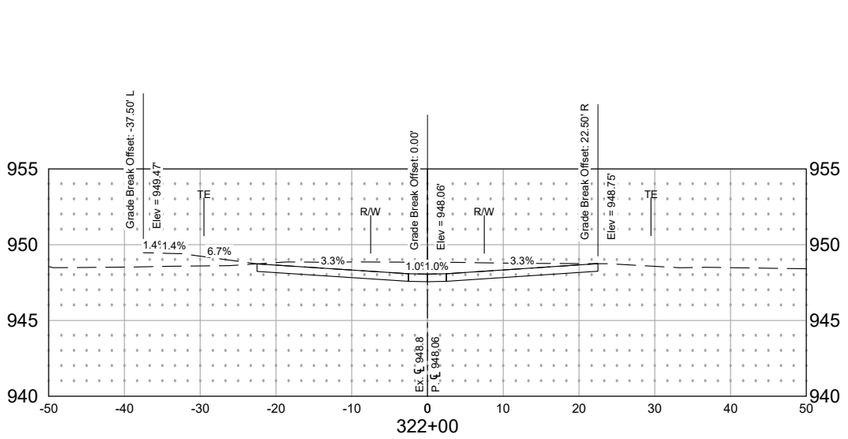


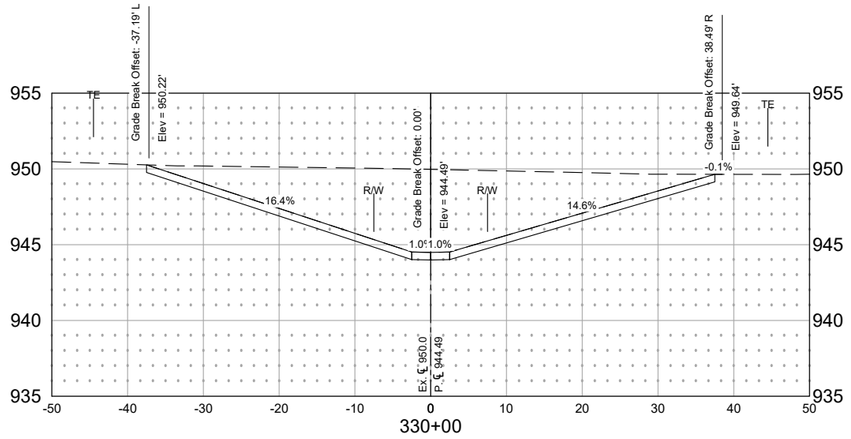


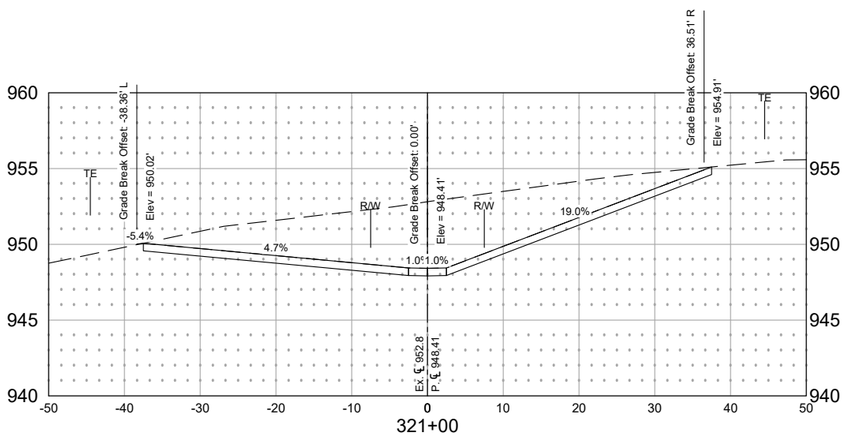


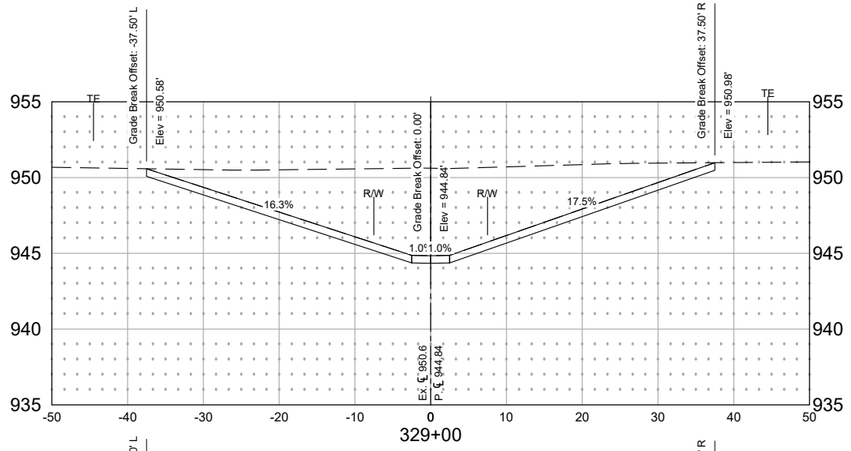


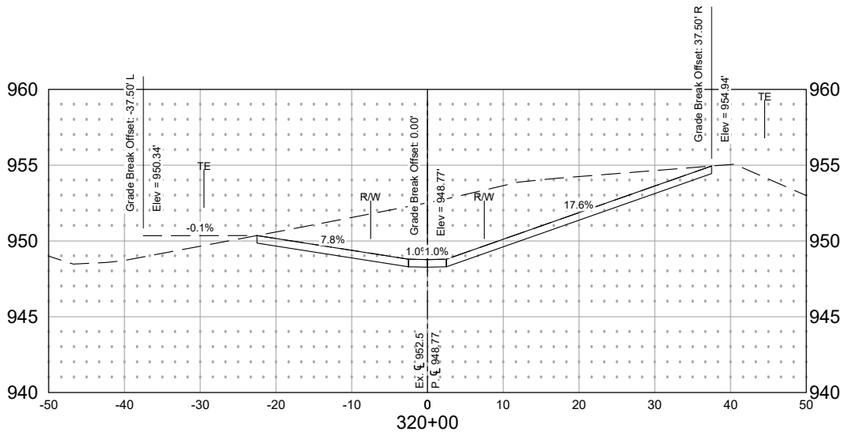
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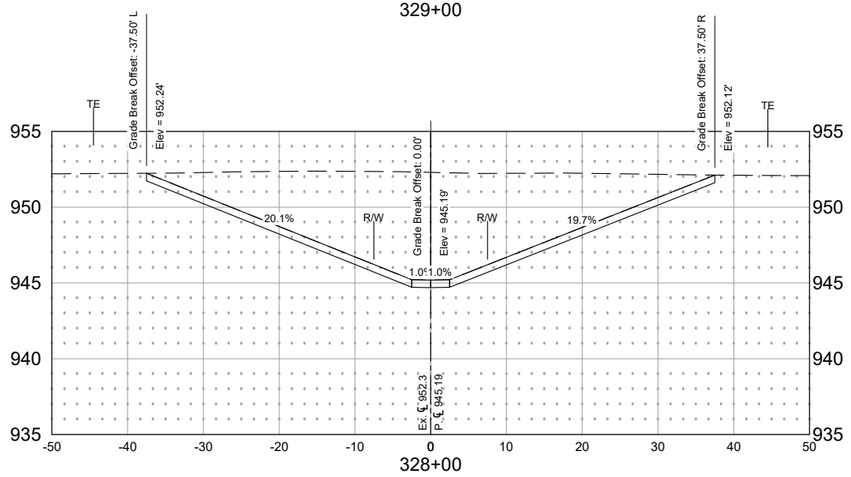




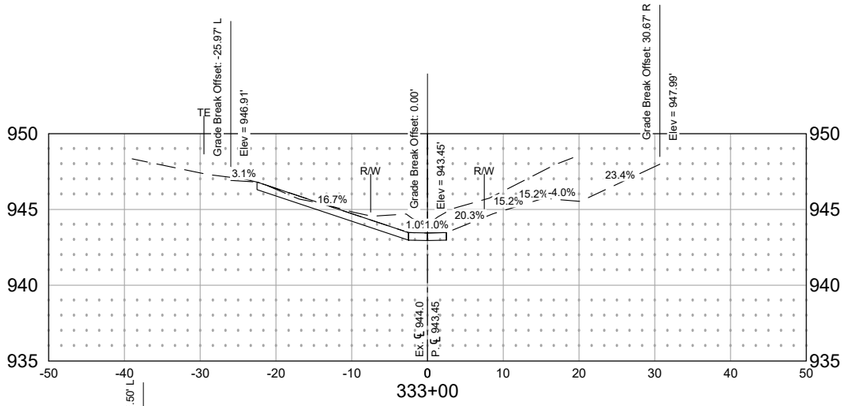


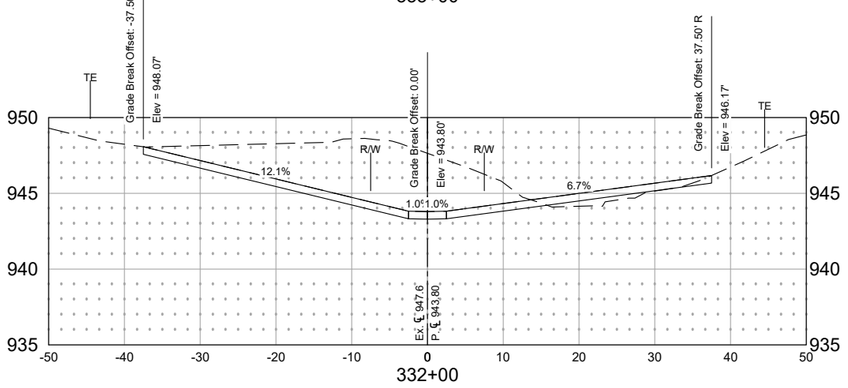


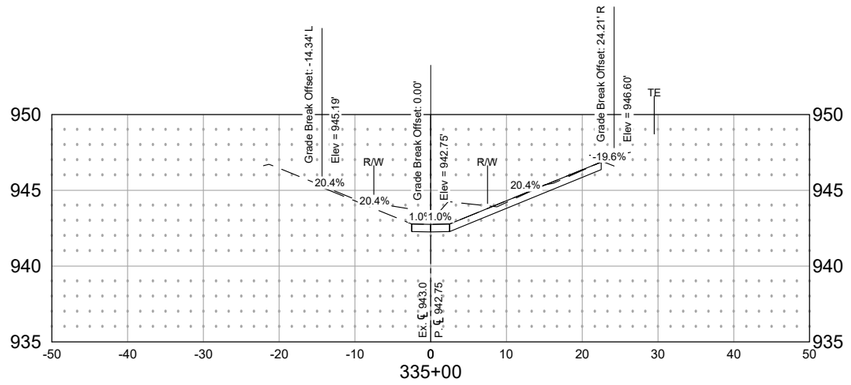


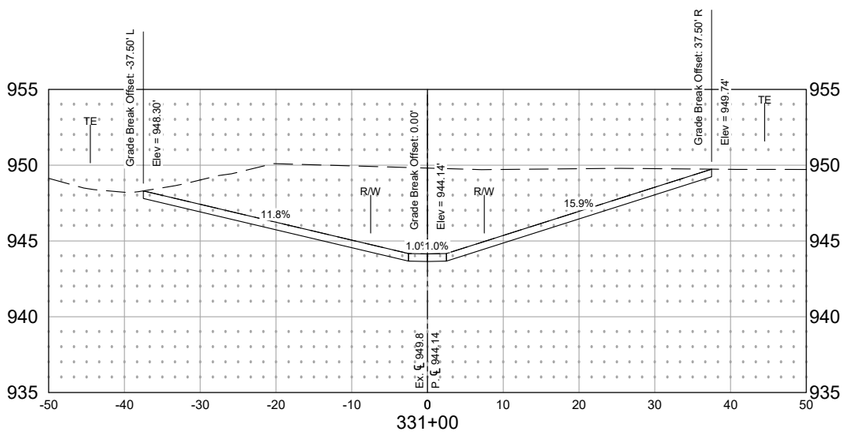


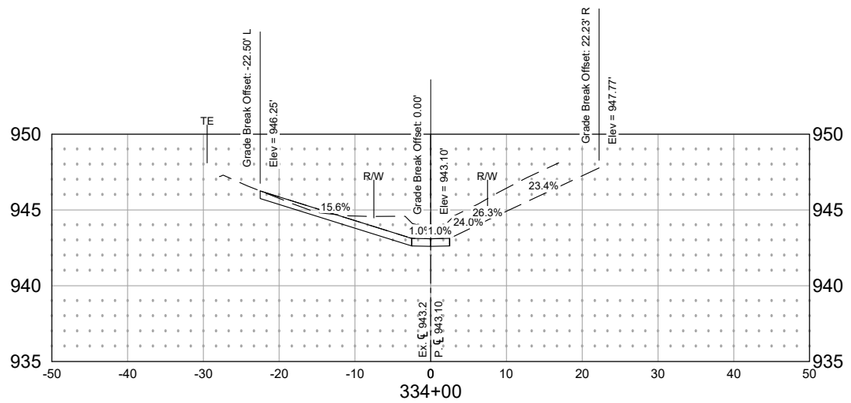
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Technical Memorandum

To:	U.S. Army Corps of Engineers
From:	Cole Kiernan, Mead & Hunt
Reviewed by:	Evan Barrett, Mead & Hunt
Date:	September 16, 2026
Subject:	Airlake Airport Runway Project – Stream Functional Assessment Memo

1. Project Overview

The Metropolitan Airports Commission (MAC) is proposing improvements at Airlake Airport (LVN) in Lakeville, Minnesota to meet long-term operational, safety, and design objectives identified in the Airport's 2035 Long-Term Comprehensive Plan (LTCP). The proposed action includes reconstructing the existing Runway 12-30 pavement, extending the runway from 4,099 feet to approximately 4,850 feet, relocating and modifying associated taxiways and navigational aids, expanding the aircraft apron, and relocating 225th Street. The proposed action figure is included in **Attachment A**. These improvements are needed to address deteriorating pavement conditions, improve safety for aircraft operations, and meet current Federal Aviation Administration (FAA) design standards. To accommodate these airfield improvements, a minor relocation of an unnamed intermittent stream located on airport property is required. The purpose of this memo is to document the existing functions and values of the stream, evaluate stream alternatives, and demonstrate that the proposed project will not significantly alter the stream's functions and values.

The MAC proposes to relocate two segments of the intermittent stream, together representing approximately 1,000 linear feet of the existing stream, as part of the project. The relocation will be designed to preserve overall hydrologic function and water quality characteristics while minimizing impacts to the extent practicable within the constraints of airport design standards and safety requirements. The project will be evaluated through a joint Federal Environmental Assessment (EA) / State Environmental Assessment Worksheet (EAW), and will require coordination and permitting with federal, state, and local agencies, including the Minnesota Department of Natural Resources (MnDNR), the U.S. Army Corps of Engineers (ACOE), and local regulatory authorities. The MAC contracted with airport planning consultants at Mead & Hunt, Inc., to prepare the EA/EAW documentation.

As part of the EA/EAW process, the MAC convened an Agency Technical Advisory Panel (ATAP) consisting of relevant agency stakeholders, including MnDNR, ACOE, and the Vermillion River Watershed Joint Powers Organization (VRWJPO), to inform the stream relocation alternatives analysis and determine permitting requirements for the project. The ATAP met two times during Draft EA/EAW development, on April 28 and June 16, 2026, and is scheduled to meet one more time during the Draft EA/EAW public comment period on October 21, 2026.

Mead & Hunt staff met virtually with ACOE staff on May 5, 2026, to discuss permitting requirements for the project. Following this meeting, the ACOE sent a written email request for this qualitative stream functional assessment memo describing existing stream conditions and the proposed stream relocation. During the May 5 meeting, Mead & Hunt and ACOE staff agreed that a detailed quantitative assessment using the Minnesota and Wisconsin Stream Quantification Tool (MNWI SQT) would likely not be required for permitting, given the limited functions and values of the affected aquatic resource and given that the relocated stream can be designed to replace and enhance the existing stream functions and values.

Following circulation of an earlier draft of this memo to the ATAP members for review and comment, Mead & Hunt and ACOE staff met virtually again on August 31, 2026. Following this meeting, the ACOE sent a written email request for additional data to support that trout do not currently utilize the affected stretch of stream. This version of the memo has been updated to incorporate additional data to that effect.

Following completion of the EA/EAW process, final project design and permitting will be completed in 2027 and the project will be constructed in 2028.

2. Existing Conditions

The unnamed intermittent stream functions as the primary surface water conveyance feature for the airport property. Designated as a public watercourse by the Minnesota Department of Natural Resources (MnDNR), the stream conveys water across the Airport through a combination of vegetated channels and culverts beneath existing infrastructure. The stream flows west to east across the site, beginning on the southwest side of the airport at the outfall of a culvert under Highview Avenue and a railroad corridor. The stream continues along a vegetated channel, passing through culverts beneath the runway and taxiways, and ultimately discharging off-site where it contributes flow to South Creek and the Vermillion River. While the stream itself is not designated as a trout stream by the MnDNR, it is hydrologically connected to downstream designated trout stream segments. A map showing designated trout streams is included in **Attachment B**. The stream provides an important hydrologic connection within the Mississippi River & Lake Pepin watershed, conveying runoff generated on airport property during precipitation and snowmelt events. The stream is integrated with the airport's stormwater management system, which includes culverts, vegetated swales, wetlands, and a stormwater detention basin that helps limit the direct runoff to the stream.

The stream also provides water quality functions by conveying runoff through vegetated corridors and wetlands located adjacent to the channel. In support of the LVN EA/EAW, Mead & Hunt completed an on-site wetland delineation on airport property in 2022. The delineation identified twelve wetlands within the AOI, documented by twenty-four sampling points. Wetlands 4, 5, and 6 were associated with the portion of the stream being relocated by the proposed project. Wetlands associated with the stream corridor provide opportunities for temporary storage of runoff, sediment deposition, and attenuation of stormwater flow prior to discharge from airport property. These features contribute to the protection of downstream receiving waters, including the downstream designated trout stream.

The stream corridor provides habitat and ecological functions within an otherwise developed airport environment. Although portions of the stream are conveyed through culverts and other engineered infrastructure, vegetated channel segments and adjacent wetlands provide riparian habitat and wildlife movement opportunities across the airport property. The stream corridor also contributes to habitat diversity by supporting emergent wetland vegetation and providing aquatic and riparian features otherwise absent within maintained turf areas. While this is an important ecological function of the stream, airport projects must consider potential wildlife attractants and associated aviation safety risks. Wildlife attractants are features that provide food, water, movement corridors, and/or habitat that may increase the presence of wildlife in areas where they pose a danger to aviation safety. Per FAA Advisory Circular 150/5200-33C, *Hazardous Wildlife Attractants on or Near Airports,* the FAA recommends minimizing wildlife attractants near aircraft movement areas. Consistent with the FAA Advisory Circular, the project will be designed to maintain ecological functions and values while avoiding wildlife attractant hazards.

Approximately 1,500 feet of the unnamed intermittent stream was previously relocated in 1999. Prior to this relocation, the stream daylighted east of the railroad and continued directly east across airport property for approximately 1,500 feet before turning to the northeast into the culvert under the runway and parallel taxiway. The 1999 realignment (MnDNR PWWP 199-6034) redirected the 1,500-foot stream segment into a 2,000-foot meandered constructed channel between the runway and the south parallel taxiway to facilitate new hangar development in the airport's south building area. Special provisions of the permit included erosion and sediment control measures, excavated materials disposal requirements, invasive species prevention measures, native vegetation seed mix specifications, seasonal construction during the month of September to minimize downstream impacts, and a prohibition on mowing vegetation around the stream. At the same time, a stormwater detention basin was also constructed south of the constructed channel to allow infiltration of stormwater and limit direct runoff to the stream. Design specifications for the stream included a meander wavelength of 24-27 feet, a belt width of approximately 15 feet, a channel width of 2 to 3 feet, and a channel depth of approximately 1 foot. The 1999 Design Specifications are included in **Attachment C.** These design specifications have generally functioned as intended. To evaluate the existing channel geometry, cross sections were surveyed by design engineer Short Elliott Hendrickson, Inc., in May 2026 at 100-foot increments along the stream profile. The segment of affected existing stream included in this survey was approximately 3,068 feet in length. The stream segment conveys flow from an upstream elevation of 956.1 feet to a downstream elevation of 944.1 feet, resulting in an average channel slope of approximately 0.39 percent. The surveyed plan, profile, and cross sections are included in **Attachment D**.

To estimate the presence of suitable trout habitat, historic aerial images were analyzed to determine the water level of the stream in different years. Seven historic aerials were selected between August 2015 and February 2025, which depict the stream with minimal to no surface water. These observations were further supported by informal communication with airport staff, who indicated that the stream frequently experiences low- to no-flow conditions. The intermittent nature of the stream, combined with the absence of a trout-stream designation and the stream's primary function as a stormwater conveyance corridor, suggests the airport reach provides limited suitability for sustaining coldwater trout habitat. Historic Aerial Imagery is included in **Attachment E.**

The 1999 stream relocation permit also discusses the suitability of the stream as a trout habitat. The permit states that, "Brown trout have been caught in the area, however, the stream on airport property does not provide suitable trout habitat mainly because there is little or no flow in the channel during much of the year. These findings were confirmed in a trout stream monitoring study in the area conducted by the City of Lakeville in 1997. Results of the study were published in a report prepared by Barr Engineering dated June, 1998 and entitled 1997 Vermillion River and South Creek Tributary Monitoring Program. A copy of the report is available from the City of Lakeville upon request." The project requested a copy of the Barr Engineering report from the City on September 9, 2026. At the time of this memo, no response has been received. The permit continues, stating "Although the monitoring data indicates that the Vermillion River and lower reaches of South Creek are capable of supporting brown trout throughout most of the year, the monitoring report concluded that conditions are not favorable for the habitation and reproduction of brown trout in the South Tributary. Despite cooler temperatures and above normal precipitation in 1997, the monitoring data showed elevated stream temperatures generally above the optimum range for trout (66^{o}F), large daily temperature fluctuation, and sustained periods of little or no

flow (no measurable flow was recorded at the Cedar Avenue monitoring station from May through mid-July)." The project team is not aware of any other monitoring studies conducted within the stream reach. The 1999 Permit Document is included in **Attachment D**.

Existing channel and culvert alignments include bends within and adjacent to culvert crossings that create less favorable conditions for stream continuity and long-term maintenance. Ponding has been documented near the Taxiway B1 crossing that creates wildlife attractants and operational concerns. The ponding and associated wildlife attractant are conditions that would be improved by the proposed project.

Overall, the unnamed stream provides hydrologic conveyance, limited water quality treatment, and localized riparian habitat functions within the airport environment; however, these functions are constrained by the stream's intermittent hydrology, extensive integration with engineered airport infrastructure, and history of channel modification. The stream primarily functions as a stormwater conveyance feature and includes multiple culvert crossings, a previously relocated channel segment, documented ponding issues, and recurring low- to no-flow conditions. Historic aerial imagery, airport staff observations, and findings documented in the 1999 stream relocation permit indicate that the stream does not consistently maintain perennial flow and has historically experienced elevated water temperatures, substantial daily temperature fluctuations, and sustained periods of little or no discharge. While the stream provides connectivity to downstream waters and contributes to runoff conveyance and attenuation, the available information indicates that the airport reach exhibits limited aquatic habitat functions and does not possess many of the physical and hydrologic characteristics commonly associated with high-quality or productive coldwater trout streams.

3. Alternatives Screening

The project is evaluating five different stream alternatives. An alternatives figure is included in **Attachment F**. The stream alternatives were developed through coordination between regulatory agencies and the project design team. All alternatives were analyzed based on their practicality and ability to satisfy the project purpose and need.

The alternatives were evaluated based on the following criteria:

- Minimize wetland impacts
- Avoid reduction in stream length
    - Informal coordination with the DNR indicates that the DNR generally does not allow a reduction in stream length
- Meet shoreland vegetated buffer requirements (Minnesota Statutes §103G)
    - MnDNR Public Watercourse regulated by Minnesota Statutes §103G require a 50-foot average width, 30-foot minimum width, shoreland vegetative buffer under Minnesota Statutes §103F.48, enforced by the City of Lakeville
- Minimize wildlife hazard potential
    - Address the existing ponding at Taxiway B1 Culvert
    - Do not create new wildlife hazards
- Keeping stream daylit
    - Minimize additional culverts
    - Minimize right angles and tight bends in culvert designs

- Minimize channel modification
    - Maintain existing channel geometry (slope, alignment, floodplain connectivity, bankfull elevation)

3.1 Alternative 1

Alternative 1 closely follows the existing stream alignment, with minimal deviations from current conditions. The Alternative 1 realignment shifts only at the necessary locations to accommodate the proposed project. The stream would cross the Taxiway B1 connector at approximately the same location as the existing crossing, continue to flow within the existing swale parallel to the runway, and cross under the runway at the same location through a new replacement culvert. The stream would daylight and divert immediately to the west to avoid the proposed apron expansion. This alternative would incur 0.435 acres of wetland impacts and create an additional 342 linear feet of stream length. Alternative 1 was identified as the preferred stream relocation concept in the airport's LTCP.

Under current conditions, airport staff have noted that water pools around the Taxiway B1 culvert, which creates a wildlife hazard. If the stream remains in the same location after crossing underneath the proposed taxiway, it should be re-designed to eliminate this wildlife hazard.

While Stream Relocation Alternative 1 relocates the stream around the proposed airfield improvements, satisfying the project's purpose and need, it does not meet shoreland buffer requirements. Because the stream is a MnDNR Public Watercourse regulated by Minnesota Statutes §103G, the relocated stream would require a 50-foot average width, 30-foot minimum width, shoreland vegetative buffer under Minnesota Statutes §103F.48. If the relocated stream were to daylight at the location of the existing culvert, there would not be enough space between the stream and the proposed apron expansion to satisfy this buffer requirement. The project would require a shoreland variance from the City of Lakeville if this alternative were pursued.

3.2 Alternative 2

Alternative 2 follows a similar alignment to Alternative 1, generally maintaining the existing stream corridor. However, this alternative shifts the culvert under the runway and parallel taxiway to the northwest to meet shoreland requirements around the proposed apron expansion and avoid the need for a shoreland variance. This culvert location also reduces jogs in the alignment and eliminates the bends present in the existing culvert. This alternative would incur 0.435 acres of wetland impacts and create an additional 250 linear feet of stream length.

Alternative 2 satisfies the project purpose and need. Similar to Alternative 1, the stream would be re-designed to address the wildlife hazard created by water pooling around the existing Taxiway B1 culvert.

3.3 Alternative 3

Alternative 3 deviates substantially from the existing alignment, rerouting the stream along the perimeter of the airfield generally following Highview Avenue and 220th Street. This alignment also introduces new interactions with surrounding infrastructure, including crossings at driveways servicing the MAC maintenance building, proximity to an existing fuel farm, multiple crossings of a Metropolitan Council interceptor sewer line, and routing around the FAA-owned Runway 12 localizer antenna array and supporting equipment. The City of Lakeville, the Vermillion River Watershed Joint Powers Organization (VRWJPO), and the MnDNR have expressed a preference for this alternative, particularly due to an

increase in stream length, infiltration, and habitat benefit. This alternative would incur 0.814 acres of wetland impacts and create an additional 522 linear feet of stream length.

While Alternative 3 satisfies the project purpose and need, the relocation would incur additional construction costs and create additional hazards. This alternative presents greater constructability challenges due to its significant deviation from the existing alignment. Construction along Highview Avenue and 220th Street would require coordination with roadway right of way considerations, utilities, and multiple pieces of adjacent infrastructure. Additional infrastructure constraints include the following:

- The proximity of the stream to FAA navigational aid infrastructure (Runway 30 localizer antenna array, it's associated equipment and power building, and access road off Highview Ave) would require adherence to the shoreland vegetated buffer requirements (Minnesota Statutes §103G).
- The proximity of the stream to FAA navigational aid infrastructure would not meet FAA requirements for work adjacent to their infrastructure and require additional project cost and coordination above what is expected from the agency. To meet grading criteria, the relocated stream may need to be enclosed in a culvert.
- Alternative 3 results in the longest stream length. Because the same overall elevation change is distributed across a longer channel length, the reduced gradient may result in lower flow velocities and reduced drainage efficiency relative to the other alternatives. This condition could increase the potential for localized ponding and prolonged standing water within the stream corridor and adjacent low-lying areas, creating a potential wildlife hazard.
- The stream would cross the Metropolitan Council MCES sanitary sewer interceptor line in multiple locations and reduce cover over their utility. The sewer pipes range in size up to 14 feet in diameter. If the relocated stream must be enclosed, it would be incompatible with the sewer line.
- The small window where the MCES interceptor and FAA localizer antenna array are at their closest point will likely prove to be an area of high conflict for grading and constructing the proposed stream.
- The MAC maintenance facility and associated fueling area are in close proximity to 220th Street. There would be limited remaining space to provide the necessary stream profile and cross section, or to satisfy the shoreland vegetated buffer requirements.

While Alternative 3 reduces direct interactions with the airfield, it introduces new operational and safety considerations. The realignment around the airfield would bring the stream under the Runway 12/30 extended centerline beneath low-flying aircraft on approach and departure. This would create a wildlife hazard in an undesirable location. The stream would also cross the Runway 30 Localizer Antenna Critical Area. An additional culvert would need to enclose the stream as it passes through the Localizer Critical Area.

3.4 Alternative 4

Alternative 4 is similar to Alternative 3, but follows a shorter perimeter route generally along 200th Street, but remaining closer to the runway blast pad rather than extending to Highview Avenue. This alignment introduces similar interactions with the surrounding infrastructure, including crossings at driveways serving the MAC maintenance building, proximity to an existing fuel farm, and routing around the Runway 12 localizer. This alternative would incur 0.814 acres of wetland impacts and increase the stream length by 97 linear feet.

Alternative 4 satisfies the project purpose and need but creates additional hazards and construction costs. This relocation would put a large portion of the stream within the Runway 12 Localizer Critical Area, runway safety area, and runway object free area, and adjacent to the proposed Runway 12 blast pad. Having open water in this area would interfere with the Runway 12 localizer antenna array and create a significant wildlife hazard adjacent to the runway end. Enclosing the stream with a culvert in this area would alter the stream's existing functions and values.

3.5 Alternative 5

Alternative 5 is the same as Alternative 2, but the stream portion parallel to Runway 12/30 would be shifted southwest from the edge of the Runway 12 localizer critical area to a location well outside of it. Like Alternative 2, the culvert under the runway and parallel taxiway would be shifted northwest to meet shoreland requirements, reducing jogs in the alignment and eliminating the bends present in the existing culvert. This alternative would incur 0.814 acres of wetland impacts and create an additional 272 linear feet of stream length.

Alternative 5 satisfies the project purpose and need, and would be re-designed to address the wildlife hazard created by water pooling around the existing Taxiway B1 culvert. Because the deviation from the existing stream channel would incur additional construction costs, this alternative would only be pursued if the FAA requires this segment of the stream relocated to meet the localizer critical area grading criteria.

4. Comparative Analysis

Alternative	Change in Length	Wetland Impact	Satisfies Purpose and Need?	Additional Constraints	Determination
Existing Conditions (No Action Alternative)	None	None	No	Ponding at Taxiway B1 culvert	Does not address project Purpose and Need
Alternative 1	+342 feet	0.435 acres	Yes	Shoreland buffer	Meets project purpose and need, but creates an additional constraint
Alternative 2	+250 feet	0.435 acres	Yes	None	Meets project purpose and need; preferred alternative
Alternative 3	+522 feet	0.814 acres	Yes	Flooding, Localizer Critical Area, new wildlife hazard, interceptor sewer line, MAC maintenance facility, refueling area, potential new stream enclosure	Meets project purpose and need, but creates numerous additional constraints, increases costs and impacts to wetlands
Alternative 4	+97 feet	0.814 acres	Yes	Flooding, Localizer Critical Area, wildlife hazard, new stream enclosure	Meets project purpose and need, but creates additional constraints, increases costs and impacts to wetlands
Alternative 5	+272 feet	0.814 acres	Yes	None	Meets project purpose and need, but incurs increased costs and impacts to wetlands

5. Proposed Conditions

Alternative 2 is the MAC's preferred stream relocation alternative because it maintains the stream within a corridor similar to existing conditions while improving the alignment of key infrastructure crossings and minimizing impacts to airport operations. The realignment maintains the overall drainage pattern while eliminating the need for a shoreland variance and reducing abrupt directional changes in the stream alignment.

The preferred alternative would maintain the existing drainage area served by the stream and preserve downstream connectivity to South Creek and the Vermillion River watershed. Based on VRWJPO requirements, peak discharge rates for the proposed project are required to be less than or equal to pre-construction levels. The project intends to modify and expand the existing stormwater management facilities, including increasing available storage volume, modifying outlet control structures, and improving conveyance to the basins prior to offsite discharge, in order to meet these requirements. Final peak rate control measures will be confirmed during subsequent design phases following completion of the stormwater model and incorporation of existing stormwater facilities. The relocated stream would continue to function as the primary conveyance feature for stormwater runoff generated within the airport property while accommodating planned airport improvements. Preliminary design criteria for the relocated stream have been developed to preserve the existing stream's geomorphic characteristics. The proposed alignment increases stream length by approximately 250 feet while maintaining a comparable longitudinal slope (0.36 percent versus 0.39 percent existing). Final design will utilize channel dimensions, meander geometry, and bankfull characteristics comparable to the existing stream to maintain similar hydraulic conditions and floodplain interaction.

The preferred alternative would continue to provide water quality functions by maintaining connections with adjacent vegetated areas. These vegetated areas would provide sediment filtration and would slow overland flow, reducing the rate stormwater enters the stream. Additional erosion and sediment control best management practices would be implemented during construction to minimize temporary impacts to water quality and downstream resources. Preliminary coordination with the U.S. Army Corps of Engineers (USACE) emphasized the need to maintain the existing floodplain connectivity. Final design will establish bankfull elevations and adjacent grading that allow overbank flow to access floodplain areas at frequencies comparable to the existing stream. The project is not intended to create a deeply incised channel or disconnect the stream from adjacent wetland and floodplain features.

This alternative also minimizes wetland impacts. The proposed culvert replacement reduces the number of directional changes required adjacent to the proposed apron expansion compared to Alternative 1. The replacement of the existing corrugated metal culvert which is in deteriorating condition with a concrete culvert is anticipated to reduce long-term maintenance requirements.

The preferred alternative would maintain the stream's ecological and habitat functions by preserving an open-channel stream corridor through the project area. Existing ecological and habitat functions within the airport reach are primarily associated with riparian vegetation and emergent wetland communities. Final design will provide a vegetated open-channel corridor and maintain connectivity to adjacent wetlands and riparian habitats. Unlike alternatives requiring extensive relocation along railroad and roadway corridors and additional enclosed conveyance systems, Alternative 2 maintains a stream alignment generally consistent with existing conditions and preserves opportunities for riparian vegetation. The 1997

Vermillion River and South Creek Tributary Monitoring Program determined that high-quality coldwater fish habitat is not present within the airport reach. The construction stormwater permit requires the project to minimize any increase in temperature to the downstream trout stream resulting from the 1- or 2-year, 24-hour storm event. Best management practices will be implemented during final design to ensure the project will not have a negative impact on downstream water temperature.

Alternative 2 represents the alternative that best balances airport development needs with the preservation of stream functions and values. Alternative 2 is anticipated to maintain the primary hydrologic, water quality, habitat, and conveyance functions currently provided by the existing stream while addressing existing operational constraints associated with aging infrastructure, wildlife attractants, and airport expansion needs. Coordination with the MnDNR is on-going to determine the ideal bankfull geometry and channel dimensions in order to maintain and improve the existing functions. Initial agency recommendations indicate that the relocated stream should maintain the existing channel geometry to the extent possible. Preliminary plan, profile, and cross sections were developed for Alternative 2. These preliminary designs show the stream as approximately 3,318 feet long, representing an increase of approximately 250 linear feet. The proposed upstream and downstream elevations would remain consistent, resulting in an average channel grade of approximately 0.36 percent, similar to existing conditions. Preliminary plan, profile, and cross sections are included in **Attachment G**. Final design will be developed to preserve stream continuity and maintain hydrologic and geomorphic functions being provided by the existing stream.

6. Conclusion

The MAC is proposing improvements at Airlake Airport including the relocation of approximately 1,000 linear feet of an unnamed intermittent stream. The existing conditions of the stream were evaluated to ensure the functions and values will be maintained post construction. These functions include stormwater conveyance, maintenance of downstream hydrologic connectivity, attenuation and treatment of runoff through adjacent wetlands and vegetated corridors, and retention of riparian habitat within an otherwise developed airport environment.

Five stream relocation alternatives were evaluated on their ability to satisfy the project's purpose and need while minimizing impacts to the existing stream functions and values. Alternative 2 was identified as the preferred alternative because it satisfied the project's purpose and need while preserving the stream's existing functions and values.

Final stream design will be developed in coordination with the MnDNR and other regulatory agencies. Preliminary coordination with the MnDNR recommends maintaining the existing channel dimensions and geometry to the extent practicable. Final design will aim to preserve the length, slope, conveyance capacity, floodplain interaction, and riparian functions of the existing stream to the greatest extent possible. Because the existing stream functions are largely associated with stormwater conveyance, hydrologic connectivity, water quality treatment, and riparian habitat rather than high-quality coldwater aquatic habitat, Alternative 2 is anticipated to maintain the primary functions and values of the existing stream while supporting implementation of the proposed airport improvements.

Attachment A – Proposed Action Figure

PROPOSED ACTIONS:

1. RECONSTRUCT THE EXISTING 4,099 FEET OF RUNWAY 12/30 PAVEMENT AND TAXIWAYS A1-A5, B, B1-B2, AND PORTIONS OF TAXIWAY A.
2. LENGTHEN RUNWAY 12/30 TO 4,850 FEET BY EXTENDING THE RUNWAY 12 END APPROXIMATELY 271 FEET AND EXTENDING THE RUNWAY 30 END APPROXIMATELY 480 FEET. SHIFT THE RUNWAY 12 LANDING THRESHOLD 120 FEET EAST TO PROVIDE A CLEAR APPROACH SURFACE OVER THE RAILROAD AND REVISE RUNWAY 12 INSTRUMENT APPROACH PROCEDURES ACCORDINGLY. THE FULL 4,850 FEET WILL BE AVAILABLE TO TORA/TODA/ASDA, WHILE REDUCED LDA WILL BE EMPLOYED TO MITIGATE APPROACH SURFACE OBSTRUCTIONS.
3. EXTEND TAXIWAYS A & B TO, RELOCATE TAXIWAYS A1 & B1 TO, AND CONSTRUCT NEW HOLDING BAYS NORTH AND SOUTH OF THE NEW RUNWAY 12 END.
4. EXTEND TAXIWAY A TO, RELOCATE TAXIWAY A5 TO, AND CONSTRUCT A NEW HOLDING BAY NORTH OF THE NEW RUNWAY 30 END.
5. MODIFY TAXIWAYS A AND A1 TO ALLOW AIRCRAFT TO HOLD PERPENDICULAR TO THE RUNWAY CENTERLINE.
6. MODIFY RUNWAY 30 MALSR TO INCLUDE NEW IN-PAVEMENT LIGHTS AND ADJUSTED LIGHT TOWER HEIGHTS.
7. EXTEND RUNWAY EDGE LIGHTING AND RELOCATE AIRFIELD GUIDANCE SIGNS.
8. REMOVE ON-AIRPORT TREES WITHIN PART 77, APPROACH, AND DEPARTURE SURFACES. MITIGATE OTHER OBSTRUCTIONS AND OBSTACLES AS DETERMINED IN AN AERONAUTICAL STUDY.
9. REVISE INSTRUMENT APPROACH AND DEPARTURE PROCEDURES TO CORRESPOND WITH THE NEW RUNWAY END AND DISPLACED THRESHOLD LOCATIONS.
10. RELOCATE 225TH STREET W OUTSIDE THE RUNWAY 30 RPZ ON THE EAST SIDE OF CEDAR AVENUE.
11. RELOCATE STREAM ON AIRPORT PROPERTY AS NECESSARY TO ACCOMMODATE PROPOSED IMPROVEMENTS.
12. RELOCATE APRON TO PARALLEL TAXIWAY CONNECTOR SEGMENT OF TAXIWAY A2 TO ADDRESS DIRECT ACCESS FROM APRON TO RUNWAY.
13. REMOVE ACCESS ROAD FROM RUNWAY 12/30 TO GLIDESLOPE FACILITY AND RELOCATE MALSR EQUIPMENT SHELTER ACCESS ROAD.
14. RECONSTRUCT BLAST PADS ON BOTH RUNWAY ENDS TO MEET DESIGN STANDARDS.
15. EXPAND THE FIXED BASE OPERATOR (FBO) AIRCRAFT PARKING APRON.
16. RELOCATE PUBLIC AIRCRAFT VIEWING AREA.
17. EXPAND STORMWATER INFILTRATION BASIN.

TREES TO BE REMOVED (TYP)

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #2

INTERMITTENT STREAM

STREAM RELOCATION

220TH STREET W

CEDAR AVENUE

AIRPORT PROPERTY LINE

ULTIMATE 271' EXTENSION

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #1

HIGHVIEW AVENUE

225TH STREET W

EXISTING RUNWAY 12/30 - 75' X 4,099'

TAXIWAY A

TAXIWAY B

AREA OF POTENTIAL EFFECTS

AIRPORT PROPERTY LINE

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #3

ARCHAEOLOGY AND WETLANDS GROUND DISTURBANCE LIMITS

ULTIMATE 480' EXTENSION

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #4

225TH STREET W RELOCATION OUTSIDE OF RUNWAY 30 RPZ ON WEST SIDE OF CEDAR AVENUE WAS CLEARED UNDER MINNESOTA ENVIRONMENTAL ASSESSMENT WORKSHEET FINDING DATED APRIL 2026, NOT SUBJECT TO NEPA

LEGEND:

	TREE REMOVAL
	PAVEMENT REMOVAL
	NEW AND/OR REPURPOSED PAVEMENT
	AIRPORT PROPERTY LINE
	ARCHAEOLOGY AND WETLANDS GROUND DISTURBANCE LIMITS
	HISTORIC ARCHITECTURE AREA OF POTENTIAL EFFECTS
	STREAM RELOCATION

N

0 400 800

AIRLAKE AIRPORT
LAKEVILLE, MINNESOTA

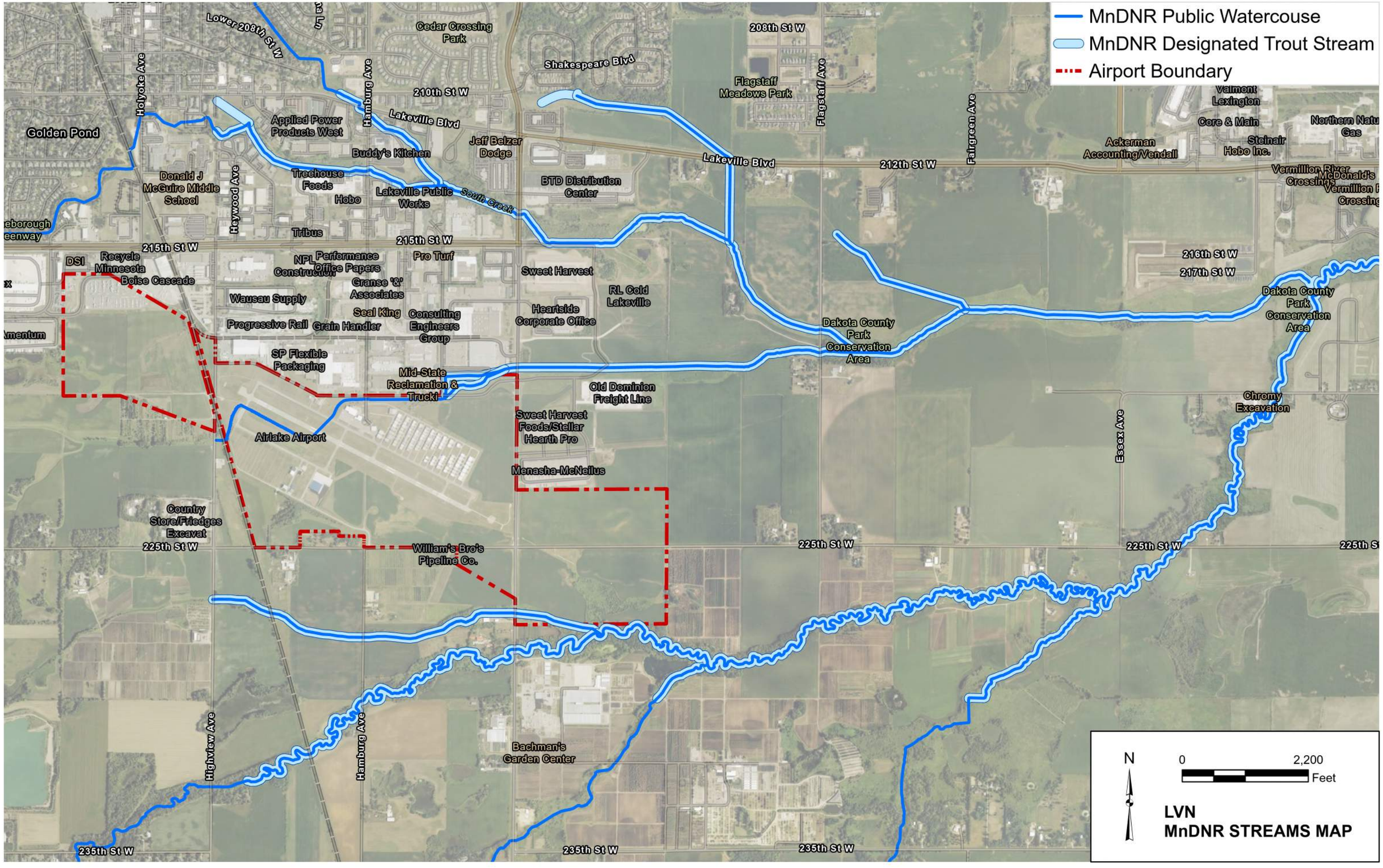
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MAY 2026

AIRPORT SPONSOR'S PROPOSED PROJECT

FIGURE 2.7

9/9/2026 10:49:36 AM
X:\2838700\220268.01\TECH\CAD\2026 DRP LTCP FIGURES\220268.01 - AREA OF POTENTIAL EFFECTS EXHIBIT FIGURE 2.7.DWG

Attachment B - Designated Trout Streams


MnDNR Public Watercouse
MnDNR Designated Trout Stream
Airport Boundary
Lower 208th St W
Cedar Crossing Park
208th St W
Shakespeare Blvd
Holyoke Ave
Hamburg Ave
210th St W
Lakeville Blvd
Flagstaff Meadows Park
Flagstaff Ave
Fairgreen Ave
Valmont Lexington
Core & Main
Northern Natu Gas
Golden Pond
Applied Power Products West
Jeff Belzer Dodge
Buddy's Kitchen
Ackerman Accounting/Vendall
Steinair Hobo Inc.
Donald J McGuire Middle School
Heywood Ave
Treehouse Foods
Hobo
Lakeville Public Works
South Creek
BTD Distribution Center
212th St W
Vermillion River Crossings
McDonald's
Tribus
215th St W
216th St W
217th St W
DSI
Recycle Minnesota
Boise Cascade
NPL Construction
Performance Office Papers
Pro Turf
Sweet Harvest
Granse '&' Associates
RL Cold Lakeville
Wausau Supply
Seal King
Consulting Engineers Group
Heartside Corporate Office
Progressive Rail
Grain Handler
Dakota County Park Conservation Area
SP Flexible Packaging
Mid-State Reclamation & Trucki
Old Dominion Freight Line
Chromy Excavation
Sweet Harvest Foods/Stellar Hearth Pro
Essex Ave
Airlake Airport
Menasha-McNeilus
Country Store/Friedges Excavat
225th St W
William's Bro's Pipeline Co.
Highview Ave
Bachman's Garden Center
235th St W
N
0
2,200
Feet
LVN
MnDNR STREAMS MAP

Attachment C – 1999 Stream Relocation Permit Document

Minnesota Department of Natural Resources
Metro Waters - 1200 Warner Road, St. Paul, MN 55106-6793
Telephone: (651) 772-7910 Fax: (651) 772-7977

September 1, 1999

Metropolitan Airports Commission
c/o David Dahlquist
HNTB Corporation
3400 West 66th Street, Suite 250
Minneapolis, Minnesota 55435

RE: DNR Permit #99-6034, Realignment of an Unnamed Tributary to the Vermillion River, Airlake Airport, Dakota County

Dear Mr. Dahlquist:

Enclosed is DNR Permit #99-6034, authorizing the realignment and filling of approximately 1,500 feet of an unnamed tributary to the Vermillion River as part of the *South Building Area Development* plan at the Airlake Airport in Lakeville/Eureka Township.

Please read all terms and conditions of your permit carefully. In particular, note Special Provisions #5 and #6. Special Provision #5 requires specific vegetation management and prohibits mowing of the new channel and floodplain. It also requires notification to the DNR Stream Habitat Specialist at least five working days prior to planting.

Special Provision #6 requires the connection of the existing channel to the new channel occur between September 1 and October 1 to minimize downstream impacts.

The coordination and cooperation you and the grading contractor have exhibited is commendable. Stream Habitat Specialist Jason Moeckel (651-772-7965) will continue to be available to provide technical assistance throughout the project. If you have questions about your permit, please direct them to Area Hydrologist Pat Lynch at 651-772-7917.

Sincerely,

Dale E. Homuth
Regional Hydrologist

enclosure

c: Metropolitan Airports Commission, Bridget Rief
City of Lakeville, Keith Nelson
Dakota County SWCD, Brian Watson
Vermillion River WMO
U.S. Army Corps of Engineers, Gary Elftmann
DNR Conservation Officer, Ross Opsahl
DNR Fisheries, Dave Zappetillo
DNR Wildlife, Diana Regenscheid
DNR Stream Habitat Specialist, Jason Moeckel
DNR Trout Stream Watershed Coord., Kevin Bigalke
Central Waters, Ron Anderson
Dakota County Unnamed Watercourse File

FA-02733-05
REGION 6
REV. 3/96

Department of Natural Resources
Division of Waters

PROTECTED WATERS PERMIT

Permit Number

99-6034

Pursuant to Minnesota Statutes, Chapter 103G, and on the basis of statements and information contained in the permit application, letters, maps, and plans submitted by the applicant and other supporting data, all of which are made a part hereof by reference, **PERMISSION IS HEREBY GRANTED** to the applicant to perform the work as authorized below:

Protected Water	*County*
Unnamed tributary to the Vermillion River	Dakota
Name of Permittee	*Telephone Number (include Area Code)*
Metropolitan Airports Commission, c/o HNTB Corporation, David Dahlquist	(612) 920-4668
Address (No. & Street, RFD, Box No. City, State, Zip Code)	
3400 West 66th Street, Suite 250, Minneapolis, Minnesota 55435	
Authorized Work:	
Fill and redirect approximately 1,500 feet of stream channel to a meandered constructed channel, in accordance with the Design Specifications for Trout Stream Relocation at Airlake Airport, dated September, 1998 to facilitate the South Building Area Development at the Airlake Airport; as per the terms and conditions herein.	
Purpose of Permit	*Expiration Date of Permit*
Relocation of watercourse to facilitate expansion of existing airport	November 30, 2000
Property Described as:	
Airlake Airport located in the NW¼ Section 4, T113N-R20W	
Address of Property, if Known:	
As Indicated in General Provision No. 11:	
The Ordinary High Water Elevation (top of bank of channel)	

This permit is granted **subject to** the following **GENERAL** and **SPECIAL PROVISIONS**:

GENERAL PROVISIONS

1. The **permittee** is not released from any rules, regulations, requirements, or standards of any applicable federal, state, or local agencies; including, but not limited to, the U.S. Army Corps of Engineers, Board of Water and Soil Resources, MN Pollution Control Agency, watershed districts, water management organizations, county, city and township zoning. This permit does not release the **permittee** of any permit requirements of the St. Paul District, U.S. Army Corps of Engineers, Army Corps of Engineers Centre, 190 Fifth Street East, St. Paul, MN 55101-1638.

2. This permit is not assignable by the **permittee** except with the written consent of the Commissioner of Natural Resources.

3. The **permittee** shall notify the Area Hydrologist at least five days in advance of the commencement of the work authorized hereunder and notify him/her of its completion within five days. The Notice of Permit issued by the Commissioner shall be kept securely posted in a conspicuous place at the site of operations.

4. The **permittee** shall make no changes, without written permission previously obtained from the Commissioner of Natural Resources, in the dimensions, capacity, or location of any items of work authorized hereunder.

5. The **permittee** shall grant access to the site at all reasonable times during and after construction to authorized representatives of the Commissioner of Natural Resources for inspection of the work authorized hereunder.

6. This Permit may be terminated by the Commissioner of Natural Resources at any time deemed necessary for the conservation of water resources of the state, or in the interest of public health and welfare, or for violation of any of the provisions of this permit, unless otherwise provided in the Special Provisions.

7. Construction work authorized under this permit shall be completed on or before date specified above. The **permittee** may request an extension of time to complete the project, stating the reason thereof, upon written request to the Commissioner of Natural Resources.

8. In all cases where the permittee by performing the work authorized by this permit shall involve the taking, using, or damaging of any property rights or interests of any other person or persons, or of any publicly owned lands or improvements thereon or interests therein, the permittee, before proceeding, shall obtain the written consent of all persons, agencies, or authorities concerned, and shall acquire all property, rights and interests needed for the work.

9. This permit is permissive only. No liability shall be imposed by the State of Minnesota or any of its officers, agents or employees, officially or personally, on account of the granting hereof or on account of any damage to any person or property resulting from any act or omission of the permittee or any of its agents, employees, or contractors. This permit shall not be construed as estopping or limiting any legal claims or right of action of any person other than the state against the permittee, its agents, employees, or contractors, for any damage or injury resulting from any such act or omission, or as estopping or limiting any legal claim or right of action of the state against the permittee, its agents, employees, or contractors for violation of or failure to comply with the permit or applicable provisions of law.

10. Any extension of the surface of public waters resulting from work authorized by this permit shall become protected waters and left open and unobstructed for use by the public.

11. No material excavated by authority of this permit nor material from any other source, except as specified herein, shall be placed on any portion of the bed of said waters which lies below (as indicated above.)

12. Where the work authorized by this permit involves the draining, filling or burning of wetlands not subject to DNR jurisdiction, the permittee shall not initiate any work under this permit until the permittee has obtained official approval from the responsible governmental unit as required by the Minnesota Wetlands Conservation Act of 1991.

SPECIAL PROVISIONS

1. Erosion control measures shall be adequately designed for the site characteristics. They may include staked haybales, diversion channels, sediment ponds, or sediment fences. They shall be installed in accordance with "Protecting Water Quality in Urban Areas - Best Management Practices for Minnesota" MPCA, October 1989, prior to commencement and maintained throughout the project. All exposed soil shall be stabilized as soon as possible and no later than 72 hours after the completion of the project. Topsoil should be used to re-dress disturbed soil areas and indigenous plant species should be used to revegetate disturbed areas whenever possible.

2. Upon completion of the authorized work, the permittee shall submit representative photographs and any as-built surveys, as appropriate, of the project area to DNR Metro Region Waters (1200 Warner Road, St. Paul, MN 55106).

3. Excavated materials must be deposited or stored in an upland area, in a manner where the materials will not be redeposited into the protected water by reasonably expected high water or runoff.

4. The permittee shall monitor all disturbed areas for the presence of purple loosestrife and control the plant as described in the enclosed pamphlet titled Purple Loosestrife Alert. The DNR aquatic plant manager should be contacted at 651-772-7950 for permit needs and additional information.

5. The constructed channel and its floodplain, a minimum of two rods wide shall be seeded, using MNDOT Mix 25A, and shall not be mowed. In addition to Seeding, the banks on both sides of the new channel, except the point bars, shall be planted with two-foot long live stake willows, two rows deep, at two-foot spacing. Prior to the willow planting, please notify Jason Moeckel, DNR Stream Habitat Specialist, at 651-772-7965 a minimum of five working days in advance of the planting.

6. The connection between the existing and new channel shall occur between the dates of September 1 and October 1 to minimize downstream impacts to the trout stream.

c: Metropolitan Airports Commission, Bridget Rief
City of Lakeville, Keith Nelson
Dakota County Soil and Water Conservation District, Brian Watson
Vermillion River Watershed Management Organization
U.S. Army Corps of Engineers, Gary Elftmann
DNR Conservation Officer, Ross Opsahl
DNR Fisheries, Dave Zappetillo
DNR Wildlife, Diana Regenscheid
DNR Stream Habitat Specialist, Jason Moeckel
DNR Trout Stream Watershed Coordinator, Kevin Bigalke
Central Waters, Ron Anderson
Dakota County Unnamed Watercourse File

Authorized Signature	*Title*	*Date*
Dale E. Homuth	Regional Hydrologist	Sept. 1, 1999

Department of Natural Resources
Division of Waters

PROJECT EVALUATION CHECKLIST AND RECOMMENDATION

PA #: 99-6034 **APPL. TYPE (A or P):** PW **TODAY'S DATE:** 9-2-99

Appl. Name: Metropolitan Airports Comm. **Res. Name & ID#:** Unnamed tributary to the Vermillion River (trout stream)

Brief Description of Project:
re-direct ≈ 1500' of altered natural watercourse in to a new, meandered channel.

Field Inspection Made: X Yes (several) _ No **Mitigation Involved:** X Yes _ No (in form of channel design + plantings)

- ✓ Comments from Local Units have been received and considered or 30 days has expired.
- ✓ Comments from DNR Fish & Wildlife, PCA, Met Council, COE, etc. have been considered.
- ✓ Permit Rules have been reviewed as to how they relate to this application.
- ✓ Local Zoning and Water Planning requirements and issues have been considered.
- ✓ Environmental Review (EAW, EIS, AUAR) is either not needed or the process has been completed.
- ✓ The Permit is being issued to the Owner of the property, or appropriate leases have been obtained.
- ✓ N/A If the project involves a structure, a recorded permit is not required.
- ✓ N/A If the project involves roadway fill, a waiver from the Commissioner is not required.
- ✓ N/A The project does not require legislative approval (Appropriation).
- ✓ All necessary fees have been received.
- ✓ I have reviewed the Delegation Order and the draft permit is prepared for the correct signature.

RECOMMENDATION, DISCUSSION, AND RATIONALE FOR RECOMMENDATION:

This project was designed before the pwi. maps were amended to reflect trout stream additions. At the time of design the subject watercourse was not protected. MAC began construction of a new channel before being stopped.

An EAW was conducted, and MAC worked with Jason Moeckel to design a meandered channel and floodplain, and a vegetation plan.

EAW process is completed and new channel, constructed last year, is now stable enough to redirect the existing channel in to. MAC is moving the stream to construct new hangar areas

Name of Reviewer: PJ Gothe **Approval of Area Hydrologist:** PJG

c: Wayne Barstad, Eco Serv.

Minnesota Department of Natural Resources

1200 Warner Rd., St. Paul, MN 55106

11 August 1999

Mr. Nicholas D. DeBar
Airport Engineer
HNTB
3400 West 66th Street, Suite 250
Minneapolis, MN 55435-2133

Dear Mr. DeBar,

As you requested during our recent meeting at Airlake Airport, I am providing written comments from DNR and Dakota SWCD regarding the status of the realigned channel and strategy to proceed.

Over most of the new channel, the vegetation has improved significantly compared to a month ago. The only exception is at the downstream end of the new channel, where water has ponded. The channel in this area needs to be reconstructed and vegetation established before the stream is connected. The only feasible way of doing that is probably laying sod along that portion, so that a minimum of two rows of sod cover the exposed soil on either side of the streambank and then seed and mulch beyond the sod. Portions of the new channel need to have sediment that built up behind the straw bales removed to establish a consistent channel throughout. Several rills have developed on the adjacent slopes due to concentrated flow. Every effort should be made to disperse overland flow and stabilize these rills. Silt fence needs to be installed at the top of the slope along the southern edge of the new stream prior to initiating further grading activities. The gully in the SW quadrant of the culvert crossing at the NE corner of the site also needs to be repaired.

We discussed two options for connecting the new channel to the existing waterway. First, the most conservative approach would be to place willow livestakes along the banks this fall and allow them to establish through next spring and summer, then connect the channel. Willows will provide excellent root structure similar to that along the existing channel and increase the likelihood of a stable channel. The second approach would be to connect the channel after September 1 but before October 1, 1999 to minimize sediment inputs during warm water conditions and spawning of trout, which generally occurs in October. Willow livestakes should still be planted this fall, as soon as vegetation has gone dormant.

If you have any questions, I can be reached at (651) 772-7965.

Sincerely,

Jason B. Moeckel

Jason B. Moeckel
Stream Habitat Specialist

METROPOLITAN AIRPORTS COMMISSION

Minneapolis-Saint Paul International Airport
6040 - 28th Avenue South • Minneapolis, MN 55450-2799
Phone (612) 726-8100 • Fax (612) 726-5296

April 29, 1999



To: EAW Distribution List and Commentors
Interested Parties
(List attached)

Re: Airlake Airport
South Building Area Development
Environmental Assessment Worksheet

On April 28, 1999, the Metropolitan Airports Commission (MAC) formally adopted the attached Findings of Fact, Conclusions, and Recommendation for the Environmental Assessment Worksheet (EAW) prepared for the Airlake Airport South Building Area Development project. Based on the EAW, comments received, and the attached responses to those comments, the potential adverse environmental effects from the project have been adequately identified and addressed by appropriate mitigative measures. The Commission recommendation was that further environmental review in an Environmental Impact Statement (EIS) is not warranted.

Please contact Ms. Bridget Rief, Assistant Airport Engineer, at the above address if you have any questions.

Sincerely,

Nigel D. Finney
Deputy Executive Director
Planning and Environment

AIRLAKE AIRPORT SOUTH BUILDING AREA DEVELOPMENT PROJECT
EAW DISTRIBUTION LIST
(1-25-99)

ENVIRONMENTAL QUALITY BOARD (1 copy) Jon Larsen Environmental Review Program 300 Centennial Office Building 658 Cedar Street St. Paul, MN 55155	**BOARD OF WATER AND SOIL RESOURCES** (1 copy) Doug Thomas One West Water Street, Suite 200 St. Paul, MN 55107
DEPARTMENT OF PUBLIC SERVICE (1 copy) Susan Kosowski 200 Metro Square Building 121 7th Place East St. Paul, MN 55101	**HISTORICAL SOCIETY** (1 copy) State Historic Preservation Office 345 Kellogg Boulevard West St. Paul, MN 55102
DEPARTMENT OF NATURAL RESOURCES (3 copies) Tom Balcom Office of Planning 500 Lafayette Road, Box 10 St. Paul, MN 55155	**LEGISLATIVE REFERENCE LIBRARY** (2 copies) Carol Blackburn 645 State Office Building St. Paul, MN 55155
POLLUTION CONTROL AGENCY (3 copies) Paul Hoff Environmental Analysis Office 520 Lafayette Road St. Paul, MN 55155	**ENVIRONMENTAL CONSERVATION LIBRARY** (2 copies) 300 Nicollet Mall Minneapolis, MN 55401
DEPARTMENT OF TRANSPORTATION (3 copies) Gerald Larson Mn/DOT Environmental Services 3485 Hadley Avenue North Oakdale, MN 55128	**U.S. ARMY CORP OF ENGINEERS** (1 copy) Ben Wopat, Chief Regulatory Functions Branch Army Corps of Engineers Centre 190 Fifth Street East St. Paul, MN 55101-1638
DEPARTMENT OF HEALTH (1 copy) Environmental Health Division 121 East 7th Place, Suite 220 St. Paul, MN 55101	**U.S. ENVIRONMENTAL PROTECTION AGENCY** (1 copy) William D. Franz Chief of Environmental Review 77 West Jackson Boulevard Chicago, IL 60604-3590
DEPARTMENT OF AGRICULTURE (1 copy) Becky Balk 90 West Plato Boulevard St. Paul, MN 55107	**U.S. FISH AND WILDLIFE SERVICE** (1 copy) Twin Cities Field Office E.S. 4101 East 80th Street Bloomington, MN 55425-1665
VERMILLION RIVER WATERSHED MGMT COMMISSION (1 copy) Steve Woods c/o Montgomery Watson 505 U.S. Highway 169, Suite 555 Minneapolis, MN 55441	**METROPOLITAN COUNCIL** (1 copy) Lynda Voge, Referrals Mears Park Centre 230 East Fifth Street St. Paul, MN 55101
DAKOTA COUNTY (1 copy) Jack Ditmore Office of Planning 14955 Galaxie Avenue Apple Valley, MN 55124	**DAKOTA CO. SOIL & WATER CONSERVATION DISTRICT** (1 copy) Brian Watson 4100 220th Street West, Suite 102 Farmington, MN 55024
EUREKA TOWNSHIP (1 copy) Cheryl Schindeldecker, Chair Eureka Town Board 26600 Ipava Avenue West Lakeville, MN 55044	**METROPOLITAN AIRPORTS COMMISSION** (4 copies) Bridget Rief 6040 28th Avenue South Minneapolis, MN 55450
CITY OF LAKEVILLE (1 copy) Keith Nelson, City Engineer 20195 Holyoke Avenue Lakeville, MN 55044	**CITY OF FARMINGTON** (1 copy) Lee Mann, City Engineer/Public Works Director 325 Oak Street Farmington, MN 55024

AIRLAKE AIRPORT SOUTH BUILDING AREA DEVELOPMENT PROJECT
EAW DISTRIBUTION LIST
(1-25-99)

DAKOTA COUNTY LIBRARY-FARMINGTON (1 copy) Andrew Cook 508 3rd Street Farmington, MN 55024	**GALAXIE LIBRARY (1 copy)** Kalla Kalloway 14955 Galaxie Avenue Apple Valley, MN 55124
DEPARTMENT OF NATURAL RESOURCES (1 copy) Kevin Bigalke Metro Trout Stream Watershed Coordinator Division of Waters 1200 Warner Road St. Paul, MN 55106	

Barbara Conti
Minnesota Pollution Control Agency
Environmental Analysis Office
520 Lafayette Road
St. Paul, MN 55155

Paul Nelson
Vermillion River Watershed Management Commission
c/o Montgomery Watson
505 U.S. Highway 169, Suite 555
Minneapolis, MN 55441

Helen Boyer
Metropolitan Council
Mears Park Centre
230 East Fifth Street
St. Paul, MN 55101

Jay Riggs
Dakota County SWCD
4100 220th Street West, Suite 102
Farmington, MN 55024

Beth Zdon, Reference Coordinator
Dakota county Library
1340 Wescott Road
Eagon, MN 55123-1099

John Hunt
Trout Unlimited
P.O. Box 11465
St. Paul, MN 55111

Dennis Miranowski, Chair
Vermillion River WMO
c/o City of Apple Valley
14200 Cedar Avenue
Apple Valley, MN 55124

Scott Peters
Mn/DOT – Metro Division
Waters Edge
1500 West County Road B2
Roseville, MN 55113

AIRLAKE AIRPORT
SOUTH BUILDING AREA DEVELOPMENT
ENVIRONMENTAL ASSESSMENT WORKSHEET

FINDINGS OF FACT, CONCLUSIONS, AND RECOMMENDATION

Background

In January, 1999, the Metropolitan Airports Commission (MAC), acting as the Responsible Governmental Unit (RGU), prepared an Environmental Assessment Worksheet (EAW) for the above project as required by the Environmental Quality Board for relocation of a designated trout stream. The purpose of the EAW is to disclose information about potential environmental impacts associated with the project.

The Airlake Airport is a 565-acre public use facility located in Dakota County within both the City of Lakeville and Eureka Township. Airlake Airport, owned and operated by MAC since 1981, is classified as a minor use airport in the Metropolitan Council's Regional System Plan. The airport is currently served by one asphalt runway, a taxiway, and a building area on the north side of the airport. The airport is a designated reliever for the Minneapolis – St. Paul International Airport, and serves as an instrument landing system training facility. In October, 1997, MAC adopted a Long Term Comprehensive Plan (LTCP) Update which included a recommendation that a new building area be developed on available open land on the south side of the airport to accommodate the demand for additional aircraft storage and supporting aviation facilities.

The initial planning and design of the new building area was conducted in 1993-1994. During this time, various governmental agencies including the City of Lakeville, Eureka Township, Dakota County, and the Vermillion River Watershed Management Commission were contacted regarding applicable permits and approvals. Originally scheduled for construction in 1994-1995, the project was delayed for various reasons. In early 1998 when the project began to move forward again, the same governmental agencies were contacted regarding the project. At that time, MAC was not informed of recent changes made in the regulatory status of the stream located on airport property, and remained unaware of the changes until after construction was started in July, 1998. The Minnesota Department of Natural Resources (DNR) Protected Waters Inventory Map for Dakota County was revised in December of 1996 and was made available to the general public, but was only distributed to the following three county agencies: Auditor; Soil and Water Conservation District; and the Highway Department. Similar maps showing designated trout streams were not available from the DNR until 1996. The stream on airport property was officially designated as a trout stream by the DNR in December of 1994 after a judge's ruling providing clarification that trout stream designation applied to the main branch and its tributaries. Although Dakota County was notified sometime in 1996 of the ruling, public hearings were not held on this matter, and property owners were not notified.

Upon learning of the stream designation in August, 1998, MAC halted construction in the vicinity of the stream. The existing ditch had not yet been disturbed, and continues to convey flows as it did before the start of construction. The DNR informed MAC that a permit would be required to relocate the existing drainage ditch, and it was determined at that time that an EAW was mandatory under Minnesota Rules 4410.4300, Subpart 26 (Stream Diversion). MAC has worked closely with the DNR to address concerns about the design and construction of the relocated trout stream channel section, including provisions for meandering the channel and planting native grasses along the streambank to make it more conducive to trout. The relocated channel will be maintained as a "no-mow" zone, consistent with the existing channel. This will help provide a buffer to filter overland storm water runoff prior to reaching the channel.

Copies of the EAW were distributed to the Environmental Quality Board (EQB), governmental agencies included on the official EQB mailing list, and other interested parties on January 25, 1999. Availability of the EAW was published in the February 8, 1999 EQB Monitor, and copies of the report have been available upon request for public review at the Metropolitan Airports Commission's offices. A public notice was also published in the *Lakeville Life and Times* newspaper on January 30, 1999, and copies of the EAW were available for review at the Galaxie Public Library in Apple Valley, and the Dakota County Public Library in Farmington.

During the comment period, which ended on March 10, 1999, seven (7) comment letters were received. Responses to the letters are included in Appendix A.

Findings of Fact

1. The EAW did not find the potential for a significant environmental impact from the proposed project.

2. A total of seven (7) comment letters were received on the EAW. Those submitting comments were: Dakota County Office of Planning; Dakota County Soil and Water Conservation District (SWCD); Metropolitan Council; Minnesota Department of Natural Resources (DNR); Minnesota Department of Transportation, Metro Office; Minnesota Pollution Control Agency (PCA); and Montgomery Watson, the watershed engineer for the Vermillion River Watershed Management Organization (VRWMO).

3. The major concerns are trout habitat, quality of receiving waters, and control of erosion and sedimentation.

4. The comments received on the EAW do not state that the proposed project has the potential for a significant environmental impact and do not indicate that an EIS should be prepared.

5. General characteristics of a trout stream include cool, clean water, stable temperatures and water flows, gravel bottoms, and low sediment load. One of the main criteria for long-term trout survival is a cold water habitat during the warm summer months. Brown trout have been caught in the area; however, the tributary on the airport property does not provide suitable trout habitat mainly because there is little or no flow in the channel much of the year. These findings were confirmed in a trout stream monitoring study in the area conducted by the City of Lakeville in 1997. Results of the study were published in a report prepared by Barr Engineering dated June, 1998, entitled 1997 Vermillion River and South Creek Tributary Monitoring Program.

6. A Minnesota DNR Protected Waters Permit is required prior to relocation of the stream channel. A General Stormwater Discharge Permit for Construction Activity was issued by the Minnesota PCA on July 14, 1998.

7. The project includes the following mitigation measures:

   - Implementing and maintaining temporary and permanent erosion and sediment control measures;
   - Meandering the new stream channel and planting native vegetation along the streambank to provide trout habitat;
   - Routing storm water runoff from developed portions of the building area through a detention pond/infiltration basin prior to reaching the stream channel;
   - Maintaining existing peak flow rates from the site;
   - Routing drainage from adjacent undeveloped areas, including flows from existing cold water springs, through grassed swales prior to discharging into the stream channel.

Conclusions

Given the above mitigation measures, the project does not have the potential for significant environmental effects during and after construction of the building area, and therefore, an environmental impact statement (EIS) is not necessary.

Recommendation

Based on the Environmental Assessment Worksheet prepared for the Airlake Airport South Building Area Development project, comments received on the EAW, and the responses prepared for those comments, the potential adverse environmental effects from the project have been adequately identified and addressed by appropriate mitigative measures, and further environmental review in an Environmental Impact Statement (EIS) is not warranted.

APPENDIX A

COMMENT LETTERS AND RESPONSES

DAKOTA COUNTY SOIL AND WATER CONSERVATION DISTRICT

Dakota County Extension and Conservation Center
4100 220th Street West, Suite 102
Farmington, MN 55024
Phone: (651) 480-7777 FAX: (651) 480-7775

February 22, 1999

RECEIVED
FEB 23 1999
Airport Development

Ref.: 98-EUR-052

Ms. Bridget Rief, P.E.
Assistant Airport Engineer
Metropolitan airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

RE: ENVIRONMENTAL ASSESSMENT WORKSHEET (EAW) REVIEW FOR THE SOUTH BUILDING AREA DEVELOPMENT PROJECT AT THE AIRLAKE AIRPORT IN EUREKA TOWNSHIP

Dear Bridget:

This letter is in response to the Environmental Assessment Worksheet (EAW) completed for the above-referenced project which was submitted to our office for review and comment. The proposed development entails a 30-acre site with multiple storage buildings and associated taxi-ways. The following comments are submitted for your review and consideration:

Item 6: Description

It is clear the MAC was not aware of the change to the DNR Protected Waters Inventory and that a significant amount of effort has been made to address the issues associated with modifications to a DNR-protected trout stream. 1.

Item 8: Permits and Approvals Required

Confirm with Dakota County Office of Planning that the proposed project is in compliance with Shoreland regulations. 2.

Item 12: Physical Impacts on Water Resources

Diversion of water flows to the newly constructed drainageway alignment should not occur until the area is fully stabilized and permission to proceed has been obtained from the DNR. 3.

Item 14: Water-Related Land Management Districts

See Item 8 above.

Item 17: Erosion and Sedimentation

Contrary to the statement in the EAW, the site does have significant erosion potential. Multiple sediment plumes in the existing DNR-protected watercourse have been observed. Efforts have been made to address this issue, and these efforts should be continued until the site is fully stabilized. The Dakota SWCD looks forward to continuing to work with the project engineer and grading contractor to minimize soil erosion and sedimentation on this site. 4.

AN EQUAL OPPORTUNITY EMPLOYER

1. **Response:** Comment noted; no response required.

2. **Response:** As discussed with Tom Barry of Dakota County on March 4, 1999 and as stated in Dakota County's EAW comment letter dated March 9, 1999, although the DNR has officially designated the stream on the airport property as a trout stream and protected watercourse, the stream does not fall under the regulations of the Dakota County shoreland district.

3. **Response:** As stated at the bottom of Page 3 of the EAW under Item 6, the MAC will comply with all provisions required under the pending DNR permit and wait until the permit is issued and conditions are met before flows are redirected through the new channel.

4. **Response:** The MAC and its project engineer and grading contractor will continue to work with the Dakota County SWCD in an effort to minimize soil erosion and sedimentation on the site during the development process. As stated on Page 9 of the EAW under Item 17, steep slopes located along the south side of the access road were seeded and mulched upon completion of the grading activities in the area in October of 1998 to establish vegetation and minimize potential erosion along the slope. Remaining disturbed areas of the site will be seeded and mulched upon completion of final grading work. Temporary erosion control measures will be maintained during construction and will remain in place until vegetation has been fully established.

Item 18: Water Quality – Surface Water Runoff

While the proposed development alone may not have quantifiable impacts on stream temperatures or downstream trout habitat, the cumulative impacts associated with the existing airport and expected expansions may. We suggest the MAC contact the VRWMO and DNR in the near future to develop a plan to address the potential for cumulative adverse impacts on the areas water resources. 5.

Item 28: Compatibility with Plans

The EAW does not provide any information regarding the project's compliance with the Vermillion River Watershed Management Organization's Watershed Management Plan. 6.

Item 30: Related Developments; Cumulative Impacts

Future stages of this development (i.e. the Airlake Airport) are planned or likely. See Item 18. 7.

CONCLUSIONS

The proposed project does not appear to have the potential for severe environmental effects, most adverse impacts can be anticipated and controlled, and an EIS is not necessary. However, the project does appear to be part of a larger development plan, and as such the overall water quality and thermal impacts of the airport on the trout stream should be considered. As noted above, we suggest the MAC contact the VRWMO and DNR to develop a plan to address the potential for cumulative adverse impacts on the areas water resources. If you should have any questions or comments regarding this letter, call me at (651) 480-7779.

Sincerely,

Jay Riggs
Urban Conservationist

cc: Dennis Miranowski, Vermillion River WMO
Jack Ditmore, Dakota County Office of Planning
Tom Berry, Dakota County Office of Planning
Kevin Bigalke, MDNR
Pat Lynch, MDNR
Eureka Township

5. **Response:** The MAC is currently in the process of preparing a water management plan for the Airlake Airport. The plan will provide general information on the airport's land and water resources, define existing and future water management systems, and develop water management strategies to address water management issues including stormwater, wetlands, erosion and sediment control, floodplains, and groundwater quality. Regulatory requirements associated with planned airport improvements will also be outlined in the plan. As part of this planning process, representatives of the DNR and VRWMO have been contacted several times to discuss water management issues and to receive their input. Furthermore, a copy of the water management plan will be submitted to both agencies for their review and comment. It is anticipated that the plan will be completed and available for review within the next few months.

6. **Response:** The Vermillion River Watershed Management Organization (VRWMO) has an existing watershed management plan (1989). The main focus of the watershed management plan is to maintain existing flood profiles along the Vermillion River by requiring member communities through their local planning efforts to utilize stormwater storage areas to control discharge rates. The current plan is scheduled to be updated in 1999 and will place additional emphasis on the protection of existing trout streams and fish habitat. Currently there are no watershed permitting requirements and none are planned for the near future. The VRWMO requires member communities to develop and implement local water management plans tailored to the needs of the member community while conforming to the watershed management plan. Eureka Township is currently in the process of preparing their local plan. The proposed stormwater management plan for the new building area described in the EAW is consistent with the VRWMO's desire to provide rate control and promote ponding and infiltration of stormwater runoff.

7. **Response:** Other than was is described in the EAW, no further development in the South Building Area is planned at this time or foreseen in the near future.

Note: Although the Dakota County SWCD expressed several concerns, they concluded in their comment letter that the Project does not appear to have the potential for severe environmental effects, most adverse impacts can be anticipated and controlled, and an EIS is not necessary.

RECEIV
MAR 10 1
Airport Devel

Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-40__ 10

March 5, 1999

Bridget Rief, P.E.
Assistant Airport Engineer
Metropolitan Airports Commission (MAC)
6040 28th Avenue South
Minneapolis, MN 55450

RE: Airlake Airport South Building Area Development Project
Environmental Assessment Worksheet (EAW)

Dear Ms. Rief:

The Department of Natural Resources (DNR) has reviewed the EAW for the Airlake Airport South Building Area Development Project. We offer the following comments for your consideration.

The EAW correctly notes that the project affects the South Tributary of South Creek, which is tributary to the Vermillion River and a designated trout stream. As such, DNR has participated in the project design being evaluated in the EAW. In this respect, we encourage continued consultation with relevant DNR staff as the project proceeds to ensure that adverse effects are avoided and minimized. 1.

Item 12 refers to attachments that depict the channel realignment proposed with the project. It should be noted that the new channel depicted on the plans has been modified, as per DNR recommendation, to reflect a simuous rather than linear channel. 2.

Item 13b, in its discussion of water use and appropriation, identifies that temporary dewatering of groundwater may be required to facilitate utility installation. If such dewatering exceeds 10,000 gallons per day, or 1,000,000 gallons per year, then a DNR water appropriation permit will be required. 3.

The issues of project-related potentials for erosion and sedimentation are addressed in Item 17. Because erosion control has been problematic at this site, it is very important that all conditions of the required Minnesota Pollution Control Agency (MPCA) National Pollutant Discharge Elimination System (NPDES) permit be strictly followed. Furthermore, the connection of the existing watercourse to the new constructed channel should not occur until such time that the new channel is stabilized with vegetative growth. Also, the proposed channel includes a very sharp, almost 90° turn, that will be susceptible to erosion; DNR will offer further guidance on this issue during our permit process. 4.

Item 18 notes that the proposed detention basin is expected to have a high infiltration rate. Assurances should be in place that the pond bottom has sufficient separation from the water table to effectively operate as an infiltration basin. 5.

1. **Response:** The MAC and its project engineer and grading contractor will continue to work with DNR staff in an effort to minimize impacts to the stream.

2. **Response:** Although channel modifications are not specifically shown on the plans, it has been correctly noted on Pages 3 and 7 of the EAW that the relocated stream channel section will include meanderings to address DNR concerns.

3. **Response:** If groundwater quantities pumped as part of future temporary dewatering activities at the site are anticipated to exceed 10,000 gallons per day or 1 million gallons per year, a DNR water use permit will be obtained.

4. **Response:** Details and locations of temporary erosion control measures to be implemented and maintained throughout the site development process are shown on the construction plans (Sheets 8 and 9) provided in Appendix A of the EAW. Temporary erosion and control measures will be maintained during construction and will remain in place until vegetation has been fully established. The MAC and their project engineer and grading contractor have worked closely with the Dakota County Soil and Water Conservation District, and will continue to do so, to ensure that adequate measures are being taken to minimize soil erosion and sedimentation on the site. As stated on Page 3 of the EAW, the MAC will comply with all provisions required under the pending DNR permit and wait until the permit is issued and conditions are met before flows are redirected through the new channel.

5. **Response:** The detention pond was designed to treat stormwater runoff from the new building area and provide rate control through temporary ponding. As the existing soils in the vicinity of the pond generally consist of sandy soils, infiltration through the bottom and sides of the basin is expected to occur providing additional stormwater treatment as well as a reduction in runoff volumes and peak discharge rates. As shown on the Detention Pond, Erosion Control and Dike Details (Sheet 9) contained in Appendix A of the EAW, the pond bottom is to be set at elevation 950. Soil borings taken in November of 1993 closest to the pond indicated approximate groundwater elevations ranging from 949-950, which are at or near the bottom of the pond. Groundwater elevations fluctuate depending on precipitation. It is assumed that the groundwater elevations measured at the project site in November of 1993 were relatively high as 1993 was the fourth consecutive year of above normal precipitation. Upon review of existing groundwater monitoring data from a remedial investigation conducted by the MAC on the north side of airport from 1990 through 1994, groundwater elevations measured in three wells approximately 1,000 feet northeast of the pond varied from 938.9 to 945.6, a difference of 6.7 feet. The average groundwater elevation in the closest monitoring well over the 4-year monitoring period was 941.8. Based on this information, it appears that under normal hydrologic conditions, the pond bottom has sufficient separation from the water table to effectively operate as an infiltration basin.

Bridget Rief, P.E.
March 5, 1999

Item 19, Water Quality - Wastewaters, indicates that urban services may need to be provided for the facility. If sewers, or utilities of any type, are extended over or under the new or existing watercourse, a DNR License to Cross is required. Please contact Jim Bloemendal, DNR Real Estate Specialist, at (651) 772-7985 for further information. 6.

Thank you for the opportunity to review this project. We look forward to receiving your record of decision and responses to comments. Minnesota Rules part 4410.1700, subparts 4 & 5, require you to send us your Record of Decision within five days of deciding this action. Please contact Bill Johnson of my staff at (651) 296-9229 if you have questions regarding this letter.

Sincerely,

Bill Johnson for

Thomas W. Balcom, Supervisor
Environmental Review and Assistance Unit
Office of Management and Budget Services

c: Kathleen Wallace
Con Christianson
Bret Anderson
Jim Bloemendal, Metro BREM
Charles Kjos, USFWS
Jon Larsen, EQB

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AIRLAKE.WP7

6. **Response:** If sanitary sewer lines, water mains, or other future utilities serving the new building area will extend over or under the existing or relocated stream channel, a DNR License to Cross will be obtained prior to installation.

Minnesota Pollution Control Agency

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MAR 08 1999

Airport Development

March 5, 1999

Ms. Bridget Rief
Metropolitan Airports Commission
6040 - 28th Avenue South
Minneapolis, Minnesota 55450

RE: Environmental Assessment Worksheet -- Airlake Airport South Building Area Development Project

Dear Ms. Rief:

Thank you for the opportunity to comment on the Airlake Airport proposal. This project consists of the addition of a building area for hangers and a building for supporting facilities. Minnesota Pollution Control Agency (MPCA) staff has reviewed the Environmental Assessment Worksheet (EAW) for this project. We have the following comments for your consideration and response in determining the need for an Environmental Impact Statement.

Item 8. Permits and Approvals

1. The Airlake Airport may require an Industrial Storm Water Permit. A fact sheet and permit application are enclosed with this letter. If you have questions about this permit, please contact the resources listed on Page 2 of the fact sheet.

Item 10. Cover Types

2. The document indicates that native vegetation would be planted in a "no-mow" zone by the trout stream. The MPCA would like to support and encourage this effort. We would also encourage the use of native plants, trees, and shrubs whenever possible. The use of native plants has a number of environmental benefits. These benefits can include reduced or eliminated chemical use and less watering. In addition, less frequent mowing for native plantings saves fuel, and reduces air emissions and noise.

Item 17. Erosion and Sedimentation and Item 18. Water Quality - Surface Water Runoff

3. As noted in the EAW, this project will require a General Construction Storm Water Permit. This site includes a sensitive resource in the adjacent trout stream. To protect the stream, we would like to emphasize that the requirements of the Construction Storm Water Permit must be followed. Best Management Practices (BMPs) will apply during construction, as discussed. We would like to encourage the project proposer to work very closely with its construction contractors to ensure that appropriate BMPs are used. The BMPs will help minimize or prevent impacts from runoff while the soil is disturbed. Please also be aware that development that disturbs ten or more contiguous acres may require temporary sedimentation basins during construction.

4. Permanent detention basins must meet the criteria in the MPCA's general permit. The ponds should be designed to support water quality goals for the area and the Vermillion River. Additional treatment goals you may wish to consider are a 60 percent removal rate for phosphorus and a 90 percent reduction in sediment. Minimizing the amount of impervious surfaces, where possible, will also help maintain the quality of the watershed.

520 Lafayette Rd. N.; St. Paul, MN 55155-4194; (612) 296-6300 (Voice); (612) 282-5332 (TTY)
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1. **Response:** The Airlake Airport is currently covered under Minnesota General Stormwater Permit MNG611000 authorizing stormwater discharge from industrial activities conducted at the site. Future tenants in the new building area having commercial operations that provide various aviation-related services such as cleaning, fueling, and maintenance will be responsible for preparing and implementing required Stormwater Pollution Prevention (SWPP) plans. SWPP plans will be prepared in compliance with NPDES stormwater discharge permit requirements identifying potential pollutant sources that may affect the quality of stormwater discharges and describing controls and best management practices which will be implemented to minimize pollutants in stormwater.

2. **Response:** The bottom and side slopes of the relocated stream channel have been seeded with a wet seed mix (Mn/DOT 25A) consisting of deep-rooted native grasses (e.g., big bluestem, blue joint grass, Canada wild rye, fringed brome, Indian grass, prairie cord grass, and switch grass). As stated in the EAW, fertilizers and herbicides are generally not used at the airport.

3. **Response:** A permit application for project coverage under the Minnesota NPDES General Stormwater Discharge Permit for Construction Activity was submitted to the MPCA on July 2, 1998 and subsequently approved by the MPCA in a letter dated July 14, 1998 (ID No. C00005291). Details and locations of temporary erosion control measures to be implemented and maintained throughout the site development process are shown on the construction plans (Sheets 8 and 9) provided in Appendix A of the EAW. Temporary erosion and control measures will be maintained during construction and will remain inplace until vegetation has been fully established. The MAC and their project engineer and grading contractor have worked closely with the Dakota County Soil and Water Conservation District, and will continue to do so, to ensure that adequate measures are being taken to minimize soil erosion and sedimentation on the site.

4. **Response:** The proposed detention pond was designed as a permanent basin to treat stormwater runoff and provide rate control from the new building area taking into account concerns regarding aviation safety. As the existing soils underlying the pond consist of permeable sandy soils, infiltration through the bottom and sides of the basin will occur providing additional treatment as well as a reduction in runoff volumes and peak discharge rates. The majority of the building area (Subwatershed 4) draining to the proposed pond will consist of flat grassed areas with low runoff potential.

5. We are concerned about potential impacts from de-icing materials that are commonly used at airports. Airplane de-icing materials should be sprayed only in contained areas. Operators should contain drippings from planes, overspray, blowby, and blast tracking. Collect the de-icing material for recycling or treatment. There can be no discharge of deicing mixtures to surface waters.

6. It is not clear whether urea is used as a de-icing agent on runways. If so, it may result in nitrate loading in the nearby streams or the Vermillion River. Any nitrate loading should be analyzed further to determine if there are any environmental impacts.

Item 21. Solid Wastes; Hazardous Wastes; Storage Tanks

7. There may be toxic or hazardous materials present during construction of this project, as well as the fuel and oil that would be used in operations (listed in Item 20). We recommend that you evaluate whether any such materials may be present during construction. If so, they should be managed to avoid or minimize environmental impacts.

Item 24. Stationary Source Air Emissions

8. If the new hangers would have heating boilers or paint spray booths, for example, they may be subject to air emission permit requirements. If you need assistance on air quality requirements, please call the MPCA's air permit help-line at (651) 282-5844.

We look forward to receiving your written responses to these comments. We would also like to commend the MAC on providing a more thorough and informative EAW than we have sometimes seen on airport projects. We hope that this positive trend will continue. If you have any questions regarding this letter, please contact me at (651) 296-6703.

Sincerely,

Barbara Conti

Barbara Conti
Planner Principal
Operations and Planning Section
Metro District

BC/gs

Enclosure

cc: Gregg Downing, Environmental Quality Board

5. **Response:** Unlike the Minneapolis-St. Paul International Airport where deicing of commercial aircraft is done on a routine basis during the winter, deicing activities conducted at the Airlake Airport are very limited. The Airlake Airport serves primarily small recreational aircraft users and airplanes are typically grounded during inclement weather. When flying is necessary during bad weather conditions and as an alternative to using deicing chemicals, planes are generally kept inside hangars and moved outside just before takeoff. Planes normally stored outside that have iced up are moved inside heated hangars to thaw out before takeoff. If deicing is required for safety reasons, ethylene glycol is sprayed on the planes with portable backpack sprayers in isolated apron areas with most of the overspray quickly evaporating. Since deicing is done on a limited basis and in relatively small quantities, deicing activities conducted at the airport do not pose a threat to the water quality of stormwater runoff.

6. **Response:** Section 18 of the EAW regarding water quality specifically refers to the 60-acre project site located on the south side of the airport. Although urea (a nitrogen based fertilizer) is used on the existing runway during the winter as a pavement deicing agent, urea will not be used in the new building area. Furthermore, the use of urea at the airport is done on a limited basis and in relatively small quantities and its potential impact on the stormwater discharges is expected to be minimal.

7. **Response:** Other than fuel and oil contained in fuel tanks and crankcases of the construction equipment, no toxic or hazardous materials will be stored on the site during construction.

8. **Response:** Future tenants in the new building area having commercial operations that provide various aviation-related services involving the use of heating boilers, paint spray booths, etc. will be responsible for obtaining the necessary air emission permits from the MPCA. When these types of services are identified as part of a proposed hangar development, MAC will notify tenants of the required permit(s) during the plan review process.

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FEB 26 1999
Airport Developme

MONTGOMERY WATSON

February 23, 1999

Ms. Bridget Rief, P.E.
Assistant Airport Engineer
Metropolitan Airports Commission
6040-28th Avenue S.
Minneapolis, MN 55450

SUBJECT: Air Lake Airport South Building Area Development Project EAW

Dear Ms. Rief:

The Vermillion River Watershed Management Organization (VRWMO) directed us to review the above referenced Environmental Assessment Worksheet (EAW) dated January 25, 1999. VRWMO comments deal primarily with stormwater management issues on the site. Our understanding is the EAW is required due to your proposed alterations to an intermittent stream which is tributary to South Creek (an inventoried trout stream). The alteration will be conducted in support of grading operations affecting 60 acres of land which includes creation of approximately 15 acres of new impervious surface.

The comments which follow reflect the VRWMO's desire to promote ponding and infiltration of runoff and incorporate site development practices to the extent possible to lessen the effect on downstream communities.

1. The EAW is silent on the special grading and soil remediation measures which will be taken to preserve or restore the infiltration capacity in graded areas. We are particularly interested in avoiding disruption of soil structure via compaction in low-lying areas which will collect or convey runoff. What techniques will be utilized to restore infiltration capacities within graded areas? Can these areas be seeded with deep-rooted grasses?

2. Deicing operations were barely discussed. Is there a projected increase in deicing which will accompany the increased use of the airport? Has a specific deicing location been specified? Are the deicing solution volumes anticipated to be used a threat to dissolved oxygen levels in South Creek?

3. The ponding area addresses only the 25-year occurrence interval storm event. Is sufficient detention time being provided to hold back more frequently occurring storm events to allow for settling of waterborne pollutants and provide opportunities for infiltration? It is a recommended practice to provide rate control for frequent storm events (1 or 2 years) as well as infrequent storm events up to the 100-year storm.

Waterford Park
505 U.S. Hwy. 169
Suite 555
Minneapolis, Minnesota 55441

Tel: 612 593 9000
Fax: 612 593 9975

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1. **Response:** Soils in the vicinity of the detention pond generally consist of poorly graded sands and gravel having high infiltration capacity. Upon completion of the final grading of the pond, the surface will be scarified to break up any compacted subsoils. The bottom and side slopes of the pond will be seeded with a wet seed mix (Mn/DOT 25A) consisting of deep-rooted native grasses (e.g., big bluestem, blue joint grass, Canada wild rye, fringed brome, Indian grass, prairie cord grass, and switch grass). The bottom and side slopes of the relocated stream channel have already been seeded with the same mixture. The ground surface of all other disturbed areas of the site will be loosened by discs or spike-tooth harrows prior to placing and spreading topsoil.

2. **Response:** Unlike the Minneapolis-St. Paul International Airport where deicing of commercial aircraft is done on a routine basis during the winter, deicing activities conducted at the Airlake Airport are very limited. The Airlake Airport serves primarily small recreational aircraft users and airplanes are typically grounded during inclement weather. When flying is necessary during bad weather conditions and as an alternative to using deicing chemicals, planes are generally kept inside hangars and moved outside just before takeoff. Planes normally stored outside that have iced up are moved inside heated hangars to thaw out before takeoff. Since deicing is done on a limited basis and in relatively small quantities, deicing activities conducted at the airport do not pose a threat to dissolved oxygen levels in South Creek which is located approximately two miles downstream of the project site.

3. **Response:** As discussed on Page 10 of the EAW under Item 18a, the 1.3-acre pond, to a large extent will function as an infiltration basin as a result of the underlying sandy soils. It is anticipated that a significant amount of runoff from the smaller, more frequent storm events directed to the pond will infiltrate thus reducing runoff volumes discharged downstream to the stream channel.

4. Can the proposed pond area be expanded significantly within the large impervious area in which it sits? This would allow the basin to function as a large infiltration area and would be less likely to retain a permanent pool of water subject to warming. An expanded pond area could greatly increase the amount of dead storage provided to minimize the number of discharges from the pond and maximize the water quality benefits.

If you have any further questions, please contact me directly at (612) 595-5275.

Sincerely,

MONTGOMERY WATSON

Steven C. Woods, P.E.
Watershed Engineer

4. **Response:** The majority of the building area (Subwatershed 4) draining to the proposed detention pond will consist of flat grassed areas with low runoff potential. The operation and infiltration capabilities of the pond are described on Page 10 of the EAW under Item 18a. Concerns regarding potential thermal effects on downstream trout habitat from pond discharges have been addressed in the EAW. The pond has been designed to temporarily hold stormwater runoff and drain down after rainfall events and will not retain a permanent pool of water. Discharges from the pond are not expected to increase stream temperatures or impact the existing downstream trout habitat of the Vermillion River and its tributaries.

Metropolitan Council
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Airport Development

Environmental Services

March 3, 1999

Bridget Rief, P.E.
Assistant Airport Engineer
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Ms. Rief:

Council staff has concluded their review of the EAW for the Airlake Airport South Building Area Development Project. We have determined that the EAW is complete, but that the following technical comments should be addressed.

Question 18. Water Quality – Surface Water Runoff

The EAW states that the proposed detention will treat runoff from a 34-acre drainage area. The pond outlet will consist of a 24" rcp that will completely drain the pond shortly after rainfall events, and an emergency spillway. The pond will also function as an infiltration basin due to poorly graded sand and gravel soils in the vicinity. The EAW suggests that in the event of accidental chemical or fuel spills, the pond outlet could be blocked and the spill contained. 1.

Council staff is concerned that the pond may be used both as a rapid infiltration basin and as a spill containment facility, as the two uses do not seem to compatible. To prevent groundwater contamination, Council staff suggests that the detention basin be constructed as a two-stage system. The first basin, which would function primarily as an emergency spill catchment, would be lined to prevent infiltration and would be fitted with a relatively large outlet that could be easily obstructed to contain and collect spills. The second basin would remain as designed to provide rapid infiltration and discharge to the intermittent stream. 2.

Council staff understands that the pond must be operated as a "dry" pond to deter waterfowl. To operate most effectively as a water quality Best Management Practice (BMP), accumulated sediments should be routinely removed from the basin to prevent resuspension and transport of solids to the trout stream. A maintenance program for the detention pond should be developed and implemented. Council staff did not have access to detailed topographic maps of the site, but it appears the pond could be moved to the open space south of the proposed building site. This would serve two purposes. It would move any waterfowl attracted to the facility further from the runway, and the outlet from the basin could be routed to the proposed grassed swales to provide additional water quality benefit. 3.

230 East Fifth Street St. Paul, Minnesota 55101-1626 (612) 602-1005 Fax 602-1183 TDD/TTY 229-3760

An Equal Opportunity Employer

1. **Response:** The detention pond was designed to treat stormwater runoff from the new building area and provide rate control and is not intended to serve as a spill containment facility. However, in the unlikely event of a chemical or fuel spill, the outlet pipe could be blocked and the basin utilized as a secondary control measure to contain the spill as part of an emergency response and cleanup effort. Primary measures will be in place to prevent and control potential spills onsite. Future tenants in the new building area having commercial operations that provide various aviation-related services such as cleaning, fueling, and maintenance will be responsible for preparing and implementing Spill Prevention Control and Countermeasure (SPCC) and Stormwater Pollution Prevention (SWPP) plans that may be required. Potential pollutant sources at the airport will be identified in the SPCC and SWPP plans associated with various activities conducted at the airport that may affect the quality of stormwater discharges from the site. SPCC plans will be prepared under the provisions of 40 CFR Part 112 and outline operating procedures for material handling activities, spill containment and cleanup operations, and emergency contacts. SWPP plans will be prepared in compliance with NPDES stormwater discharge permit requirements and describe controls and best management practices which will be implemented to minimize pollutants in stormwater.

2. **Response:** The detention pond will be routinely inspected and adequate measures, including removal of accumulated sediment, will be taken to ensure that the pond functions properly.

3. **Response:** The project site generally slopes from the south/southwest to the north/northeast draining to the existing stream channel. Existing and proposed contours are shown on the Grading, Drainage & Erosion Control Plan (Sheet 8) contained in Appendix A of the EAW. Steep slopes are located along the south side of the access road. The most suitable location for a pond to collect runoff from developed portions of the new building area is on the north side of the site.

The EAW also states that deicing chemicals may be used during winter months. The EAW does not indicate the types of chemicals that may be used, or the anticipated amount. Council staff realizes that such chemicals would most likely be used in limited quantities. If the chemicals are used in such quantity that there may be contamination of stormwater runoff, facilities should be retrofit to either collect and recycle the chemicals, or dispose of them through the sanitary sewer system. 4.

Thank you for the opportunity to comment on this environmental assessment. Please contact Karen Jensen, Planner-Environment Services, at 651-602-1401 with any questions or comments.

Sincerely,

Helen Boyer
Director, Environmental Services Division

HB:kj
cc: Keith Buttleman, Director, MCES Environmental Planning and Evaluation Dept.
Chauncey Chase, Metropolitan Council Transportation Planning

4. **Response:** Unlike the Minneapolis-St. Paul International Airport where deicing of commercial aircraft is done on a routine basis during the winter, deicing activities conducted at the Airlake Airport are very limited. The Airlake Airport serves primarily small recreational aircraft users and airplanes are typically grounded during inclement weather. When flying is necessary during bad weather conditions and as an alternative to using deicing chemicals, planes are generally kept inside hangars and moved outside just before takeoff. Planes normally stored outside that have iced up are moved inside heated hangars to thaw out before takeoff. If deicing is required for safety reasons, ethylene glycol is sprayed on the planes with portable backpack sprayers in isolated apron areas with most of the overspray quickly evaporating. Since deicing is done on a limited basis and in relatively small quantities, deicing activities conducted at the airport do not pose a threat to the water quality of stormwater runoff.

DAKOTA COUNTY
DIVISION OF PHYSICAL DEVELOPMENT
14955 GALAXIE AVENUE

OFFICE OF PLANNING
(612) 891-7030
FAX (612) 891-7031
APPLE VALLEY, MINNESOTA 55124-8579

RECEIVED
MAR 12 1999
Airport Development

March 9, 1999

Bridget Rief, PE.
Assistant Airport Engineer
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Ms. Rief:

Please accept the following comments from Dakota County on the Airlake South Building Area Development Project Environmental Assessment Worksheet.

Well Abandonment (page 7)

1. Contrary to language on page 7, section 13a, we believe that there are wells on the site that will need to be properly abandoned. We recommend a re-survey of the property to verify that all wells have been located and sealed.

Dewatering (page 7)

2. A reference is made to possible dewatering at the time of construction. Should dewatering be necessary, a permit may be required by the Dakota County Environmental Management Department.

Well Sealing (page 8)

3. After water lines are installed, MAC should require all unused wells to be sealed.

Water Quality – Wastewaters (page 11)

4. Section 19 b. does not address the procedure for abandoning existing on-site sewage treatment systems. All existing on-site systems should be properly abandoned at the time municipal sewer and water becomes available. This includes disconnecting hanger floor drains to on-site systems and reconnecting them to municipal systems.

Groundwater – Potential for Contamination (page 11)

5. Hazardous waste generation associated with cleaning, fueling, de-icing, and other aircraft operations must acquire hazardous waste generator permits from the Dakota County Environmental Management Department. Also, unused wells on the property are subject to Minnesota Department of Health Rules 4725, as well as Dakota County Ordinance No. 114 regarding wells and water supply. Dakota County is the permitting authority.

Dakota County Shoreland Zoning Districts

6. While the DNR has officially designated the stream on the airport property as a trout stream, the stream does not fall under the regulations of the Dakota County shoreland district.

Thank you for the opportunity to review the Airlake South Building Area Development Project Environmental Assessment Worksheet. Please do not hesitate to call me or our staff at (612) 891-7030 if you have questions about these comments.

Sincerely,

JACK DITMORE, Deputy Director
Physical Development Division

c: Louis J. Breimhurst, Director, Physical Development Division

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1. **Response:** Section 13a in the EAW regarding the installation or abandonment of wells specifically refers to the 60-acre project site located on the south side of the airport (please refer to Figures 3, 4, and 5 in the EAW). As the site is currently undeveloped, there are no existing on-site wells and none are proposed.

2. **Response:** If temporary dewatering of local groundwater is required to facilitate future utility installation work, the Dakota County Environmental Management Department will be contacted about obtaining any applicable permits and approvals.

3. **Response:** See response to Comment No. 1 above.

4. **Response:** Section 19b in the EAW regarding proposed on-site wastewater treatment systems specifically refers to the 60-acre project site located on the south side of the airport. As the site is currently undeveloped, there are no existing on-site wastewater treatment systems and none are proposed.

5. **Response:** Future tenants in the new building area having commercial operations that provide various aviation-related services such as cleaning, fueling, and deicing will be responsible for acquiring the necessary hazardous waste generator permits from the Dakota County Environmental Management Department. When these types of services are identified as part of a proposed hangar development, MAC will notify tenants of the required permits during the plan review process.

6. **Response:** Comment noted; no response required.

Minnesota Department of Transportation

Metropolitan Division
Waters Edge
1500 West County Road B2
Roseville, MN 55113

RECEIVED
FEB 22 1999
Airport Developme

February 16, 1999

Bridget Rief
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Bridget Rief:

SUBJECT: Airlake Airport South Building Area Development Project EAW

The Metro Division of the Minnesota Department of Transportation (Mn/DOT) has reviewed the above EAW for impacts to the state highway system. We find the EAW acceptable.

This letter represents the transportation concerns of Mn/DOT Metro Division. Other environmental concerns raised by a wider Mn/DOT review may be forwarded to you in a separate letter. Please contact me at 651-582-1654 with any questions regarding this review.

Sincerely,

Scott Peters
Senior Transportation Planner/Local Government Liaison

c: Gerald Larson, Mn/DOT Environmental Services

1. Comments noted. No response required.

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99-6034

Minnesota Pollution Control Agency

March 5, 1999



Ms. Bridget Rief
Metropolitan Airports Commission
6040 - 28th Avenue South
Minneapolis, Minnesota 55450

RE: Environmental Assessment Worksheet -- Airlake Airport South Building Area Development Project

Dear Ms. Rief:

Thank you for the opportunity to comment on the Airlake Airport proposal. This project consists of the addition of a building area for hangers and a building for supporting facilities. Minnesota Pollution Control Agency (MPCA) staff has reviewed the Environmental Assessment Worksheet (EAW) for this project. We have the following comments for your consideration and response in determining the need for an Environmental Impact Statement.

Item 8. Permits and Approvals
The Airlake Airport may require an Industrial Storm Water Permit. A fact sheet and permit application are enclosed with this letter. If you have questions about this permit, please contact the resources listed on Page 2 of the fact sheet.

Item 10. Cover Types
The document indicates that native vegetation would be planted in a "no-mow" zone by the trout stream. The MPCA would like to support and encourage this effort. We would also encourage the use of native plants, trees, and shrubs whenever possible. The use of native plants has a number of environmental benefits. These benefits can include reduced or eliminated chemical use and less watering. In addition, less frequent mowing for native plantings saves fuel, and reduces air emissions and noise.

Item 17. Erosion and Sedimentation and Item 18. Water Quality - Surface Water Runoff
As noted in the EAW, this project will require a General Construction Storm Water Permit. This site includes a sensitive resource in the adjacent trout stream. To protect the stream, we would like to emphasize that the requirements of the Construction Storm Water Permit must be followed. Best Management Practices (BMPs) will apply during construction, as discussed. We would like to encourage the project proposer to work very closely with its construction contractors to ensure that appropriate BMPs are used. The BMPs will help minimize or prevent impacts from runoff while the soil is disturbed. Please also be aware that development that disturbs ten or more contiguous acres may require temporary sedimentation basins during construction.

Permanent detention basins must meet the criteria in the MPCA's general permit. The ponds should be designed to support water quality goals for the area and the Vermillion River. Additional treatment goals you may wish to consider are a 60 percent removal rate for phosphorus and a 90 percent reduction in sediment. Minimizing the amount of impervious surfaces, where possible, will also help maintain the quality of the watershed.

We are concerned about potential impacts from de-icing materials that are commonly used at airports. Airplane de-icing materials should be sprayed only in contained areas. Operators should contain drippings from planes, overspray, blowby, and blast tracking. Collect the de-icing material for recycling or treatment. There can be no discharge of deicing mixtures to surface waters.

It is not clear whether urea is used as a de-icing agent on runways. If so, it may result in nitrate loading in the nearby streams or the Vermillion River. Any nitrate loading should be analyzed further to determine if there are any environmental impacts.

Item 21. Solid Wastes; Hazardous Wastes; Storage Tanks
There may be toxic or hazardous materials present during construction of this project, as well as the fuel and oil that would be used in operations (listed in Item 20). We recommend that you evaluate whether any such materials may be present during construction. If so, they should be managed to avoid or minimize environmental impacts.

Item 24. Stationary Source Air Emissions
If the new hangers would have heating boilers or paint spray booths, for example, they may be subject to air emission permit requirements. If you need assistance on air quality requirements, please call the MPCA's air permit help-line at (651) 282-5844.

We look forward to receiving your written responses to these comments. We would also like to commend the MAC on providing a more thorough and informative EAW than we have sometimes seen on airport projects. We hope that this positive trend will continue. If you have any questions regarding this letter, please contact me at (651) 296-6703.

Sincerely,

Barbara Conti

Barbara Conti
Planner Principal
Operations and Planning Section
Metro District

BC/gs

Enclosure

cc: Gregg Downing, Environmental Quality Board

99-6034

DAKOTA COUNTY SOIL AND WATER CONSERVATION DISTRICT

Dakota County Extension and Conservation Center
4100 220th Street West, Suite 102
Farmington, MN 55024
Phone: (651) 480-7777 FAX: (651) 480-7775

February 22, 1999



Ms. Bridget Rief, P.E.
Assistant Airport Engineer
Metropolitan airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Ref.: 98-EUR-052

RE: ENVIRONMENTAL ASSESSMENT WORKSHEET (EAW) REVIEW FOR THE SOUTH BUILDING AREA DEVELOPMENT PROJECT AT THE AIRLAKE AIRPORT IN EUREKA TOWNSHIP

Dear Bridget:

This letter is in response to the Environmental Assessment Worksheet (EAW) completed for the above-referenced project which was submitted to our office for review and comment. The proposed development entails a 30-acre site with multiple storage buildings and associated taxi-ways. The following comments are submitted for your review and consideration:

Item 6: Description

It is clear the MAC was not aware of the change to the DNR Protected Waters Inventory and that a significant amount of effort has been made to address the issues associated with modifications to a DNR-protected trout stream.

Item 8: Permits and Approvals Required

Confirm with Dakota County Office of Planning that the proposed project is in compliance with Shoreland regulations.

Item 12: Physical Impacts on Water Resources

Diversion of water flows to the newly constructed drainageway alignment should not occur until the area is fully stabilized and permission to proceed has been obtained from the DNR.

Item 14: Water-Related Land Management Districts

See Item 8 above.

Item 17: Erosion and Sedimentation

Contrary to the statement in the EAW, the site does have significant erosion potential. Multiple sediment plumes in the existing DNR-protected watercourse have been observed. Efforts have been made to address this issue, and these efforts should be continued until the site is fully stabilized. The Dakota SWCD looks forward to continuing to work with the project engineer and grading contractor to minimize soil erosion and sedimentation on this site.

Item 18: Water Quality – Surface Water Runoff

While the proposed development alone may not have quantifiable impacts on stream temperatures or downstream trout habitat, the cumulative impacts associated with the existing airport and expected expansions may. We suggest the MAC contact the VRWMO and DNR in the near future to develop a plan to address the potential for cumulative adverse impacts on the areas water resources.

Item 28: Compatibility with Plans

The EAW does not provide any information regarding the project's compliance with the Vermillion River Watershed Management Organization's Watershed Management Plan.

Item 30: Related Developments; Cumulative Impacts

Future stages of this development (i.e. the Airlake Airport) are planned or likely. See Item 18.

CONCLUSIONS

The proposed project does not appear to have the potential for severe environmental effects, most adverse impacts can be anticipated and controlled, and an EIS is not necessary. However, the project does appear to be part of a larger development plan, and as such the overall water quality and thermal impacts of the airport on the trout stream should be considered. As noted above, we suggest the MAC contact the VRWMO and DNR to develop a plan to address the potential for cumulative adverse impacts on the areas water resources. If you should have any questions or comments regarding this letter, call me at (651) 480-7779.

Sincerely,



Jay Riggs
Urban Conservationist

cc: Dennis Miranowski, Vermillion River WMO
Jack Ditmore, Dakota County Office of Planning
Tom Berry, Dakota County Office of Planning
Kevin Bigalke, MDNR
Pat Lynch, MDNR
Eureka Township

From: Pat Lynch
To: DNR_GW_CO.DNR_PO_CO2.WIJOHNSO, DNR_GW_CO.DNR_PO_CO...
Subject: Airlake Airport South Building Area EAW, Vermillion River Tributary, Our File #990259-1

I have reviewed the subject EAW and offer the following comments:

MAC and its consultant have, as expressed in the document, consulted with DNR Waters and Fisheries on the project. We were made aware of the project after grading was substantially completed. We stopped work at the project, informed MAC of the EAW requirement, and re-designed the new channel geometry. MAC's grading contractor has since excavated the DNR-recommended channel, and hydroseeded it.

A DNR Waters permit application is pending, awaiting the completion of the environmental review process.

specific comments on the EAW are:

Item 12 Physical Impacts on Water Resources
The EAW refers to attached plans. It should be noted that the new channel as depicted on the plans has been modified as per DNR recommendation, to reflect a sinuous, rather than linear channel.

Item 13 Water Use
If dewatering, for any facet of the project exceeds 10,000 gallons per day or one million gallons per year, a DNR Water Appropriation permit is required.

Item 17 Erosion and Sedimentation
Erosion control has been a problem on this site. It is imperative that the conditions of the MPCA NPDES stormwater discharge permit are strictly adhered to. The connection of the existing watercourse to the new constructed channel should not occur until such time the new channel is stabilized with vegetative growth. Also, near the connection point of the new and old channels, on the west edge of the project, the channel is designed to take a sharp (nearly 90 degree) turn to the north. This sharp turn will likely result in erosion. I can deal with it in the permit process.

Item 18 Water Quality-Surface Water Runoff
EAW indicates the proposed detention basin is expected to have a high infiltration rate. MAC should investigate to make certain the pond bottom has enough separation to water table to effectively act as an infiltration basin.

Item 19 Water Quality- Wastewater
If sewer utilities (or utilities of any type) are extended over or under the new or existing watercourse, a DNR utility license is required. MAC should contact DNR-BREM for application.

CC: KAWALLAC, DAZAPPET, DAHOMUTH, Bipennin, Kebigalk, ...

2/2/99

METROPOLITAN AIRPORTS COMMISSION

Minneapolis-Saint Paul International Airport
6040 - 28th Avenue South • Minneapolis, MN 55450-2799
Phone (612) 726-8100 • Fax (612) 726-5296

TO: Interested Parties

FROM: Metropolitan Airports Commission

RE: Airlake Airport South Building Area Development Project
Environmental Assessment Worksheet (EAW)

DATE: January 25, 1999

An EAW has been prepared by the Metropolitan Airports Commission (MAC) for the South Building Area Development Project at the Airlake Airport and was approved for distribution on January 20, 1999. Copies of the EAW are being forwarded to the various governmental agencies included on the Environmental Quality Board's (EQB) official distribution list and to other interested parties (see attached distribution list). A notice of the availability of the EAW will be published in the EQB Monitor on February 8, 1999 which begins the official 30-day public comment period. Written comments on the EAW must be submitted by March 10, 1999.

The MAC adopted a Long-Term Comprehensive Plan (LTCP) Update in October of 1997 for the Airlake Airport following the guidelines defined by the FAA and the Metropolitan Council to update the forecast of aviation activity and revise the facility requirements analysis from the previous 1989 LTCP. An Advisory Committee, made up of representatives from Lakeville, Eureka Township, Airport businesses, Metropolitan Council, Mn/DOT, and the MAC participated in the planning process as the LTCP was being prepared. The demand for additional aviation facilities has expanded as the number of aircraft at the airport has increased. Over the next 20 years, the number of based aircraft is expected to grow from 180 to 280 and the annual operations is projected to increase from 75,400 to 126,000. The based and operating fleet at the airport will consist mainly of small single- and twin-engine aircraft weighing less than 12,500 pounds along with some business jets. Consistent with the 1989 plan, the updated plan recommended that a new building area be developed on the south side of the airport to accommodate the demand for additional aircraft storage and supporting aviation facilities.

The South Building Area Development Project involves the development of a new building area and adjacent taxiways on available open land located on existing airport property in Eureka Township. The new 30-acre building area will accommodate the demand for additional aircraft storage and supporting aviation facilities.

Any questions and comments on the EAW should be directed to:

Bridget Rief, P.E.
Assistant Airport Engineer
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, Minnesota 55450
Telephone: 612-725-8371
Fax: 612-794-4407

The Metropolitan Airports Commission is an affirmative action employer.

AIRLAKE AIRPORT SOUTH BUILDING AREA DEVELOPMENT PROJECT
EAW DISTRIBUTION LIST
(1-25-99)

ENVIRONMENTAL QUALITY BOARD (1 copy) Jon Larsen Environmental Review Program 300 Centennial Office Building 658 Cedar Street St. Paul, MN 55155	**BOARD OF WATER AND SOIL RESOURCES** (1 copy) Doug Thomas One West Water Street, Suite 200 St. Paul, MN 55107
DEPARTMENT OF PUBLIC SERVICE (1 copy) Susan Kosowski 200 Metro Square Building 121 7th Place East St. Paul, MN 55101	**HISTORICAL SOCIETY** (1 copy) State Historic Preservation Office 345 Kellogg Boulevard West St. Paul, MN 55102
DEPARTMENT OF NATURAL RESOURCES (3 copies) Tom Balcom Office of Planning 500 Lafayette Road, Box 10 St. Paul, MN 55155	**LEGISLATIVE REFERENCE LIBRARY** (2 copies) Carol Blackburn 645 State Office Building St. Paul, MN 55155
POLLUTION CONTROL AGENCY (3 copies) Paul Hoff Environmental Analysis Office 520 Lafayette Road St. Paul, MN 55155	**ENVIRONMENTAL CONSERVATION LIBRARY** (2 copies) 300 Nicollet Mall Minneapolis, MN 55401
DEPARTMENT OF TRANSPORTATION (3 copies) Gerald Larson Mn/DOT Environmental Services 3485 Hadley Avenue North Oakdale, MN 55128	**U.S. ARMY CORP OF ENGINEERS** (1 copy) Ben Wopat, Chief Regulatory Functions Branch Army Corps of Engineers Centre 190 Fifth Street East St. Paul, MN 55101-1638
DEPARTMENT OF HEALTH (1 copy) Environmental Health Division 121 East 7th Place, Suite 220 St. Paul, MN 55101	**U.S. ENVIRONMENTAL PROTECTION AGENCY** (1 copy) William D. Franz Chief of Environmental Review 77 West Jackson Boulevard Chicago, IL 60604-3590
DEPARTMENT OF AGRICULTURE (1 copy) Becky Balk 90 West Plato Boulevard St. Paul, MN 55107	**U.S. FISH AND WILDLIFE SERVICE** (1 copy) Twin Cities Field Office E.S. 4101 East 80th Street Bloomington, MN 55425-1665
VERMILLION RIVER WATERSHED MGMT COMMISSION (1 copy) Steve Woods c/o Montgomery Watson 505 U.S. Highway 169, Suite 555 Minneapolis, MN 55441	**METROPOLITAN COUNCIL** (1 copy) Lynda Voge, Referrals Mears Park Centre 230 East Fifth Street St. Paul, MN 55101
DAKOTA COUNTY (1 copy) Jack Ditmore Office of Planning 14955 Galaxie Avenue Apple Valley, MN 55124	**DAKOTA CO. SOIL & WATER CONSERVATION DISTRICT** (1 copy) Brian Watson 4100 220th Street West, Suite 102 Farmington, MN 55024
EUREKA TOWNSHIP (1 copy) Cheryl Schindeldecker, Chair Eureka Town Board 26600 Ipava Avenue West Lakeville, MN 55044	**METROPOLITAN AIRPORTS COMMISSION** (4 copies) Bridget Rief 6040 28th Avenue South Minneapolis, MN 55450
CITY OF LAKEVILLE (1 copy) Keith Nelson, City Engineer 20195 Holyoke Avenue Lakeville, MN 55044	**CITY OF FARMINGTON** (1 copy) Lee Mann, City Engineer/Public Works Director 325 Oak Street Farmington, MN 55024

AIRLAKE AIRPORT SOUTH BUILDING AREA DEVELOPMENT PROJECT
EAW DISTRIBUTION LIST
(1-25-99)

DAKOTA COUNTY LIBRARY-FARMINGTON (1 copy) Andrew Cook 508 3rd Street Farmington, MN 55024	**GALAXIE LIBRARY** (1 copy) Kalla Kalloway 14955 Galaxie Avenue Apple Valley, MN 55124
DEPARTMENT OF NATURAL RESOURCES (1 copy) Kevin Bigalke Metro Trout Stream Watershed Coordinator Division of Waters 1200 Warner Road St. Paul, MN 55106	

990259-01

Environmental Assessment Worksheet (EAW)

Note To Preparers

This worksheet is to be completed by the Responsible Governmental Unit (RGU) or its agents. The project proposer must supply any reasonably accessible data necessary for the worksheet, but is not to complete the final worksheet itself. If a complete answer does not fit in the space allotted, attach additional sheets as necessary.

For assistance with this worksheet contact the Minnesota Environmental Quality Board (EQB) at 651-296-8253 or (toll-free) 1-800-652-9747 (ask operator for the EQB environmental review program) or consult "EAW Guidelines," a booklet available from the EQB.

Note to Reviewers

Comments must be submitted to the RGU (see items 3) during the 30-day comment period following notice of the EAW in the EQB Monitor. (Contact the RGU or the EQB to learn when the comment period ends.) Comments should address the accuracy and completeness of the information, potential impacts that may warrant further investigation, and the need for an EIS. If the EAW has been prepared for the scoping of an EIS (see item 4), comments should address the accuracy and completeness of the information and suggest issues for investigation in the EIS.

1. **Project Title** Airlake Airport South Building Area Development Project

2. **Proposer** Metropolitan Airports Commission

   Contact Person Bridget Rief, P.E.

   Address 6040 28th Avenue South
   Minneapolis, Minnesota 55450

   Phone 612-725-8371

3. **RGU** Metropolitan Airports Commission

   Contact Person and Title Bridget Rief, P.E.
   Assistant Airport Engineer

   Address 6040 28th Avenue South
   Minneapolis, Minnesota 55450

   Phone 612-725-8371

4. **Reason for EAW Preparation**

   [ ] EIS scoping [X] mandatory EAW [ ] citizen petition [ ] RGU discretion

   [ ] Proposer volunteered

   If EAW or EIS is mandatory give EQB rule category number(s)
   Minnesota Rules, Part 4410.4300, Subpart 26
   Stream Diversion - Realignment of a designated trout stream.

5. Project Location

_____¼ NW ¼ Section 4 Township 113N Range 20W
County Dakota City/Township Eureka Township

Attach copies of each of the following to the EAW:

a. a county map showing the general location of the project;
b. copy(ies) of USGS 7.5 minute, 1:24,000 scale map (photocopy is OK) indicating the project boundaries;
c. a site plan showing all significant project and natural features.

See attached Figures 1-4.

6. Description *Give a complete description of the proposed project and ancillary facilities (attach additional sheets as necessary). Emphasize construction and operation methods and features that will cause physical manipulation of the environment or produce wastes. Indicate the timing and duration of construction activities.*

The Airlake Airport is a 565-acre public-use facility located in Dakota County within the City of Lakeville and Eureka Township. The airport, owned and operated by the MAC since 1981, is classified as a minor use facility in the Metropolitan Council's Regional System Plan. The airport is currently served by one asphalt runway, one taxiway, and one building area. The airport accommodates personal, business, and instructional uses. The airport also serves as an instrument landing system training facility and is a designated reliever for the Minneapolis-St. Paul International Airport. Property at the airport is leased to tenants involved in the various support, handling, storage, refueling, and general transportation activities associated with a minor use airport.

The MAC adopted a Long-Term Comprehensive Plan (LTCP) Update in October of 1997 for the Airlake Airport following the guidelines defined by the FAA and the Metropolitan Council to update the forecast of aviation activity and revise the facility requirements analysis from the previous 1989 LTCP. An Advisory Committee, made up of representatives from Lakeville, Eureka Township, Airport businesses, Metropolitan Council, Mn/DOT, and the MAC participated in the planning process as the LTCP was being prepared. Environmental impacts, including a noise analysis and review of water quality issues, were also examined. The demand for additional aviation facilities has expanded as the number of aircraft at the airport has increased. Over the next 20 years, the number of based aircraft is expected to grow from 180 to 280 and the annual operations is projected to increase from 75,400 to 126,000. The based and operating fleet at the airport will consist mainly of small single- and twin-engine aircraft weighing less than 12,500 pounds along with some business jets. Consistent with the 1989 plan, the updated plan recommended that a new building area be developed on available open land on the south side of the airport to accommodate the demand for additional aircraft storage and supporting aviation facilities. The updated plan was reviewed by the Metropolitan Council in February 1998 for consistency with the Aviation Chapter of the Metropolitan Development Guide.

The South Building Area Development Project involves the development of a new building area and adjacent taxiways south of Runway 11/29 and east of the Soo Line Railroad tracks on existing airport property located within Eureka Township. The first phase of the project was initiated in July of 1998 which involved rough site grading work, subgrade preparation, and construction of stormwater management facilities including drainage ditches, culverts and a detention pond. The second phase of the project involving lowering two natural gas pipelines, installation of pavements and taxiway lighting systems, and final site grading and restoration is scheduled to be completed in 1999. Copies of the

following construction plan sheets prepared by MAC's civil engineer, HNTB, are provided in Appendix A: Title Sheet; Site Plan; Grading Drainage & Erosion Control Plan; and Detention Pond, Erosion Control and Dike Details.

The 30-acre building area is proposed to accommodate 40 - 50' x 50' hangars and 24 - 60' x 60' hangars as shown on the conceptual layout plans provided in Appendix B. A future Fixed Base Operator (FBO) is proposed to be built on the east side of the site to provide various aviation-related services including flight training, aircraft sales, fuel sales, and maintenance. A conceptual layout sketch of the proposed FBO consisting of a 110' x 100' hangar and adjacent parking lot and apron area is provided in Appendix B. Upon completion of the project, the private hangars will be built on the site over a period of several years on individual lots leased to tenants by the MAC.

An intermittent stream draining approximately 2.2 square miles of rural area west of the airport in Lakeville, Eureka Township, and New Market Township passes through the northwest corner of the building area. The stream is a DNR protected watercourse and a designated trout stream. The stream has been referred to as the South Tributary of South Creek which drains to the Vermillion River located approximately 3-1/2 miles east of the site. To accommodate the new building area, the MAC is proposing to relocate a 1,400-foot section of the stream channel. The new stream channel is approximately 2,000 feet long and was excavated in 1998.

The initial planning and design of the new building area including the soils investigation work was conducted in 1993-1994. During this time, various governmental agencies including the City of Lakeville, Eureka Township, Dakota County, and Vermillion River Watershed Management Commission were contacted regarding applicable permits and approvals. Originally scheduled for construction in 1994-1995, the project was delayed for four years due to a variety of reasons. In early 1998 when the project began to move forward again, the same governmental agencies were contacted regarding the project. At that time, the MAC was not informed of recent changes made in the regulatory status of the stream located on the airport property and remained unaware of these changes until after construction was started. The DNR Protected Waters Inventory Map for Dakota County was revised in December of 1996 to include protected water status for the stream from Flagstaff Avenue up to Highview Avenue. The revised map was made available to the general public but was only distributed to the following three county agencies: Auditor; Soil and Water Conservation District; and Highway Department. Similar maps showing designated trout streams were not available from the DNR until 1996. The stream on the airport property was officially designated as a trout stream by the DNR in December of 1994 after a judge's ruling provided clarification that trout stream designation applied to the main branch and its tributaries. Although Dakota County was notified sometime in 1996 of the ruling, public hearings were not held on this matter and property owners were not notified.

Prior to being informed by the DNR in August of 1998 that a permit was required to relocate the stream channel, final construction plans had already been prepared and initial rough grading and drainage work at the site had begun. It was also determined at that time that an EAW would be required because the project involved the realignment of a trout stream. The MAC and their consultant have worked closely with the DNR to address concerns about the design and construction of the relocated stream channel section including provisions for meanders and planting of native grasses along the streambank to make it more conducive to trout. The relocated stream channel will be maintained as a "no mow" zone consistent with the existing channel. This will help provide a buffer to filter overland stormwater runoff prior to reaching the stream. The existing stream channel has not yet been disturbed and continues to convey flows as it did before the start of construction. The MAC will comply with all provisions required under the pending DNR permit and wait until the permit is issued and a decision has been made on the EAW before flows are redirected through the new stream channel and the old stream channel is filled in.

Provide a 50 or fewer word abstract for use in EQB Monitor notice:

The project involves the development of a new building area and adjacent taxiways on the south side of the airport on available open land located on existing airport property in Eureka Township. The new 30-acre building area will accommodate the demand for additional aircraft storage and supporting aviation facilities.

7. **Project Magnitude Data**

Total Project Area (acres) 60 acres *or Length (miles)* NA
Number of Residential Units
Unattached NA *Attached* NA
Commercial/Industrial/Institutional Building Area (gross floor space)

Total 197,400 *square feet;*
Indicate area of specific uses:

Office ancillary to aircraft hangars *Manufacturing* NA
Retail NA *Other Industrial* NA
Warehouse NA *Institutional* NA
Light Industrial NA *Agricultural* NA
Other Commercial (specify) 197,400 (Hangars)
Building Height(s) Proposed hangars will not exceed 30 feet in height; this complies with FAA air traffic regulations.

8. **Permits and Approvals Required** *List all known local, state, and federal permits, approvals, and funding required:*

Unit of Government	Type of Application	Status
Metropolitan Council	Long-Term Comprehensive Plan Update	Approved
MN Pollution Control Agency (MPCA)	NPDES Stormwater Permit for Construction Activities	Approved
MN Dept. of Natural Resources (DNR)	Protected Waters Permit	Pending
Eureka Township	Project Review	Approved (Verbal)

9. **Land Use** *Describe current and recent past land use and development on the site and on adjacent lands. Discuss the compatibility of the project with adjacent and nearby land uses; indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazard due to past land uses, such as soil contamination or abandoned storage tanks.*

The Airlake Airport was developed in 1966 as part of the Airlake Industrial Park. Originally, farms and farmland occupied the area where the airport and industrial park are now located. The current land use surrounding the airport consists of the industrial park in Lakeville (primarily light industrial, light manufacturing, and warehouses) to the north and agricultural land to the west, south, and east in Lakeville and Eureka Township. The adjacent land is compatible with the airport and the industrial park generally serves to complement the airport and its facilities. Although the planes using the airport generate noise, it is located in close proximity to other noise generators such as railroads, streets, farm

equipment, and industrial facilities (see Item No. 25 for discussion on noise analysis performed for the airport).

The project site was previously undeveloped agricultural land on airport property that was leased by the MAC to a local farmer who cultivated row crops (corn, soybeans) with an intermittent stream flowing north through a culvert under Runway 11/29. Just south of the project site is the remains of a former farmstead site consisting of natural grasses and vegetation, a small 0.7-acre wetland, and mature Red Pine and Aspen trees. The wetland has steep side slopes and is identified as an old gravel pit on the Dakota County Soil Survey. In November of 1996, the MAC removed approximately 1,060 cubic yards of asphalt material and demolition debris from this area which had been discarded by other parties in the past. The material was hauled offsite by trucks and taken to appropriate disposal facilities. Greenwood Cemetery and historic church site are located southeast of the project site along 225th Street. The land immediately adjacent to the project site consists of airport facilities, railroad right-of-way, and agricultural lands.

No environmental hazards due to past land use have been identified or are expected as the site has been farmed as agricultural land since the early 1900's.

10. Cover Types *Estimate the acreage of the site with each of the following cover types before and after development (before and after totals should be equal):*

	Before	After		Before	After
Types 2 to 8 Wetlands	0 acres	0 acres	*Urban/Suburban Lawn Landscaping*	0 acres	18.8 acres
Wooded/Forest	0 acres	0 acres	*Impervious Surface*	0 acres	15.4 acres
Brush/Grassland	8.5 acres	24.5 acres	*Park Area*	0 acres	0 acres
Cropland	51.5 acres	0 acres	*Detention Ponds*	0 acres	1.3 acres
			Totals	60.0 acres	60.0 acres

Note: Brush/Grassland areas listed above are considered to be natural or unmaintained areas including streams and drainage ditches.

11. Fish, Wildlife, and Ecologically Sensitive Resources

a. Describe fish and wildlife resources on or near the site and discuss how they would be affected by the project. Describe any measures to be taken to minimize or avoid adverse impacts.

The airport and surrounding area which consists of industrial park and cultivated farmland does not provide any significant wildlife habitat. Portions of the Vermillion River and its tributaries, including the intermittent stream that flows through the project site, are designed trout streams. General characteristics of a trout stream include cool clean water, stable temperatures and water flows, gravel bottoms, and low sediment load. One of the main criteria for the long-term trout survival is a cold water habitat during the warmer summer months. Brown trout have been caught in the area, however, the stream on the airport property does not provide suitable trout habitat mainly because there is little or no flow in the channel during much of the year. These findings were confirmed in a trout stream monitoring study in the area conducted by the City of Lakeville in 1997. Results of the study were published in a report prepared by

Barr Engineering dated June, 1998 and entitled 1997 Vermillion River and South Creek Tributary Monitoring Program. A copy of the report is available from the City of Lakeville upon request.

The monitoring program was developed with input from the DNR and was intended to help the Cities of Lakeville and Farmington assess stream conditions and trout habitat in the Vermillion River and its tributaries and collect data useful in determining how the streams should best be protected and managed. The data collected included temperature and flow measurements, daily precipitation, stream habitat assessment, and a limited sampling of macroinvertebrates. The monitoring site on the stream that flows through the airport, referred to as the South Tributary of South Creek in the report, was located at Cedar Avenue downstream of the project site at the northeast edge of the airport property.

Although the monitoring data indicates that the Vermillion River and lower reaches of South Creek are capable of supporting brown trout throughout most of the year, the monitoring report concluded that conditions are not favorable for the habitation and reproduction of brown trout in the South Tributary. Despite cooler temperatures and above normal precipitation in 1997, the monitoring data showed elevated stream temperatures generally above the optimum range for trout (66°F), large daily temperature fluctuations, and sustained periods of little or no flow (no measurable flow was recorded at the Cedar Avenue monitoring station from May through mid-July).

The stream habitat of the South Tributary was surveyed on July 29, 1997 from its confluence with South Creek at Flagstaff Avenue upstream to Cedar Avenue. This was done by walking along the channel and observing the overall condition of the stream and rating the trout habitat based on an established set of criteria. The overall stream habitat was judged to be in "fair" condition (based on excellent-good-fair-poor rating system) through this stretch. The limitations of this reach include areas of significant bank erosion, silt and sand filling in pools, generally shallow water depth, and few trees along the streambank to provide shade. No macroinvertebrates sampling was done on the South Tributary.

The DNR was not aware of any other studies or surveys that have been conducted in the area that would provide additional information on existing fish and wildlife resources and habitat value in the area. Results of stream assessments and fish survey data from work conducted in the area by the DNR during the summer of 1998 was not available at the time of the writing of this EAW.

As discussed in Item No. 18, the project is not expected to have an adverse affect on the existing downstream trout habitat.

b. *Are there any state-listed endangered, threatened, or special-concern species; rare plant communities; colonial waterbird nesting colonies; native prairie or other rare habitat; or other sensitive ecological resources on or near the site? [X] Yes [ ] No. If yes, describe the resource and how it would be affected by the project. Indicate if a site survey of the resources was conducted. Describe measures to be taken to minimize or avoid adverse impacts.*

A review of the Minnesota Natural Heritage Information System Database was requested by the DNR to determine if any rare plant or animal species or other significant natural features are known to occur on or near the project site. Two known occurrences within an approximate one-mile radius of the site were identified in a letter received from the DNR dated December 10, 1998. The location and type of sensitive ecological resources identified by the search are listed below:

Location (Section, Township, Range)	Element and Occurrence Number
SE1/4, NW1/4, Section 4,T113N, R20W	Rattlesnake-master (Eryngium yuccifolium) #20
NW1/4, NW1/4, Section 10, T113N, R20W	Blanding's turtle (Emydoidea blandingii) #503

The reported locations of these two occurrences, shown on the Dakota County Biological Survey Map (1997), are outside the airport property boundary. The general location of the rattlesnake master, a plant species of Special Concern, is within a small unmowed plot of native prairie on the west side of the Greenwood Cemetery just south of the project site. The general location of the Blanding's turtle, a state Threatened species, is along a tributary stream of the Vermillion River near the intersection of Cedar Avenue and 235th Street approximately two-thirds of a mile south of the airport. Common habitat suitable for the rattlesnake-master is undisturbed prairie remnants and prairie strips that occur along railroad rights-of-way. Blanding's turtles spend most of their time in shallow wetlands, but nest in open, sandy areas up to one-half mile from wetlands. Since the project site consists of cultivated agricultural farmland and an intermittent stream, suitable habitat does not exist to support these two species and therefore, it is not anticipated that there will be any adverse impacts by the project.

12. **Physical Impacts on Water Resources** *Will the project involve the physical or hydrologic alteration (dredging, filling, stream diversion, outfall structure, diking, impoundment) of any surface water (lake, pond, wetland, stream, drainage ditch)? [X] Yes [ ] No. If yes, identify the water resource to be affected and describe: the alteration, including the construction process; volumes of dredged or fill material; area affected; length of stream diversion; water surface area affected; timing and extent of fluctuations in water surface elevations; spoils disposal sites; and proposed mitigation measures to minimize impacts.*

As shown on the attached plans, the project will involve the realignment of a 1,400-foot section of an intermittent stream that flows through the northeast corner of the site discharging to two 60" CMP culverts under Runway 11/29. The stream is a DNR protected watercourse and a designated trout stream. The existing stream channel is proposed to be filled in to accommodate the new building area and upstream flows routed to the north and east through a newly excavated 2,000-foot channel section. Mitigation measures to minimize impacts are described in other sections of the EAW and include implementing and maintaining temporary erosion and sediment control measures, meandering the new stream channel and planting native vegetation along the streambank to provide trout habitat, routing stormwater runoff from developed portions of the new building area through a detention pond, maintaining existing peak flow rates from the site, and routing drainage from adjacent undeveloped areas, including flows from existing cold water springs, through grassed swales.

13. **Water Use**

a. *Will the project involve the installation or abandonment of any wells? [ ] Yes [X] No. For abandoned wells give the location and Unique well number. For new wells, or other previously unpermitted wells, give the location and purpose of the well and the Unique well number (if known).*

b. *Will the project require an appropriation of ground water or surface water (including dewatering)? [X] Yes [ ] No. If yes, indicate the source, quantity, duration, purpose of the appropriation and DNR water appropriation permit number of any existing appropriation. Discuss the impact of the appropriation on ground water levels.*

Temporary dewatering of local groundwater may be required to facilitate future utility installation work. If temporary dewatering is required, it would have minimal impacts on groundwater levels outside the construction zone.

c. *Will the project require connection to a public water supply? [X] Yes [ ] No.*
If yes, identify the supply, the DNR water appropriation permit number of the supply, and the quantity to be used.

The MAC is in the process of developing sanitary sewer and water utility plans for the Airlake Airport to determine the type and extent of urban services that should be extended onto the airport property. The plans will be consistent with the development plans of the local communities as well as the development guide of the Metropolitan Council. Sanitary sewer and water lines serving the airport and new building area are scheduled to be installed after the year 2000. The MAC will not allow tenants to install private wells. The quantity of water to be used upon completion of the project is subject to the number of tenant hookups made which is unknown at this time.

14. **Water-Related Land Management Districts** *Does any part of the project site involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? [ ] Yes [X] No If yes, identify the district and discuss the compatibility of the project with the land use restrictions of the district.*

15. **Water Surface Use** *Will the project change the number or type of watercraft on any water body? [ ] Yes [X] No. If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other users or fish and wildlife resources.*

16. **Soils** Approximate depth (in feet) to:
Groundwater: minimum_____ average__4-9 ft.__ Bedrock: minimum _____ average__100-150 ft.
Describe the soils on the site, giving SCS classifications, if known. (SCS interpretations and soil boring logs need not be attached.)

As shown on the General Soil Map contained in the Dakota County Soil Survey (1983), soils at the airport fall under the Waukegan-Wadena-Hawick association. These soils are generally described as well drained to excessively drained silty and loamy sediments underlain by sandy outwash on level to very steep outwash plains and terraces. The surface layer of these soils typically consist of dark silty or sandy loam 8-12 inches thick. The soil types present at the project site as shown on the Dakota County Soils Map include Ostrander loam (2C), Garwin silty clay loam (176), Klinger silt loam (213B), Kennebec silt loam (250), Marshan silty clay loam (252), and Waukegan silt loam (411A/411B). These soils are mainly classified as Group B hydrologic soils which are characterized as soils having moderate infiltration and transmission rates.

As shown on the Dakota County Geologic Atlas (1990), the regional near-surface geology at the airport consists of glacial drift and reworked drift of the Quaternary-aged Des Moines Lobe. These sediments form a complex sequence of interbedded loamy sand, sands, gravel, and clayey till. The depth to bedrock is between 100 to 150 feet.

A geotechnical evaluation of the site was performed by Braun Intertec in November of 1993 to assist the MAC with the design of pavements and foundations in the south building area. Nineteen soil borings were taken at the project site to depths of 10-20 feet. Results of the soils evaluation, recommendations, and copies of the boring logs are provided in a geotechnical evaluation report dated January 13, 1994. The report is available upon request. The site generally slopes downward to the north and northeast toward Runway 11/29 and at the time of the geotechnical evaluation, the site was covered with grass. Soils observed at the site consisted of an average of 1.5 feet of organic topsoil underlain mostly with glacially deposited sands and clays. Sandy soils were predominant in the northern borings, while clayey soils were predominant in the southern borings. Results of penetration resistance values indicated loose to dense conditions for the sandy soils and medium to hard consistencies for the clay soils. The sands

were typically in medium dense conditions while the consistencies of the clays typically ranged from rather stiff to very stiff. Groundwater was observed at all but two of the boring locations. The average depth to groundwater was 4-9 feet below the ground surface at the borings.

17. Erosion and Sedimentation

Give the acreage to be graded or excavated and the cubic yards of soil to be moved:

__60__ *acres;* __300,000__ *cubic yards. Describe any steep slopes or highly erodible soils and identify them on the site map. Describe the erosion and sedimentation measures to be used during and after construction of the project.*

Approximately 60 acres of the site will be graded and roughly 300,000 cubic yards of soil excavated as part of the site development process. It is anticipated that all of the excavated soil will be utilized on the site. If any of the excavated material is found to be unsuitable for use on the site, it will be hauled offsite to a designated upland disposal area. Topsoil has been stockpiled on the east side of the site for later use upon completion of rough grading operations. Steep slopes located along the south side of the access road were seeded and mulched upon completion of the grading activities in the area in October of 1998 to establish vegetation and minimize potential erosion along the slope. The rest of the site is relatively flat with minimal erosion potential; final site restoration is scheduled to be completed in 1999.

Details and locations of temporary erosion control measures that were installed such as silt fence and hay bale sediment barriers are shown on the construction plans (Sheets 8 and 9) provided in Appendix A. All disturbed areas will be seeded and mulched upon completion of the grading and excavation work. Temporary erosion control measures will be maintained during construction and will remain inplace until vegetation has been fully established. Since the project will disturb more than 5 acres of land, a permit application for coverage under the Minnesota NPDES General Stormwater Discharge Permit was submitted to the MPCA prior to construction. The permit application certifies that the MAC has prepared temporary and permanent erosion and sediment control plans which identify appropriate best management practices for the site that will be implemented as part of the construction project.

18. Water Quality - Surface Water Runoff

a. Compare the quantity and quality of site runoff before and after the project. Describe methods to be used to manage and/or treat runoff.

Stormwater runoff from the site previously drained overland to the intermittent stream which discharged to the north through two large culverts under Runway 11/29. The new building area development project will ultimately add approximately 15.4 acres of impervious surface area. Grassed areas will be maintained between hangar driveways and areas adjacent to the building area. The impervious surface area will increase the amount of runoff from the site, however, peak discharge rates will be limited to existing peak runoff rates by directing runoff from the building area through a 1.3-acre detention pond prior to discharging to the stream.

The detention pond will treat runoff from an approximate 34-acre drainage area that is highlighted in purple on Figure 5. Runoff from 55 acres of adjacent undeveloped areas highlighted in yellow on Figure 5 will be directed through long stretches of grassed swales/ditches with gentle grades prior to discharging to the stream. This drainage area includes newly graded areas of the site and adjacent undisturbed upland areas. The grassed swales will help filter stormwater flows and promote infiltration into the underlying soils. Cold water springs (seeps) shown on Figure 5 flowing out of the hill on the south side of the access road will be directed through the grassed swales and discharge directly to the stream. Fertilizers

and herbicides are generally not used in nonagricultural areas of the airport and therefore will not be introduced into stormwater runoff from the project site.

The proposed detention pond has a total storage capacity of 5 acre-feet. The pond outlet will consist of a 24" RCP that will drain down the pond shortly after rainfall events outletting north to the stream. The pond has been designed with an emergency overflow spillway. The basin can be utilized to contain chemical or fuel spills that may occur in the new building area by blocking the outlet pipe. The pond is consistent with airport design considerations which avoid the creation of permanent water surfaces adjacent to runway and taxiways that may attract waterfowl and create hazards to aircraft. The pond will function similar to the newly constructed regional pond (City Pond SC-4-2) located northwest of the site on airport property as shown on Figure 5. The regional pond was designed and constructed by the City of Lakeville under a cooperative agreement with the MAC to treat stormwater runoff and control discharge rates from a 0.6 square mile drainage area in Lakeville which outlets south to a ditch draining to the stream.

The DNR and Vermillion River Watershed Management Commission have expressed concerns regarding potential thermal effects on the stream from pond discharges. The pond for the new building area was designed to handle runoff from a 25-year storm event. Based on a volume of 2.6 acre-feet of storage and a peak discharge rate of 25 cfs, the detention time, or time to drain the pond down for this storm, is estimated to be roughly 3.1 hours. This assumes an average discharge rate of 10 cfs with no infiltration. The amount of time that water sits in the pond and is subject to thermal warming by the sun is relatively low. Underlying soils as observed from soil borings taken in the vicinity of the pond generally consisted of poorly graded sands and gravel having high infiltration rates. The pond, to a large extent, will also function as an infiltration basin. Therefore, actual discharge volumes and detention times will be less as a result of the high infiltration capacity of the pond. Furthermore, average summer storms will produce significantly less runoff volumes and will result in much lower detention times than a 25-year design storm event. Therefore, discharges from the proposed detention pond are not expected to increase stream temperatures or impact the existing downstream trout habitat in the Vermillion River and its tributaries.

During the winter months, aviation activity decreases at the airport. Deicing of aircraft may be conducted by the FBO in the new building area. Consistent with existing deicing operations conducted at the airport, it will be done on a limited basis by portable backpack sprayers in isolated apron areas with most of the overspray quickly evaporating. As an alternative to using deicing chemicals, planes are generally kept inside hangars during inclement weather and moved outside just before takeoff. Planes normally stored outside that have iced up are moved inside heated hangars to thaw out before takeoff.

b. *Identify the route(s) and receiving water bodies for runoff from the site. Estimate the impact of the runoff on the quality of the receiving waters. (If the runoff may affect a lake consult "EAW Guidelines" about whether a nutrient budget analysis is needed).*

Stormwater runoff from the site is directed to the intermittent stream that flows through the site which is tributary to South Creek and the Vermillion River located east of the project site. South Creek is located approximately 2 miles downstream and the Vermillion River approximately 3-1/2 miles downstream. Because of the conversion of cropped agricultural area, the routing of stormwater runoff from developed areas of the site through a detention pond, and other mitigation measures described above in Item 18a, sediment loads from the site are expected to be reduced and no significant impacts to downstream water quality are expected.

19. Water Quality - Wastewaters

a. *Describe sources, quantities, and composition (except for normal domestic sewage) of all sanitary and industrial wastewaters produced or treated at the site.*

The project will generate normal domestic sewage and wastewater from aircraft washing and maintenance activities. Wastewater will be discharged directly to the municipal sanitary sewer system that will be extended out to serve the new building area. There will be no industrial wastewater produced or treated onsite. The quantity of wastewater that will be generated upon completion of the project is subject to the number of tenant hookups made which is unknown at this time.

b. *Describe any waste treatment methods to be used and give estimates of composition after treatment, or if the project involves on-site treatment systems, discuss the suitability of the site conditions for such systems. Identify receiving waters (including ground water) and estimate the impact of the discharge on the quality of the receiving waters. (If the discharge may affect a lake consult "EAW Guidelines" about whether nutrient budget analysis is needed.)*

Not applicable

c. *If wastes will be discharged into a sewer system or pretreatment system, identify the system and discuss the ability of the system to accept the volume and composition of the wastes. Identify any improvements which will be necessary.*

The MAC is in the process of developing sanitary sewer and water utility plans for the Airlake Airport to determine the type and extent of urban services that should be extended onto the airport property. The plans will be consistent with the development plans of the local communities as well as the development guide of the Metropolitan Council. Sanitary sewer and water lines serving the airport and new building area are scheduled to be installed after the year 2000. The MAC will not allow tenants to install private underground treatment systems or holding tanks.

20. Groundwater - Potential for Contamination

a. *Approximate depth (in feet) to groundwater:_____minimum;____4-9 feet____ average.*

b. *Describe any of the following site hazards to groundwater and also identify them on the site map: sinkholes; shallow limestone formations/karst conditions; soils with high infiltration rates; abandoned or unused wells. Describe measures to avoid or minimize environmental problems due to any of these hazards.*

No specific hazards have been identified which could potentially impact groundwater and the MAC is not aware of any abandoned or unused wells on the site. If any wells are encountered during the course of the project, they will be abandoned and sealed according to Minnesota Department of Health regulations by a certified contractor to eliminate the potential for groundwater impacts.

c. *Identify any toxic or hazardous materials to be used or present on the project site and identify measures to be used to prevent them from contaminating groundwater.*

The future FBO planned to be built on the east side of the site will provide aviation-related services including fuel sales and aircraft maintenance and repair. Fuel, oil, and other products used will be stored in approved storage containers. All fuel storage tanks will comply with EPA and Minnesota State standards and guidelines to prevent leaks and spills. Potential pollutant sources at the airport are

identified in the Spill Prevention, Control, and Countermeasure (SPCC) plan and the Stormwater Pollution Prevention (SWPP) plan that have been prepared for the facility. Copies of these documents are available upon request. The SPCC plan also outlines operating procedures for material handling activities, spill containment and cleanup operations, and emergency contacts. The SWPP plan was prepared in compliance with NPDES stormwater discharge permit requirements. The plan identifies potential sources of pollution at the airport associated with various activities that may affect the quality of stormwater discharges from the site and describes controls and best management practices which are being implemented to minimize pollutants in stormwater. These management practices include storage of materials indoors or under covered areas, secondary containment areas around aboveground storage tanks, and proper disposal of waste materials. These plans will be updated by the MAC as necessary upon completion of the project.

21. Solid Wastes; Hazardous Wastes; Storage Tanks

a. *Describe the types, amounts, and compositions of solid or hazardous wastes to be generated, including animal manures, sludges and ashes. Identify the method and location of disposal. For projects generating municipal solid waste indicate if there will be a source separation plan; list type(s) and how the project will be modified to allow recycling.*

Not applicable

b. *Indicate the number, location, size and use of any above or below ground tanks to be used for storage of petroleum products or other materials (except water).*

No information on future above or below ground storage tanks is available at this time. Precautions to be taken to prevent leaks and spills are described in Item 20c above.

22. Traffic *Parking spaces added __25__; Existing spaces (if project involves expansion) ____; Estimated Total Average Daily Traffic (ADT) generated ____; Estimated maximum peak hour traffic generated (if known) and its timing ____. For each affected road indicate the ADT and the directional distribution of traffic with and without the project. Provide an estimate of the impact on traffic congestion on the affected roads and describe any traffic improvements which will be necessary.*

Access to the new building area will be provided from the south off 225th Street. There will be no dedicated parking lots to serve general aviation operations, other than those provided by the FBO (less than 25 parking spots). It is the custom for private hangar owners to park their automobiles in or adjacent to their hangars when they are using their aircraft. The project is not anticipated to affect traffic flow or cause traffic congestion in the area, and therefore, no transportation improvements are warranted.

23. Vehicle-Related Air Emissions *Provide an estimate of the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or mitigation measures on air quality impacts. (If the project involves 500 or more parking spaces, consult "EAW Guidelines" about whether a detailed air quality analysis is needed.)*

Since the project is not anticipated to affect traffic flow in the area, there should not be any significant decrease in air quality.

24. **Stationary Source Air Emissions** *Will the project involve any stationary sources of air emissions (such as boilers or exhaust stacks)? [ ] Yes [X] No If yes, describe the sources, quantities, and composition of the emissions; the proposed air pollution control devices; the quantities and composition of the emissions after treatment; and the effects on air quality.*

25. **Dust, Odors, Noise** *Will the project generate dust, odors, or noise during construction and/or operation? [X] Yes [ ] No If yes, describe the sources, characteristics, duration, and quantities or intensity, and any proposed measures to mitigate adverse impacts. Also identify the locations of sensitive receptors in the vicinity and estimate the impacts on these receptors.*

The project site is surrounded by agricultural land with the closest farmhouse located along 225th Street approximately 1,000 feet to the south of the project site. Dust will be generated during construction but is not expected to be a significant problem as compared to the dust generated from adjacent farming operations and gravel roads. Typical construction noise from heavy equipment and trucks is expected during construction of the project. Both of these impacts will be temporary and will be generally confined to the immediate vicinity of the project site. It is not anticipated that the project will generate any significant odors.

A noise analysis involving noise contour modeling was performed by the MAC as part of the LTCP to evaluate future existing and future noise impacts at the airport. The FAA has prepared guidelines that indicate that residential land uses are typically incompatible with noise levels in excess of 65 day-night average sound level (DNL). The noise modeling results showed the 65 DNL contour is contained within the airport property under both existing and future conditions. The airport is located in close proximity to other noise generators such as railroads, streets, farm equipment, and industrial facilities.

26. **Sensitive Resources** *Are any of the following resources on or in proximity to the site:*

	Yes	*No*
a. archeological, historical or architectural resources?	____	X
b. prime or unique farmlands?	____	X
c. designated parks, recreation areas, or trails?	____	X
d. scenic views and vistas?	____	X
e. other unique resources?	____	X

If any items are answered Yes, describe the resource and identify any impacts on the resource due to the project. Describe any measures to be taken to minimize or avoid adverse impacts.

a. archeological, historical or architectural resources?

Information was requested from the Minnesota Historical Society about possible archeological, historical or architectural resources located at the project site. A letter was received dated November 10, 1998 indicating that no such resources are present on or near the site that would be affected by the project.

27. **Visual Impacts** *Will the project create adverse visual impacts? (Examples include: glare from intense lights; lights visible in wilderness areas; and large visible plumes from cooling towers or exhaust stacks.) [ ] Yes [X] No. If yes, explain.*

28. **Compatibility with plans** *Is the project subject to an adopted local comprehensive land use plan or any other applicable land use, water, or resource management plan of a local, regional, state, or federal agency? [X] Yes [ ] No If yes, identify the applicable plan(s), discuss the compatibility of the project with the provisions of the plan(s), and explain how any conflicts between the project and the plan(s) will be resolved. If no, explain.*

Airlake Airport Long-Term Comprehensive Plan

The proposed project is consistent with the recommendations for future airport facilities presented in the 1997 LTCP Update for the Airlake Airport. An Advisory Committee, made up of representatives from Lakeville, Eureka Township, Airport businesses, Metropolitan Council, Mn/DOT, and the MAC participated in the planning process as the LTCP was being prepared. Environmental impacts, including a noise analysis and review of water quality issues, were also examined. The plan was adopted by the MAC in October of 1997.

Metropolitan Council

The Airlake Airport is classified as a minor use facility in the Metropolitan Council's Regional System Plan. The 1997 LTCP Update, which includes the new south building area and taxiways, was reviewed by the Metropolitan Council in February of 1998 for consistency with the Development Guide.

Eureka Township Comprehensive Plan

Development of the airport property is consistent with the land use plan for Eureka Township. The project site is within the area currently zoned as airport. Township officials were contacted regarding the project and verbal approval was received.

29. **Impact on Infrastructure and Public Services** *Will new or expanded utilities, roads, other infrastructure, or public services be required to serve the project? [X] Yes [ ] No. If yes, describe the new or additional infrastructure/services needed. (Any infrastructure that is a "connected action" with respect to the project must be assessed in the EAW; see "EAW Guidelines" for details.)*

As discussed previously in Items 13 and 19, municipal sanitary sewer and water lines are scheduled be extended onto the airport sometime after the year 2000 to serve the new building area. Other utilities including natural gas, electricity, and telephone service will also be provided. No environmental impacts are expected as a result of future utility connections. General maintenance of the new building area including mowing and snow plowing will be performed by the MAC. Although the project will not affect existing local roads and they will continue to serve the public as before, an approximate half mile section of 225th Street from Cedar Avenue west to the access road to the new building area is proposed to be paved upon completion of the project. No environmental impacts are expected as a result of converting the roadway surface from gravel to asphalt.

30. Related Developments; Cumulative Impacts

a. Are future stages of this development planned or likely? [ ] Yes [X] No
If yes, briefly describe future stages, their timing, and plans for environmental review.
b. Is this project a subsequent stage of an earlier project? [ ] Yes [X] No
If yes, briefly describe the past development, its timing, and any past environmental review.
c. Is other development anticipated on adjacent lands or outlots? [ ] Yes [X] No
d. If a, b, or c were marked Yes, discuss any cumulative environmental impacts resulting from this project and the other development.

Although no further development in the south building area is planned at this time, other possible projects associated with future development at the airport are identified in the 1997 LTCP Update. These include a 500-foot extension to the existing runway to increase the length to 4,600 feet, a new 2,500-foot crosswind runway, and new and relocated taxiways. A mandatory EAW will be required for a new crosswind runway prior to construction.

31. Other Potential Environmental Impacts *If the project may cause any adverse environmental impacts which were not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.*

No other potential environmental impacts have been identified at this time.

32. Summary of Issues *(This section need not be completed if the EAW is being done for EIS scoping: instead, address relevant issues in the draft Scoping Decision document which must accompany the EAW.) List any impacts and issues identified above that may require further investigation before the project is commenced. Discuss any alternatives or mitigative measures that may have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.*

The need for further investigation of previously discussed items is not anticipated at this time. The MAC and their consultant have worked closely with the DNR to address concerns about the design and construction of the relocated stream channel including provisions for meanders and planting of native vegetation along the streambank to make it more conducive to trout. The MAC will comply with all provisions required under the pending DNR permit.

Certifications by the RGU *(all 3 certifications must be signed for EQB acceptance of the EAW for publication of notice in the EQB Monitor*

A. I hereby certify that the information contained in this document is accurate to the best of my knowledge.

Signature Nigel D. Finney

B. I hereby certify that the project described in this EAW is the complete project and there are no other projects, project stages or project components, other than those described in this document, which are related to the project as "connected actions", or "phased actions," as defined, respectively, at Minn. Rules, pts. 4410.0200, subp. 9b and subp. 60.

Signature Nigel D. Finney

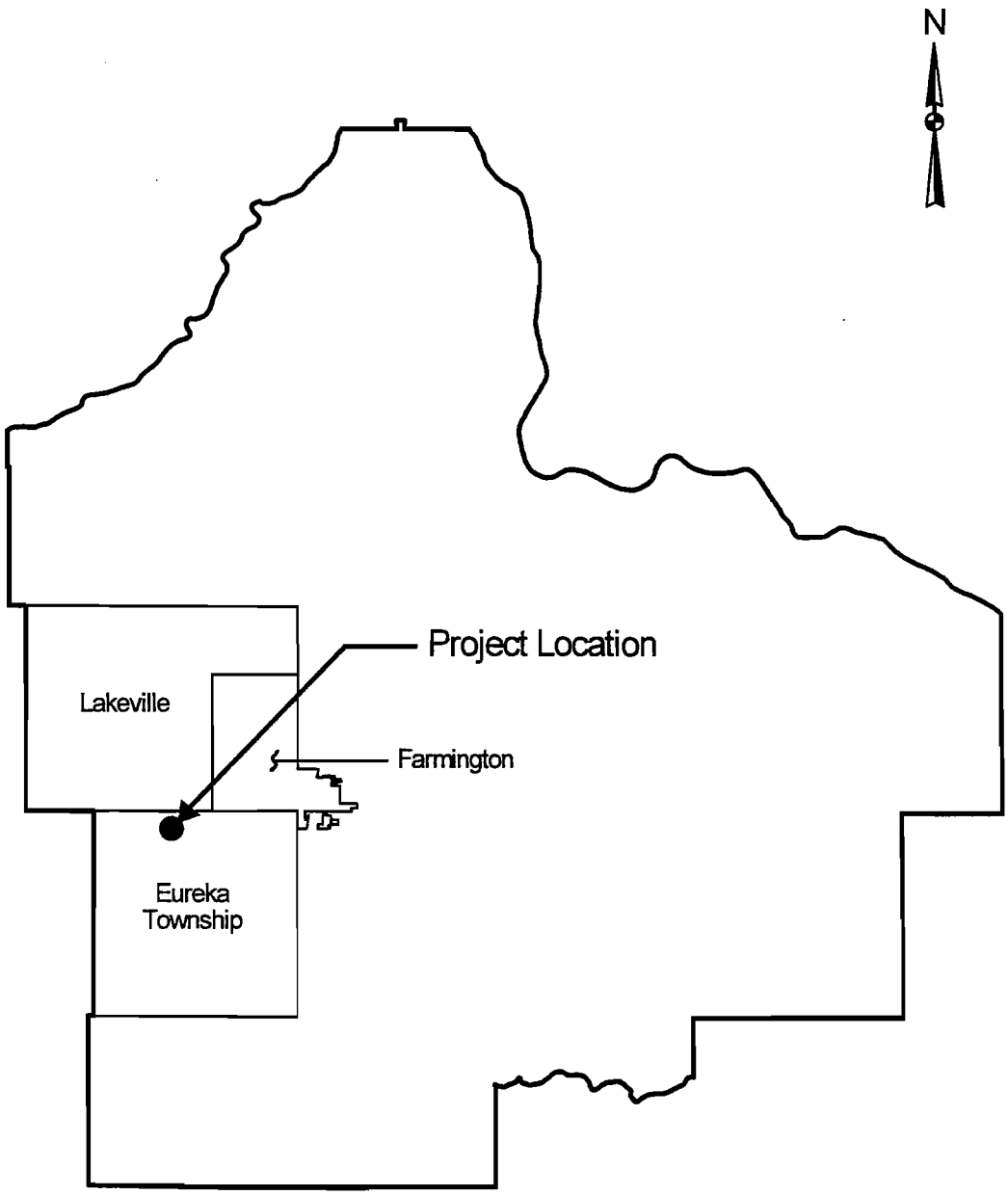
C. I hereby certify that copies of the completed EAW are being sent to all points on the official EQB EAW distribution list.

Signature Nigel D. Finney

Title of signer Deputy Executive Director - Planning/Environment

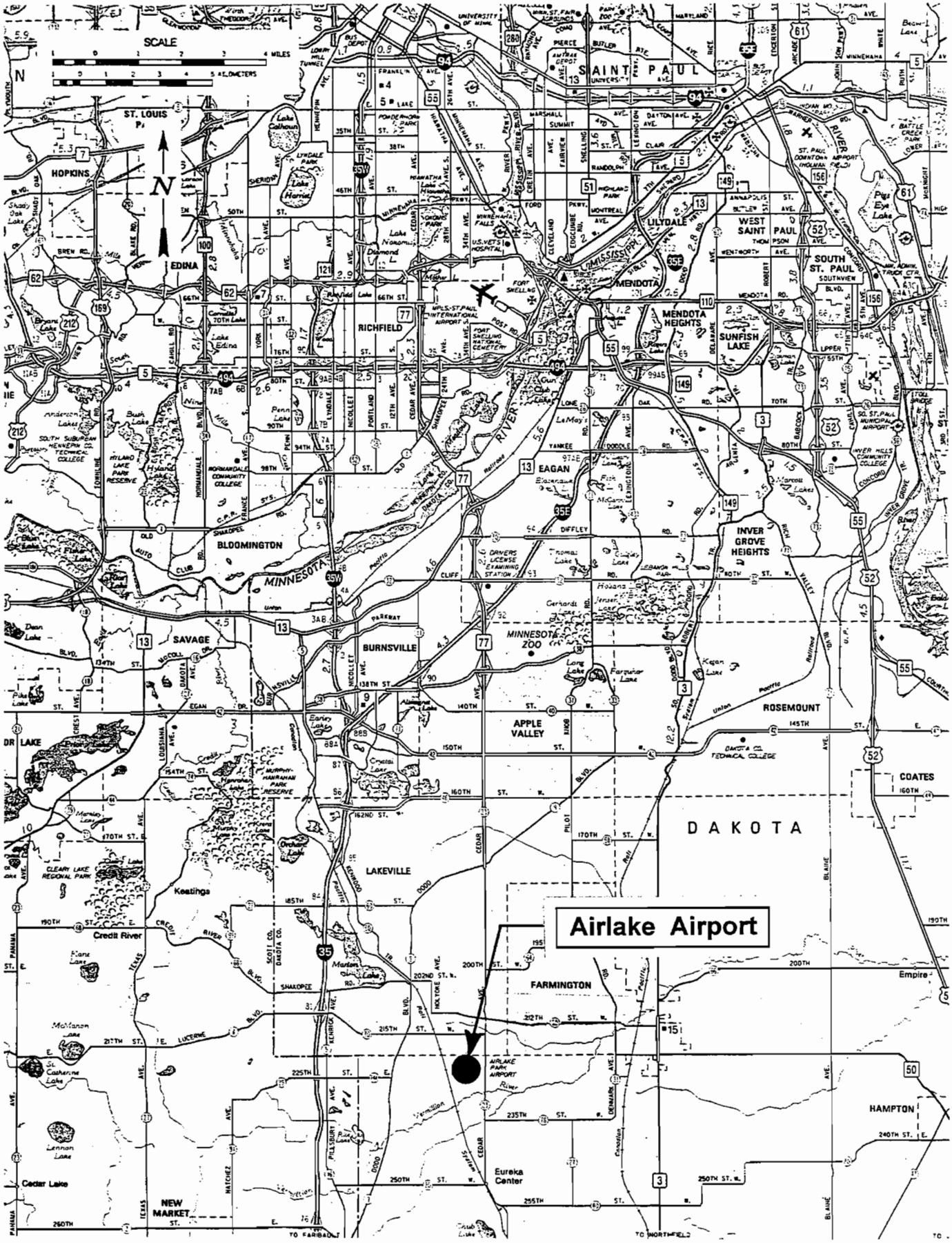
Date 1-20-99

Dakota County
Minnesota



H:\FILES\WENCK\DAKOTA.APR

METROPOLITAN AIRPORTS COMMISSION	Wenck Associates, Inc. Environmental Engineers — 1800 Pioneer Creek Center Maple Plain, MN 55359-0428	JAN 1999
General Location Map		Figure 1



METROPOLITAN AIRPORTS COMMISSION

Location Map - Airlake Airport

COPYRIGHT

Wenck Associates, Inc.
Environmental Engineers

Wenck

1800 Pioneer Creek Center
Maple Plain, MN 55359

JAN 1999

Figure 2

Appendix A

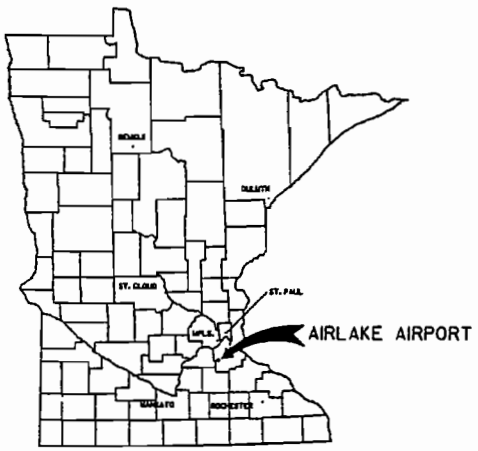
Construction Plans

METROPOLITAN AIRPORTS COMMISSION

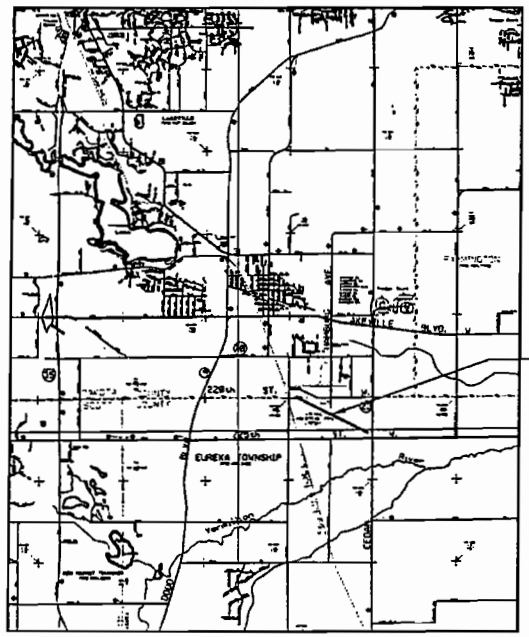
AIRLAKE AIRPORT

SOUTH BUILDING AREA AND TAXIWAY GRADING

MAC PROJECT NUMBER 113-3-003



LOCATION MAP
SCALE 1" = 65 MILES



VICINITY MAP
2000' 0 4000'
SCALE IN FEET

TABLE OF CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SITE PLAN
3	SAFETY PLAN
4	ESTIMATED QUANTITIES AND EARTHWORK BALANCE
5-6	TYPICAL SECTIONS AND PAVEMENT DETAILS
7	PLANNED CONSTRUCTION
8	GRADING, DRAINAGE AND EROSION CONTROL PLAN
9	DETENTION POND, EROSION CONTROL AND DIKE DETAILS
10-14	PROFILES
15-16	HANGAR FLOOR ELEVATION PLAN
17	WIND CONE RELOCATION PLAN AND DETAILS
18-19	ELECTRICAL DETAILS
20	CROSS SECTION LAYOUT PLAN
21-53	CROSS SECTIONS

REVISIONS	BY	APP.	DATE

DESIGNED RAB	CHECKED PAS
DRAWN SPC	APPROVED RAB
DATE 4/23/98	JOB NO. 29086

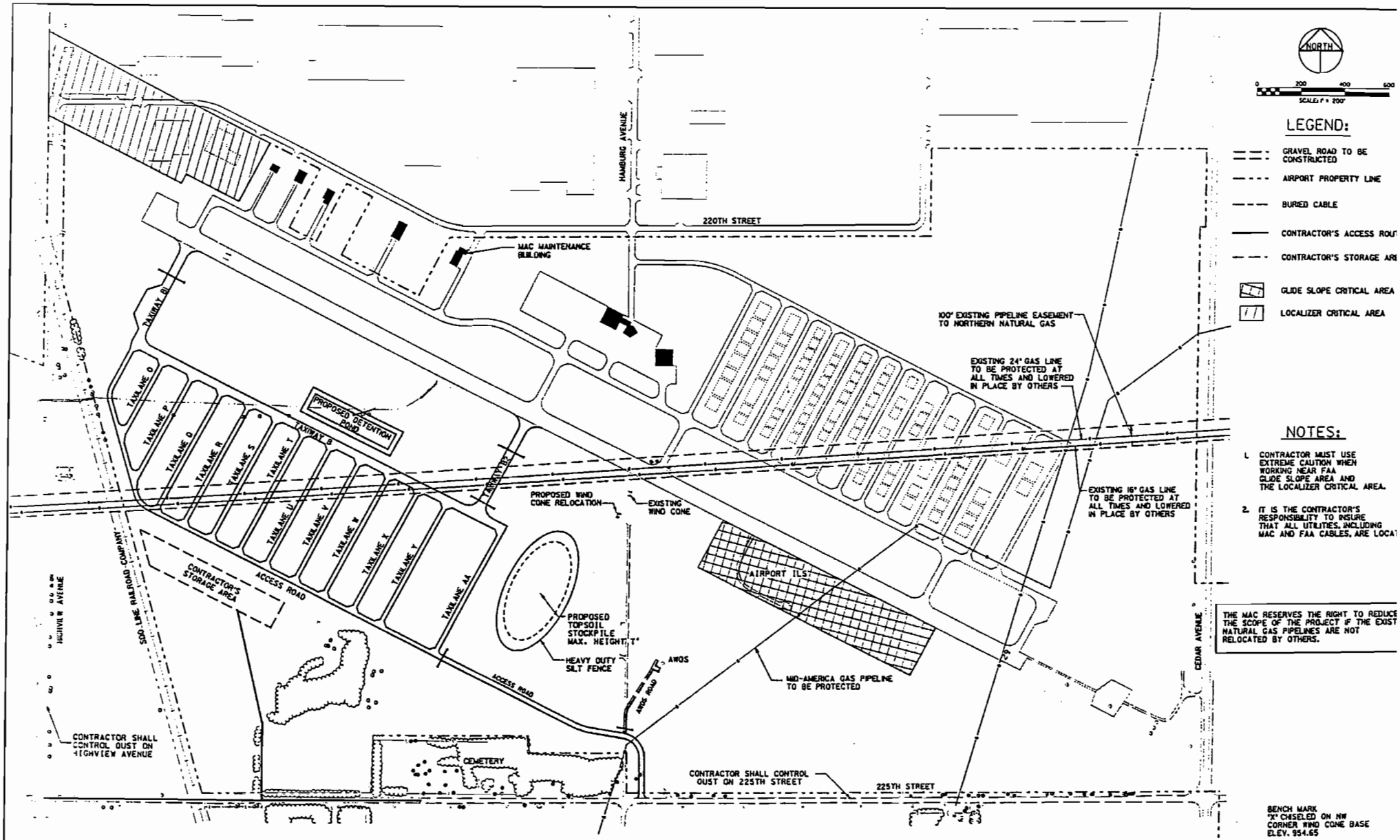
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 21570

HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28TH AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT
TITLE SHEET

SHEET 1 OF 53



NO.	REVISIONS	BY	APP.	DATE

DESIGNED RAB	CHECKED PAS
DRAWN SPG	APPROVED RAB
DATE 4-23-98	JOB NO. 29088

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 23872

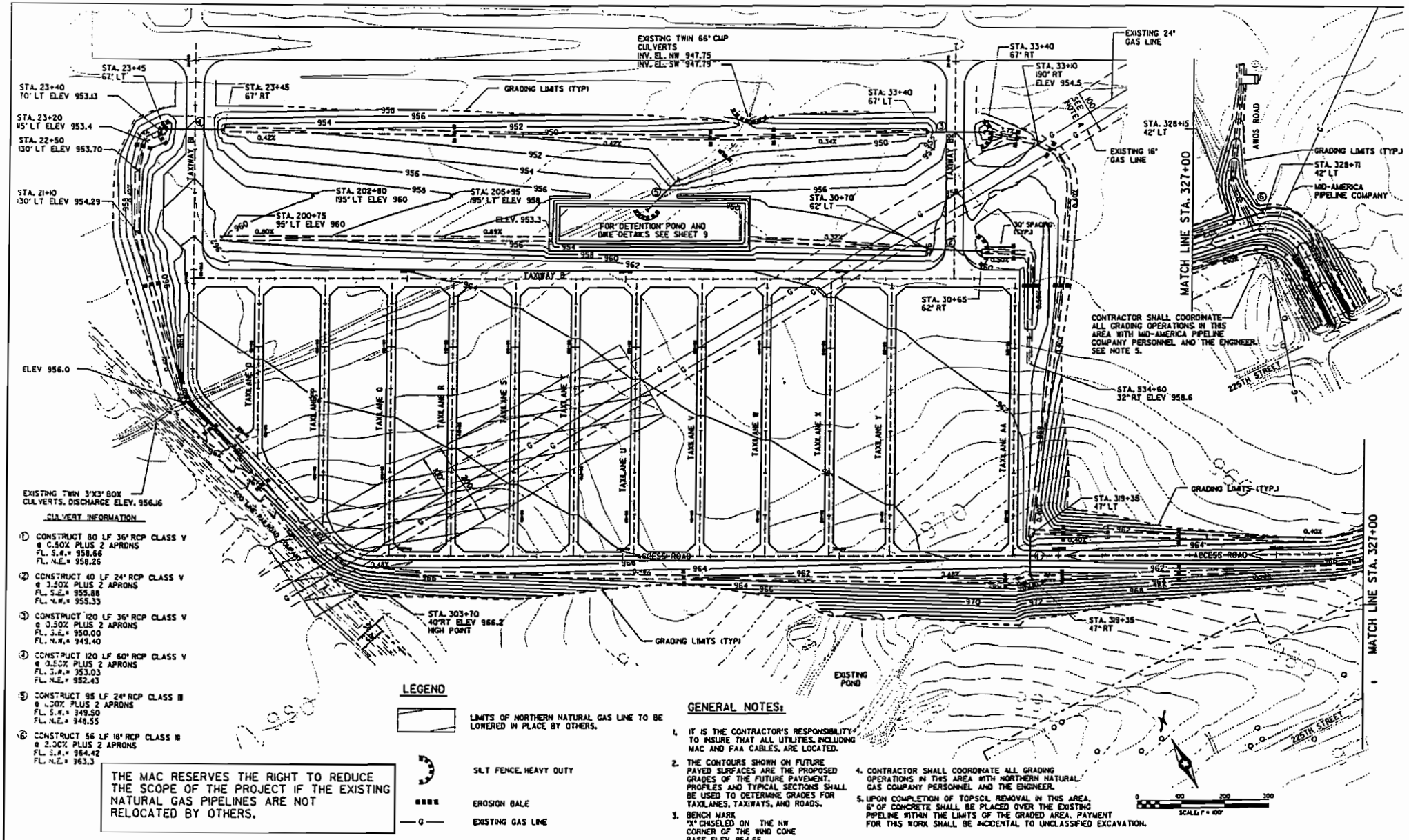
HNTB ARCHITECTS ENGINEERS PLANNERS
Traditional Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28TH AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT

SITE PLAN

SHEET 2
OF 53



CULVERT INFORMATION

① CONSTRUCT 80 LF 36" RCP CLASS V @ 0.50% PLUS 2 APRONS
FL. S.E.= 958.66
FL. N.E.= 958.26

② CONSTRUCT 40 LF 24" RCP CLASS V @ 3.50% PLUS 2 APRONS
FL. S.E.= 955.88
FL. N.W.= 955.33

③ CONSTRUCT 120 LF 36" RCP CLASS V @ 0.50% PLUS 2 APRONS
FL. S.E.= 950.00
FL. N.W.= 949.40

④ CONSTRUCT 120 LF 60" RCP CLASS V @ 0.50% PLUS 2 APRONS
FL. S.W.= 953.03
FL. N.E.= 952.43

⑤ CONSTRUCT 95 LF 24" RCP CLASS III @ 1.20% PLUS 2 APRONS
FL. S.W.= 949.50
FL. N.E.= 948.55

⑥ CONSTRUCT 56 LF 18" RCP CLASS III @ 2.30% PLUS 2 APRONS
FL. S.W.= 964.42
FL. N.E.= 963.3

THE MAC RESERVES THE RIGHT TO REDUCE THE SCOPE OF THE PROJECT IF THE EXISTING NATURAL GAS PIPELINES ARE NOT RELOCATED BY OTHERS.

LEGEND

- LIMITS OF NORTHERN NATURAL GAS LINE TO BE LOWERED IN PLACE BY OTHERS.
- SILT FENCE, HEAVY DUTY
- EROSION BALE
- —G— EXISTING GAS LINE

GENERAL NOTES:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ALL UTILITIES, INCLUDING MAC AND FAA CABLES, ARE LOCATED.
2. THE CONTOURS SHOWN ON FUTURE PAVED SURFACES ARE THE PROPOSED GRADES OF THE FUTURE PAVEMENT. PROFILES AND TYPICAL SECTIONS SHALL BE USED TO DETERMINE GRADES FOR TAXILANES, TAXIWAYS, AND ROADS.
3. BENCH MARK "X" CHISELED ON THE NW CORNER OF THE WIND CONE BASE ELEV. 954.65
4. CONTRACTOR SHALL COORDINATE ALL GRADING OPERATIONS IN THIS AREA WITH NORTHERN NATURAL GAS COMPANY PERSONNEL AND THE ENGINEER.
5. UPON COMPLETION OF TOPSOIL REMOVAL IN THIS AREA, 6" OF CONCRETE SHALL BE PLACED OVER THE EXISTING PIPELINE WITHIN THE LIMITS OF THE GRADED AREA. PAYMENT FOR THIS WORK SHALL BE INCIDENTAL TO UNCLASSIFIED EXCAVATION.

NO.	REVISIONS	BY	APPR.	DATE

DESIGNED	CHECKED
RAB	PAS
DRAWN	APPROVED
SPC	RAB
DATE	JOB NO.
4-23-98	29088

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 23077

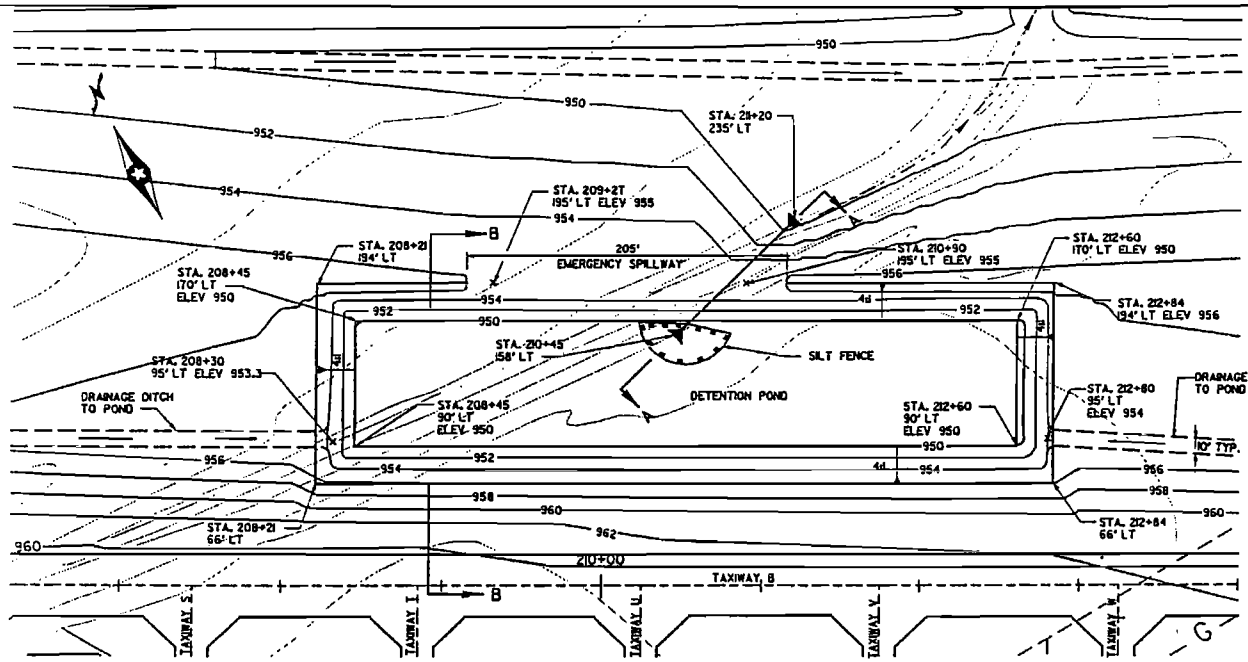
HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28TH AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

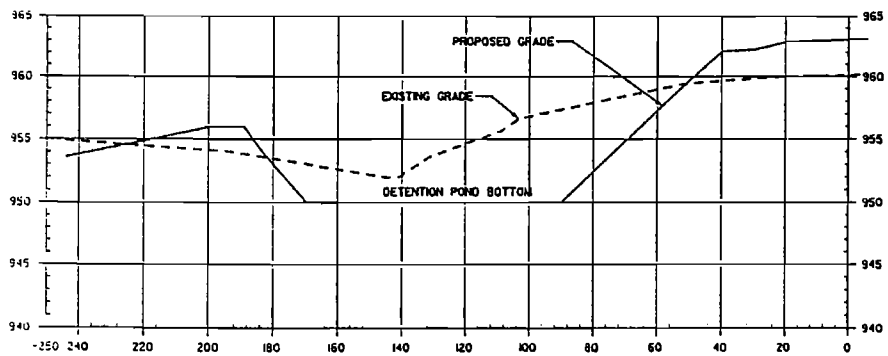
AIRLAKE AIRPORT

GRADING, DRAINAGE & EROSION CONTROL PLAN

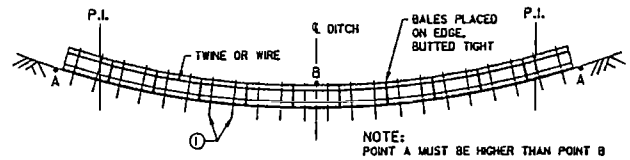
SHEET 8 OF 53



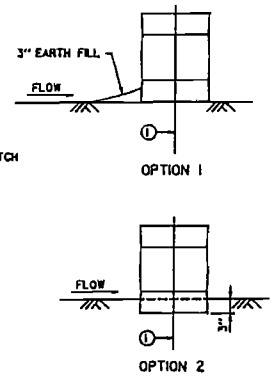
DETENTION POND DETAIL
SCALE: 1"=40'



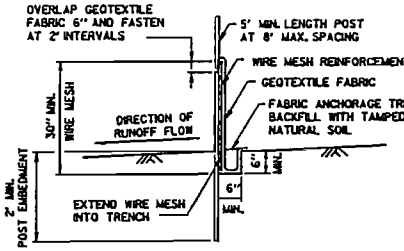
SECTION B-B



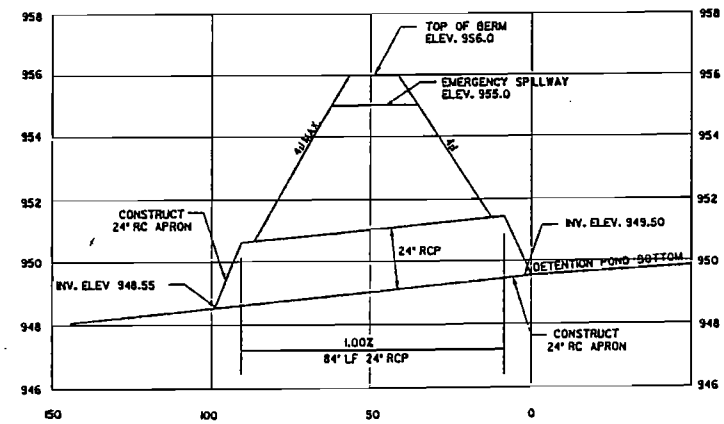
BALE DITCH SEDIMENT CHECK
NO SCALE



BALE CHECK DETAILS
NO SCALE



SILT FENCE, HEAVY DUTY DETAIL
NO SCALE



SECTION A-A
SKEWED CROSS SECTION VIEW OF
24" OUTLET FOR DETENTION POND

NO.	REVISIONS	BY	APP.	DATE

DESIGNED RAB | CHECKED PAS
DRAWN SPC | APPROVED RAB
DATE 4-23-98 | JOB NO. 29068

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 25072

HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28TH AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

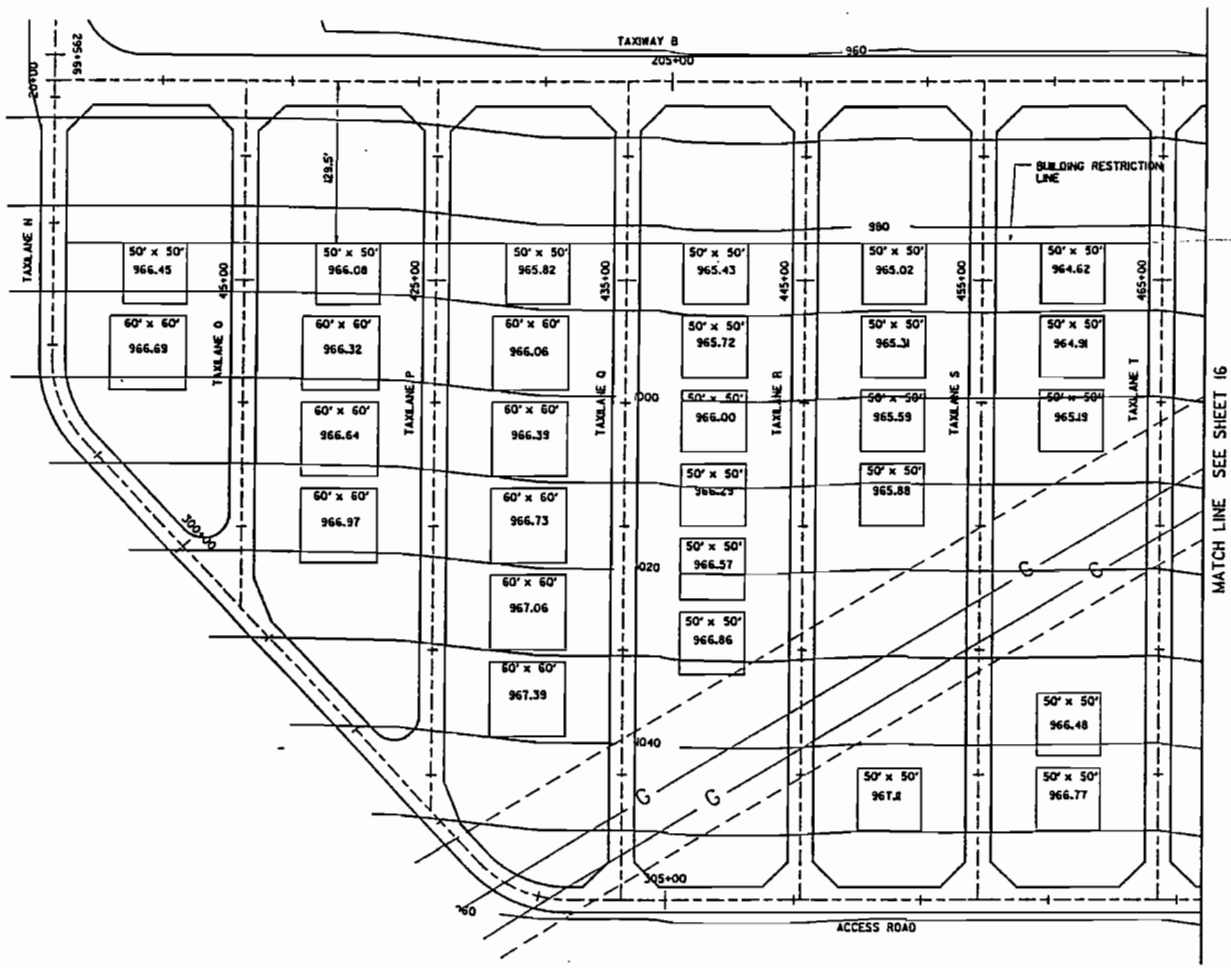
AIRLAKE AIRPORT

DETENTION POND, EROSION CONTROL AND DIKE DETAILS

SHEET 9
OF 53

Appendix B

Conceptual Hangar Layout Plans



SCALE: 1" = 50'

LEGEND

1020 — PART 77 CONTOUR

NOTE:
HANGAR PAD SIZES SUBJECT TO CHANGE

REVISIONS	BY	APPR.	DATE	DESIGNED RAB	CHECKED PAS		
				DRAWN SPG	APPROVED RAB		
				DATE 4-23-98	JOB NO. 29068		

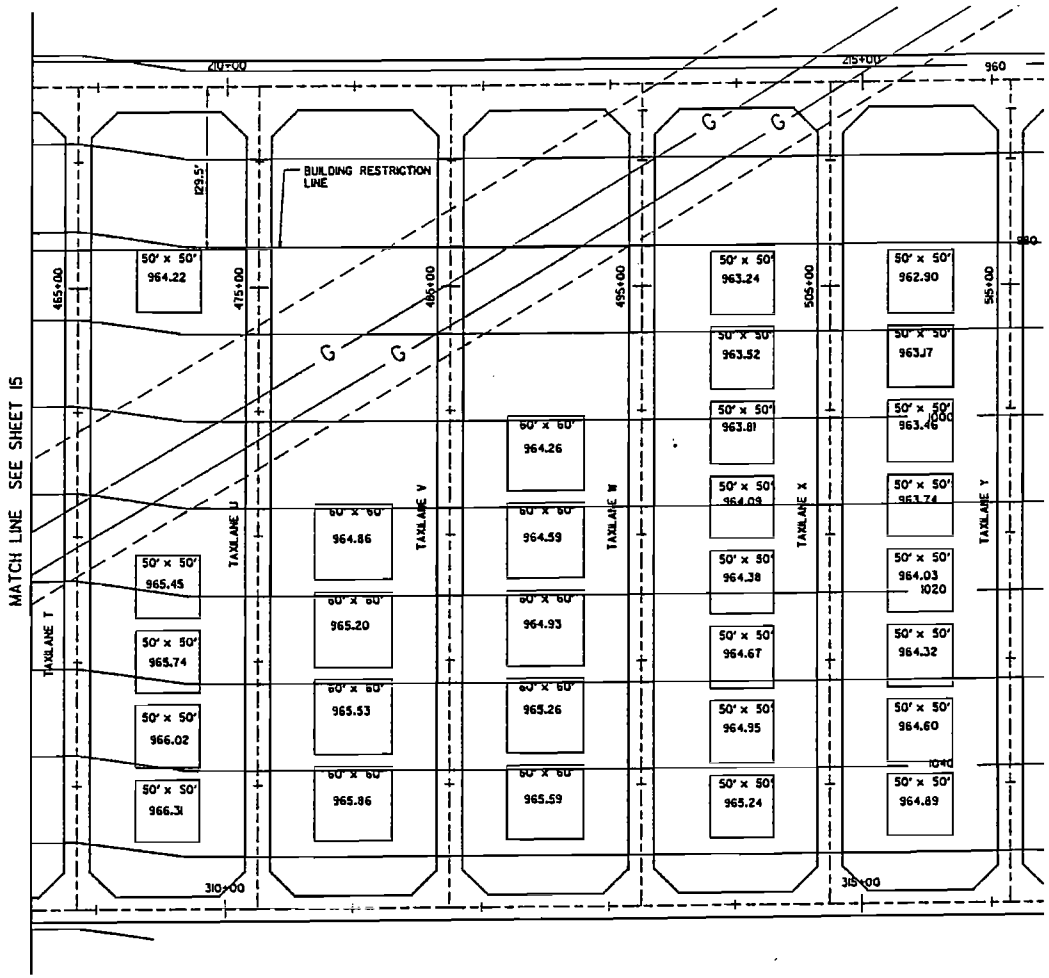
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 21907

HNTB ARCHITECTS ENGINEERS PLANNERS
Howard R Green Company

METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT
HANGAR FLOOR ELEVATION PLAN

SHEET 15
OF 53



LEGEND

1020 — PART 77 CONTOUR

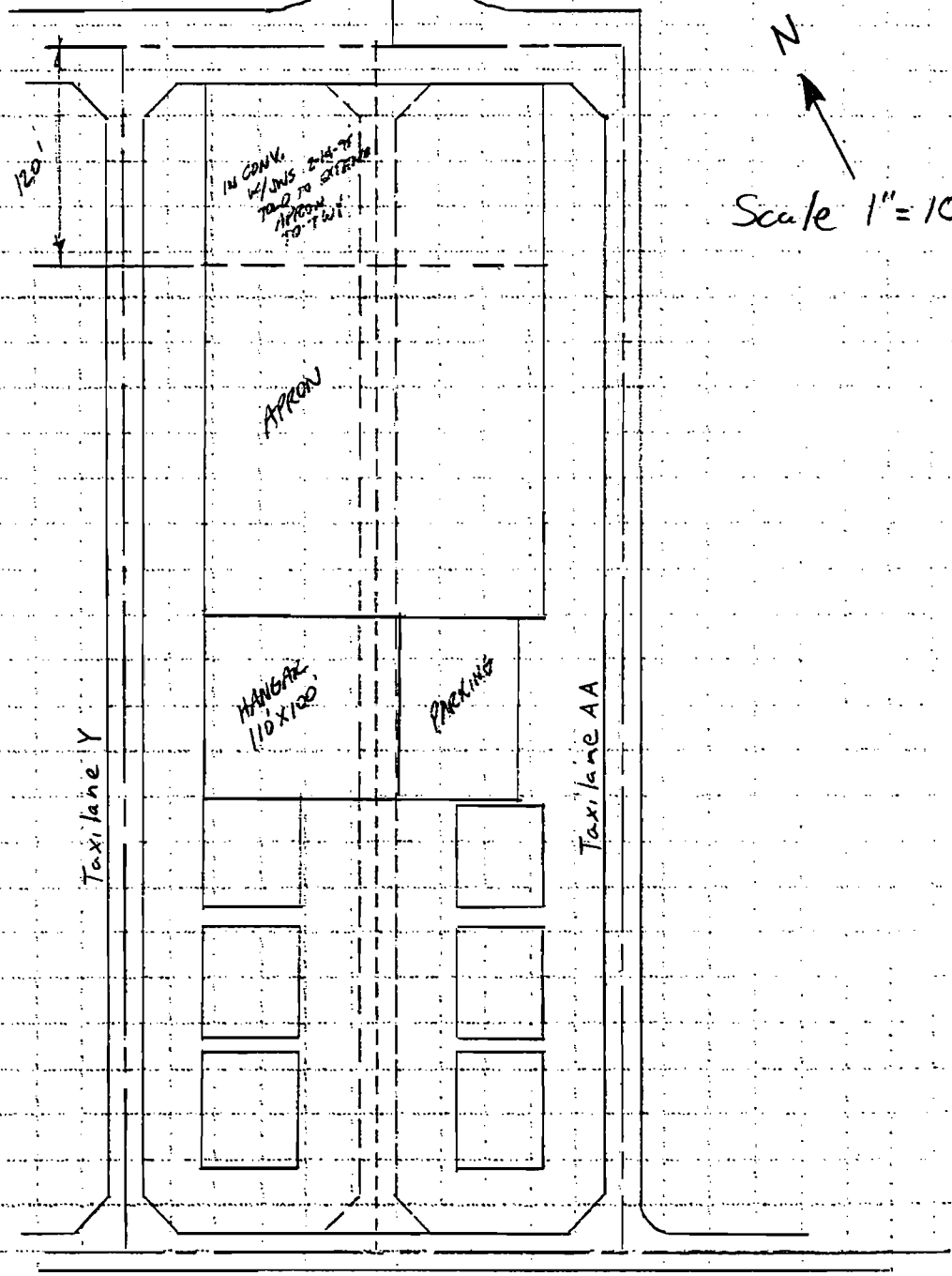
NOTE:
HANGAR PAD SIZES SUBJECT TO CHANGE

		DESIGNED RAB	CHECKED PAS	I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.	HNTB ARCHITECTS ENGINEERS PLANNERS The HNTB Companies
		DRAWN SPC	APPROVED RAB		METROPOLITAN AIRPORTS COMMISSION 6040 28th AVE. SOUTH ST. PAUL, MINNESOTA 55450-2799
NO.	REVISIONS BY DATE	DATE 4-23-98	JOB NO. 29088	DATE 4/23/98 REG. NO. 23079	

AIRLAKE AIRPORT
HANGAR FLOOR ELEVATION PLAN

SHEET 16
OF 53

HNTB The HNTB Companies	Made by RAE	Date 2-14-95	Job Number 17614
	Checked by	Date	Sheet Number 2 of 4
For AIRLAKE DRAINAGE COMP.	Backchecked by	Date	



N

Scale 1" = 100'

FBO ILLUSTRATION

SOURCE OF DRAWING
OPTION #4 FBO
LOCATION DRAWING

99-6034

Minnesota Pollution Control Agency

November 12, 1998



Mr. David Dahlquist
HNTB Corporation
3400 West 66th St., Suite 250
Minneapolis, MN 55435

RE: Noncompliance With Requirements of National Pollution Discharge Elimination System (NPDES) General Storm Water Permit for Construction Activity, ID #C00005291, For Airlake Airport--South Building Area, Lakeville, MN

Dear Mr. Dahlquist:

This letter is being sent as follow-up to a site inspection and meetings with Bonita Crow, of HNTB Corp., and Dan Westergren of Freidges, Inc., on November 9th, 1998. During this inspection the silt fence installed around the dirt stockpiles on the west end of the site was found to need replacing, and stabilization of the areas around the new channel and the remaining exposed areas of the site needs to be completed. Mr. Westergren also mentioned berming of the new channel to direct the spring runoff into the existing channel, and additional ditch checking and silt fencing in the channel. .

This site is in serious violation of the NPDES permit. Your prompt attention to these problems is required. Corrective actions on these problems must be completed by November 18, 1998.

If you have any questions, please contact me at 651-296-7036.

Sincerely,

Jay Michels

Jay Michels
Community and Area-Wide Programs
Metro District

JM:jgo

cc: Jay Riggs, Dakota SWCD
Pat Lynch, MN/DNR
Dan Westergren, Friedges, Inc.

HNTB
The HNTB Companies

Correspondence

To Dan Westergren, Darrell Buszmann (Friedges)
Jason Moeckel (DNR)
Bridge Rief (MAC)

Date 11/4/98

Pat
FYI
Jason

From Benita L. Crow

Subject November 3rd Meeting w/DNR at Airlake Airport

Minutes from Meeting with DNR to Inspect Rerouted Trout Stream at Airlake Airport

Attendees: Dan Westergren, Lana Westergren, Darrell Buszmann (Friedges)
Jason Moeckel (DNR)
Dave Dahlquist, Benita Crow (HNTB)

Jason Moeckel of the DNR was on site at Airlake to inspect the rerouted trout stream excavated by Friedges on October 21st. According to Jason, the excavation of the trout stream was done well and there are only two remaining items to be addressed regarding excavations:

1) During excavation, the backhoe left loose soil material along the edges of the trout stream. Jason wants this loose material smoothed out so that it is not washed into the trout stream during rainfall. In addition, the teeth of the backhoe bucket loosened the edges of the trout stream during excavations. If these edges can be recompacted during removal of the loose material along the edges, the trout stream will become more stabilized. This was not specifically required, but was noted by the DNR that it would help prevent water from eroding the sides of the stream.
2) In the northern corner of the west stream (NW corner of the project site), it was noted that the elevation of the trout stream varied in such a way that water would flow opposite of its intended direction. In addition, it appears that the west side of the ditch in this area is lacking topsoil fill. Jason noted that with the varied elevation and the lack of fill, water would not follow the path of the meandering stream in this area. In order to prevent this, Jason asked that Friedges add fill to the west side of the ditch and appropriately adjust the elevation within the meandering stream.

Once these two items have been completed, Friedges is to seed and mulch the ditch sides and stream bottom with dormant seeding, as planned.

Minnesota Department of Natural Resources
Metro Waters - 1200 Warner Road, St. Paul, MN 55106-6793
Telephone: (651) 772-7910 Fax: (651) 772-7977

September 23, 1998

Rex Brejnik
HNTB Corporation
3400 West 66th Street, Suite 250
Minneapolis, Minnesota 55435

RE: DNR PERMIT APPLICATION #99-6034, UNNAMED TRIBUTARY TO THE VERMILLION RIVER, AIRLAKE AIRPORT, DAKOTA COUNTY

Dear Mr. Brejnik:

Thank you for meeting with staff from the DNR and Metropolitan Airports Commission (MAC) to discuss the grading underway at the Airlake Airport in Eureka Township. Permit Application #99-6034 was submitted by you, on behalf of MAC, for the relocation of a DNR-protected watercourse which transverses the project in Section 4, T113N, R20W. The subject watercourse is a tributary to the Vermillion River, and is designated trout stream.

The proposed new channel (a portion of which has been completed) will need to be modified, as discussed in our meeting. Enclosed is a schematic with recommended design specifications for the new channel. Please incorporate the recommended channel modifications into a revised grading plan. We also discussed the possibility of enlarging the proposed pond on the north end of the project, and temporarily diverting the new channel into the pond until the new channel is vegetated and stabilized. These modifications should also be reflected in a revised grading plan. I am still working on getting a recommendation for seed mix and native plantings to incorporate into the new channel, and will forward them to you as soon as I receive them.

Subsequent to our meeting, Bridget Rief of MAC and I had a conference call with Gregg Downing of the Minnesota Environmental Quality Board Environmental Review Program. It has been determined that the project for which you have applied for a DNR permit requires a mandatory EAW. Minnesota Rules, Chapter 4410.4300, subp. 26, indicates that diversion or channelization of a natural watercourse with a total watershed of ten or more square miles **or a designated trout stream**, requires a mandatory EAW.

Furthermore, Minnesota Statutes 116D.04, subd. 2b declares that if an EAW or EIS is required for a project, the project may not be started, and no final governmental decision may be made to grant a permit, approve the project, or begin the project until any mandatory environmental review processes are completed. As such, DNR cannot grant a permit for the channel re-alignment until the EAW is completed. However, we can proceed with the permit review process, and continue to work with you and MAC to develop a plan which facilitates both MAC's needs and the protection and enhancement of the trout stream.

On September 16, DNR staff inspected the Airlake project site. A couple of erosion control issues were discussed. First, because of the EAW requirement, it is not likely the grading work will be completed this year. A large portion of the project site has been graded, and is without vegetative cover. To protect the trout stream from erosion impacts it is imperative that exposed soil areas be seeded and mulched as soon as possible. If completed quickly, a temporary cover crop may germinate yet this fall. Jay Riggs of the Dakota County Soil and Water Conservation District (480-7779) has offered to assist with identifying the appropriate seed mix and application rate to accomplish this.

We also noted that a majority of the project site, and particularly along the trout stream, were without silt fence or other erosion control measures. There was some evidence of soil deposition in select areas along the watercourse where the limits of grading were essentially at the stream edge. To address erosion control both short term (until construction once again commences) and long term, an erosion control plan must be prepared and submitted to me. In addition, please forward a copy of said plan to Jay Riggs, who will review it, provide you input on the plan, and will coordinate with the Minnesota Pollution Control Agency to ensure compliance with the NPDES permit for the site.

For now, the item of most concern for DNR is the establishment of a temporary vegetative cover, and stabilization of the site until grading continues. Please contact Jay Riggs immediately to address these items.

If you have any questions, please call me at 772-7910.

Sincerely,

Patrick J. Lynch III
Area Hydrologist

enclosure

c: Bridget Rief, Metropolitan Airports Commission
Gregg Downing, EQB
John Forrest, Dakota County Planning
Jay Riggs, Dakota SWCD
Vermillion WMO
Jay Michaels, MPCA
Kevin Bigalke, DNR Trout Stream Watershed Coordinator
Jason Moeckel, DNR Trout Stream Habitat Specialist
Dave Zappetillo, Area Fisheries Supervisor
Conservation Officer Ross Opsahl

MAC/DNR AIRLAKE 99-6034

9/10/98

✓ EQB – EAW? – timing?
Check with Gregg Downing

NEED:
revised grading plan – ✓ incorporate channel @ sinuosity
✓ seed mix
✓ shrubs/forbs
•

Check with Hannah D. on vegetation plan

JASON – channel geometry
MNTB – divert channel temporarily to pond, enlarge pond
PJL – EQB – EAW
Hannah D. – seed mix/veg plan

DNR MTG upon AIRLAKE

9/10/98
9:05 AM

NAME	COMP.	PHONE/CELL
Jason Moeckel	DNR Fisheries	772-7965
Kevin Bigalke	DNR Waters	772-6152
PAT LYNCH	DNR Waters	772-7917
DAVID DAHLQUIST	HNTB	920-4668
BRIDGET RIEF	MAC	725 8371
REX BREJNIK	HNTB	920-4668

NA-02620-01

LOCAL - STATE - FEDERAL WATER RESOURCE PROJECT NOTIFICATION / APPLICATION FORM

Use this form to notify/apply to the U.S. Army Corps of Engineers, the Minnesota Department of Natural Resources, and your Local Government Unit of a proposed water/wetland project or work which may fall within their jurisdiction. These agencies should advise you of their jurisdiction or permit requirements within 45 days. Some LGU's may also require submission of their own application forms. Fill out this form completely and mail a copy, with plans, maps, etc. to each of the agencies listed on the reverse of the form. Keep a copy for your records. YOU MUST OBTAIN ALL REQUIRED AUTHORIZATIONS BEFORE BEGINNING WORK.

AGENCY USE ONLY: LGU NUMBER: _____ MDNR NUMBER: 99-6034 CORPS NUMBER: _____

I. Applicant's Name (Last, First, M.I.) | Authorized Agent, if any | Area Code, Telephone

Metropolitan Airports Commission C/O HNTB Corporation | (612) 920-4668

Address (Street, RFD, Box Number, City, State, Zip Code)

3400 West 66th Street Ste. 250, Minneapolis, MN 55435

II. Location of proposed project (attach drawing showing how to get to site)

COUNTY	QUARTER SECTION(s)	SECTIONS(s) No.	TOWNSHIP(s) No.	RANGE(s) No.	Lot, Block, Subdivision
Dakota		4	113N	20W	

FIRE No., BOX No., OR PROJECT ADDRESS | NAME OF WATERBODY AFFECTED and NUMBER (IF KNOWN)

Drainage Ditch Across Site

III. ESTIMATED PROJECT COST: $ 588,920.37 LENGTH OF SHORE AFFECTED (in feet): 1500' (length of ditch)

IV. VOLUME OF FILL OR EXCAVATION (Cubic Yards): 30'W x 1500'L x6'D=10,000 cy (*NOTE: You may substitute dimensions*)
AREA FILLED OR EXCAVATED IS _____ Acres, OR _____ Square Feet

V. TYPE OF WORK AND AREA (CHECK ALL THAT APPLY):

☐ CONSTRUCT ☐ DRAIN ☐ EXCAVATE ☐ ACCESS PATH ☐ BRIDGE ☐ CULVERT ☐ DAM
☒ FILL ☐ REMOVE ☐ REPAIR ☐ DOCK ☐ RIPRAP ☐ SANDBLANKET
☐ LAKE ☐ SHORELINE ☒ WATERWAY ☐ WETLAND

OTHER (DESCRIBE): S. Bldg. Area & Taxiway Grading

WETLAND TYPE(S) AND ACREAGE(S) PROPOSED TO BE FILLED/DRAINED: NA

Attach applicable drawings, plans, and ASCS crop photos. Include a description of any proposed compensatory mitigation. Important: Identify any disposal and borrow areas. Describe the work below: how it would be done; what equipment would be used.

VI. PROJECT PURPOSE (why is this project needed--what benefits will it provide?):

Provide Building Area for the Construction of Additional Aircraft Storage Hangars at Airlake Arp

VII. ALTERNATIVES (describe any other sites or methods that could be used to achieve the purpose of your project while avoiding or minimizing wetland/water impacts: Attach additional sheets, if needed). Re-Route Ditch.



VIII. DATES: Proposed start of activity: 07-21-98 Proposed completion: 11-20-98

(Identify any completed work on an attached drawing)

IX. ADJOINING PROPERTY OWNERS (Attach list if more than two)

Name	Address	City	State	Zip

X. PERMITS have been received (enter an R) or already applied for (enter an A) from: ___ DNR ___ ARMY CORPS OF ENGINEERS ___ COUNTY
R TOWN/CITY R WATERSHED DISTRICT R MN POLLUTION CONTROL AGENCY

Has an archaeological survey of the project site been done? _____ If so, by whom: _____

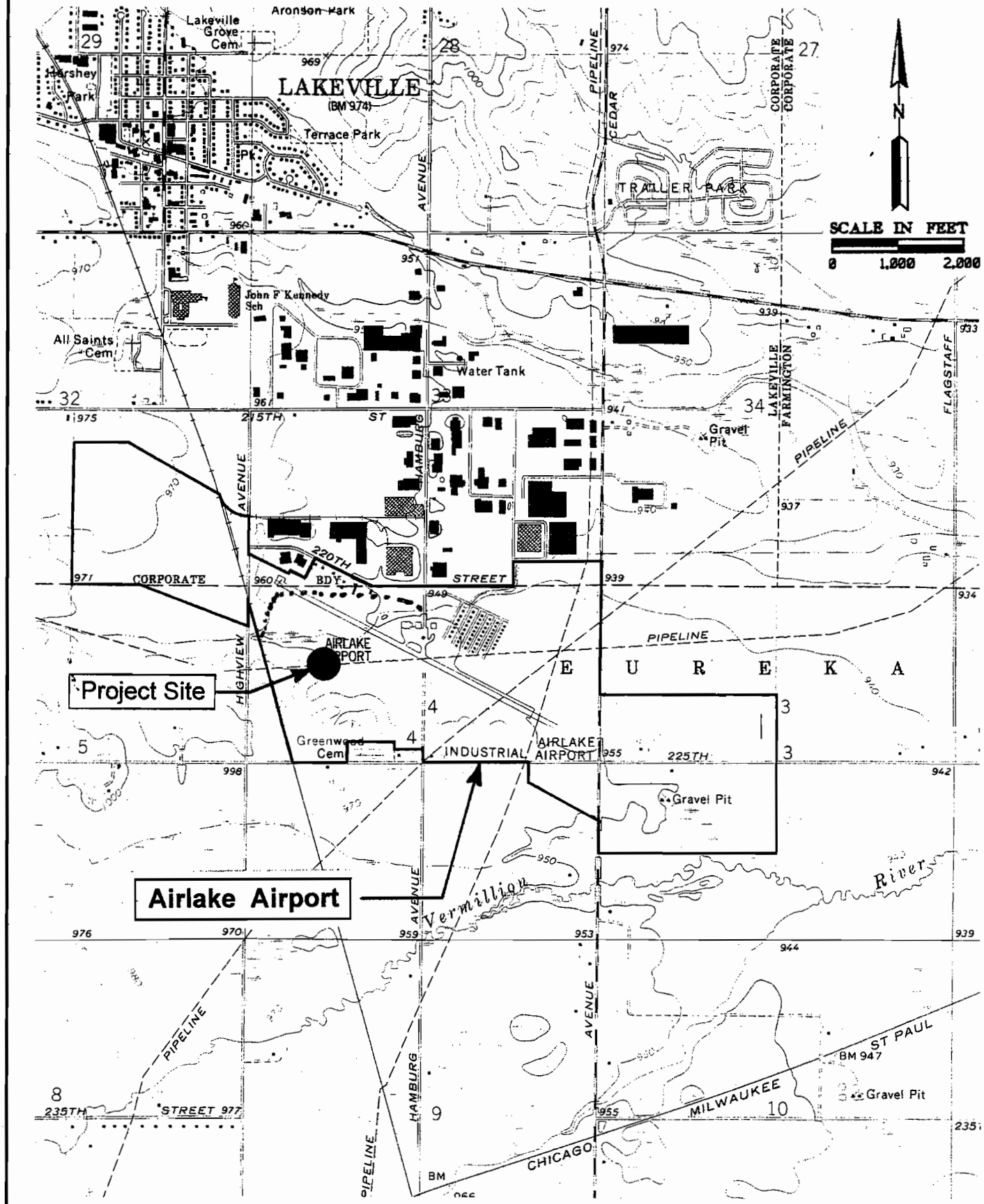
I hereby notify the recipients of this form of the project proposed herein and request that I be advised of any permits or other determinations concerning this project that I must obtain. I understand that proceeding with work before all required authorizations are obtained may subject me to Federal, State, and/or local administrative, civil and/or criminal penalties.

David D. Dahlquist
Signature of Person Proposing Project or Agent

DATE: 8-31-98

<<< PLEASE CAREFULLY READ AND COMPLETE BACK OF FORM >>>

99-6034



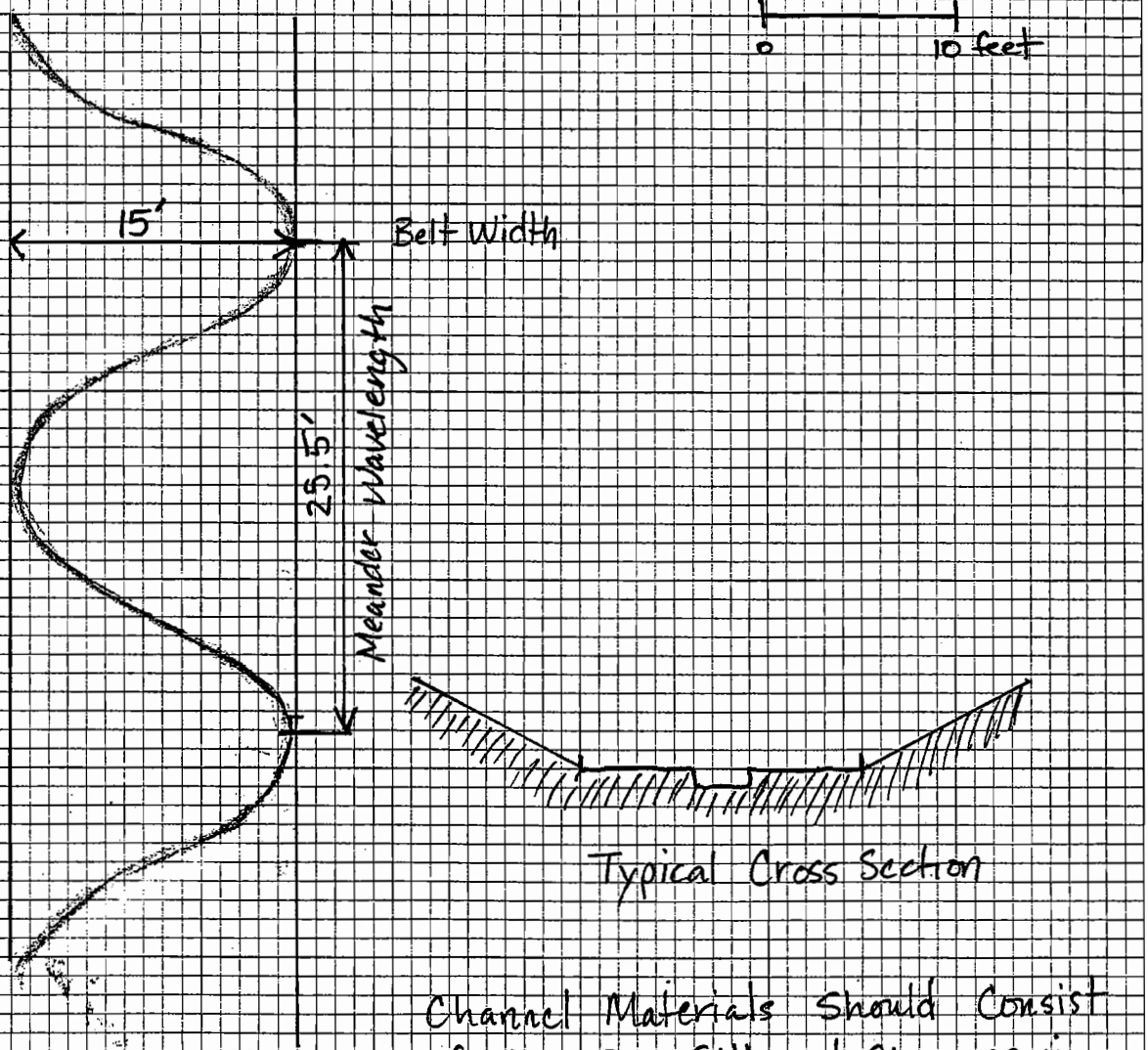
Farmington Quadrangle, 1993
Castle Rock Quadrangle, 1974

METROPOLITAN AIRPORTS COMMISSION	Wenck Associates, Inc. Environmental Engineers — 1800 Pioneer Creek Center, Maple Plain, MN 55359	JAN 1999
USGS Topographic Map - Airlake Airport		Figure 3

Design Specifications For Trout Stream Relocation at Airlake Airport.

The channel was constructed per this drawing.

Meander Wavelength	=	24 - 27 feet
Belt Width	=	15 feet
Radius of Curvature	=	5.3 feet
Channel Width	=	2 - 3 feet
Channel Depth	=	0.8 - 1.0 feet



Channel Materials Should Consist of Cohesive Silt and Clay as in Existing channel

JM
7/98

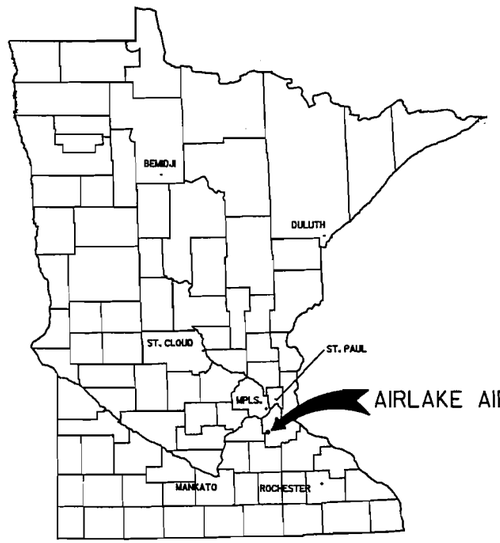
46 0700
10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

METROPOLITAN AIRPORTS COMMISSION

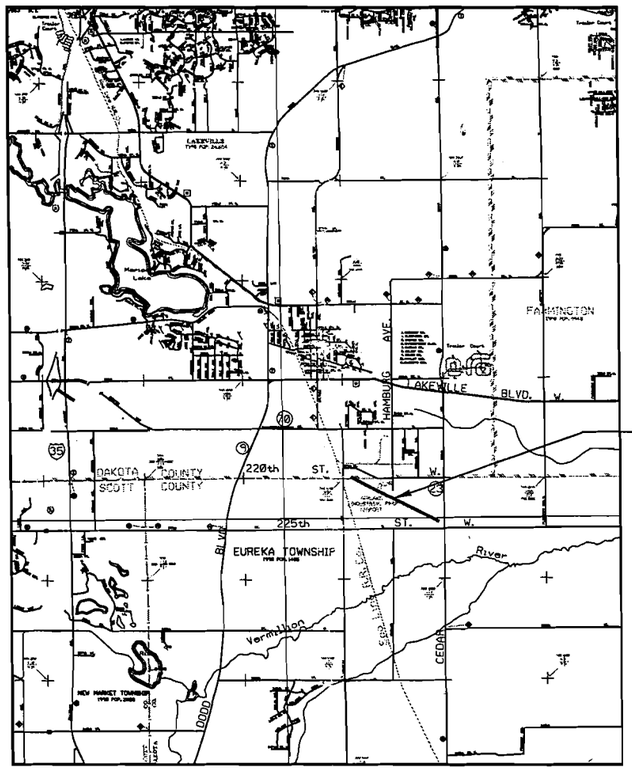
AIRLAKE AIRPORT

SOUTH BUILDING AREA AND TAXIWAY GRADING

MAC PROJECT NUMBER 113-3-003



LOCATION MAP
SCALE 1" = 65 MILES



VICINITY MAP
2000' 0 4000'
SCALE IN FEET

SEP 1998
RECEIVED
REGION VI
WATERS

TABLE OF CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SITE PLAN
3	SAFETY PLAN
4	ESTIMATED QUANTITIES AND EARTHWORK BALANCE
5-6	TYPICAL SECTIONS AND PAVEMENT DETAILS
7	PLANNED CONSTRUCTION
8	GRADING, DRAINAGE AND EROSION CONTROL PLAN
9	DETENTION POND, EROSION CONTROL AND DIKE DETAILS
10-14	PROFILES
15-16	HANGAR FLOOR ELEVATION PLAN
17	WIND CONE RELOCATION PLAN AND DETAILS
18-19	ELECTRICAL DETAILS
20	CROSS SECTION LAYOUT PLAN
21-53	CROSS SECTIONS

99-6034

NO.	REVISIONS	BY	APR.	DATE

DESIGNED	CHECKED
RAB	PAS
DRAWN	APPROVED
SPC	RAB
DATE	JOB NO.
4/23/98	29088

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 23872

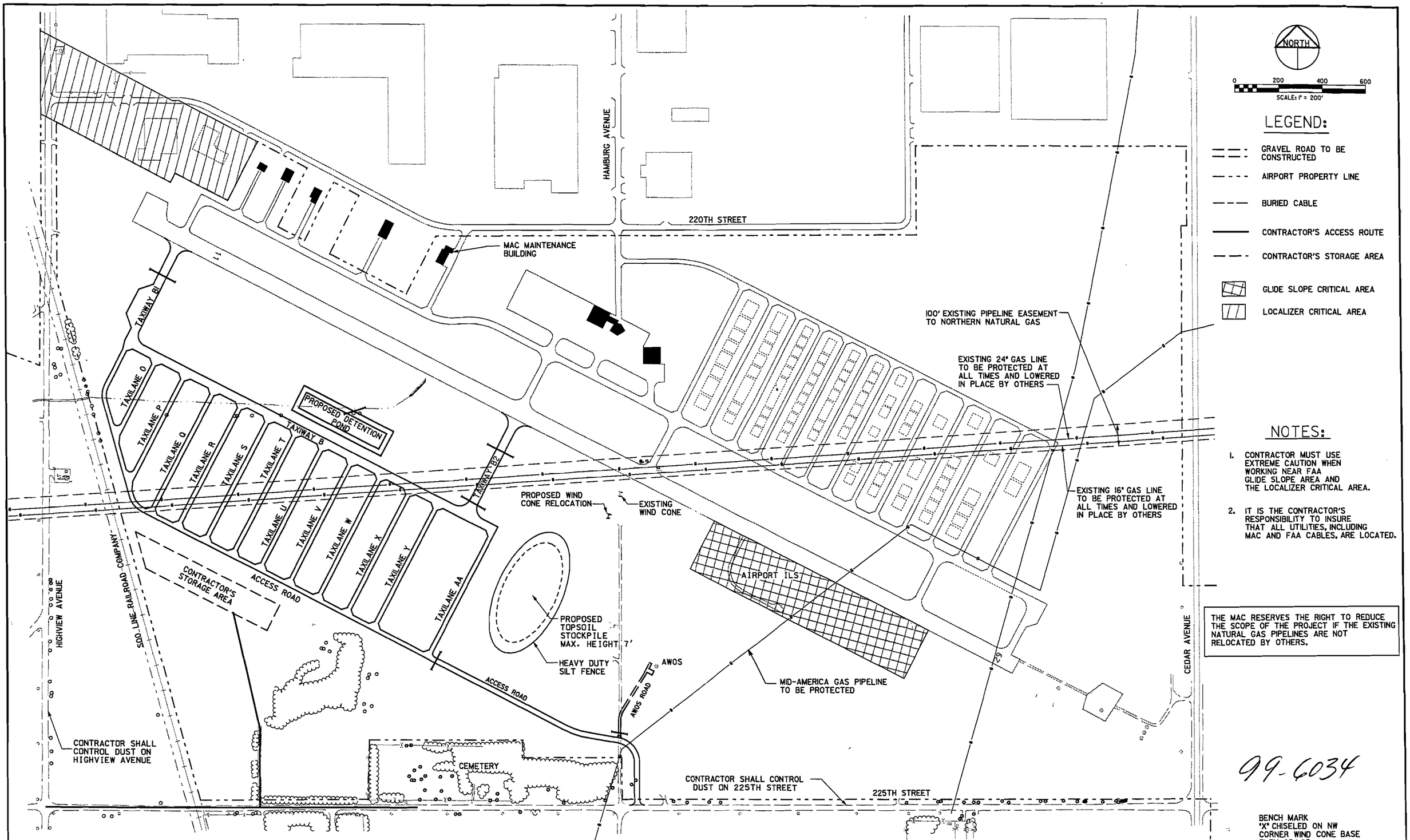
HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT

TITLE SHEET

SHEET 1
OF 53



NOTES:

1. CONTRACTOR MUST USE EXTREME CAUTION WHEN WORKING NEAR FAA GLIDE SLOPE AREA AND THE LOCALIZER CRITICAL AREA.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ALL UTILITIES, INCLUDING MAC AND FAA CABLES, ARE LOCATED.

THE MAC RESERVES THE RIGHT TO REDUCE THE SCOPE OF THE PROJECT IF THE EXISTING NATURAL GAS PIPELINES ARE NOT RELOCATED BY OTHERS.

99-6034

BENCH MARK
"X" CHISELED ON NW CORNER WIND CONE BASE
ELEV. 954.65

NO.	REVISIONS	BY	APR.	DATE

DESIGNED	CHECKED
RAB	PAS
DRAWN	APPROVED
SPG	RAB
DATE	JOB NO.
4-23-98	29088

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DATE 4/23/98 REG. NO. 23872

HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

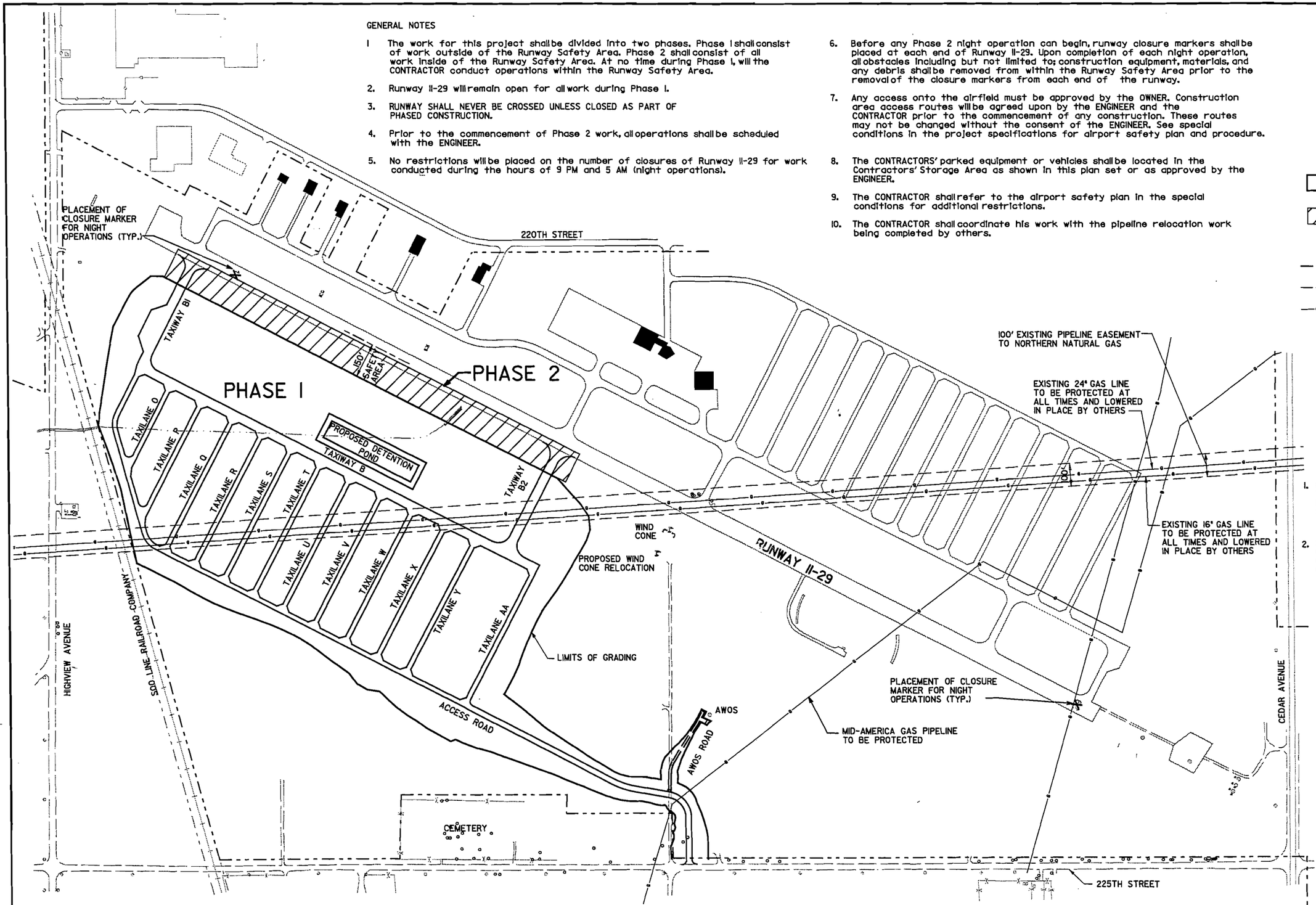
AIRLAKE AIRPORT

SITE PLAN

SHEET 2 OF 53

GENERAL NOTES

1. The work for this project shall be divided into two phases. Phase I shall consist of work outside of the Runway Safety Area. Phase 2 shall consist of all work inside of the Runway Safety Area. At no time during Phase I, will the CONTRACTOR conduct operations within the Runway Safety Area.
2. Runway 11-29 will remain open for all work during Phase I.
3. RUNWAY SHALL NEVER BE CROSSED UNLESS CLOSED AS PART OF PHASED CONSTRUCTION.
4. Prior to the commencement of Phase 2 work, all operations shall be scheduled with the ENGINEER.
5. No restrictions will be placed on the number of closures of Runway 11-29 for work conducted during the hours of 9 PM and 5 AM (night operations).
6. Before any Phase 2 night operation can begin, runway closure markers shall be placed at each end of Runway 11-29. Upon completion of each night operation, all obstacles including but not limited to; construction equipment, materials, and any debris shall be removed from within the Runway Safety Area prior to the removal of the closure markers from each end of the runway.
7. Any access onto the airfield must be approved by the OWNER. Construction area access routes will be agreed upon by the ENGINEER and the CONTRACTOR prior to the commencement of any construction. These routes may not be changed without the consent of the ENGINEER. See special conditions in the project specifications for airport safety plan and procedure.
8. The CONTRACTORS' parked equipment or vehicles shall be located in the Contractors' Storage Area as shown in this plan set or as approved by the ENGINEER.
9. The CONTRACTOR shall refer to the airport safety plan in the special conditions for additional restrictions.
10. The CONTRACTOR shall coordinate his work with the pipeline relocation work being completed by others.



NOTES:

1. CONTRACTOR MAY NOT WORK WITHIN THE AIR OPERATIONS AREA WITHOUT PERMISSION FROM THE ENGINEER. SEE SAFETY PLAN IN THE SPECIFICATIONS.
2. CONTRACTOR MUST USE EXTREME CAUTION WHEN WORKING NEAR FAA GLIDE SLOPE AREA AND THE LOCALIZER CRITICAL AREA SHOWN ON SHEET 2.

99-6034

NO.	REVISIONS	BY	APR.	DATE

DESIGNED RAB | CHECKED PAS
DRAWN SPG | APPROVED RAB
DATE 4-23-98 | JOB NO. 29088

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 23872

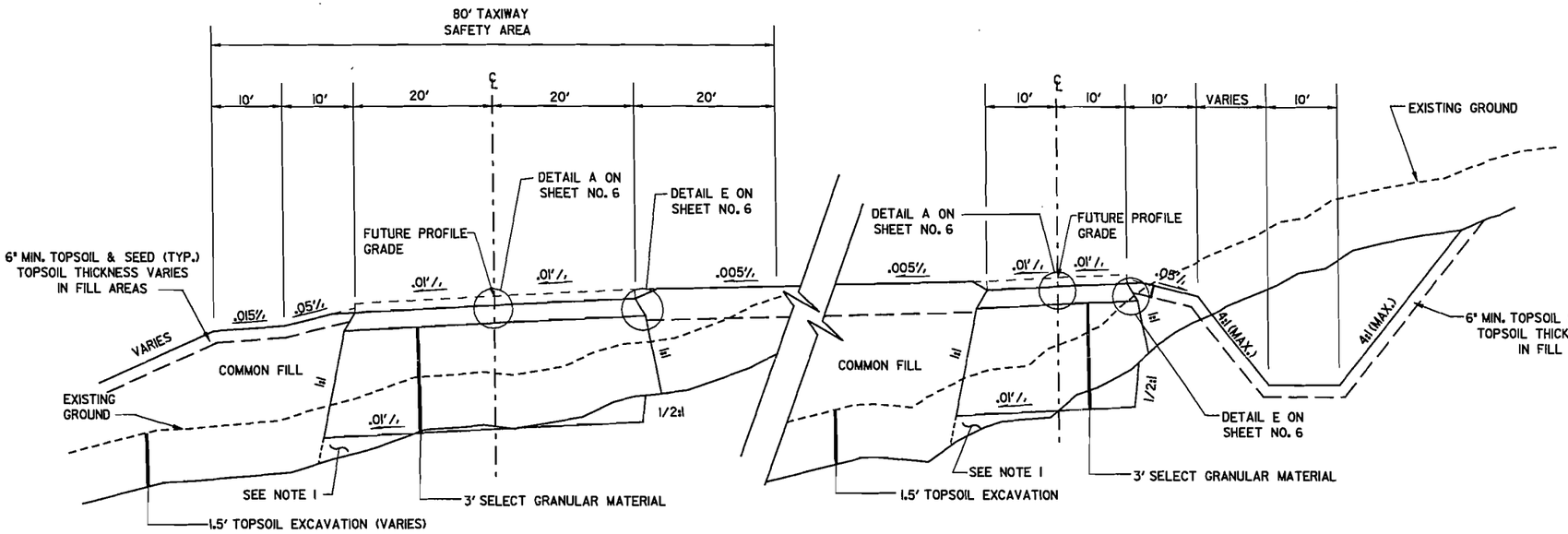
HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT

SAFETY PLAN

SHEET 3
OF 53

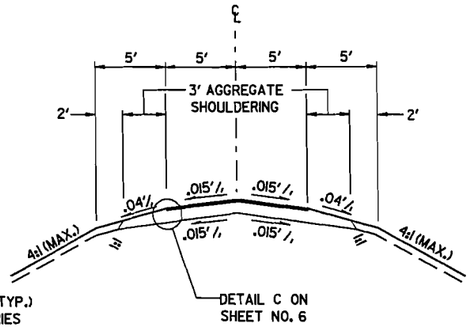


TAXIWAY B STA. 199+95 TO STA. 219+05

ACCESS ROAD STA. 296+06.29 TO STA. 319+05

TYPICAL SECTION

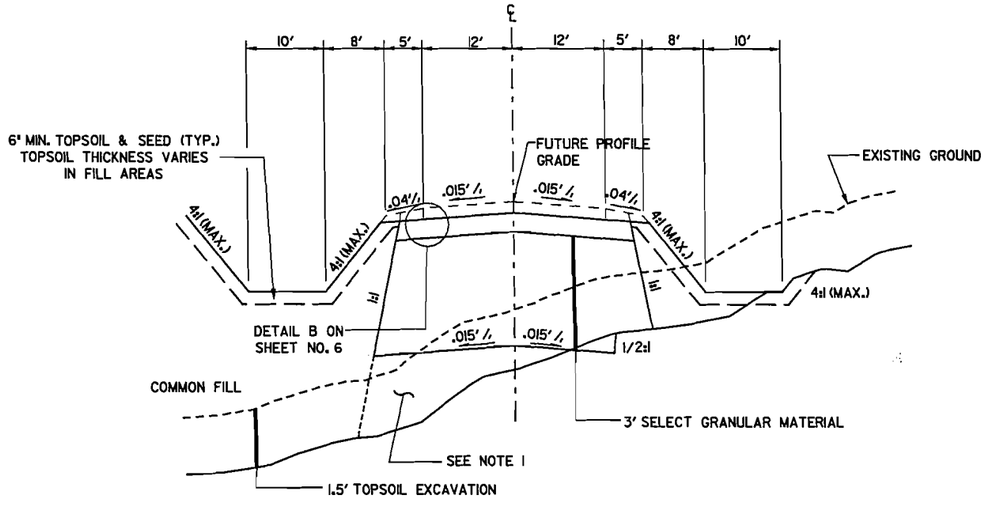
SCALE: HORIZ. 1"=10'
VERT. 1"=2'



TYPICAL SECTION

AWOS ACCESS ROAD STA. 540+00 TO STA. 543+92.37

NO SCALE



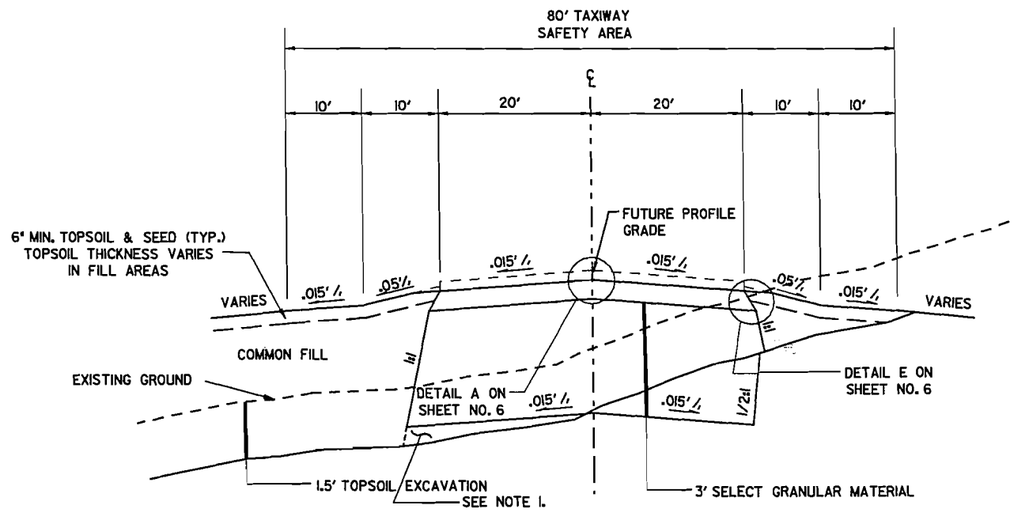
TYPICAL SECTION

ACCESS ROAD
STA. 319+05 TO STA. 331+88.26

SCALE: HORIZ. 1"=10'
VERT. 1"=2'

GENERAL NOTES:

1. COMMON FILL UNDER FUTURE PAVED AREAS SHALL NOT CONTAIN ORGANIC MATERIAL.(TYP.)



TYPICAL SECTION

TAXIWAY B1 STA. 20+20 TO STA. 25+02.5
TAXIWAY B2 STA. 30+20 TO STA. 35+01.8

SCALE: HORIZ. 1"=10'
VERT. 1"=2'

99-6034

NO.	REVISIONS	BY	APR.	DATE

DESIGNED RAB | CHECKED PAS
DRAWN SPG | APPROVED RAB
DATE 4-23-98 | JOB NO. 29088

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 4/23/98 REG. NO. 21077

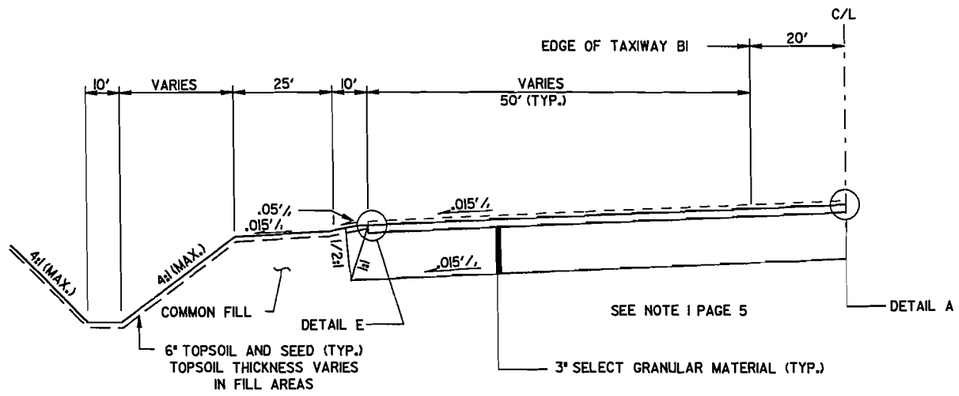
HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT

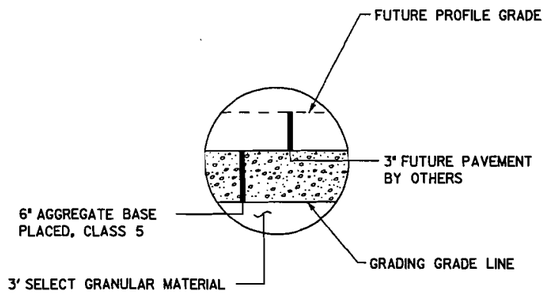
TYPICAL SECTIONS

SHEET 5
OF 53

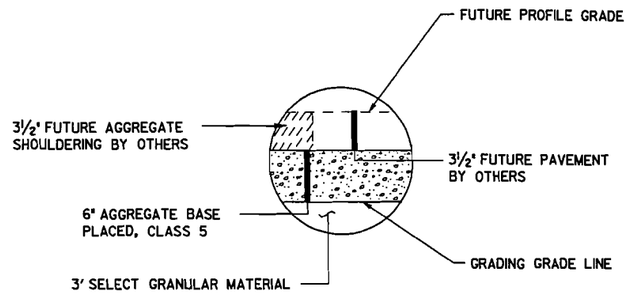


TYPICAL SECTION

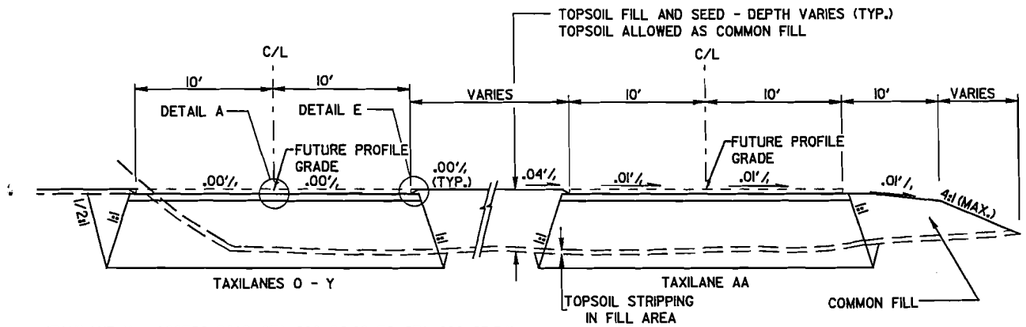
TAXIWAY BI HOLDING BAY STA. 20+65 TO STA. 22+90



DETAIL A



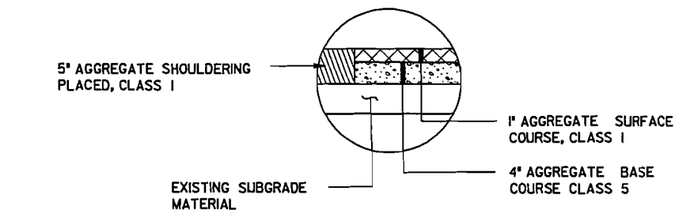
DETAIL B



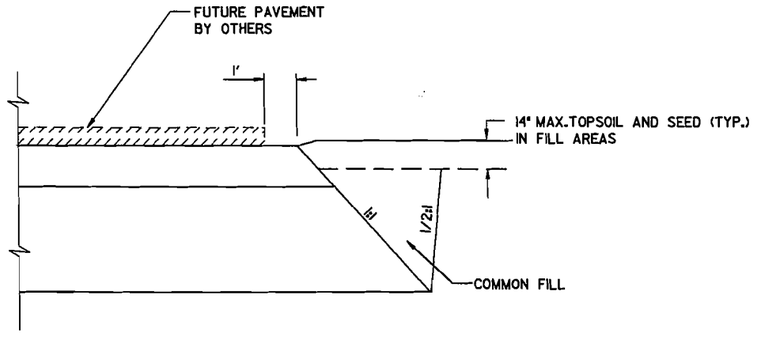
(TAXILANE N = ACCESS ROAD, STA. 296+06.29 TO STA. 298+85.34)

TAXILANES TYPICAL SECTION

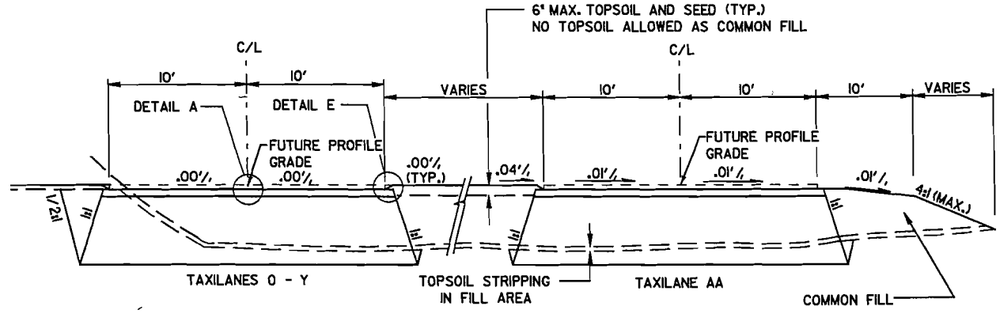
TAXILANE AREA NORTH OF BUILDING RESTRICTION LINE
AND SOUTH OF TAXIWAY B (SEE SHT. 15)
NOT TO SCALE



DETAIL C



DETAIL E



(TAXILANE N = ACCESS ROAD, STA. 296+06.29 TO STA. 298+85.34)

TAXILANES TYPICAL SECTION

TAXILANE AREA SOUTH OF BUILDING RESTRICTION LINE (SEE SHT. 15)
NOT TO SCALE

99-6034

NO.	REVISIONS	BY	APR.	DATE

DESIGNED RAB | CHECKED PAS
DRAWN SPG | APPROVED RAB
DATE 4-23-98 | JOB NO. 29088

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
Alex C. Bligh
DATE 4/23/98 REG. NO. 23872

HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

MAC METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT
TYPICAL SECTIONS/
PAVEMENT DETAILS

SHEET 6
OF 53

Txwy B1 Sta 25+40.00
N 157865.95
E 521112.78

Txwy B2 Sta 35+40.00
N 157066.01
E 522658.01

Radius Point Taxiway B1
Sta. 24+47.5, 75' Lt

Radius Point Taxiway B1
Sta. 24+47.5, 75' Rt

Radius Point Taxiway B1
Sta. 20+75, 75' Rt

Radius Point Taxiway B2
Sta. 34+48.5, 75'Lt

Radius Point Taxiway B2
Sta. 34+48.5, 75'Rt

Radius Point Taxiway B2
Sta. 30+75, 75'Lt

Radius Point Taxiway B2
Sta. 30+75, 75'Rt

Txwy B1 Sta 20+00.00

Txwy B Sta 200+15.00
Acc Rd Sta 295+86.29

Txwy B Sta 201+65.00
Txln O Sta 416+60.00

Txwy B Sta 203+15.00
Txln P Sta 426+60.00

Txwy B Sta 204+65.00
Txln Q Sta 436+60.00

Txwy B Sta 206+05.00
Txln R Sta 446+60.00

Txwy B Sta 207+45.00
Txln S Sta 456+60.00

Txwy B Sta 208+85.00
Txln T Sta 466+60.00

Txwy B Sta 210+25.00
Txln U Sta 476+60.00

Txwy B Sta 211+75.00
Txln V Sta 486+60.00

Txwy B Sta 213+25.00
Txln W Sta 496+60.00

Txwy B Sta 214+75.00
Txln X Sta 506+60.00

Txwy B Sta 216+15.00
Txln Y Sta 516+60.00

Txwy B2 Sta 217+35.00

Txwy B Sta 218+95.00
Txln AA Sta 536+60.00
N 156522.10
E 522534.07

TAXIWAY B

S 27° 21' 38" W

S 27° 22' 12" W

S 62° 37' 48" E

0.01'/,

0.015'/,

55' R

20' (TYP)

20:1 TRANSITION

50'

125'

212.5'

N 157386.40
E 520864.53

N 156586.46
E 522409.75

150' 150' 150' 140' 140' 140' 140' 150' 150' 150' 140' 280'

TAXILANE O
TAXILANE P
TAXILANE Q
TAXILANE R
TAXILANE S
TAXILANE T
TAXILANE U
TAXILANE V
TAXILANE W
TAXILANE X
TAXILANE Y
TAXILANE AA

Radius Point Access Road
Sta. 298+90.90, 30' Lt

CURVE ①
PI STA = 298+59.41
PC STA = 298+11.31
PT STA = 298+85.85
DELTA = 42° 42' 34.81"
D = 57° 17' 44.81"
R = 100.00
L = 74.45
T = 39.10

Radius Point Access Road
Sta. 302+12.20, 30' Lt

CURVE ②
PI STA = 303+85.35
PC STA = 303+41.57
PT STA = 304+24.18
DELTA = 47° 17' 25.83"
D = 57° 17' 44.81"
R = 100.00
L = 82.54
T = 43.78

Acc Rd Sta 300+67.66
Txln O Sta 412+33.56

Acc Rd Sta 302+89.03
Txln P Sta 420+70.76
N 156725.20
E 520860.05

Acc Rd Sta 304+65.00
Txln Q Sta 430+00.00
N 156593.40
E 520960.73

Acc Rd Sta 306+05.00
Txln R Sta 440+00.00

Acc Rd Sta 307+45.00
Txln S Sta 450+00.00

Acc Rd Sta 308+85.00
Txln T Sta 460+00.00

Acc Rd Sta 310+25.00
Txln U Sta 470+00.00

Acc Rd Sta 311+75.00
Txln V Sta 480+00.00

Acc Rd Sta 313+25.00
Txln W Sta 490+00.00

Acc Rd Sta 314+75.00
Txln X Sta 500+00.00

Acc Rd Sta 316+15.00
Txln Y Sta 510+00.00

Acc Rd Sta 318+95.00
Txln AA Sta 530+00.00
N 155935.98
E 522230.65

300+00 305+00 310+00 315+00 320+00 325+00 330+00

495+00 515+00 535+00

100' GAS PIPELINE EASEMENT

EXISTING 24" NATURAL GAS PIPELINE

EXISTING 16" NATURAL GAS PIPELINE

EXISTING 24" GAS LINE

EXISTING 16" GAS LINE

NORTHERN NATURAL GAS COMPANY EASEMENT

20' (TYP)

LIMIT OF CLASS 5 MATERIAL PLACED (TYP.)

ACCESS ROAD

10' 10' 12' 12'

50:1 TRANSITION

MATCH LINE STA. 324+00

Gravel AWOS Rd Sta 543+92.37

Curve ⑦
PI Sta = 543+30.38
PC Sta = 543+25.96
PT Sta = 543+34.79
Delta = 5° 03' 30.25"
D = 57° 17' 44.81"
R = 100.00
L = 8.83
T = 4.42

Curve ⑥
PI Sta = 541+18.46
PC Sta = 540+90.28
PT Sta = 541+45.22
Delta = 31° 28' 54.87"
D = 57° 17' 44.81"
R = 100.00
L = 54.95
T = 28.19

Curve ⑤
PI Sta = 540+29.06
PC Sta = 540+21.48
PT Sta = 540+36.60
Delta = 8° 39' 59.51"
D = 57° 17' 44.81"
R = 100.00
L = 15.13
T = 7.58

Curve ④
PI Sta = 329+32.74
PC Sta = 328+48.22
PT Sta = 329+88.56
Delta = 80° 24' 22.18"
D = 57° 17' 44.81"
R = 100.00
L = 140.34
T = 84.52

Gravel AWOS Road Sta 540+00.00

Acc Rd Sta 328+47.93

AWOS ROAD

LIMITS OF CLASS 5 MATERIAL PLACED (TYP)

LIMITS OF CLASS I AGGREGATE SURFACING
Radius Point GRAVEL Rd
Sta. 540+32, 25'Lt

Radius Point GRAVEL Rd
Sta. 540+32, 25'Rt

Radius Point Acc Rd
Sta. 331+68.26, 32'Rt

20' R Radius Point Acc Rd
Sta. 331+68.26, 32'Lt

Radius Point Taxilane AA
Sta. 530+75, 30'Rt

Acc Rd Sta 331+84.46
N 155960.60
E 522460.52

225TH ST

MID-AMERICA NATURAL GAS PIPELINE

0 100 200 300
SCALE: 1" = 100'

99-6034

NO.	REVISIONS	BY	APR.	DATE

DESIGNED RAB | CHECKED PAS
DRAWN SPG | APPROVED RAB
DATE 4-23-98 | JOB NO. 29088

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA
DATE 4/23/98 REG. NO. 23872

HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT

PLANNED CONSTRUCTION

SHEET 7
OF 53

STA. 23+45
67' LT

STA. 23+40
70' LT ELEV 953.13

STA. 23+20
115' LT ELEV 953.4

STA. 22+50
130' LT ELEV 953.70

STA. 21+10
130' LT ELEV 954.29

ELEV 956.0

EXISTING TWIN 3'X3' BOX
CULVERTS. DISCHARGE ELEV. 956.16

STA. 23+45
67' RT

GRADING LIMITS (TYP)

EXISTING TWIN 66" CMP
CULVERTS
INV. EL. NW 947.75
INV. EL. SW 947.79

STA. 202+80
195' LT ELEV 960

STA. 205+95
195' LT ELEV 958

STA. 200+75
95' LT ELEV 960

ELEV. 953.3

FOR DETENTION POND AND
DIKE DETAILS SEE SHEET 9

STA. 33+40
67' LT

STA. 30+70
62' LT

STA. 30+65
62' RT

STA. 33+40
67' RT

STA. 33+10
190' RT
ELEV 954.5

SEE NOTE 4

EXISTING 24"
GAS LINE

EXISTING 16"
GAS LINE

30' SPACING
(TYP.)

STA. 328+15
42' LT

STA. 328+71
42' LT

GRADING LIMITS (TYP.)

MID-AMERICA
PIPELINE COMPANY

MATCH LINE STA. 327+00

CONTRACTOR SHALL COORDINATE
ALL GRADING OPERATIONS IN THIS
AREA WITH MID-AMERICA PIPELINE
COMPANY PERSONNEL AND THE ENGINEER.
SEE NOTE 5.

STA. 534+60
32' RT ELEV 958.6

TAXIWAY B1

TAXIWAY B

TAXIWAY B2

TAXILANE O

TAXILANE P

TAXILANE Q

TAXILANE R

TAXILANE S

TAXILANE T

TAXILANE U

TAXILANE V

TAXILANE W

TAXILANE X

TAXILANE Y

TAXILANE AA

AWOS ROAD

225TH STREET

500' LINE RAILROAD COMPANY

ACCESS ROAD

STA. 303+70
40'RT ELEV 966.2
HIGH POINT

GRADING LIMITS (TYP)

STA. 319+35
47' LT

GRADING LIMITS (TYP.)

STA. 319+35
47'-RT

EXISTING
POND

MATCH LINE STA. 327+00

0 100 200 300
SCALE: 1" = 100'

CULVERT INFORMATION

① CONSTRUCT 80 LF 36" RCP CLASS V
@ 0.50% PLUS 2 APRONS
FL. S.W.= 958.66
FL. N.E.= 958.26

② CONSTRUCT 110 LF 24" RCP CLASS V
@ 0.50% PLUS 2 APRONS
FL. S.E.= 955.88
FL. N.W.= 955.33

③ CONSTRUCT 120 LF 36" RCP CLASS V
@ 0.50% PLUS 2 APRONS
FL. S.E.= 950.00
FL. N.W.= 949.40

④ CONSTRUCT 120 LF 60" RCP CLASS V
@ 0.50% PLUS 2 APRONS
FL. S.W.= 953.03
FL. N.E.= 952.43

⑤ CONSTRUCT 95 LF 24" RCP CLASS III
@ 1.00% PLUS 2 APRONS
FL. S.W.= 949.50
FL. N.E.= 948.55

⑥ CONSTRUCT 56 LF 18" RCP CLASS III
@ 2.00% PLUS 2 APRONS
FL. S.W.= 964.42
FL. N.E.= 963.3

THE MAC RESERVES THE RIGHT TO REDUCE THE SCOPE OF THE PROJECT IF THE EXISTING NATURAL GAS PIPELINES ARE NOT RELOCATED BY OTHERS.

LEGEND

LIMITS OF NORTHERN NATURAL GAS LINE TO BE LOWERED IN PLACE BY OTHERS.

SILT FENCE, HEAVY DUTY

EROSION BALE

—G— EXISTING GAS LINE

GENERAL NOTES:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ALL UTILITIES, INCLUDING MAC AND FAA CABLES, ARE LOCATED.
2. THE CONTOURS SHOWN ON FUTURE PAVED SURFACES ARE THE PROPOSED GRADES OF THE FUTURE PAVEMENT. PROFILES AND TYPICAL SECTIONS SHALL BE USED TO DETERMINE GRADES FOR TAXILANES, TAXIWAYS, AND ROADS.
3. BENCH MARK
"X" CHISELED ON THE NW CORNER OF THE WIND CONE BASE ELEV. 954.65
4. CONTRACTOR SHALL COORDINATE ALL GRADING OPERATIONS IN THIS AREA WITH NORTHERN NATURAL GAS COMPANY PERSONNEL AND THE ENGINEER.
5. UPON COMPLETION OF TOPSOIL REMOVAL IN THIS AREA, 6" OF CONCRETE SHALL BE PLACED OVER THE EXISTING PIPELINE WITHIN THE LIMITS OF THE GRADED AREA. PAYMENT FOR THIS WORK SHALL BE INCIDENTAL TO UNCLASSIFIED EXCAVATION.

99-6034

NO.	REVISIONS	BY	APR.	DATE

DESIGNED RAB | CHECKED PAS
DRAWN SPG | APPROVED RAB
DATE 4-23-98 | JOB NO. 29088

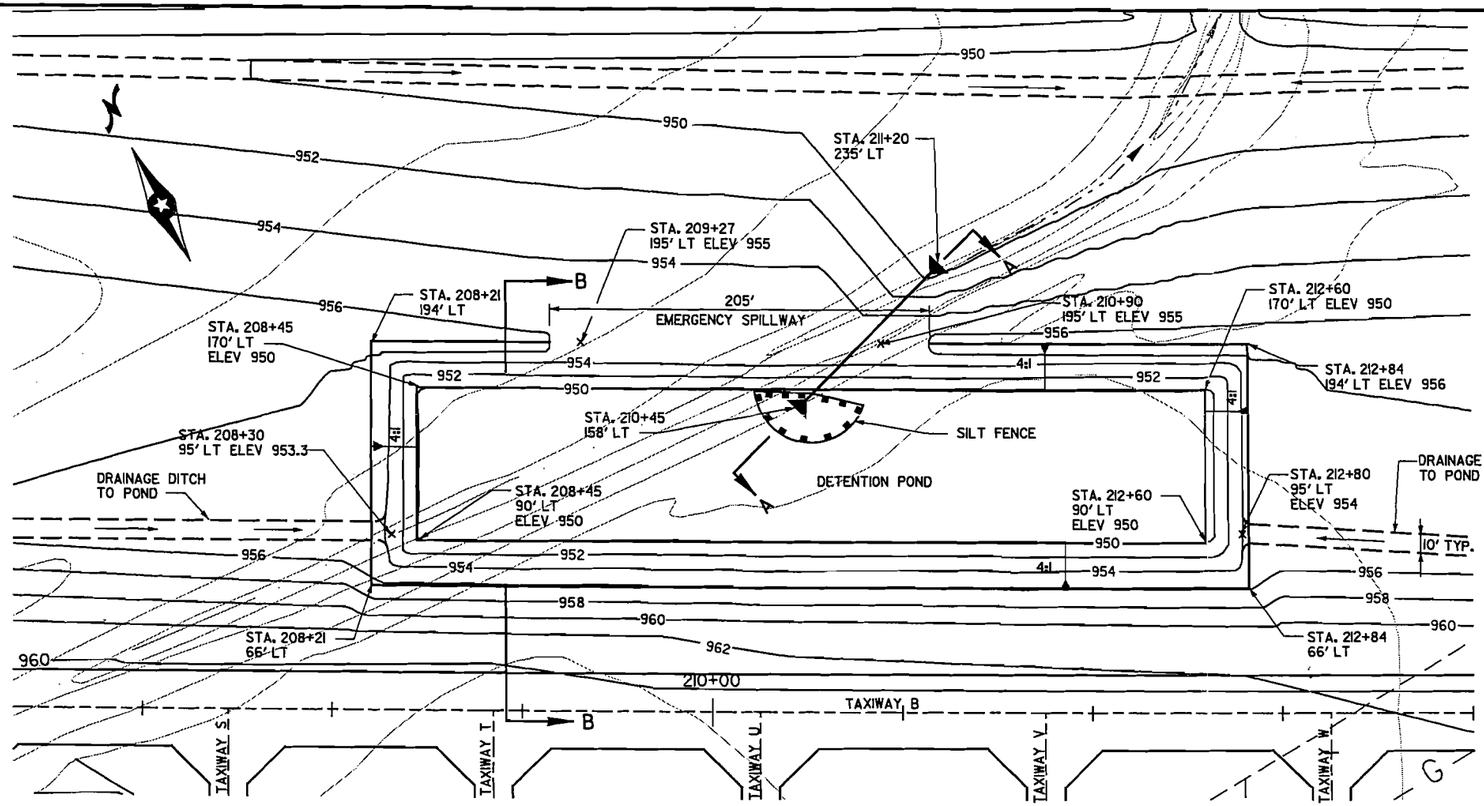
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DATE 4/23/98 REG. NO. 23672

HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

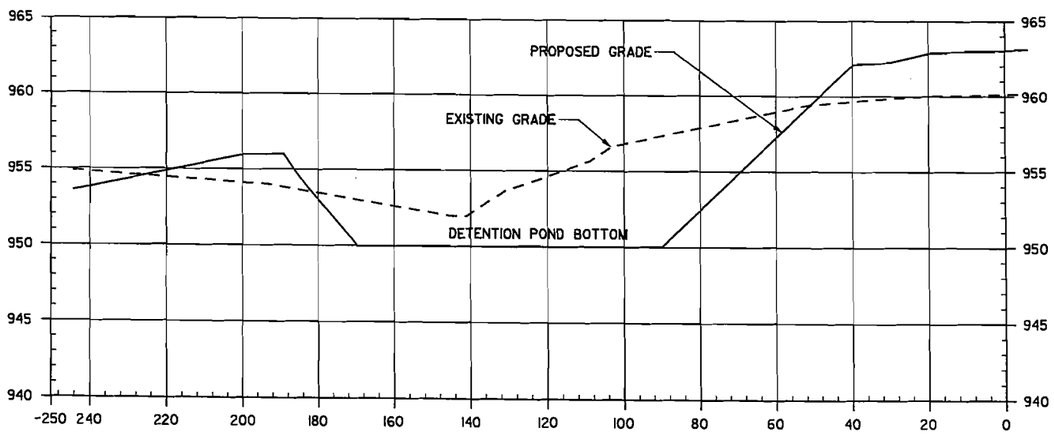
METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT
GRADING, DRAINAGE & EROSION CONTROL PLAN

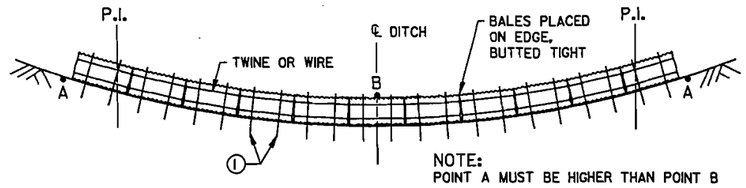
SHEET 8
OF 53



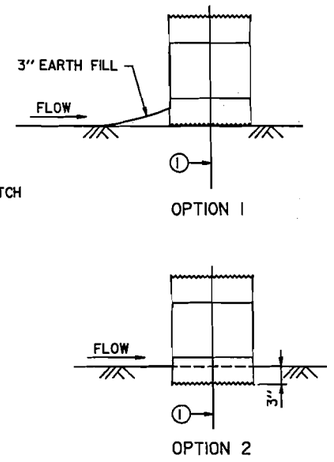
DETENTION POND DETAIL
SCALE: 1"=40'



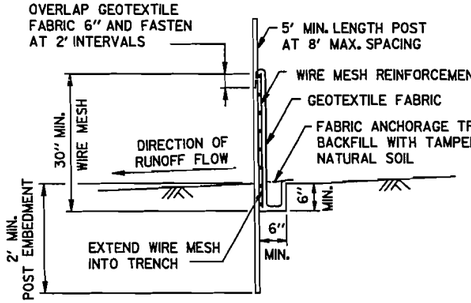
SECTION B-B



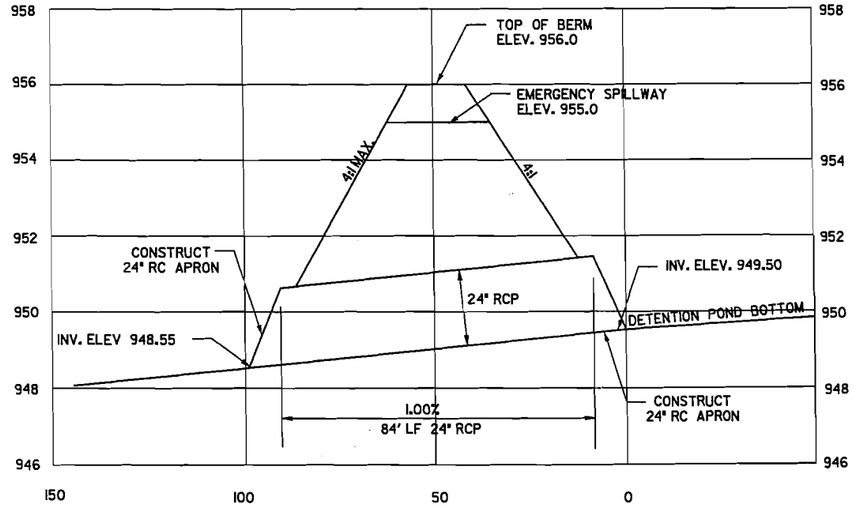
BALE DITCH SEDIMENT CHECK
NO SCALE



BALE CHECK DETAILS
NO SCALE



SILT FENCE, HEAVY DUTY DETAIL
NO SCALE



SECTION A-A
SKEWED CROSS SECTION VIEW OF
24" OUTLET FOR DETENTION POND

99-6034

NO.	REVISIONS	BY	APR.	DATE

DESIGNED RAB | CHECKED PAS
DRAWN SPG | APPROVED RAB
DATE 4-23-98 | JOB NO. 29088

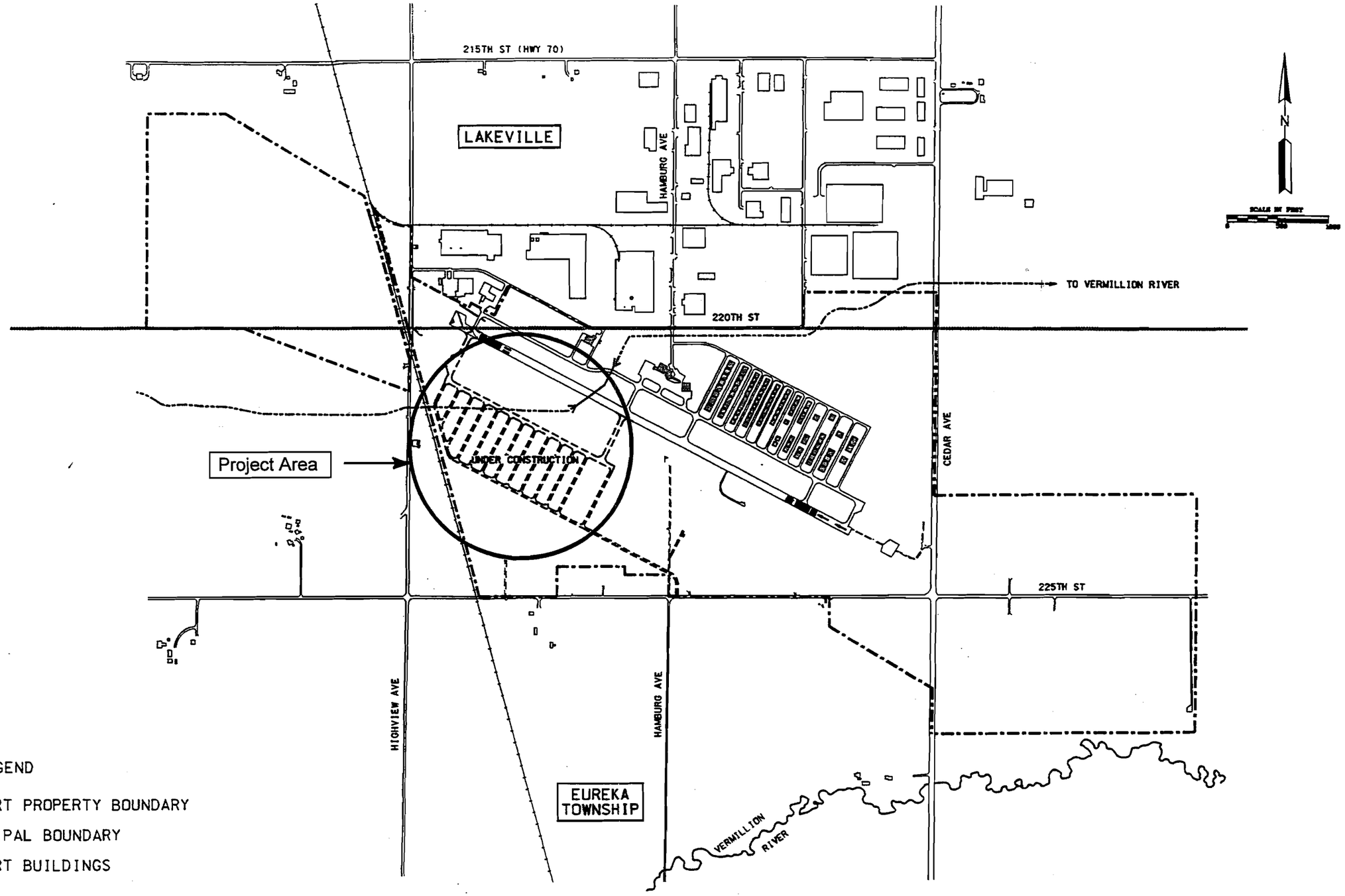
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DATE 4/23/98 REG. NO. 23072

HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

METROPOLITAN AIRPORTS COMMISSION
6040 28th AVE. SOUTH
ST. PAUL, MINNESOTA 55450-2799

AIRLAKE AIRPORT
DETENTION POND, EROSION CONTROL AND DIKE DETAILS

SHEET 9
OF 53



BASE MAP PROVIDED BY HNTB

METROPOLITAN AIRPORTS COMMISSION - AIRLAKE AIRPORT

Site Map

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Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JANUARY 1999

Figure 4

LAKEVILLE
POP. 586

FARMINGTON
POP. 3464

EMPIRE

Antlers Park

Marion Lake

Rice L.

Vermillion River

Chicago, Milwaukee, St. Paul and Pacific Railroad

Southern Minnesota Railway

Northern Natural Gas Company

Kenwood Trail

Dodd Blvd.

Holyoke Ave.

Cedar Ave.

Hamburg Ave.

Essex Ave.

Flagstaff Ave.

Denmark Road

Kenrick Ave.

Malvern Ave.

Brothers Ave.

Biscayne Ave.

Highview Blvd.

Kenroy Way

Kapatia Ave.

Keokuk Ave.

Jordan Trail

Scalee Path

Airlake Ind. Park

To Jct. U.S. 65

To Faribault

F.A.S. 0.4

F.A.P. 0.7

F.A.P. 0.6

F.A.S. 0.2

F.A.P. 4.2

F.A.S. 3.1

F.A.S. 2.0

F.A.S. 0.3

F.A.P. 0.1

367W

368W

373W

374W

375W

377W

351 W

352W

353 W

354W

355W

418W

414W

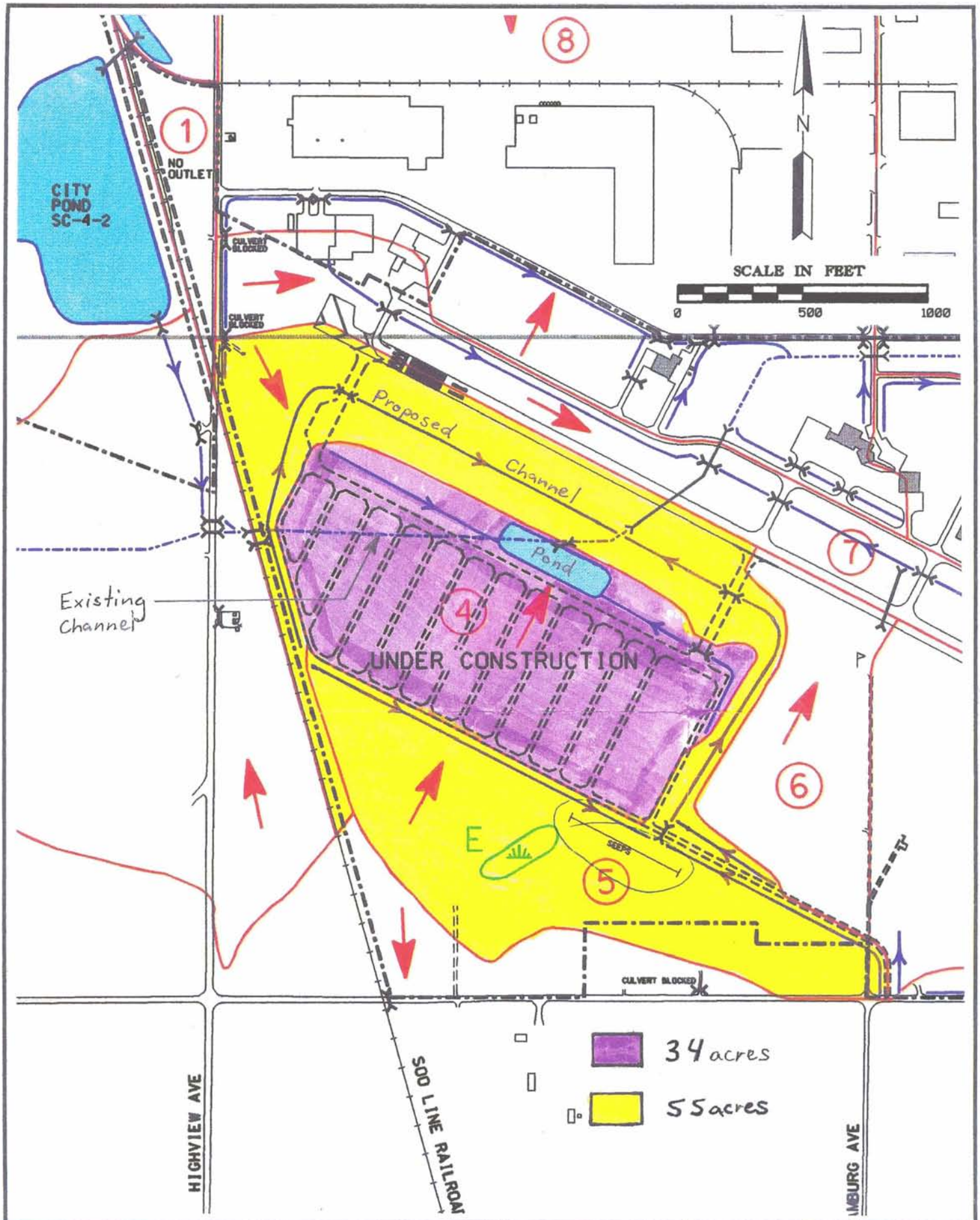
419W

420W

18W

70-1P

99-6034



METROPOLITAN AIRPORTS COMMISSION

Proposed Drainage System

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Wenck

Wenck Associates, Inc. 1800 Pioneer Creek Ctr.
Environmental Engineers Maple Plain, MN 55359

JAN 1999

Figure 5

Airlake Airport

P.A# 99-6034

(1)



East and parallel to runway

(2)



looking S South perpendicular to runway

↑S



(3)

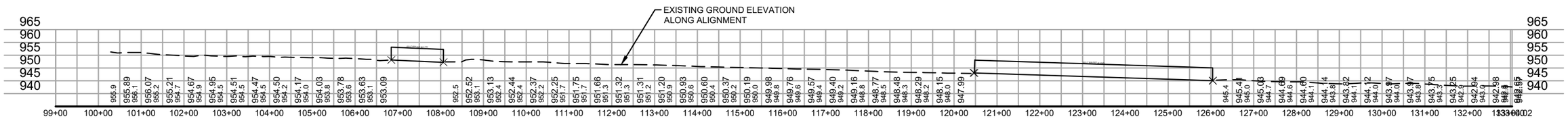


looking ≈SE parallel to runway

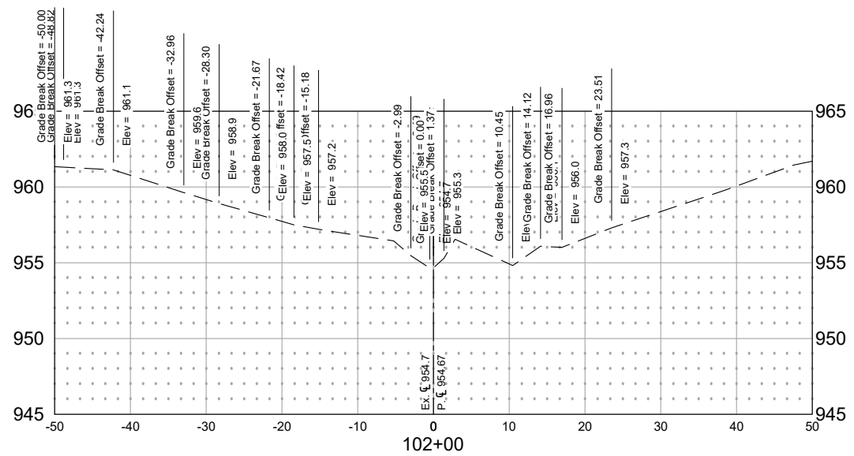
Attachment D – Surveyed Plan, Profile, and Cross Sections

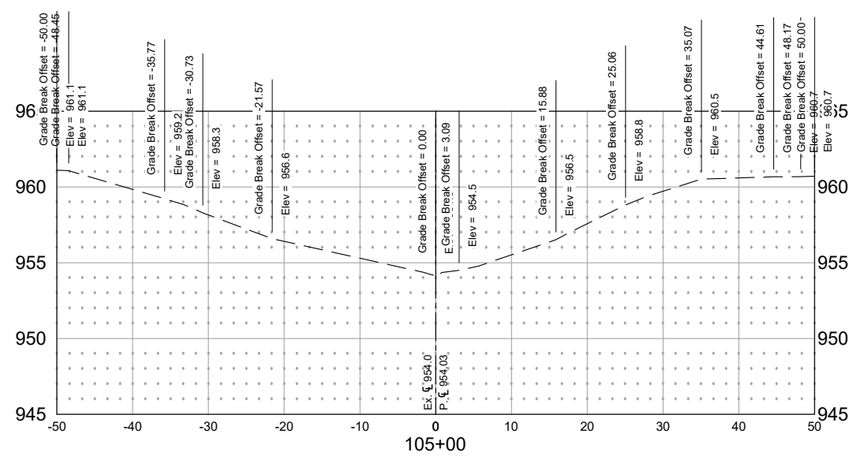


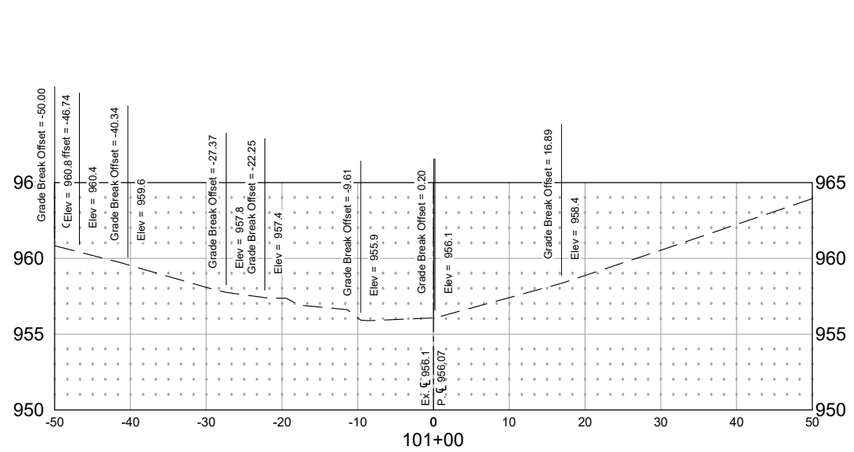
EXISTING STREAM ALIGNMENT
PLAN & PROFILE

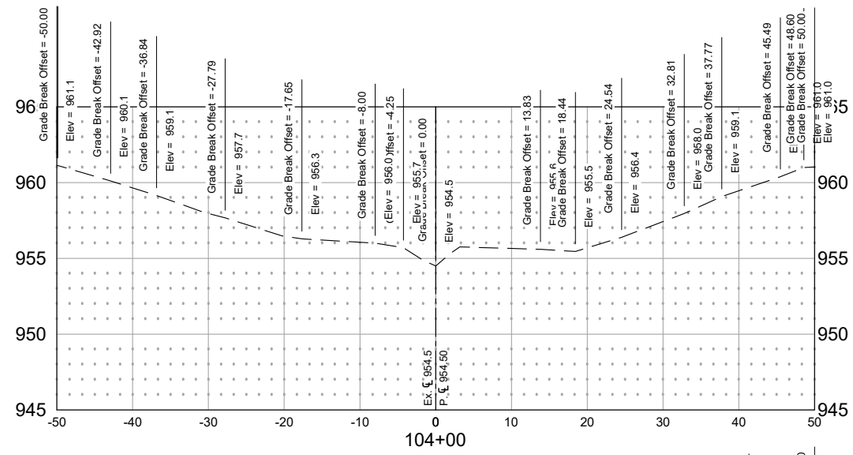


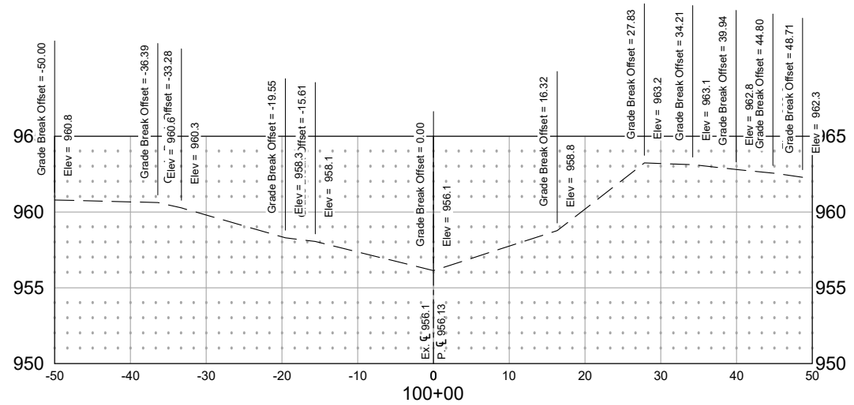
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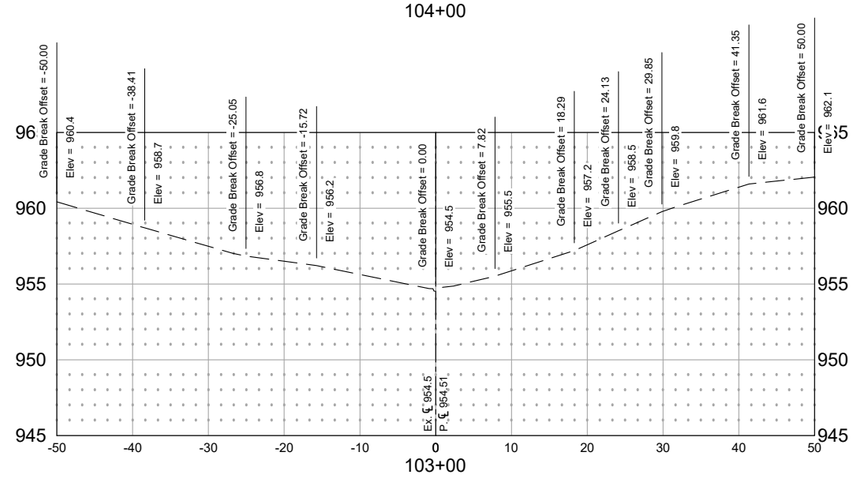




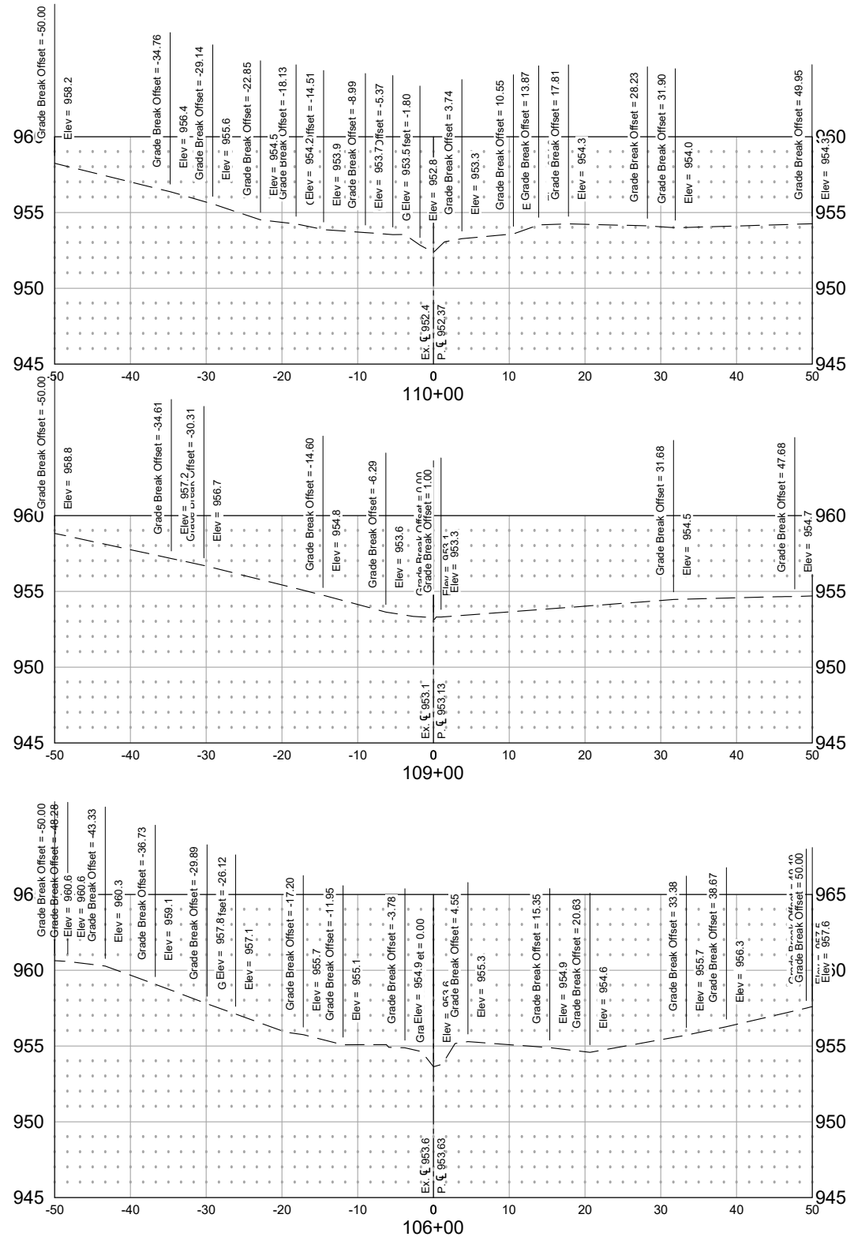








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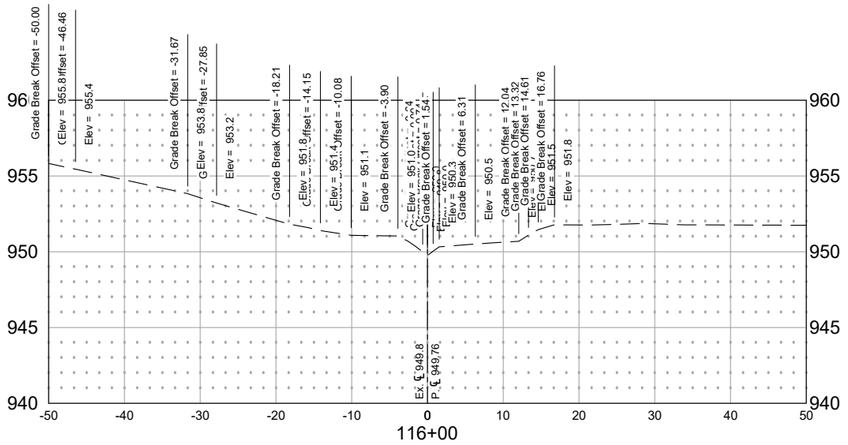
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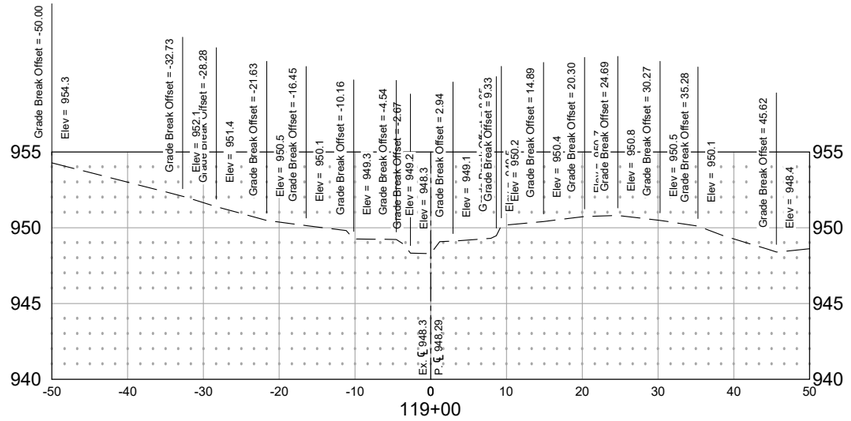
Unnamed Intermittent Stream Relocation

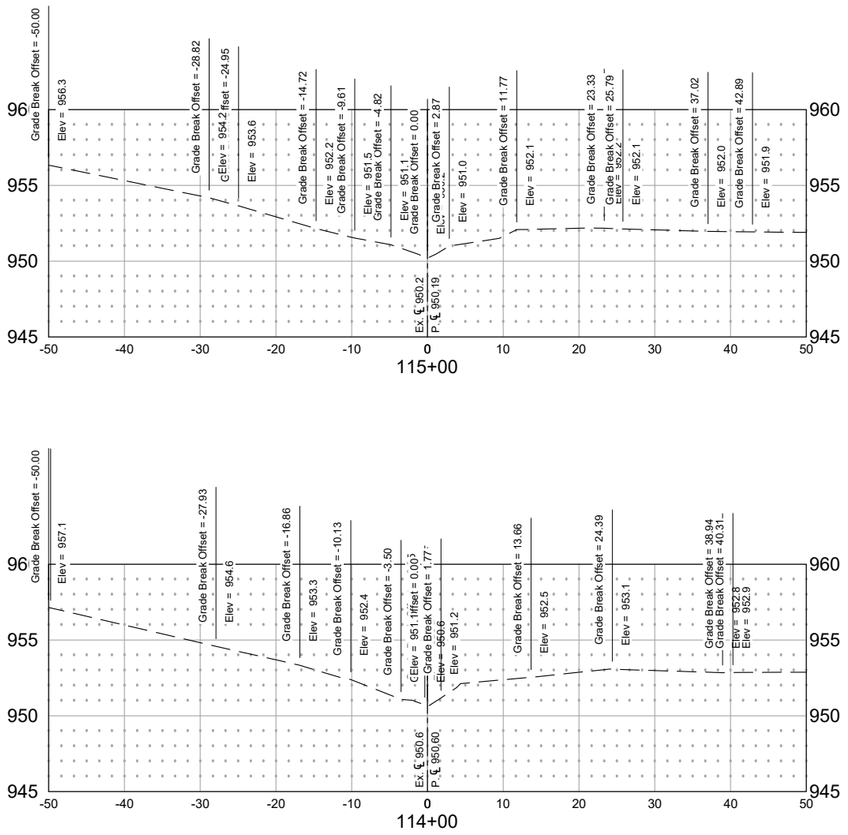
Airlake Airport
Lakeville, Minnesota

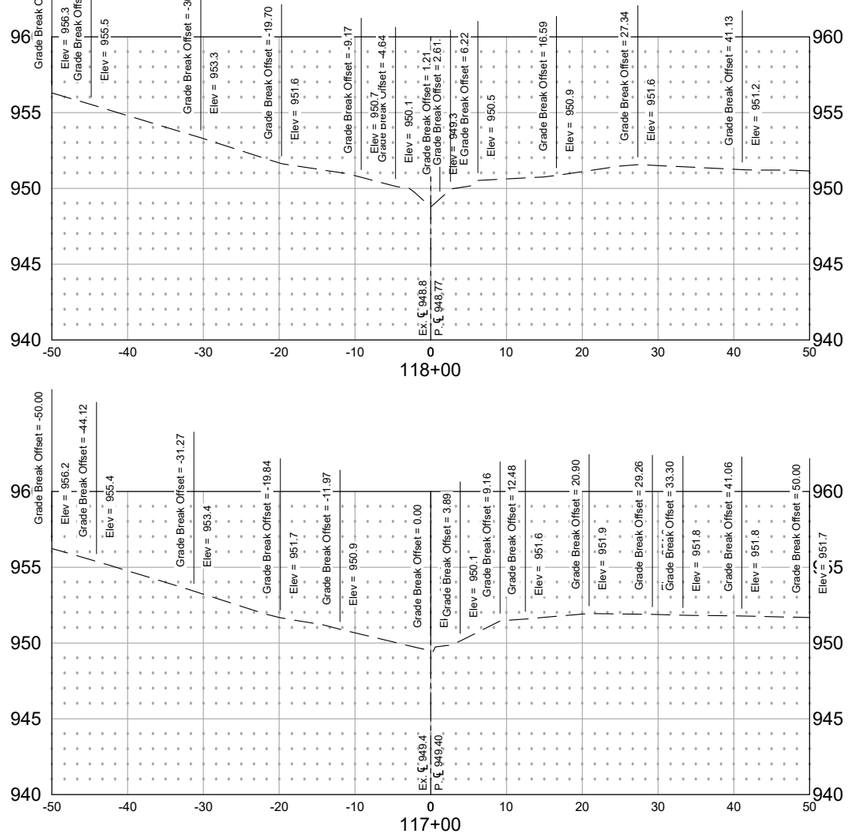
Figure 5.3

Existing Stream Cross Sections
07/2026; MAC00 165551

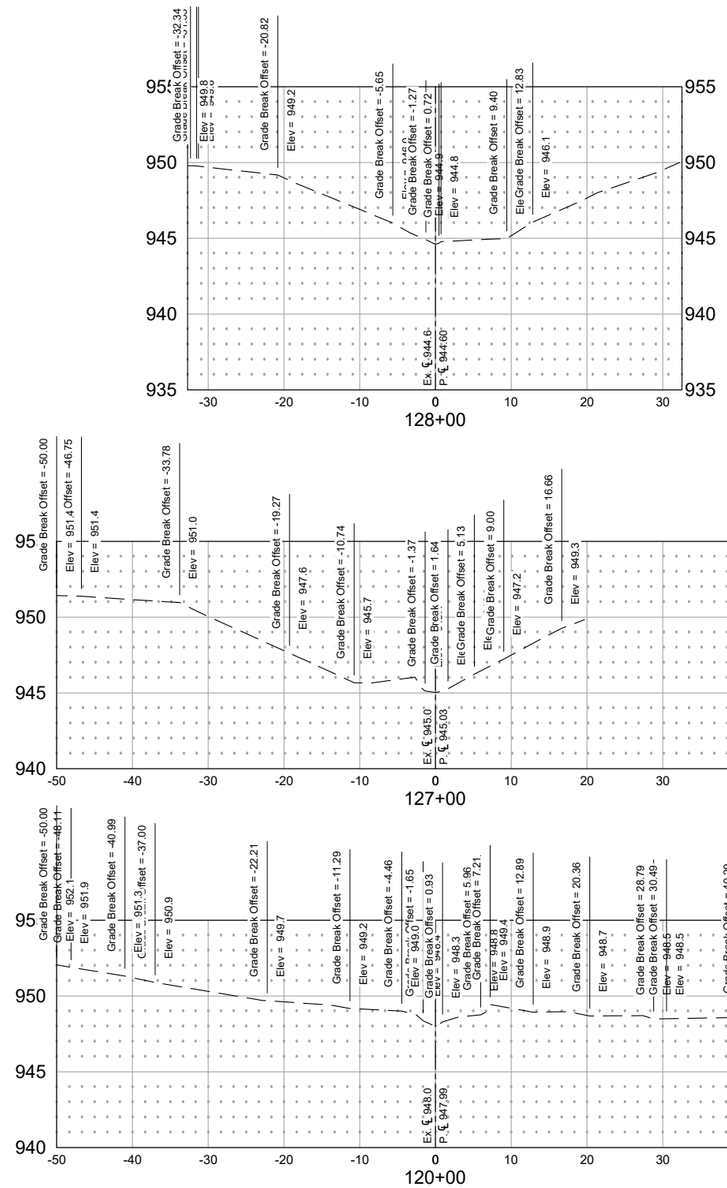








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Attachment E – Historic Aerials


21
N
0
240
Feet
LVN Environmental Assessment
Stream Historical Aerial
August 2015


N
0
240
Feet
LVN Environmental Assessment
Stream Historical Aerial
June 2021


N
0
240
Feet
LVN Environmental Assessment
Stream Historical Aerial
August 2021


N
0
240
Feet
LVN Environmental Assessment
Stream Historical Aerial
August 2023


12
N
0
240
Feet
LVN Environmental Assessment
Stream Historical Aerial
March 2024


N
0
240
Feet
LVN Environmental Assessment
Stream Historical Aerial
September 2024


12
N
0
240
Feet
LVN Environmental Assessment
Stream Historical Aerial
February 2025

Attachment F – Stream Alternatives

LEGEND:	
	AIRPORT PROPERTY LINE
	INTERMITTENT STREAM AND 100' BUFFER
ROFA	EXISTING RUNWAY OBJECT FREE AREA
	FUTURE RUNWAY OBJECT FREE AREA
RSA	EXISTING RUNWAY SAFETY AREA
	FUTURE RUNWAY SAFETY AREA
RPZ	EXISTING RUNWAY PROTECTION ZONE
	FUTURE RUNWAY PROTECTION ZONE
	PROPOSED NEW AIRFIELD PAVEMENT
	ROAD RELOCATION
	STREAM RELOCATION ALTERNATIVE 1
	STREAM RELOCATION ALTERNATIVE 2
	STREAM RELOCATION ALTERNATIVE 3
	STREAM RELOCATION ALTERNATIVE 4
	STREAM RELOCATION ALTERNATIVE 5

INTERMITTENT STREAM AND 100' BUFFER

RELOCATED CULVERT

TAXIWAY A

LOCALIZER ANTENNA

T/W A1

PROPOSED 271' EXTENSION

EXISTING CULVERT

T/W A2

LOC

EXISTING RUNWAY 12/30 - 75' X 4,099' (PROPOSED 75' X 4850)

INTERCEPTOR SEWER

NEW CULVERT

T/W B1

EXISTING CULVERT

T/W B2

NEW CULVERT UNDER RSA, ROFA, AND LOCALIZER CRITICAL AREA

TAXIWAY B

AIRPORT PROPERTY LINE

0 200 400

7/8/2026 11:01:38 AM
X:\2838700\220268.01\TECH\CAD\2026 DRP LTCP FIGURES\220268.01 - STREAM FIGURE 3.6.DWG

AIRLAKE AIRPORT
LAKEVILLE, MINNESOTA

2838700-220268.01
MAY 2026

STREAM RELOCATION ALTERNATIVES

FIGURE 2.6

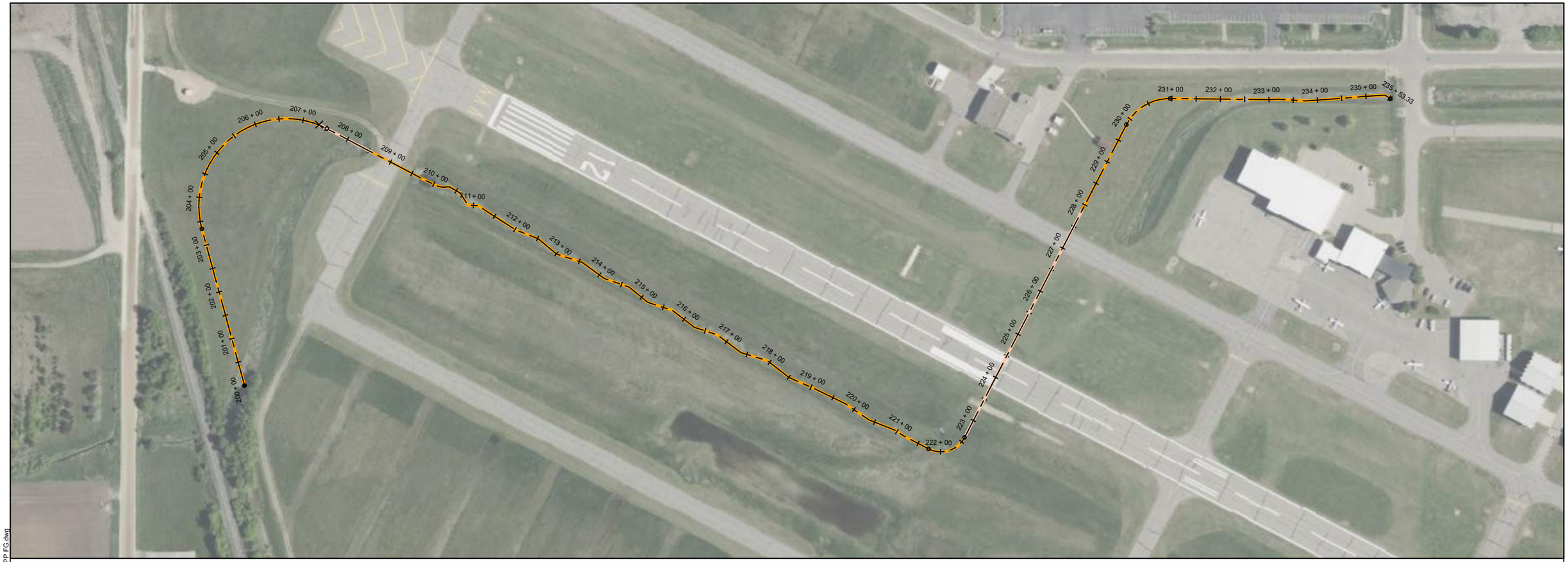
Attachment G – Preliminary Plan, Profile, and Cross Sections

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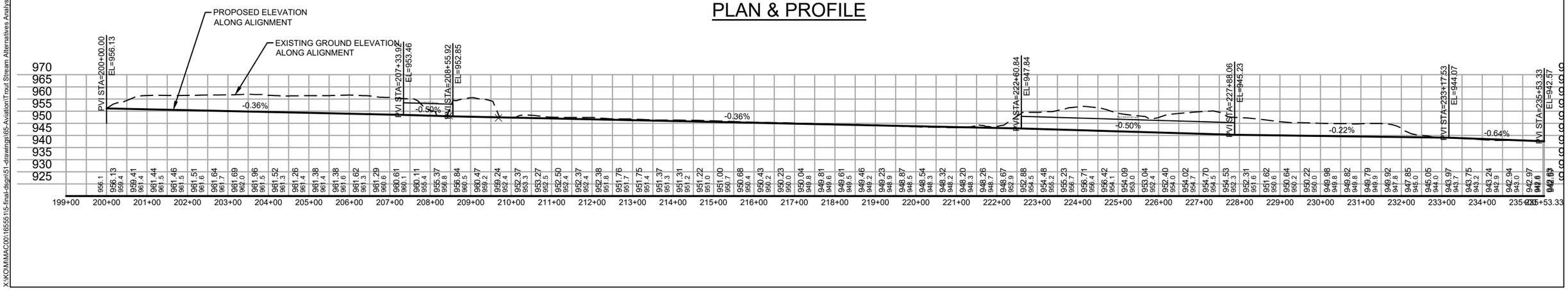
Figure 3

Airlake Airport
Lakeville, Minnesota

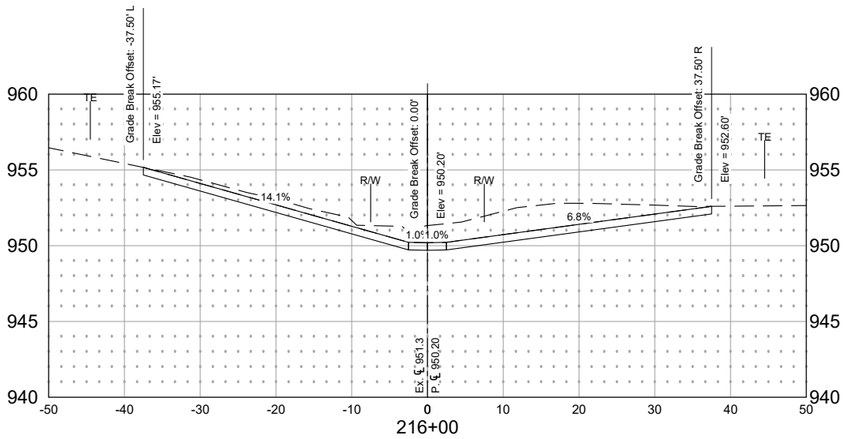
Proposed Stream Plan & Profile - Alternative 2
07/2026; MAC00 165551

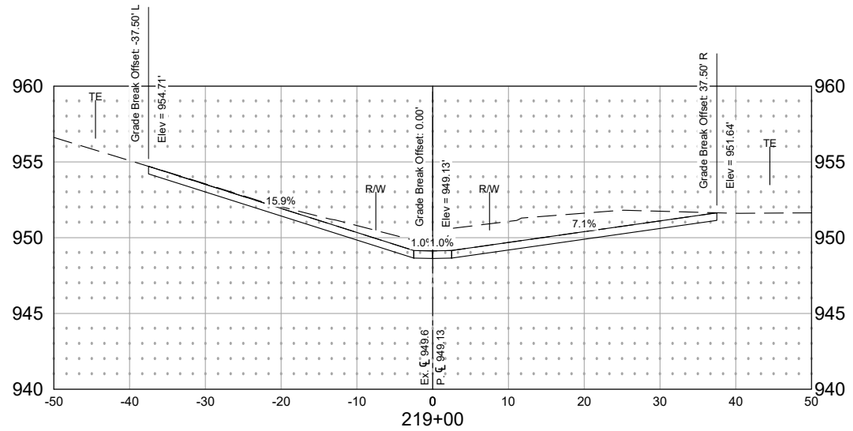


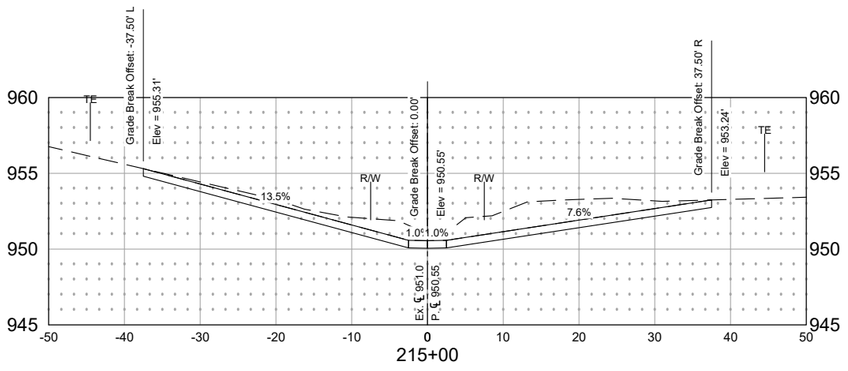
PROPOSED STREAM ALIGNMENT
PLAN & PROFILE

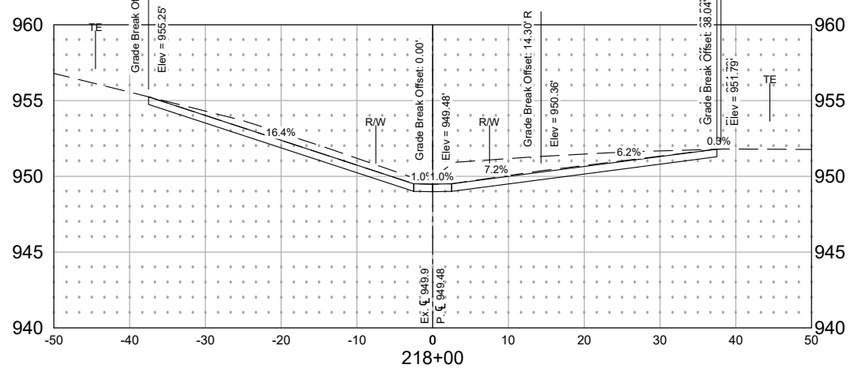


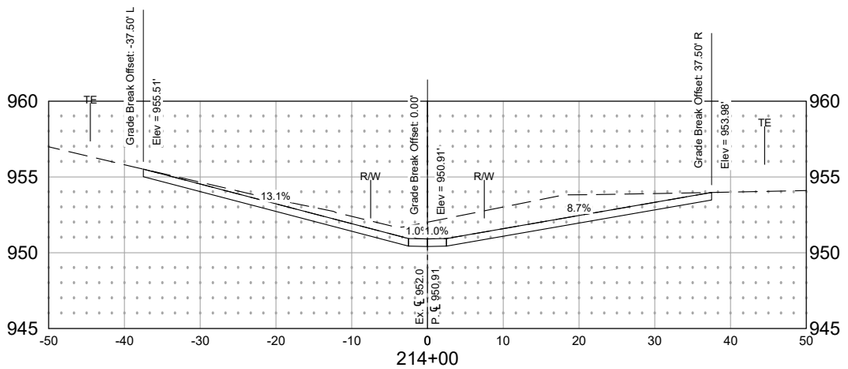
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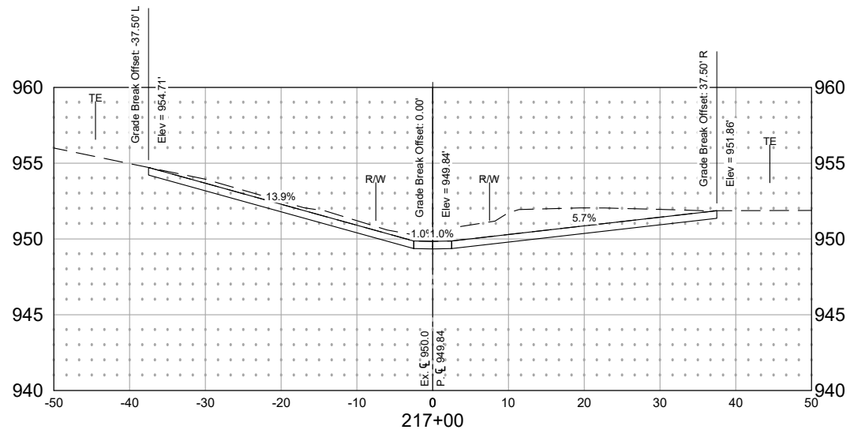












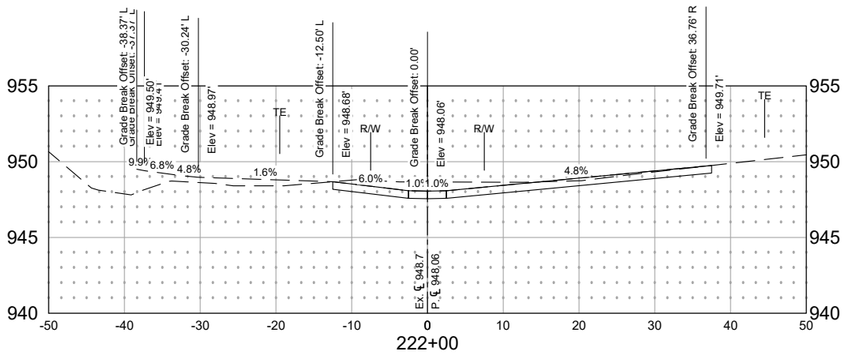
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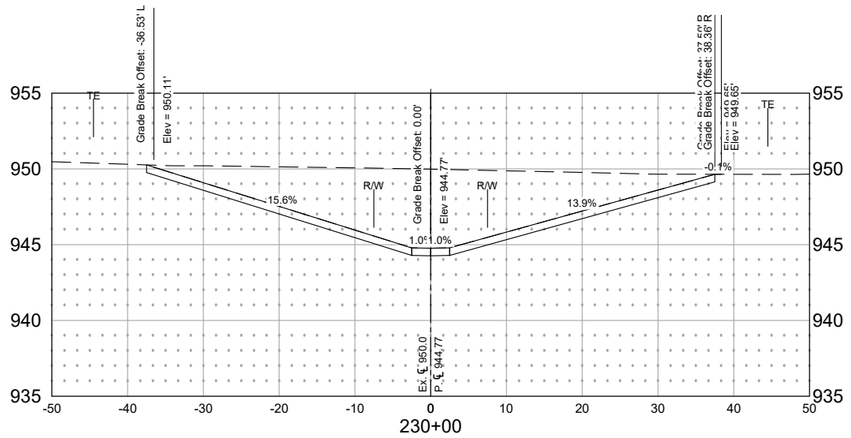
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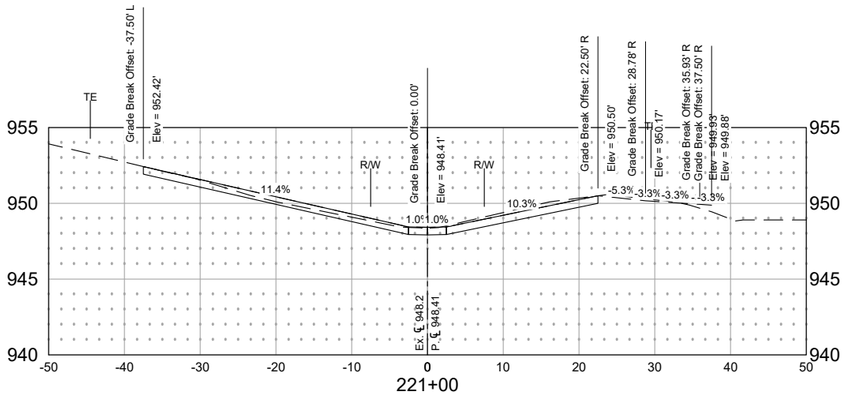
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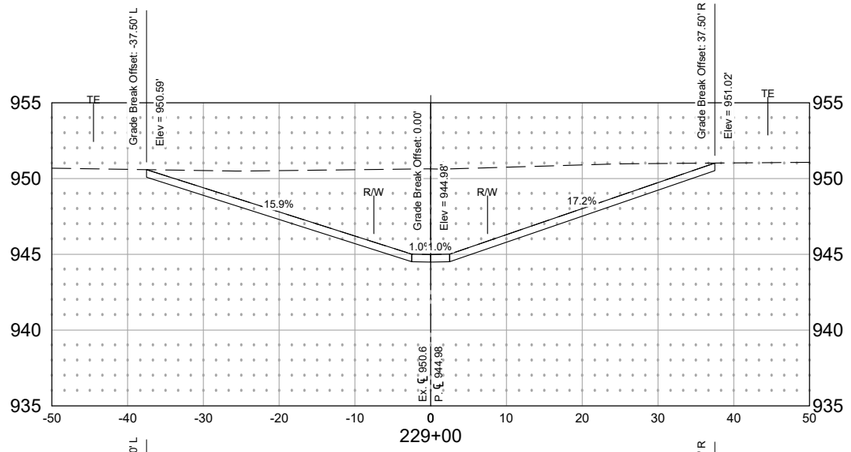
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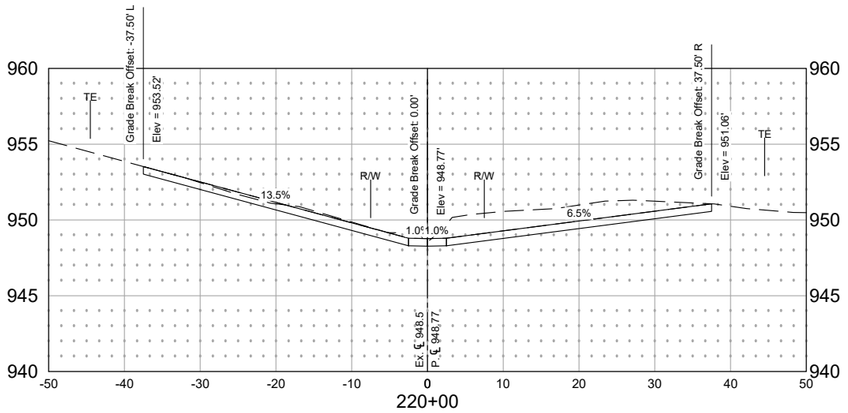
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07/2026; MAC00 165551

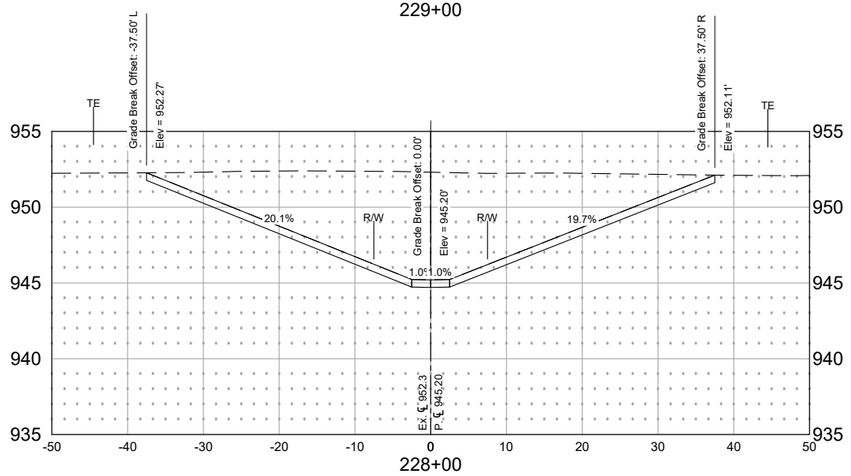












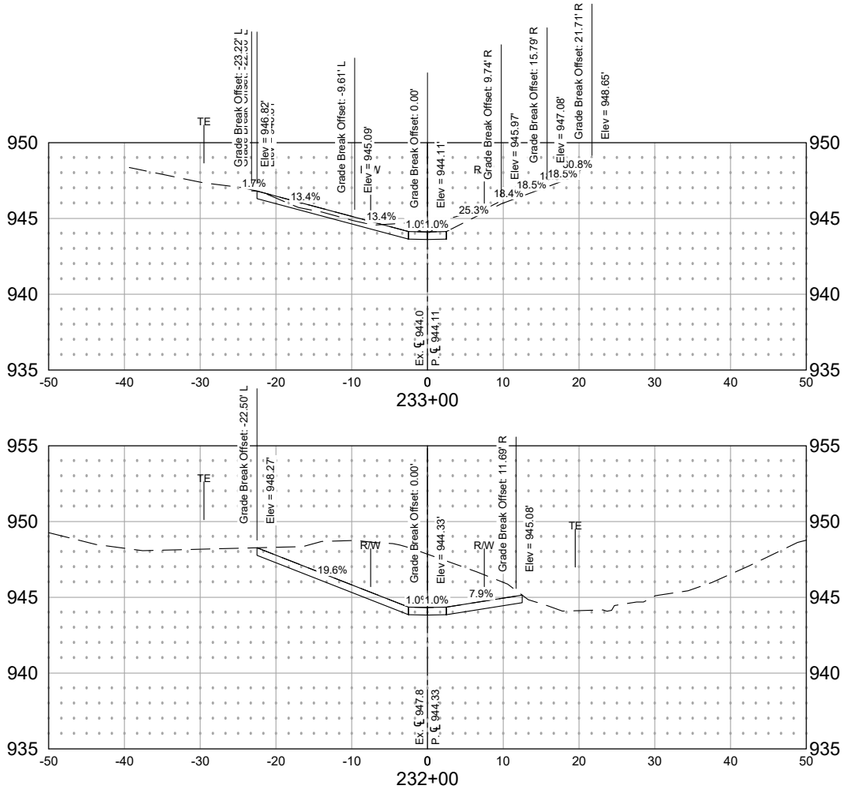
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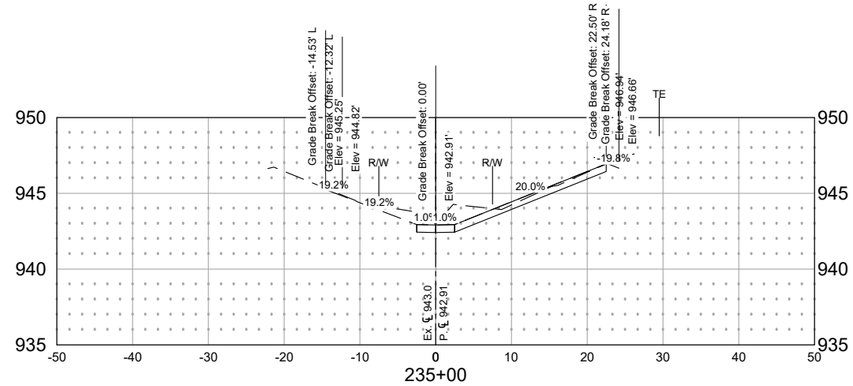
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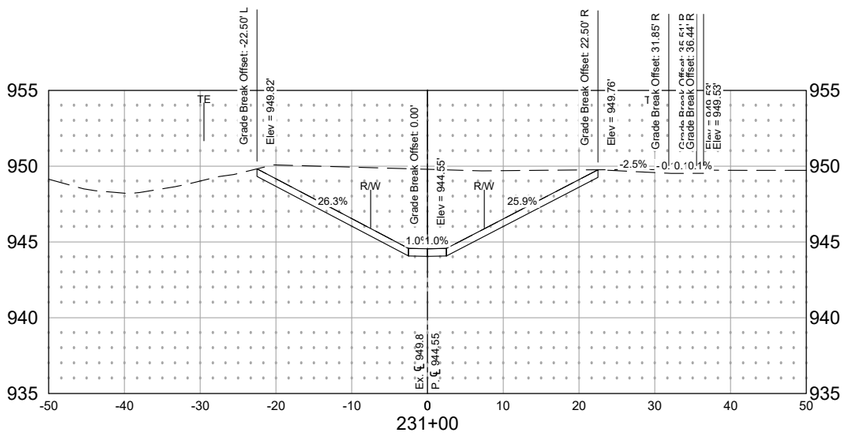
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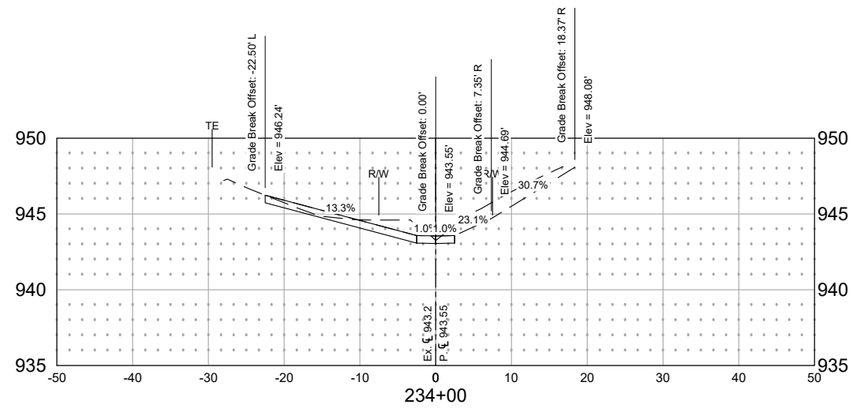
Airlake Airport
Lakeville, Minnesota

Proposed Stream Cross Sections - Alternative 2
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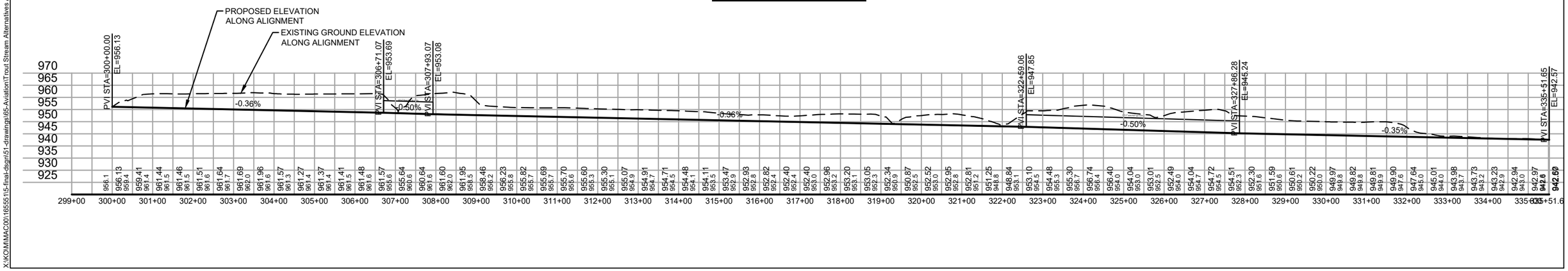




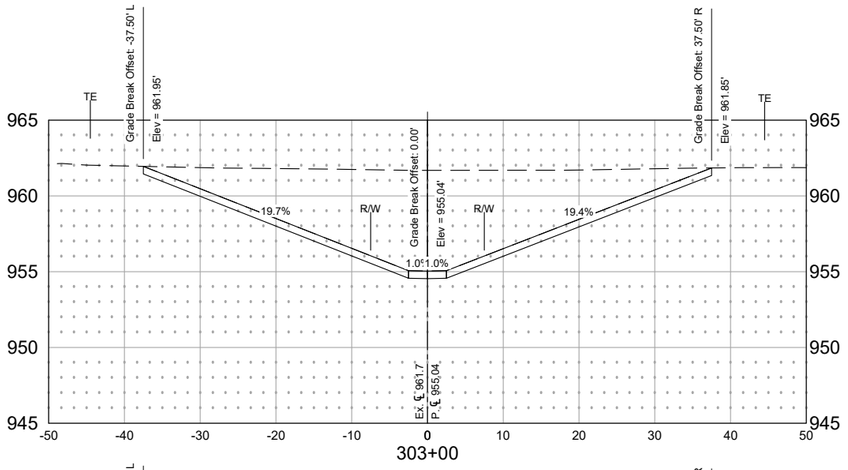
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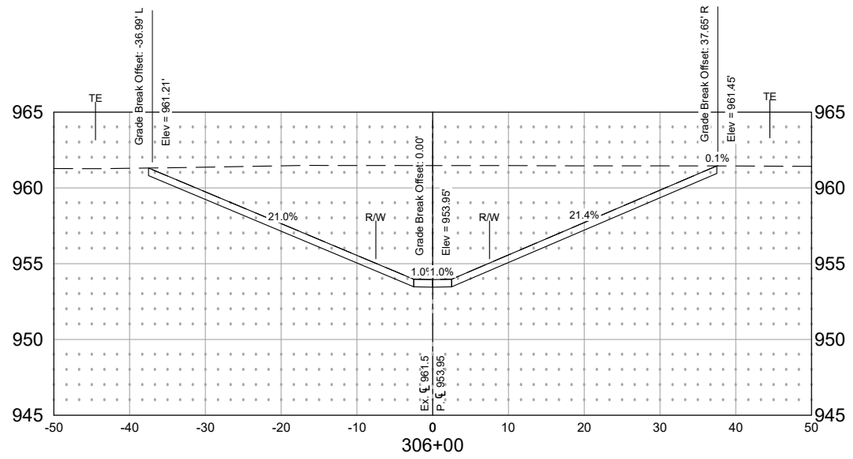


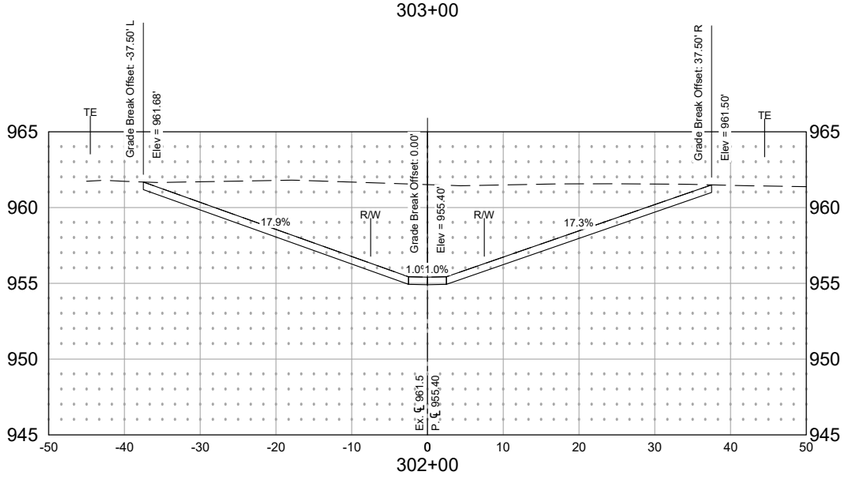
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PLAN & PROFILE

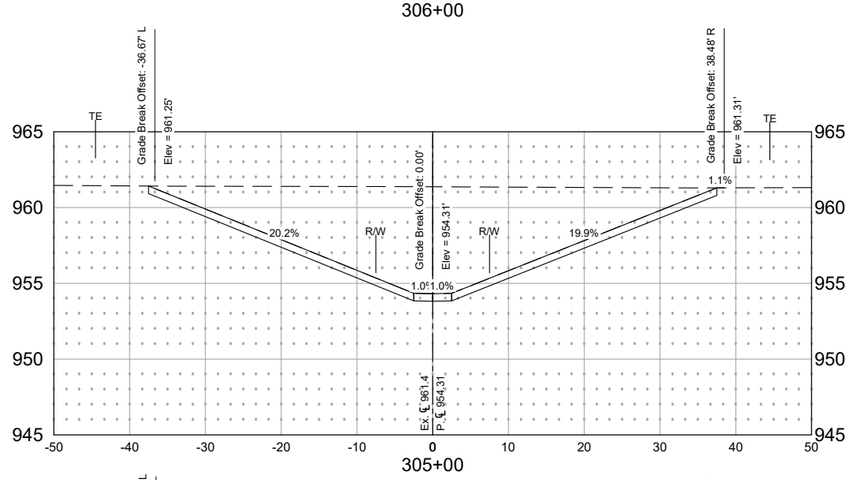


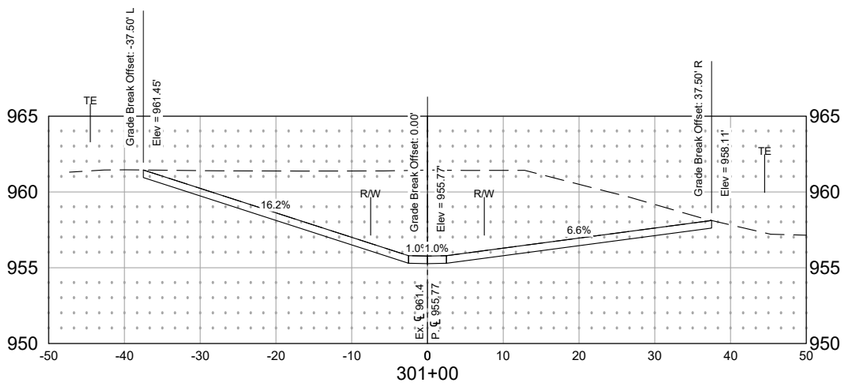
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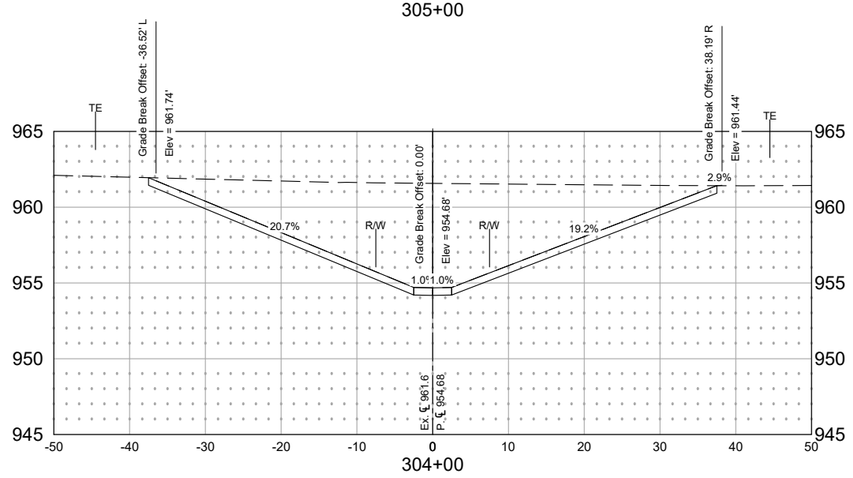












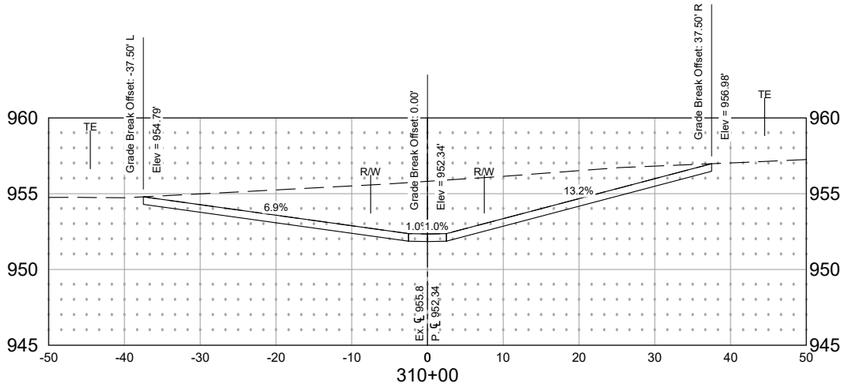
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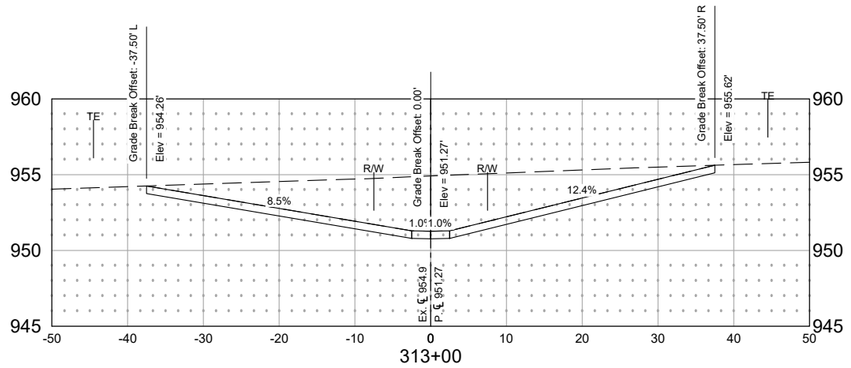
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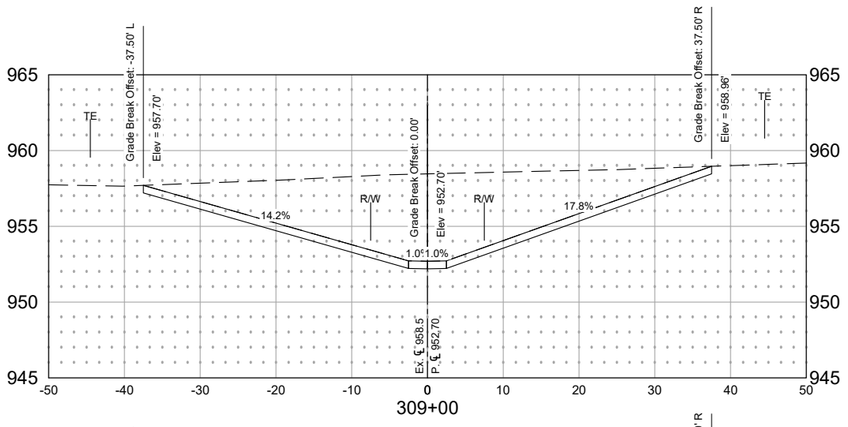
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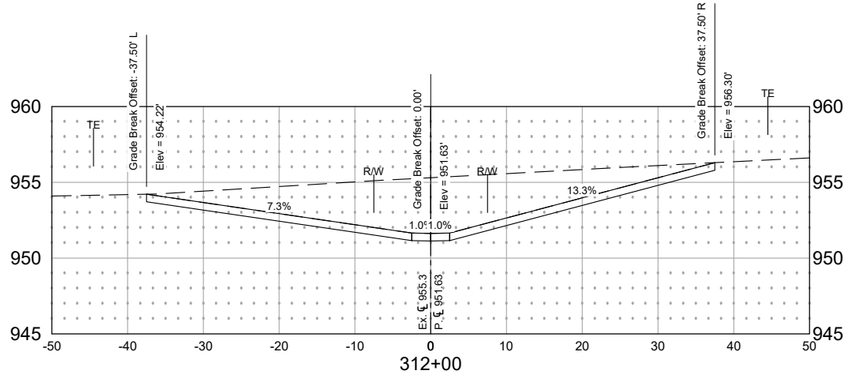
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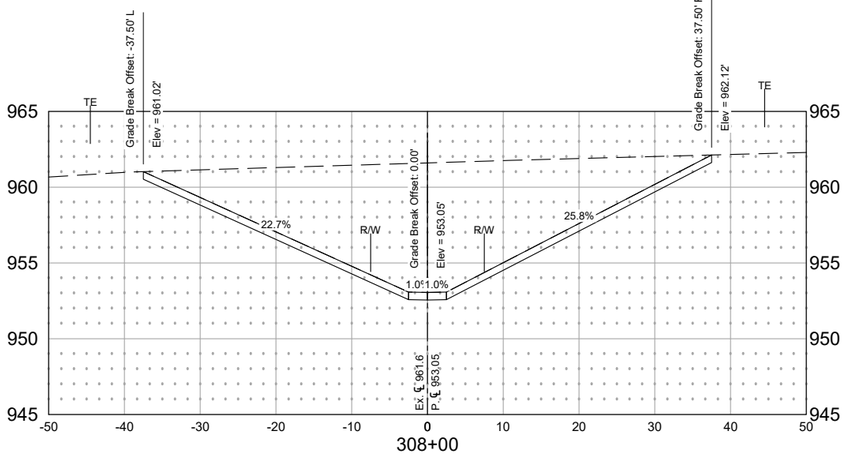
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07/2026; MAC00 165551

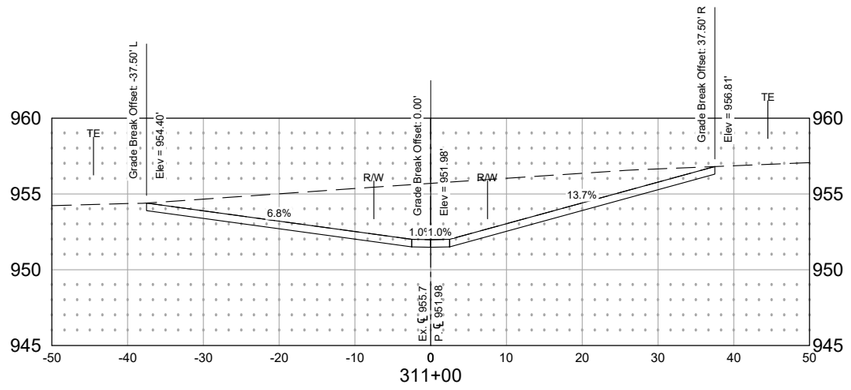




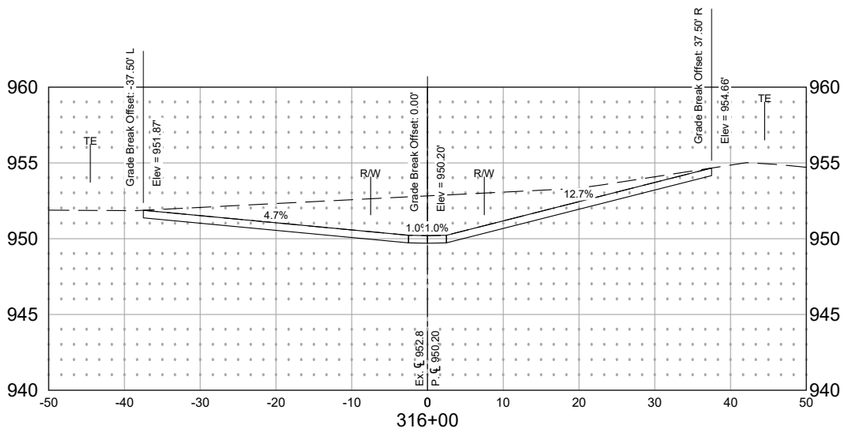


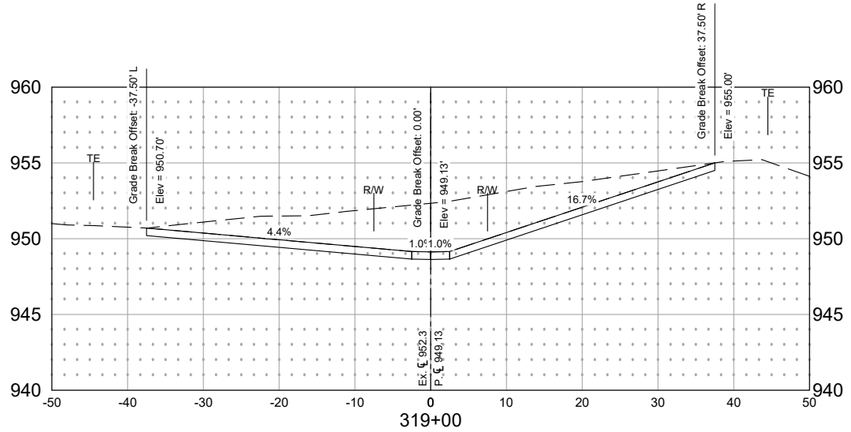


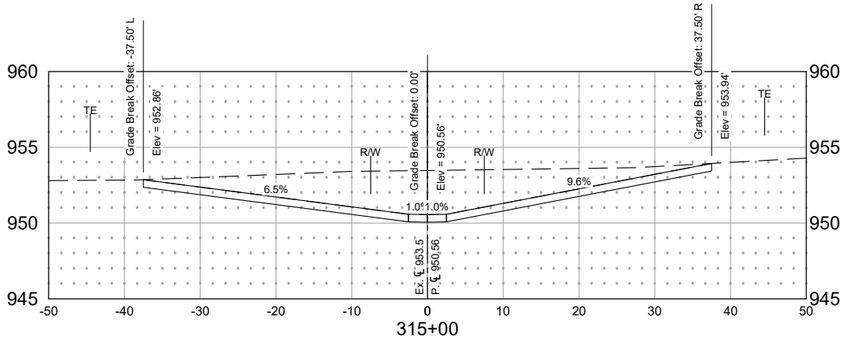


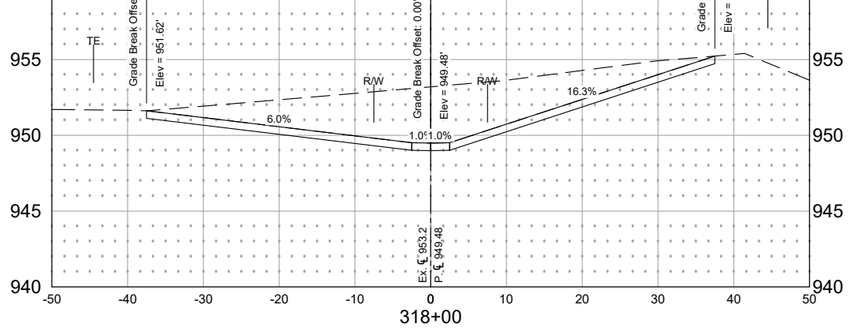


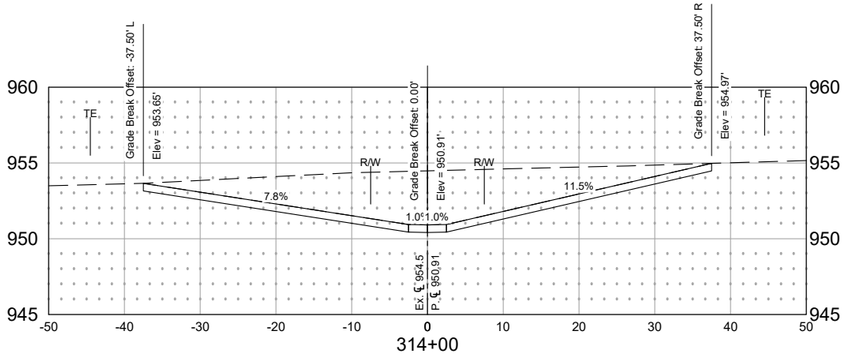
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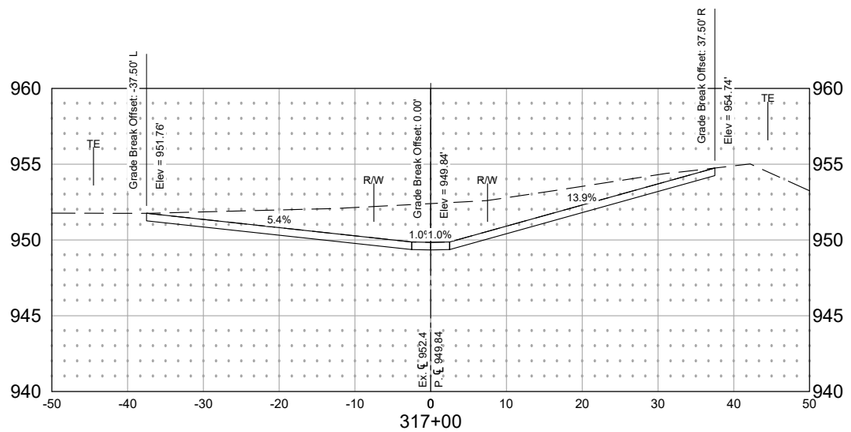




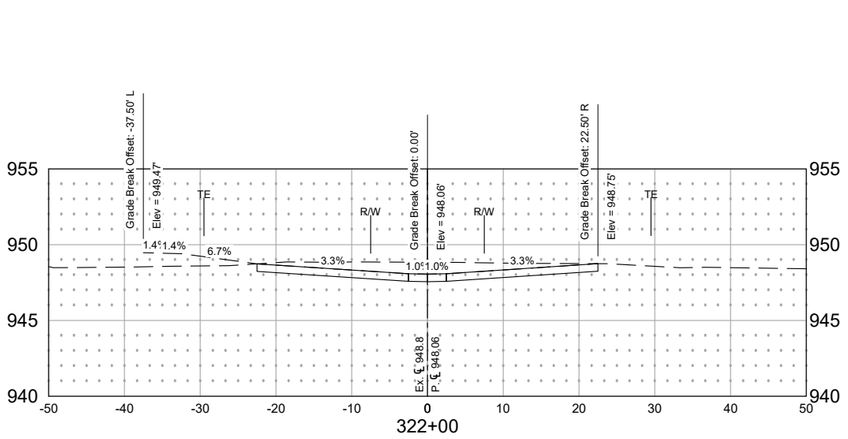


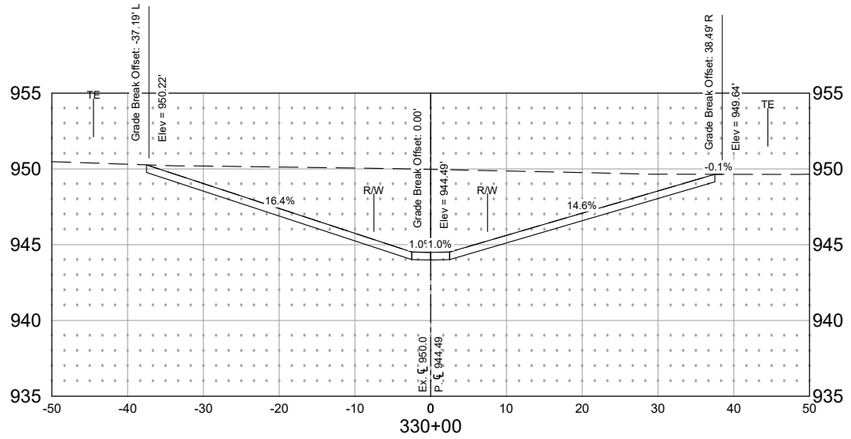


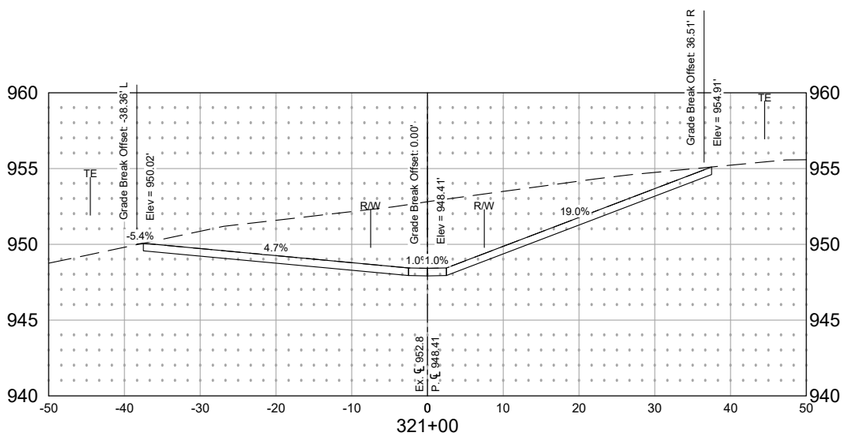


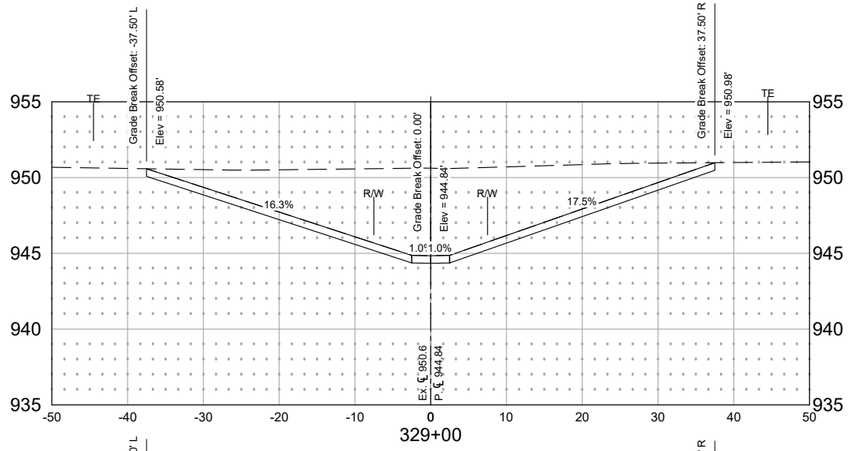


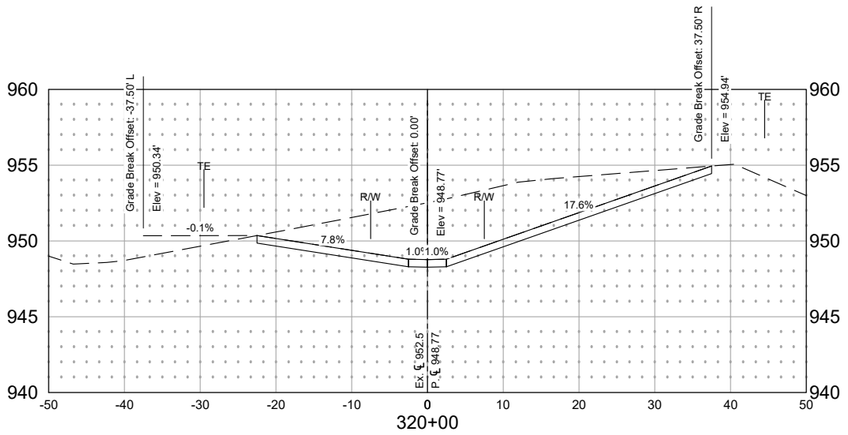
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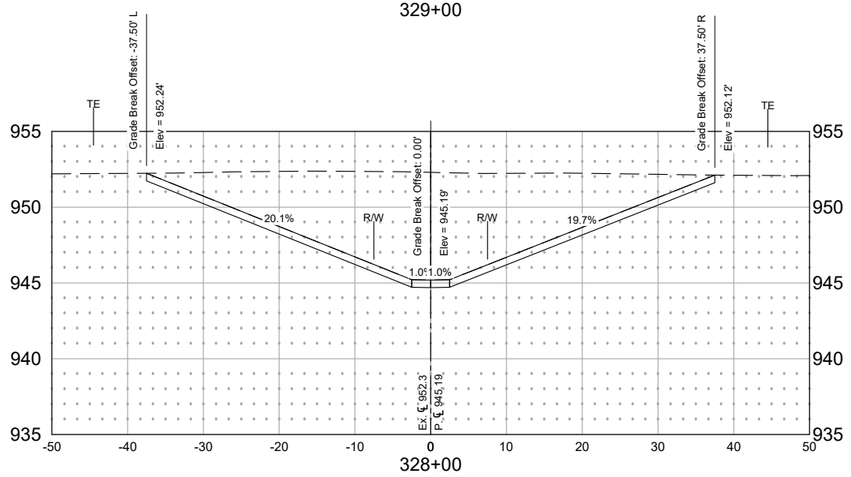




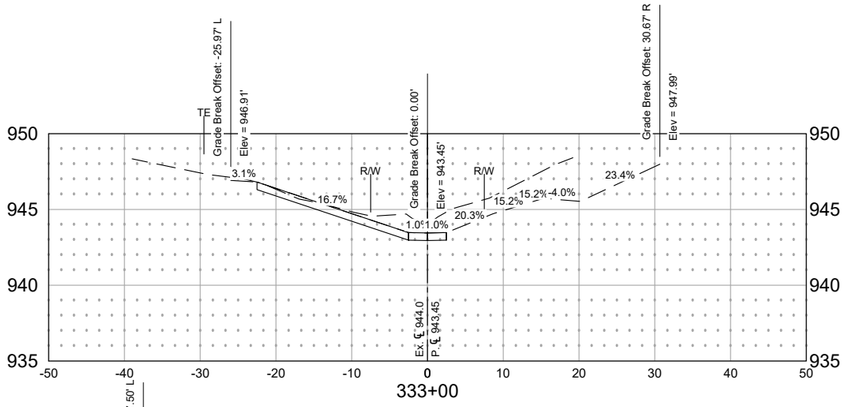


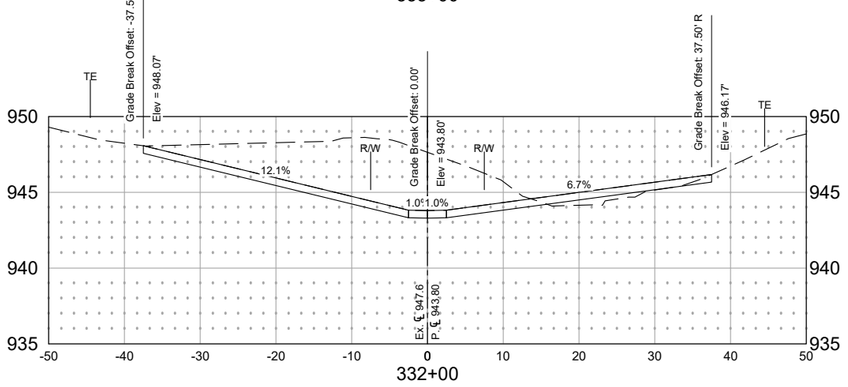


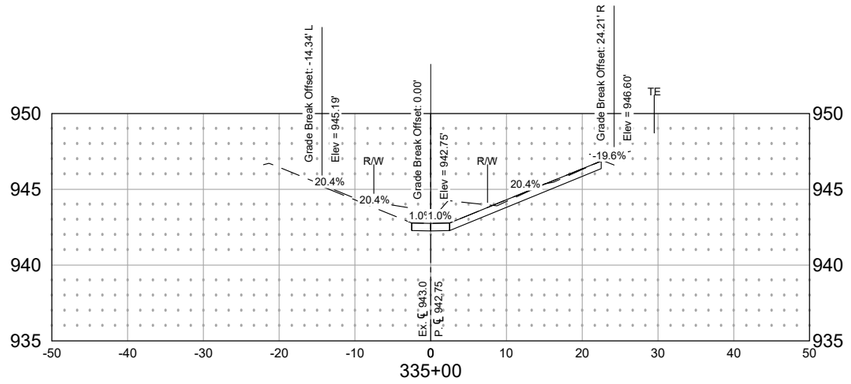


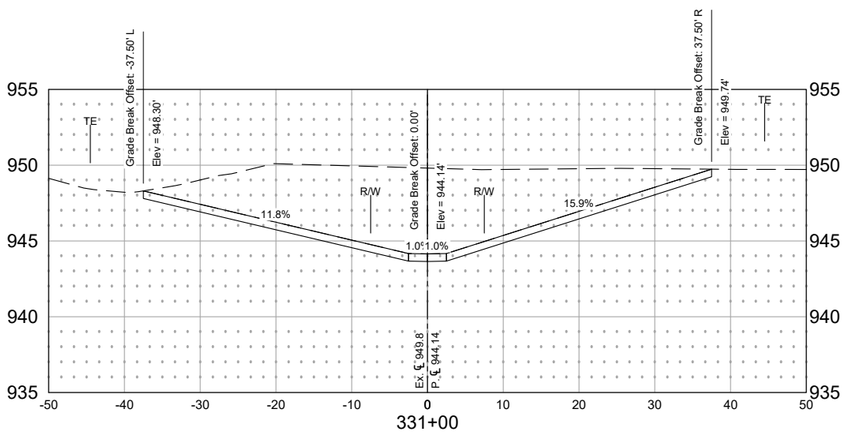


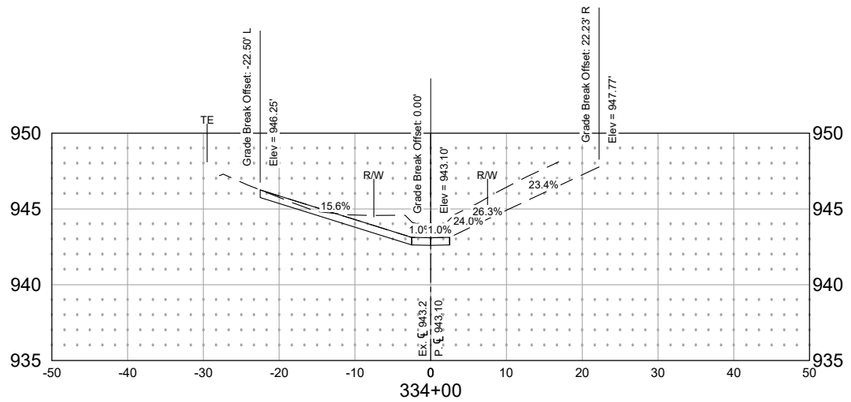
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Comparative Stormwater Analysis

TO: Evan Barrett, Mead & Hunt, Inc.

FROM: Andrew Fisher, E.I., Staff Engineer

DATE: July 1, 2026

RE: Airlake Airport Improvements – Comparative Stormwater Analysis

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The purpose of this memorandum is to analyze stormwater runoff impacts associated with the proposed airfield improvements. Improvements to both the runway and taxiways will result in an overall net increase in site imperviousness. This stormwater analysis compares existing and proposed conditions in accordance with regulatory requirements for runoff volume, rate control, water quality, and potential thermal impacts.

When the impervious surface created by a project exceeds one acre, the Vermillion River Watershed Joint Powers Organization (VRWJPO) standards require consideration of temperature-sensitive practices within trout stream portions of the Vermillion River and its tributaries, as well as site design measures to minimize potential increases in runoff temperature. As part of the airport improvements, stormwater best management practices (BMPs) will be implemented as part of project construction and operation to meet all applicable watershed and state requirements. It is anticipated that the Airport's current Stormwater Pollution Prevention Plan (SWPPP) will be modified to incorporate the changes associated with the planned airport improvements.

The stormwater comparative analysis covers the following components:

- Land Coverage Changes
- Runoff Volume and Water Quality
- Peak Rate Control
- Thermal Effects

1.0 LAND COVERAGE CHANGES

Based on the proposed project plan view prepared by Mead & Hunt, the total limit of ground disturbance for this project is 145.44 acres. Under pre-construction conditions, 125.85 acres of the site are pervious and 19.59 acres are impervious. Following construction of the airport improvements, there will be a net increase in impervious surface of 5.04 acres.
To determine the hydrologic soil group (HSG) classification for pervious areas within the project site, the United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Web Soil Survey was utilized. Based on this review, the majority of the project site consists of Hydrologic Soil Group B soils.

In accordance with the Minnesota Stormwater Manual, runoff coefficients (Curve Numbers) are based on the USDA Urban Hydrology for Small Watersheds (TR-55) methodology. Table 1 provides a summary of pre- and post-development land cover conditions, along with the selected Curve Numbers used in the runoff analysis.

Table 1
Land Coverage Comparison

Pre-Construction Land Cover			Post Construction Land Cover		
Land Cover [TR-55 Table 2-2a]	**CN Value**	**Area (Acres)**	**Land Cover [TR-55 Table 2-2a]**	**CN Value**	**Area (Acres)**
HSG B Pervious (50%-75% cover)	69	125.85	HSG B Pervious (50%-75% cover)	69	120.82
Impervious	98	19.59	Impervious	98	24.62

2.0 RUNOFF VOLUME AND WATER QUALITY

To determine the increase in runoff volume for the project site, the NRCS TR-55 method will be used to analyze pre-construction and post-construction conditions. Table 2 summarizes the calculated runoff volumes for the 2-, 10-, 25-, 50-, and 100-year, 24-hour storm events from the 145.44 acre project area. Precipitation depths for each storm event were determined using NOAA Atlas 14.

Table 2
Runoff Volume Comparison

Storm Event (24-Hour)	Pre-Construction Runoff (Acre-ft)	Post-Construction Runoff (Acre-ft)	Net Change (Acre-ft)
2-year	8.95	9.52	0.57
10-year	19.92	20.79	0.87
25-year	30.22	31.28	1.06
50-year	40.05	41.25	1.20
100-year	51.56	52.89	1.33

To meet volume control standards within the VRWJPO, stormwater BMPs must be designed to prevent an increase in runoff volume for the 2-year, 24-hour storm event above pre-development conditions. The proposed project will be required to capture and treat a minimum of 0.57 acre-feet of runoff. Infiltration BMPs are the preferred method within the watershed where site and soil conditions are suitable to capture and treat runoff. Airlake Airport currently has infiltration BMPs that were implemented to treat existing runoff and it

is anticipated that the existing infiltration BMPs will be modified and expanded to capture increased runoff prior to discharge offsite. As part of the stormwater design, additional infiltration testing will be conducted to support final design.

To meet post-construction water quality standards, the stormwater design must comply with the Minnesota Construction Stormwater General Permit, which requires retention (infiltration) of the first 1 inch of runoff from new impervious surfaces. Design of infiltration BMPs to fully capture the 2-year, 24-hour storm event will also satisfy this water quality requirement.

3.0 PEAK RATE CONTROL

Peak runoff rates for the project site will be evaluated using the NRCS TR-55 (SCS) methodology, with hydrologic and hydraulic modeling performed using stormwater modeling software. The analysis will compare pre-construction and post-construction peak discharge rates for the 2-, 10-, 25-, 50-, and 100-year, 24-hour storm events. At this stage of design, peak rate calculations have not been finalized as additional information regarding the existing stormwater management system, including basin geometry, outlet structures, and site conveyance are unknown. This information will be included during final design of the stormwater facilities.

Based on VRWJPO regulations, post-development peak discharge rates will be required to match or be less than pre-development rates for critical storm events. Compliance with peak rate control requirements will be achieved through modification and expansion of the existing stormwater management facilities at Airlake Airport. Modifications may include increasing available storage volume, modifying outlet control structures, and improving conveyance to the basins prior to discharge offsite.

Final peak rate control measures will be confirmed during subsequent design phases following completion of the stormwater model and incorporation of existing stormwater facilities.

4.0 THERMAL EFFECTS

The Airlake Airport project site includes an intermittent tributary that runs through the northwestern portion of the site and will serve as the primary receiving water for site runoff. This tributary flows offsite and ultimately discharges to a designated trout stream located northeast of the project area.

The construction stormwater permit requires that stormwater design minimize any increase in temperature to the downstream trout stream resulting from the 1- or 2-year, 24-hour storm event. As noted above, modifications will be made to existing infiltration stormwater BMPs to meet volume, water quality, and peak flow requirements, including capturing runoff up to the 2-year storm event.

In addition, a drainage area analysis was performed at several Points of Analysis (POAs) to evaluate potential thermal effects. Three POAs were selected, and their respective drainage

areas are shown in Figure 1 below. Drainage areas for each POA were delineated using StreamStats, a GIS-based web tool provided by the United States Geological Survey (USGS). Results of the drainage area analysis are shown in table 3.

- POA-1: Location where the intermittent tributary enters the Airlake project boundary.
- POA-2: Location where the tributary exits the project site; this point captures all improvements on the western end of the airport runway.
- POA-3: Location that receives all drainage from both western and eastern project improvements.

Figure 1
POA Drainage Areas

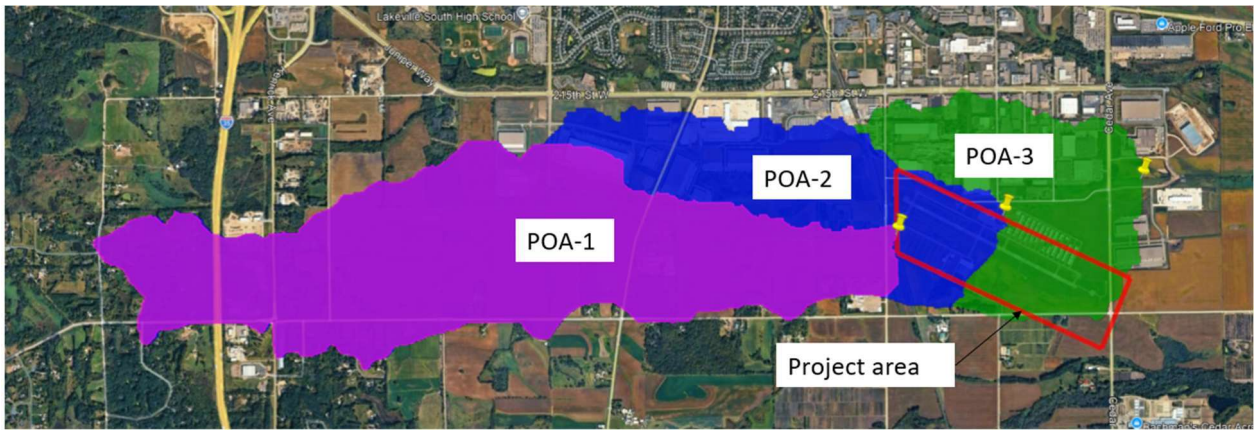


Table 3
POA Drainage Area Analysis

POA	Drainage Area (Acres)	Average Percentage Impervious	Impervious Area (Acres)
POA-1	1,229	2.66	33
POA-2	1,715	5.61	96
POA-3	2,061	12.89	266

The proposed project results in a net increase of 5.04 acres of impervious surface, which represents less than 1% of the total drainage area contributing to POA-3. This increase corresponds to an approximate 1.88% increase in overall imperviousness within the drainage area.

Based on the small scale of the impervious increase compared to the total drainage area, along with the implementation of stormwater BMPs, thermal impacts from the project are anticipated to be negligible and the project is expected to meet all applicable VRWJPO requirements.

If you have any questions regarding this analysis, please contact Andrew Fisher (717-510-7709, Andrew.Fisher@terracon.com).

Sincerely,
Terracon Consultants, Inc.

Andrew Fisher, E.I.
Staff Engineering
Civil Engineering

Michael E. Lower, P.E. (PA, MD, VA, TX)
Principal
Department Manager, Engineering

Attachments:

- TR-55 Worksheets for Pre- and Post Construction
- NOAA Atlas 14 Rainfall Event
- USDA Soil Survey

File: https://terracon4.sharepoint.com/sites/MP267156/Shared Documents/General/07 Working Files/01 Drafts/LVN Airport Stormwater Comparative Analysis (2026-07-01).docx

Worksheet for Runoff Curve Number (CN)

Project:	Airlake Airport	By:	Andrew Fisher	Date:	6/30/2026
Location:	Lakeville, Minnesota	Ck'd:		Date:	

Check One: [x] Present [ ] Developed

Runoff Curve Number (CN)

Soil Name	Hydrologic Group	Cover Description	CN			Area	CN x Area
			Table 2-2	Figure 2-3	Figure 2-4	Acres	
	B	Pervious	69			125.850	8684
	B	Impervious	98			19.590	1920
						Totals =>	145.440	10604

CN (weighted) = $\frac{\Sigma \text{ (CN x Area)}}{\Sigma \text{ (Area)}} = \frac{10604}{145.4} =$ 72.9

Use CN => 72.9

0.227 Sq. Miles

Event	P [in]	S [in]	I_a [in]	Q [in]	Q [Acre-ft]	WQ_V [Acre-ft]	CP_Q [cfs]	Req'd SW Controls
1 Year	2.47	3.72	0.74	0.55	6.64			
2 Year	2.81	3.72	0.74	0.74	8.95			
5 Year	3.49	3.72	0.74	1.17	14.14			
10 Year	4.17	3.72	0.74	1.64	19.92			
25 Year	5.28	3.72	0.74	2.49	30.22			
50 Year	6.27	3.72	0.74	3.30	40.05			
100 Year	7.38	3.72	0.74	4.25	51.56			

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Worksheet for Runoff Curve Number (CN)

Project:	Airlake Airport	By:	Andrew Fisher	Date:	
Location:		Ck'd:		Date:	

Check One: [ ] Present [x] Developed

Runoff Curve Number (CN)

Soil Name	Hydrologic Group	Cover Description	CN			Area	CN x Area
			Table 2-2	Figure 2-3	Figure 2-4	Acres	
	B	Pervious	69			120.820	8337
	B	Impervious	98			24.620	2413
						Totals =>	145.440	10750

$$\text{CN (weighted)} = \frac{\Sigma\,(\text{CN x Area})}{\Sigma\,(\text{Area})} = \frac{10750}{145.4} = 73.9$$

Use CN => 73.9

0.227 Sq. Miles

Event	P [in]	S [in]	I_a [in]	Q [in]	Q [Acre-ft]	WQ_V [Acre-ft]	CP_Q [cfs]	Req'd SW Controls
1 Year	2.47	3.53	0.71	0.59	7.12			
2 Year	2.81	3.53	0.71	0.79	9.52			
5 Year	3.49	3.53	0.71	1.23	14.87			
10 Year	4.17	3.53	0.71	1.71	20.79			
25 Year	5.28	3.53	0.71	2.58	31.28			
50 Year	6.27	3.53	0.71	3.40	41.25			
100 Year	7.38	3.53	0.71	4.36	52.89			

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NOAA Atlas 14, Volume 8, Version 2
Location name: Lakeville, Minnesota, USA*
Latitude: 44.6289°, Longitude: -93.231°
Elevation: 957 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.354** (0.279-0.457)	**0.422** (0.332-0.545)	**0.540** (0.424-0.699)	**0.645** (0.503-0.838)	**0.799** (0.606-1.08)	**0.926** (0.683-1.26)	**1.06** (0.754-1.47)	**1.20** (0.819-1.70)	**1.40** (0.916-2.03)	**1.56** (0.990-2.27)
10-min	**0.518** (0.409-0.670)	**0.618** (0.487-0.798)	**0.791** (0.621-1.02)	**0.944** (0.737-1.23)	**1.17** (0.887-1.58)	**1.36** (1.00-1.84)	**1.55** (1.10-2.15)	**1.76** (1.20-2.49)	**2.05** (1.34-2.97)	**2.28** (1.45-3.33)
15-min	**0.632** (0.499-0.817)	**0.753** (0.594-0.974)	**0.964** (0.757-1.25)	**1.15** (0.898-1.50)	**1.43** (1.08-1.92)	**1.65** (1.22-2.25)	**1.89** (1.35-2.62)	**2.15** (1.46-3.04)	**2.50** (1.64-3.62)	**2.79** (1.77-4.06)
30-min	**0.889** (0.701-1.15)	**1.07** (0.840-1.38)	**1.38** (1.08-1.78)	**1.65** (1.29-2.14)	**2.06** (1.56-2.77)	**2.39** (1.76-3.25)	**2.74** (1.95-3.80)	**3.12** (2.12-4.42)	**3.65** (2.38-5.28)	**4.07** (2.58-5.93)
60-min	**1.16** (0.914-1.50)	**1.39** (1.09-1.79)	**1.80** (1.41-2.33)	**2.19** (1.71-2.84)	**2.78** (2.12-3.78)	**3.28** (2.43-4.50)	**3.83** (2.74-5.34)	**4.43** (3.03-6.31)	**5.29** (3.47-7.68)	**5.99** (3.80-8.72)
2-hr	**1.43** (1.14-1.82)	**1.70** (1.36-2.18)	**2.23** (1.77-2.85)	**2.72** (2.15-3.50)	**3.50** (2.71-4.74)	**4.18** (3.14-5.68)	**4.92** (3.56-6.81)	**5.74** (3.97-8.11)	**6.93** (4.60-9.98)	**7.91** (5.07-11.4)
3-hr	**1.60** (1.28-2.02)	**1.89** (1.52-2.40)	**2.48** (1.98-3.14)	**3.04** (2.42-3.88)	**3.96** (3.10-5.35)	**4.77** (3.61-6.46)	**5.67** (4.13-7.81)	**6.67** (4.65-9.38)	**8.14** (5.44-11.7)	**9.36** (6.03-13.4)
6-hr	**1.85** (1.50-2.32)	**2.20** (1.78-2.76)	**2.89** (2.33-3.62)	**3.56** (2.86-4.48)	**4.64** (3.67-6.20)	**5.60** (4.28-7.49)	**6.66** (4.90-9.08)	**7.84** (5.52-10.9)	**9.58** (6.47-13.6)	**11.0** (7.18-15.6)
12-hr	**2.14** (1.75-2.64)	**2.50** (2.05-3.09)	**3.20** (2.61-3.96)	**3.89** (3.15-4.83)	**4.98** (3.97-6.54)	**5.94** (4.59-7.84)	**7.01** (5.21-9.43)	**8.19** (5.83-11.3)	**9.93** (6.77-13.9)	**11.4** (7.48-15.9)
24-hr	**2.47** (2.04-3.01)	**2.81** (2.33-3.43)	**3.49** (2.88-4.27)	**4.17** (3.42-5.12)	**5.28** (4.27-6.87)	**6.27** (4.90-8.19)	**7.38** (5.55-9.82)	**8.62** (6.20-11.7)	**10.4** (7.20-14.5)	**12.0** (7.96-16.6)
2-day	**2.86** (2.40-3.44)	**3.19** (2.67-3.84)	**3.86** (3.22-4.65)	**4.53** (3.76-5.49)	**5.64** (4.61-7.24)	**6.64** (5.25-8.56)	**7.76** (5.91-10.2)	**9.02** (6.57-12.1)	**10.9** (7.60-15.0)	**12.4** (8.37-17.1)
3-day	**3.12** (2.63-3.72)	**3.47** (2.92-4.15)	**4.17** (3.50-5.00)	**4.87** (4.06-5.85)	**6.00** (4.92-7.62)	**7.01** (5.57-8.95)	**8.13** (6.23-10.6)	**9.40** (6.88-12.5)	**11.3** (7.90-15.3)	**12.8** (8.67-17.5)
4-day	**3.32** (2.82-3.95)	**3.71** (3.14-4.41)	**4.46** (3.77-5.32)	**5.19** (4.35-6.20)	**6.34** (5.22-7.98)	**7.36** (5.87-9.32)	**8.48** (6.51-11.0)	**9.72** (7.14-12.9)	**11.5** (8.13-15.6)	**13.0** (8.87-17.7)
7-day	**3.86** (3.30-4.53)	**4.35** (3.72-5.12)	**5.24** (4.47-6.18)	**6.05** (5.12-7.16)	**7.26** (5.98-8.94)	**8.27** (6.63-10.3)	**9.35** (7.22-11.9)	**10.5** (7.77-13.7)	**12.2** (8.62-16.3)	**13.5** (9.27-18.2)
10-day	**4.36** (3.76-5.09)	**4.94** (4.25-5.77)	**5.93** (5.08-6.94)	**6.80** (5.79-7.99)	**8.05** (6.64-9.79)	**9.06** (7.29-11.2)	**10.1** (7.84-12.7)	**11.2** (8.33-14.5)	**12.8** (9.09-16.9)	**14.0** (9.66-18.7)
20-day	**5.96** (5.20-6.86)	**6.70** (5.83-7.72)	**7.90** (6.85-9.13)	**8.90** (7.68-10.3)	**10.3** (8.54-12.2)	**11.3** (9.20-13.7)	**12.4** (9.70-15.3)	**13.5** (10.1-17.1)	**14.9** (10.7-19.4)	**16.0** (11.2-21.2)
30-day	**7.37** (6.47-8.42)	**8.25** (7.23-9.42)	**9.65** (8.42-11.0)	**10.8** (9.35-12.4)	**12.3** (10.3-14.5)	**13.4** (10.9-16.0)	**14.5** (11.4-17.8)	**15.6** (11.7-19.6)	**17.0** (12.2-21.9)	**18.0** (12.6-23.7)
45-day	**9.20** (8.13-10.4)	**10.3** (9.08-11.7)	**12.0** (10.5-13.6)	**13.3** (11.6-15.2)	**15.0** (12.6-17.5)	**16.3** (13.3-19.2)	**17.4** (13.8-21.1)	**18.5** (14.0-23.0)	**19.8** (14.4-25.4)	**20.8** (14.7-27.1)
60-day	**10.8** (9.57-12.1)	**12.1** (10.7-13.6)	**14.1** (12.4-15.9)	**15.6** (13.7-17.7)	**17.5** (14.7-20.2)	**18.9** (15.5-22.1)	**20.1** (15.9-24.1)	**21.2** (16.1-26.1)	**22.4** (16.3-28.5)	**23.2** (16.5-30.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

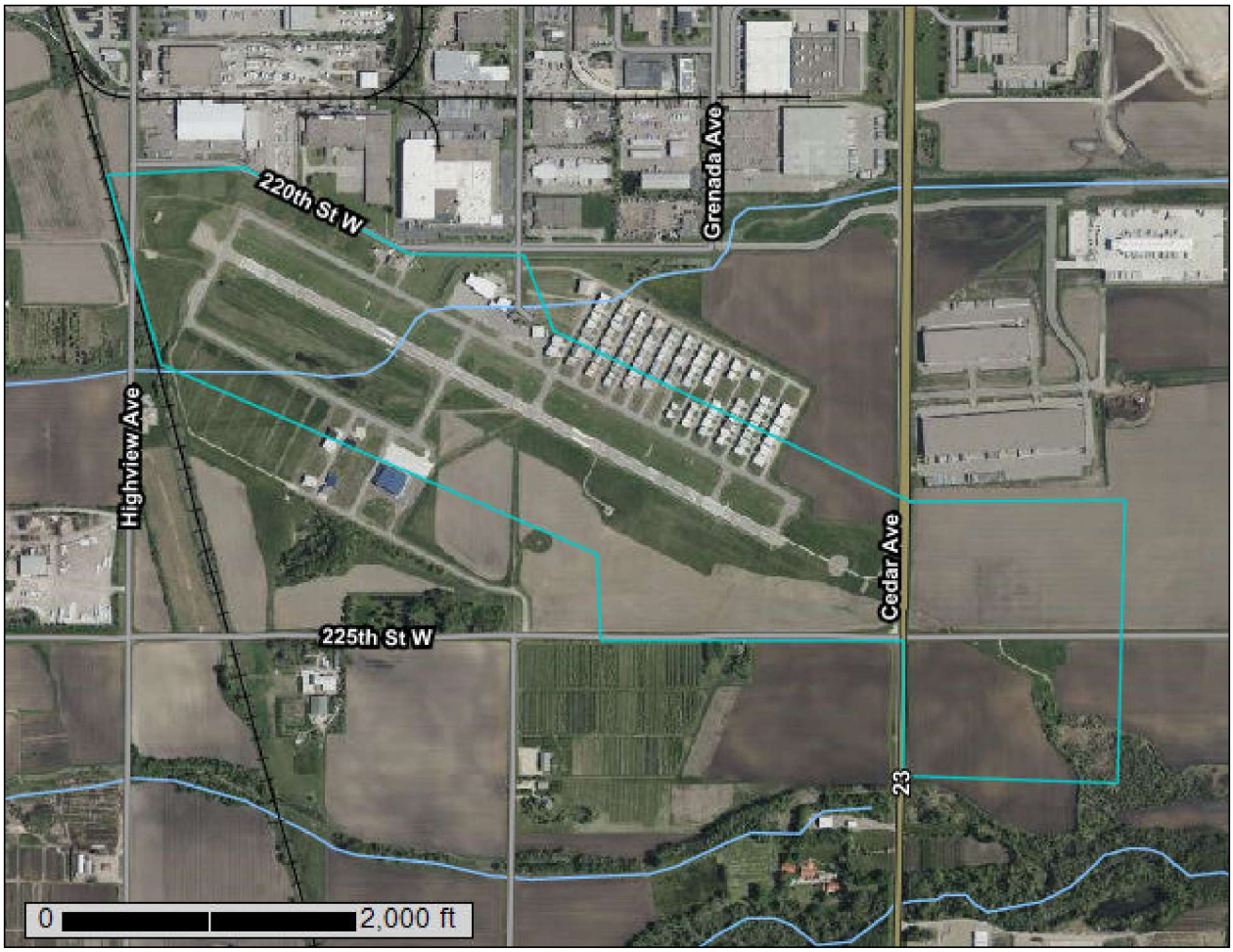
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Dakota County, Minnesota



June 30, 2026

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

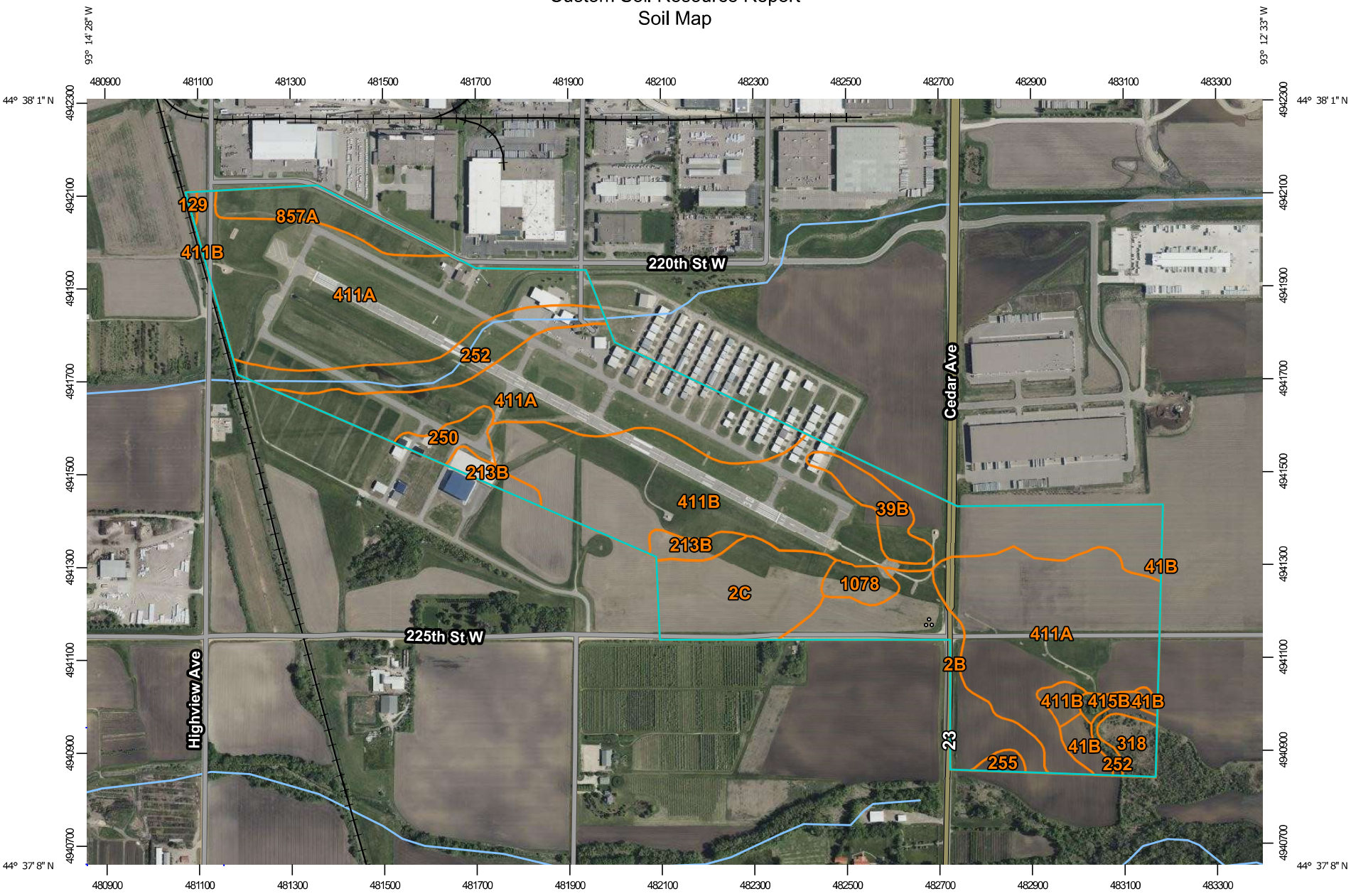
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 21, Sep 10, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2024—Jul 1, 2024

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2B	Ostrander loam, 1 to 6 percent slopes	14.6	5.9%
2C	Ostrander loam, 6 to 12 percent slopes	16.2	6.6%
39B	Wadena loam, 2 to 6 percent slopes	5.1	2.1%
41B	Estherville sandy loam, 2 to 6 percent slopes	2.3	1.0%
129	Cylinder loam, 0 to 2 percent slopes	0.2	0.1%
213B	Klinger silt loam, 1 to 5 percent slopes	4.3	1.8%
250	Kennebec silt loam	3.3	1.4%
252	Marshan silty clay loam	13.1	5.4%
255	Mayer silt loam	0.9	0.4%
318	Mayer loam, swales	3.1	1.3%
411A	Waukegan silt loam, 0 to 1 percent slopes	113.8	46.3%
411B	Waukegan silt loam, 1 to 6 percent slopes	57.1	23.2%
415B	Kanaranzi loam, 2 to 6 percent slopes	1.2	0.5%
857A	Urban land-Waukegan complex, 0 to 1 percent slopes	7.5	3.1%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	2.8	1.1%
Totals for Area of Interest		**245.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without

including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Dakota County, Minnesota

2B—Ostrander loam, 1 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9xz
Elevation: 850 to 1,120 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ostrander and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ostrander

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A,AB - 0 to 17 inches: loam
2Bw - 17 to 53 inches: loam
2C - 53 to 60 inches: loam

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R104XY005IA - Loamy Upland Prairie
Forage suitability group: Sloping Upland, Neutral (G104XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

Minor Components

Dickinson

Percent of map unit: 8 percent

Hydric soil rating: No

Klinger

Percent of map unit: 7 percent
Hydric soil rating: No

2C—Ostrander loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: f9y0
Elevation: 840 to 1,120 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ostrander and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ostrander

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A - 0 to 13 inches: loam
2Bw - 13 to 53 inches: loam
2C - 53 to 60 inches: loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Ecological site: R104XY005IA - Loamy Upland Prairie
Forage suitability group: Sloping Upland, Neutral (G104XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

Minor Components

Dickinson
Percent of map unit: 8 percent
Hydric soil rating: No

Klinger
Percent of map unit: 7 percent
Hydric soil rating: No

39B—Wadena loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2wd86
Landscape: Till plains
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Wadena and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wadena

Setting
Landscape: Till plains
Landform: Outwash plains, Terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile
Ap - 0 to 7 inches: loam
A - 7 to 17 inches: loam
Bw - 17 to 30 inches: loam
2C - 30 to 79 inches: gravelly loamy coarse sand

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sloping Upland, Acid (G103XS006MN)
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Estherville

Percent of map unit: 10 percent
Landscape: Till plains
Landform: Outwash plains, Terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

Dickinson

Percent of map unit: 5 percent
Landscape: Till plains
Landform: Outwash plains, Terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

41B—Estherville sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2tsjp
Landscape: Till plains

Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Estherville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Estherville

Setting

Landscape: Till plains
Landform: Terraces, Outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 8 inches: sandy loam
A - 8 to 13 inches: sandy loam
Bw - 13 to 19 inches: sandy loam
2C - 19 to 79 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sandy (G103XS022MN)
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

Minor Components

Dickinson

Percent of map unit: 8 percent
Landscape: Till plains
Landform: Outwash plains, Terraces
Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

Wadena

Percent of map unit: 6 percent
Landscape: Till plains
Landform: Terraces, Outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

Biscay

Percent of map unit: 1 percent
Landscape: Till plains
Landform: Terraces, Outwash plains
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R103XY007MN - Sandy Wet Prairies
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

129—Cylinder loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2wd84
Landscape: Till plains
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cylinder and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cylinder

Setting

Landscape: Till plains

Landform: Outwash plains, Terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 8 inches: loam
A - 8 to 19 inches: loam
Bg - 19 to 34 inches: sandy loam
2C - 34 to 79 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B/D
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Level Swale, Neutral (G103XS001MN)
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: No

Minor Components

Biscay

Percent of map unit: 10 percent
Landscape: Till plains
Landform: Outwash plains, Terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY007MN - Sandy Wet Prairies
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Biscay, depressional

Percent of map unit: 5 percent
Landscape: Till plains
Landform: Depressions on outwash plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: R103XY015MN - Depressional Marsh
Other vegetative classification: Ponded If Not Drained (G103XS013MN)

Hydric soil rating: Yes

213B—Klinger silt loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: f9x8
Elevation: 1,200 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Klinger and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klinger

Setting

Landform: Moraines
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A - 0 to 13 inches: silt loam
Bt - 13 to 28 inches: silt loam
2Bt,2Bw - 28 to 55 inches: loam
2C - 55 to 60 inches: loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B/D
Ecological site: R104XY005IA - Loamy Upland Prairie
Forage suitability group: Level Swale, Neutral (G104XS001MN)
Other vegetative classification: Level Swale, Neutral (G104XS001MN)

Hydric soil rating: No

Minor Components

Maxfield

Percent of map unit: 5 percent
Landform: Drainageways on moraines
Hydric soil rating: Yes

Ostrander

Percent of map unit: 5 percent
Hydric soil rating: No

250—Kennebec silt loam

Map Unit Setting

National map unit symbol: f9xc
Elevation: 600 to 1,300 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Kennebec and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kennebec

Setting

Landform: Outwash plains
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap,A1,A2 - 0 to 41 inches: silt loam
C - 41 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Ecological site: F090AY004WI - Loamy Floodplain
Forage suitability group: Sloping Upland, Neutral (G090AN002MN)
Other vegetative classification: Sloping Upland, Neutral (G090AN002MN)
Hydric soil rating: No

252—Marshan silty clay loam

Map Unit Setting

National map unit symbol: f9xg
Elevation: 670 to 1,100 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Marshan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marshan

Setting

Landform: Flats on outwash plains, Flats on stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciolacustrine sediments over outwash

Typical profile

A1,A2 - 0 to 14 inches: silty clay loam
BA,Bg - 14 to 32 inches: loam
2C - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F090AY006WI - Wet Loamy Lowland

Forage suitability group: Level Swale, Neutral (G090AN001MN)
Other vegetative classification: Level Swale, Neutral (G090AN001MN)
Hydric soil rating: Yes

Minor Components

Cylinder
Percent of map unit: 10 percent
Hydric soil rating: No

255—Mayer silt loam

Map Unit Setting
National map unit symbol: f9xj
Elevation: 700 to 1,800 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Mayer and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mayer

Setting
Landform: Flats on stream terraces, Flats on outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile
Ap,A - 0 to 17 inches: silt loam
Bg,BC - 17 to 31 inches: loam
2C - 31 to 60 inches: gravelly loamy sand

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: R104XY016IA - Wet Terrace Sedge Meadow
Forage suitability group: Level Swale, Calcareous (G104XS009MN)
Other vegetative classification: Level Swale, Calcareous (G104XS009MN)
Hydric soil rating: Yes

Minor Components

Cylinder

Percent of map unit: 10 percent
Hydric soil rating: No

318—Mayer loam, swales

Map Unit Setting

National map unit symbol: f9y4
Elevation: 680 to 1,950 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Mayer, swales, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mayer, Swales

Setting

Landform: Depressions on stream terraces, Depressions on outwash plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Outwash

Typical profile

Ap,A - 0 to 19 inches: loam
Bg,BC - 19 to 36 inches: loam
2C - 36 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: R104XY016IA - Wet Terrace Sedge Meadow
Forage suitability group: Ponded If Not Drained (G104XS013MN)
Other vegetative classification: Ponded If Not Drained (G104XS013MN)
Hydric soil rating: Yes

Minor Components

Cylinder

Percent of map unit: 10 percent
Hydric soil rating: No

411A—Waukegan silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: f9ys
Elevation: 900 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Waukegan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waukegan

Setting

Landform: Outwash plains, Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial sediments over outwash

Typical profile

Ap,AB - 0 to 13 inches: silt loam
Bt - 13 to 28 inches: silt loam
2BC - 28 to 42 inches: gravelly sand
2C - 42 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F090AY014WI - Loamy Bedrock Upland
Forage suitability group: Sloping Upland, Neutral (G090AN002MN)
Other vegetative classification: Sloping Upland, Neutral (G090AN002MN)
Hydric soil rating: No

Minor Components

Estherville

Percent of map unit: 5 percent
Hydric soil rating: No

Kanaranzi

Percent of map unit: 5 percent
Hydric soil rating: No

411B—Waukegan silt loam, 1 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9yt
Elevation: 900 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Waukegan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waukegan

Setting

Landform: Stream terraces, Outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Glaciofluvial sediments over outwash

Typical profile

Ap,AB - 0 to 13 inches: silt loam
Bt - 13 to 28 inches: silt loam
2BC - 28 to 42 inches: gravelly sand
2C - 42 to 60 inches: gravelly sand

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F090AY014WI - Loamy Bedrock Upland
Forage suitability group: Sloping Upland, Neutral (G090AN002MN)
Other vegetative classification: Sloping Upland, Neutral (G090AN002MN)
Hydric soil rating: No

Minor Components

Estherville

Percent of map unit: 5 percent
Hydric soil rating: No

Kanaranzi

Percent of map unit: 5 percent
Hydric soil rating: No

415B—Kanaranzi loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9yy
Elevation: 700 to 1,600 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Kanaranzi and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kanaranzi

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

Ap - 0 to 9 inches: loam
Bw - 9 to 19 inches: silt loam
2BC - 19 to 23 inches: loamy sand
2C - 23 to 60 inches: coarse sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sloping Upland, Low AWC, Neutral (G103XS004MN)
Other vegetative classification: Sloping Upland, Low AWC, Neutral (G103XS004MN)
Hydric soil rating: No

857A—Urban land-Waukegan complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: f9zv
Elevation: 900 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 90 percent
Waukegan and similar soils: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Outwash plains

Description of Waukegan

Setting

Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial sediments over outwash

Typical profile

Ap,AB - 0 to 13 inches: silt loam
Bt - 13 to 28 inches: silt loam
2BC - 28 to 42 inches: gravelly sand
2C - 42 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sloping Upland, Neutral (G103XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

1078—Anthroportic Udorthents, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2xm97
Landscape: Till plains
Elevation: 520 to 1,310 feet
Mean annual precipitation: 23 to 41 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 155 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Anthroportic udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Anthroportic Udorthents

Setting

Landscape: Till plains
Anthropogenic Feature: Leveled land
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Human-transported material

Typical profile

^A - 0 to 6 inches: loam
^C - 6 to 79 inches: loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: R104XY007IA - Loamy Upland Savanna
Forage suitability group: Not Suited (G105XS024MN)
Other vegetative classification: Not Suited (G105XS024MN)
Hydric soil rating: Unranked

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APPENDIX D:
AIR QUALITY, GREENHOUSE GAS, AND NOISE ANALYSIS

Technical Memorandum

To:	Federal Aviation Administration (FAA) Dakota-Minnesota Airports District Office (DMA-ADO)
From:	Mead & Hunt on behalf of the Metropolitan Airports Commission (MAC)
Date:	July 27, 2026
Subject:	Airlake Airport (LVN) – Base Case and Forecast Noise Scenario Fleet Mix Profiles

This memorandum summarizes the rationale for selecting the noise and air quality scenarios considered by the Airlake Airport Environmental Assessment (EA) and the methodology used to generate the fleet mix profile for each scenario. The FAA *Environmental Desk Reference for Airport Actions*, Chapter 11, dated February 2020, states the following regarding applicability of a noise analysis to a specific project:

> *"No noise analysis is needed for projects involving Design Group I and II airplanes (wingspan less than 79 feet) in Approach Categories A through D (landing speed less than 66 knots) operating at airports whose forecast operations in the period covered by the National Environmental Policy Act (NEPA) document do not exceed 90,000 annual propeller operations (247 average daily operations) or 700 annual jet operations (2 average daily operations)."*

In 2025, LVN had fewer than 90,000 propeller operations and the MAC does not expect that LVN will exceed the 90,000 operations threshold in the foreseeable future. LVN also had fewer than 700 jet operations in 2025; however, as detailed in the Purpose & Need statement for the EA, the MAC expects that LVN will have over 700 annual jet operations once the proposed runway extension is constructed. Therefore, LVN exceeds the 700 annual jet operations threshold, requiring a noise analysis for the EA.

According to FAA email correspondence dated June 2, 2026, the noise analysis will meet FAA requirements if it considers the following three scenarios: 2025 Base Case, 2033 No Action Alternative, and 2033 With Project. The year 2025 is the most recent year for which detailed operations data was available at the time of EA development and was used as the base case for the noise analysis in lieu of using forecasted operations for the year of anticipated project implementation, which is expected to be 2028. Based on guidance from the FAA Great Lakes Regional Office, it is most appropriate for this project to model future scenarios for five years following project implementation, which is expected to be 2033. The 2025 Base Case was established using historical operations data provided by the MAC Noise and Operations Monitoring System (MACNOMS) and is summarized in **Table 1** below.

Table 1: 2025 Base Case Operations Summary

Engine Type	Day Arrivals	Night Arrivals	Day Departures	Night Departures	Day Touch and Goes	Night Touch and Goes	Total 2025 Operations
Single-Engine Piston	20,482	412	20,511	383	8,382	64	**50,233**
Multi-Engine Piston	156	-	156	-	37	-	**349**
Turboprop	70	3	71	2	-	-	**146**
Jet	83	1	84	-	2	-	**170**
Turbine Helicopter	177	16	174	19	14	-	**400**
Piston Helicopter	95	6	95	6	85	-	**287**
Total	**21,063**	**438**	**21,091**	**410**	**8,520**	**64**	**51,585**

Note: Greater than actual 2025 shares of total operations were assigned to jet and turboprop operations to reflect the historical peak year of 2020, so that the noise contours do not understate recent noise exposure.

In email correspondence dated June 2, 2026, the FAA encouraged the use of annual growth rates published in the *FAA Aerospace Forecast FY 2026-2046* to prepare the forecast scenarios for the noise analysis. For the 2033 No Action scenario, these growth rates were applied to the 2025 base case to arrive at the operations profile summarized in **Table 2** below.

Table 2: 2033 No-Action Operations Calculations

Engine Type	2025 Base Case Operations	Annual Growth Rate 2025-2026	2026 No-Action Operations	Annual Growth Rate 2026-2036	2033 No-Action Operations
Single-Engine Piston	50,233	-0.6%	49,932	-1.0%	**46,540**
Multi-Engine Piston	349	-2.4%	341	-0.1%	**338**
Turboprop	146	3.2%	151	1.3%	**165**
Jet	170	3.9%	176	3.2%	**220**
Turbine Helicopter	400	2.1%	408	2.4%	**482**
Piston Helicopter	287	0.6%	288	0.9%	**307**
Total	**51,585**		**51,296**		**48,052**

Annual Growth Rate Source: FAA Aerospace Forecast 2026-2046, Table 29

The 2033 With Project scenario uses the same annual growth rates as the No Action scenario to forecast organic growth in operations from 2025 to 2033 but also includes one-time increases in jet and turboprop operations in 2027 and 2028. These one-time increases reflect additional operations anticipated by the project Purpose & Need statement. These include additional operations that the Airport's FBO, Aloft Aviation, expects to conduct in 2027 and 2028 as indicated in their Letter of Intent, as well as additional operations that are expected to be re-allocated from other MAC reliever airports to LVN in 2028 once adequate runway length is in place at LVN. The one-time increases are summarized in **Table 3** below.

Table 3: With Project Scenario One-Time Increases in Turboprop and Jet Operations

Engine Type	User	2027 Additional Operations	2028 Additional Operations
Turboprop	FBO (Aloft Aviation)	0	50
	Other Transient	0	99
Jet	FBO (Aloft Aviation)	421	48
	Other Transient	0	432
Total One-Time Increase		**421**	**629**

The same FAA Aerospace Forecast annual growth rates used to generate the 2033 No Action fleet mix profile were applied to the adjusted 2027 and 2028 operations totals to generate the 2033 With Project fleet mix profile, which is compared to the 2025 Base Case and 2033 No Action scenario profiles in **Table 4** below.

Table 4: Noise Analysis Scenario Fleet Mix Profiles Comparison							
					Annual Total Operations		
Engine Type	Aircraft Designator	AEDT equip ID	AEDT Airframe	AEDT ANP Type	2025 Base Case	2033 No Action	2033 With Project
Single Engine Piston	C172	1267	Cessna 172 Skyhawk	CNA172	31,460	29,146	29,146
Single Engine Piston	P28A	1887	Piper PA-28 Cherokee Series	GASEPF	10,710	9,922	9,922
Single Engine Piston	C182	1262	Cessna 182	CNA182	1,870	1,733	1,733
Single Engine Piston	PIAT	6681	Pipistrel Alpha Trainer	GASEPF	1,375	1,273	1,273
Single Engine Piston	C152	6262	Cessna 152	GASEPF	1,250	1,158	1,158
Single Engine Piston	SR20	1324	Cirrus SR20	COMSEP	893	827	827
Single Engine Piston	SR22	6646	Cirrus SR22	COMSEP	656	608	608
Single Engine Piston	C150	1882	Cessna 150 Series	GASEPF	625	579	579
Single Engine Piston	GA7	6301	Gulfstream American GA-7 Cougar	GASEPF	566	525	525
Single Engine Piston	RV7	6330	Vans RV-7	GASEPV	429	398	398
Single Engine Piston	RV6	6329	Vans RV-6	GASEPV	401	371	371
			Single Engine Piston Subtotal		**50,235**	**46,540**	**46,540**
Multi Engine Piston	PA44	6319	Piper PA-44-180	PA30	349	338	338
			Multi Engine Piston Subtotal		**349**	**338**	**338**
Turboprop	PC12	3122	Pilatus PC-12	CNA208	94	107	142
Turboprop	BE20	3790	Raytheon Super King Air 200	DHC6	52	58	182
			Turboprop Subtotal		**146**	**165**	**324**
Jet	HDJT	6071	Honda HA-420 Hondajet	CNA510	66	86	289
Jet	C650	3046	Cessna 650 Citation III	CIT3	43	56	537
Jet	C25A	6067	Cessna CitationJet CJ/CJ1	CNA525C	33	43	302
Jet	C510	6062	Cessna Citation 510 VLJ	CNA510	27	35	162
			Jet Subtotal		**169**	**220**	**1,290**
Turbine Helicopter	H60	21	Sikorsky UH-60 Black Hawk	S70	218	263	263
Turbine Helicopter	B06	4123	Bell 206B-3	B206B3	181	219	219
			Turbine Helicopter Subtotal		**399**	**482**	**482**
Piston Helicopter	R44	3161	Robinson R44 Raven	R44	287	307	307
			Piston Helicopter Subtotal		**287**	**307**	**307**
			TOTAL OPERATIONS		**51,585**	**48,052**	**49,281**

FINAL

Aviation Emissions Technical Report

Airlake Airport
Environmental Assessment
Runway Extension

August 2026

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Airlake Airport

HMMH Report No: 25-0104A.004

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Attachments

Attachment A Air Emissions Spreadsheet Calculations A-1

1. Introduction

Harris Miller Miller & Hanson Inc. (HMMH), as a subconsultant to Mead & Hunt, is assisting the Airlake Airport (LVN) on the Environmental Assessment (EA) for the proposed Runway Extension ("Proposed Action") at Airlake Airport in Dakota County, Minnesota. The Proposed Action will consist of rehabilitating and extending the existing runway and associated taxiways at the airport as described below.

The Proposed Action, includes five elements: (1) extend both runway ends to result in a runway length of 4,850 feet, including connector taxiway extensions and rehabilitating the existing runway pavement; (2) displace the Runway 12 end for additional clearance over railroad tracks; (3) relocate 225th Street to accommodate runway changes; (4) modify some taxiway configurations; and (5) expand the aircraft parking apron.

The EA also evaluates the No Action Alternative, which represents the conditions that would occur if the Proposed Action were not implemented and provides a baseline for comparison with the Proposed Action.

This Aviation Emissions Technical Report was prepared to support the EA. The Federal Aviation Administration (FAA) is the lead agency for the environmental review of the Proposed Action. This report describes the methodology and assumptions used to evaluate air emissions associated with the construction and demolition activities for the Proposed Action and the net change in air emissions associated with changes in aircraft operations.

Comparing the Proposed Action to the FAA *Technical Support Document for Attainment Area Screening Methodology* (FAA 2024a) and the guidance provided in the FAA *Aviation Emissions and Air Quality Handbook Version 4* (FAA 2024b) and FAA Order 1050.1G (FAA 2025) is the basis for evaluating the potential for significant impacts under the National Environmental Policy Act (NEPA) for those pollutants designated by the United States Environmental Protection Agency (US EPA) as "attainment" (FAA 2020).

Section 2 of this report presents the air quality affected environment, including standards, applicable rules, and attainment status. **Section 3** presents the air quality environmental consequences associated with the Proposed Action. Additionally, **Section 4** includes a list of references used herein, and **Attachment A** includes the supporting emission calculation spreadsheets.

2. Air Quality Affected Environment

Under NEPA, federal agencies must consider the impact their actions will have on the environment compared to alternatives, including a No Action Alternative. According to the FAA NEPA implementing guidance (FAA Order 1050.1G and 1050.1 Desk Reference, and FAA Order 5050.4B), impacts to air quality must be considered as part of the environmental analysis under NEPA (FAA 2025; FAA 2023; FAA 2006). Potential effects of the Proposed Action are evaluated against the National Ambient Air Quality Standards (NAAQS), as promulgated by the US EPA under the Federal Clean Air Act (CAA).

2.1 National Ambient Air Quality Standards

The US EPA currently regulates six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). Particulate matter is divided into two particle size categories: coarse particles with a diameter less than 10 micrometers (PM_{10}) and fine particles with a diameter of less than 2.5 micrometers ($PM_{2.5}$). The NAAQS are expressed in terms of pollutant concentration measured (or averaged) over a defined period of time and are two-tiered. The first tier (the "primary standard") is intended to protect public health; the second tier (the "secondary standard") is intended to protect public welfare and prevent further degradation of the environment.

Table 2-1 shows the primary and secondary NAAQS for the criteria pollutants. Section 176(c) of the CAA states that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project that could cause or contribute to the severity and/or number of violations of the NAAQS, or could inhibit the expeditious attainment of these standards.

The standards in **Table 2-1** apply to the concentration of a pollutant in outdoor ambient air. If the air quality in a geographic area is equal to or better than the national standard, the US EPA will typically designate the region as an "attainment area." An area where air quality does not meet the national standard is typically designated by the US EPA as a "non-attainment area." Once the air quality in a non-attainment area improves to the point where it meets the standards and the additional requirements outlined in the CAA, the US EPA can redesignate the area to attainment upon approval of a Maintenance Plan, and these areas are then referred to as "maintenance areas." Each state is required to prepare a State Implementation Plan (SIP) that outlines measures that regions within the state will implement to attain the applicable air quality standard in non-attainment areas for applicable criteria air pollutants, and to maintain compliance with the applicable air quality standard in maintenance areas. The status and severity of pollutant concentrations in a particular area will impact the types of measures a state must take to reach attainment with the NAAQS. The US EPA must review and approve each state's SIP to ensure the proposed measures are sufficient to either attain or maintain compliance with the NAAQS within a set period of time.

The CAA Amendments of 1990 require states to make recommendations to the US EPA regarding the attainment status of all areas within their borders when the US EPA finalizes an update to any NAAQS. Under its CAA Amendments authority, the US EPA further classifies non-attainment areas for some pollutants—such

as O_3—based on the severity of the NAAQS violation as marginal, moderate, serious, severe, and extreme. To further improve the nation's air quality, the US EPA lowered the O_3 standard in 2015 to 0.070 parts per million (ppm). Similarly in February 2024, the US EPA strengthened the primary annual $PM_{2.5}$ standard to 9 micrograms per cubic meter (µg/m^3) of air from 12 µg/m^3 (Federal Register 2024).

Table 2-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standards	Secondary Standards
CO	Eight-Hour	9 ppm	None
	One-hour	35 ppm	None
Pb	Rolling Three-Month Average	0.15 µg/m^3	Same as Primary
NO_2	Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	Same as Primary
	One-hour	0.100 ppm Note 2	None
O_3	Eight-hour (2015 standard) Note 4	0.070 ppm	Same as Primary
$PM_{2.5}$	Annual Arithmetic Mean	9 µg/m^3 Note 5	15 µg/m^3
	24-hour	35 µg/m^3	Same as Primary
PM_{10}	24-hour	150 µg/m^3 Note 1	Same as Primary
SO_2	One-hour	75 parts per billion (ppb) Note 3	None
	Annual	None	10 ppb Note 6

Source: US EPA NAAQS, Accessed on July, 2026, https://www.epa.gov/criteria-air-pollutants/naaqs-table

Notes:

1. For PM_{10}, the 24-hour standard is not to be exceeded more than once per year on average over three years. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or are less than the standard.
2. To attain this standard, the three-year average of the 98th percentile of the daily maximum one-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
3. Final rule signed June 2, 2010. To attain this standard, the three-year average of the 99th percentile of the daily maximum one-hour average at each monitor within an area must not exceed 75 ppb.
4. US EPA updated the NAAQS for O_3 to strengthen the primary eight-hour standard to 0.07 ppm on October 1, 2015. An area will meet the standard if the fourth-highest maximum daily eight-hour O_3 concentration per year, averaged over three years is equal to or less than 70 ppb.
5. US EPA strengthened the annual $PM_{2.5}$ standard to 9 µg/m^3 on February 7, 2024. https://www.epa.gov/newsreleases/epa-finalizes-stronger-standards-harmful-soot-pollution-significantly-increasing.
6. The 2024 rulemaking added a new annual secondary NAAQS in 40 CFR Part 50 without altering the 1971 secondary 3-hour SO2 NAAQS. Note that some areas may have certain continuing implementation obligations.

2.2 Attainment Status

The US EPA Green Book lists non-attainment, maintenance, and attainment areas across the nation (US EPA 2024). It, along with the Code of Federal Regulations, lists Dakota County, in which the project is located, as being in attainment for all of the NAAQS (US EPA 2026).[1]

2.3 General Conformity Rule

The General Conformity Rule defines a federal action as any activity engaged in by a department, agency, or instrumentality of the Federal Government, or any activity that a department, agency, or instrumentality of the Federal Government supports in any way, provides financial assistance for, licenses, permits, or approvals. General Conformity is defined as demonstrating that a project or action conforms to the SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. Federally funded and approved actions at airports are subject to the US EPA's

[1] It should be noted that parts of Dakota County (Eagan) are designated non-attainment for the 2008 lead standard, however the airport is not located within the Eagan non-attainment boundary area. https://www3.epa.gov/airquality/greenbook/mnpb2008.html

General Conformity regulations. The General Conformity Rule applies to all federal actions except for certain highway and transit programs which must instead comply with the Transportation Conformity Plans (US EPA and US DOT 2010; US EPA 2023).

The General Conformity Rule includes annual emissions thresholds for non-attainment and maintenance areas that trigger the need for a General Conformity determination and defines projects that are typically excluded from General Conformity requirements. As noted above, since LVN is located in a US EPA-designated attainment area for all current criteria pollutant NAAQS, the General Conformity requirements do not apply to this Proposed Action. As a result, this air quality analysis does not discuss Clean Air Act General Conformity requirements further. For NEPA analysis purposes, **Section 3.2** below describes the standard the FAA applies to determine the significance of the impacts of air pollutant emissions in NEPA reviews.

3. Air Quality Environmental Consequences

Potential air quality impacts associated with construction and demolition activity and aircraft operational changes for the Proposed Action are discussed in this section. Air emissions were evaluated under the FAA *Aviation Emissions and Air Quality Handbook* (FAA 2024b) and *Technical Support Document for Attainment Area Screening Methodology* (FAA 2024a) for construction and any new aircraft operations.

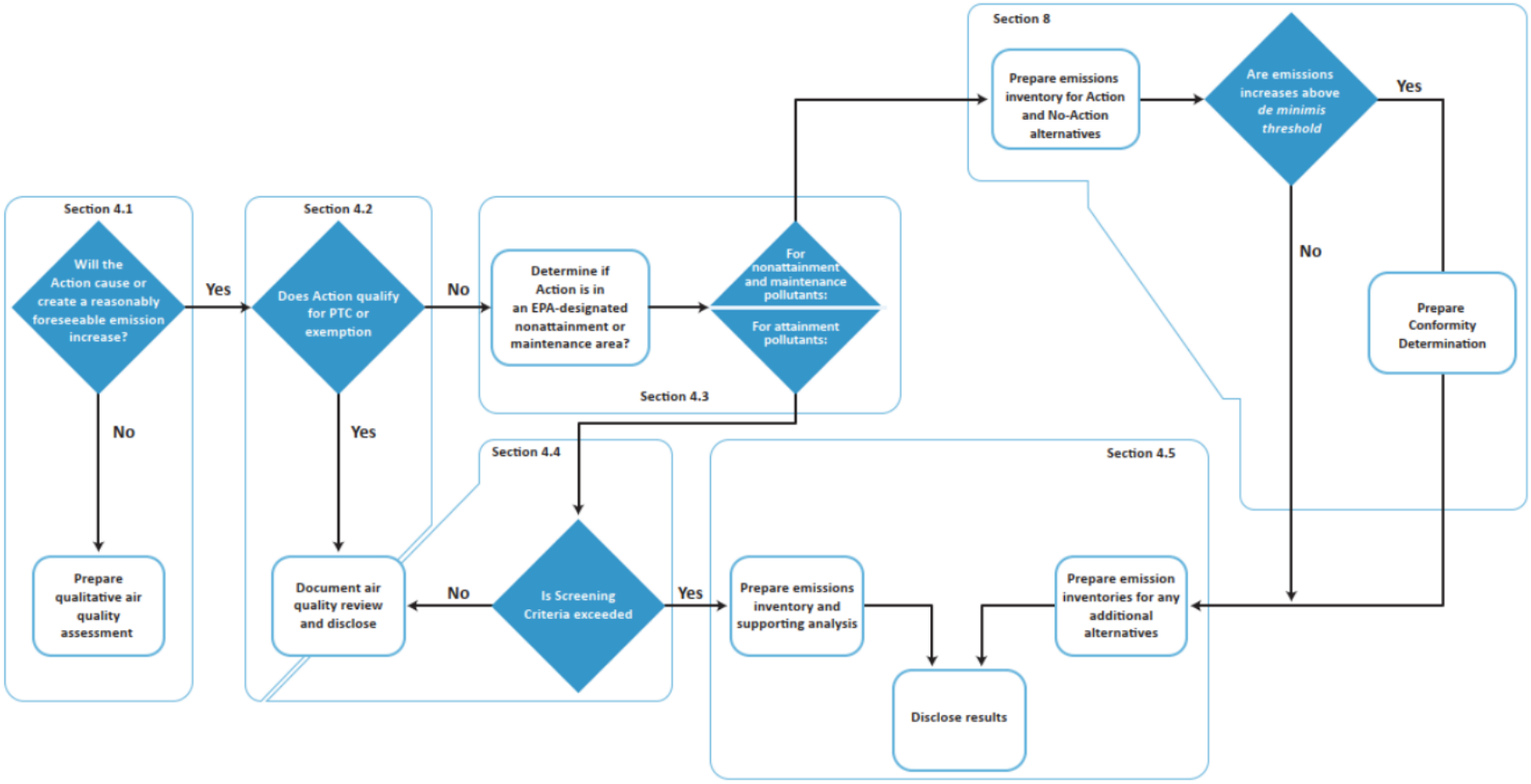
The Proposed Action would induce changes in aircraft operations compared to the No Action Alternative after construction. Therefore, air emissions associated with aircraft along with construction emissions were inventoried and evaluated as part of this analysis.

3.1 Significance Thresholds

As provided in FAA Order 1050.1G, an action would cause a significant air quality impact if pollutant concentrations would exceed one or more of the NAAQS established by the US EPA under the CAA for any of the time periods analyzed or would increase the frequency or severity of any such existing violations (FAA 2025).

The FAA's *Technical Support Document for Attainment Area Screening Methodology* includes a flow chart identifying how to conduct the air quality analysis and is depicted below in **Figure 3-1** (FAA 2024a). The chart is a modification of the chart in Figure 4-1 of the *Airport Air Quality Handbook, Version 3 Update 1, January 2015* (FAA 2015). The proposed revision attempts to minimize changes by limiting modifications to the flowchart to the review of attainment areas and pollutants. The Proposed Action is evaluated relative to the Screening Criteria. The four screening questions presented below in **Section 3.2** should be assessed for every year affected by the Proposed Action. If the Proposed Action is below these screening thresholds, or a no response to the screening question, the Proposed Action is assumed to not cause an adverse impact on air quality. The determination should be documented, and no further analysis is required. Otherwise, an emission inventory should be prepared.

Figure 3-1. Air Quality Assessment Process for A Federal Action



Source: FAA, Technical Support Document for Attainment Area Screening Methodology, https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/files/technical_support_document.pdf

3.2 Methodology

The Proposed Action was compared to technical support document thresholds identified in the FAA *Aviation Emissions and Air Quality Handbook Version 4* (FAA 2024b) and the *Technical Support Document For Attainment Area Screening Methodology* (FAA 2024a). The methodology provides clarification on what to evaluate when an air quality assessment is warranted in an attainment area (for which LVN is designated by US EPA; see **Section 2.2**). Furthermore, it simplifies the environmental review of air quality impacts from projects that occur in attainment areas by screening out such projects using common parameters that have little chance of causing an adverse impact on air quality. The parameters cover both operations and construction and include aircraft operations, operational efficiency (delays), changes in vehicle activity, and construction.

The resultant screening criteria questions for the four parameters were used in determining whether the Proposed Action can be screened out for determining if an adverse impact on air quality could occur. The four questions and answers to those questions (in blue) as they pertain to the Proposed Action are as follows:

1. Will the FAA action result in an increase of more than 14,000 commercial aircraft operations per year, or if the project is in an Ozone Transportation Region (OTR)[2], more than 5,000 general aviation (GA) aircraft operations per year? No. Additional annual operations associated with the Proposed Action of 1,229 are expected to be below the FAA Screening thresholds (124 additional Beechcraft Super King Air 200 operations, 259 additional Cessna Citation CJ2 operations, 127 Cessna Citation Mustang operations, 481 additional Cessna Citation III operations, 203 additional HondaJet operations, and 35 additional Pilatus PC-12 operations for a total of 1,229 new aircraft operations) of 14,000 new commercial operations or 5,000 new GA operations if within an OTR.

2. Will the FAA action result in an increase of more than 340,000 minutes of aircraft delay per year? No increase in aircraft delay is expected with the Proposed Action.

3. Will the FAA action result in an additional 25 million vehicle miles traveled (VMT) per year? Forecast increase in traffic is expected to be minimal (e.g., small number of new employee and GAV trips) compared to the No Action, with any additional traffic trips expected to be well below the 25 million VMT threshold.

4. Will the FAA action result in the use of more than 125 construction vehicles or ground support equipment (GSE) during a year, or if the project is in the OTR, 50 construction vehicles or GSE during a year? Yes, the Proposed Action could consist of more than 125 construction vehicles during the year, and a quantitative construction emission analysis was conducted.

Because the construction activities associated with the Proposed Action could exceed the FAA screening threshold of 125 construction vehicles per year, the attainment area screening methodology does not screen out potential air quality impacts from construction equipment. Accordingly, a quantitative emission inventory was conducted to demonstrate that construction-related emissions would not exceed the NAAQS (see **Section 3.2.8**). Estimates of construction-related emissions were developed for the Proposed Action using standard industry methodologies and techniques, including the FAA *Aviation Emissions and Air Quality Handbook* and associated US EPA guidance, with the Motor Vehicle Emission Simulator (MOVES5) used to derive emissions factors for both on-road and off-road sources. Construction-related emissions were quantitatively inventoried

[2] LVN is not located within an Ozone Transport Region.

and compared to applicable US EPA *de minimis* thresholds to evaluate significant impacts and compliance with the NAAQS. These methods are described in more detail in the following sections.

3.2.1 Construction Activities

This section documents the methods used to calculate emissions of CO, volatile organic compounds (VOCs), oxides of nitrogen (NOx), SO_2, PM_{10}, and $PM_{2.5}$, from construction sources associated with the Proposed Action. This analysis develops emissions inventories pursuant to NEPA, consistent with the FAA *Aviation Emissions and Air Quality Handbook Version 4* (FAA 2024b), as well as determining whether emissions associated with the Proposed Action would exceed the NAAQS.

Construction activities associated with the Proposed Action are expected to occur in 2028. Construction emissions were not estimated for the No Action Alternative, because no construction activity would be associated with the No Action Alternative. The construction associated with the Proposed Action would result in short-term changes in air emissions from sources such as exhaust from off-road construction equipment such as but not limited to:

- Milling and paving,
- Site clearing, and
- Grading.

On-road vehicles include those associated with:

- Transport and delivery of supplies,
- Materials and equipment to and from the site, and
- Construction worker trips.

Additionally, fugitive dust emissions sources include:

- Site preparation and land clearing,
- Equipment movement on unpaved and paved roads, and
- Evaporative emissions from the application of asphalt paving.

Table 3-1 presents the primary components of the Proposed Action, including area estimates (square feet) and anticipated start and end dates of construction. These area estimates were used for deriving construction equipment schedules with the Airport Cooperative Research Board's (ACRP's) Airport Construction Emissions Inventory Tool (ACEIT) (Transportation Research Board 2011).

Table 3-1. Proposed Action Construction Activities

Project Action Component	Area (Square Feet)	Construction Start	Construction End
Runway Extension	141,553	6/1/2028	10/31/2028
Displacement of Runway 12 (Demolition)	343,946	6/1/2028	10/31/2028
Relocation of 225th Street	165,384	6/1/2028	10/31/2028
Modify Taxiway Configurations for each Taxiway Change	369,281	6/1/2028	10/31/2028
Expansion of Aircraft Parking Apron	56,400	6/1/2028	10/31/2028
Realignment, reconstruction, and widening of parallel Taxiway A	203,291	6/1/2028	10/31/2028
Existing Runway Reconstruction	1,112,135	6/1/2028	10/31/2028
Source: Mead & Hunt, email to HMMH, July 15, 2026			

The ACRP ACEIT model was used to estimate the construction schedule of equipment only for each project component based on the project dimensions and project costs for each activity consistent with the latest FAA Handbook Version 4 guidance, Section 5.2.1 (FAA 2024b). The model has the ability to generate construction schedules for a variety of standard airport construction projects including the associated activity types and the equipment used for this project.

ACEIT can also produce emission factors for nonroad and on-road construction equipment, as well as for fugitive emission sources using US EPA and industry standard models and methodologies. However, the current version of ACEIT includes an older version of the US EPA's MOVES emission model, MOVES2010a and NONROADs, which have both been updated over the years. Consistent with the recent FAA Handbook Version 4, *emission factors were generated outside of ACEIT using the current version of MOVES5 to develop on-road and nonroad emission factors for Dakota County*.[3] These emission factors were applied to estimates of VMT and construction equipment (hours, horsepower, load factor), respectively, for the construction activity. Spreadsheet calculations for construction emissions are presented in **Attachment A**.

3.2.2 Off-Road Construction Equipment

As discussed above, off-road (i.e., Nonroad) equipment emission factors for each construction year using the MOVES5 emission model, which incorporates county-level data representative of Dakota County for criteria pollutants/precursors. Emission factors in grams per horsepower-hour (g/hp-hr) for each off-road equipment type were applied to the equipment size (in hp), load factor, and anticipated activity levels (in hours per year) of expected equipment use, as generated in the construction equipment inventory by ACEIT.

The annual emissions for off-road construction equipment were computed using the following equation:

> *Off-road Vehicle Construction emissions (tons per year) = emission factor (grams per hp-hr) x size (hp) x load factor x hours per year x (1 pound/453.6 grams) x (1 ton/2,000 pounds)*

[3] Construction emissions used in MOVES5 NONROAD assumed a blend of Tier 1, Tier 2, Tier 3, and Tier 4 for Dakota County based on US EPA phasing ratios of older equipment in future years and does not reflect the primary use of either Tier 1 thru Tier 4 engines. MOVES emission factors are specific to Dakota County as generated within MOVES for each year.

3.2.3 On-road Construction Passenger/Truck Delivery Vehicles

VMT data for each on-road construction employee trip and truck delivery vehicles were derived from round-trip distances and the number of construction employee hours from the activity-specific construction schedule in ACEIT. It is assumed that all on-road equipment would use gasoline for passenger vehicles and diesel fuel for truck deliveries. Emission factors in grams per mile (g/mile) for each on-road vehicle type were applied to the anticipated VMT. Similar to the way emissions are estimated for off-road equipment, the MOVES (Version 5) model uses US EPA vehicle default data representative of Dakota County for both criteria pollutants/precursors and greenhouse gases to estimate emissions factors in g/mile. A round-trip distance of 30 miles was assumed for construction employee trips, and 40 miles was assumed for material delivery trips.

3.2.4 Fugitive Dust

Fugitive dust emissions from site preparation and land clearing, equipment movement on unpaved and paved areas, along with evaporative emissions from asphalt paving activities were estimated using US EPA emission factors and methodologies (ACRP 2010). These are all included in the total construction emissions.

3.2.5 Summary of Construction Emissions

Construction-related emissions of criteria pollutants during the 2028 construction period under the Proposed Action using the methodology discussed above are summarized in **Table 3-2**. Lead emissions are included and are expected to be zero, as fuel for the construction and vehicles is expected to be ultra-low diesel fuel and gasoline, neither of which contain lead. The construction emission spreadsheets are included in **Attachment A**.

Table 3-2. Construction Emission Inventory – Proposed Action

Year	Activity	Relevant Criteria Pollutant Emissions (tons per year)						
		CO	VOC [Note 1]	NOx [Note 1]	SO_2	PM_{10}	$PM_{2.5}$	Lead
2028	Off-Road	0.943	0.285	3.477	0.028	0.223	0.216	0
	On-Road	28.701	0.892	1.264	0.024	0.303	0.091	0
	Fugitives	4.955	2.595	0.309	0.057	3.623	--	0
	Total	**34.60**	**3.77**	**5.05**	**0.109**	**4.15**	**0.31**	**0**

Notes:
1. Following standard industry practice, O_3 was evaluated by evaluating emissions of VOC and NOx, which are precursors in the formation of O_3

Source: Based on MOVES5 for On-road and Nonroad using construction information provided by Mead & Hunt.

3.2.6 Operational Emissions

As shown above in **Section 3.2**, aircraft and ground access vehicle (GAV) operational changes associated with the Proposed Action are expected to be below the FAA screening thresholds (1,229 expected new operations compared to the FAA threshold of 14,000-operation screening threshold, as the airport is located outside the OTR). In addition, estimated aircraft delays and associated additional VMT would remain below the applicable screening thresholds. Accordingly, operational emissions were screened out based on the FAA criterion described above, and no significant operational air quality impacts are expected from the Proposed Action.

3.2.7 Significance Thresholds

As provided in FAA Order 1050.1G, an action would cause a significant air quality impact if pollutant concentrations exceed one or more of the NAAQS established by the US EPA under the CAA for any of the time periods analyzed or would increase the frequency or severity of any such existing violations (FAA 2025).

The FAA *Aviation Emissions and Air Quality Handbook* includes a flow chart identifying how to conduct the air quality analysis (FAA 2024b). The flow chart, presented above in **Figure 3-1,** demonstrates that if the action qualifies for an exemption from CAA General Conformity demonstration obligations, one can conclude that the project will not cause a significant impact under NEPA. The accompanying text of the Handbook states, "the analysis of emissions for attainment pollutants (i.e., air quality analysis under NEPA) can be satisfied if a major federal action qualifies as exempt under 40 CFR 93.153" (FAA 2024b). The regulations at 40 CFR 93.153(c)(1) indicate that an exemption applies to projects that, upon evaluation of total net emissions on an annual basis for the criteria pollutants, stay below *de minimis* thresholds for each pollutant that are published in 40 CFR 93.153(b).[4]

Because there are no US EPA *de minimis* thresholds for areas designated as in "attainment" of the NAAQS, the status applicable in the project area for all criteria pollutants, this document considered instead the maintenance *de minimis* thresholds of 100 tons per year for CO, NOx, VOC, SO_2, PM_{10} and $PM_{2.5}$ and the 25 tons per year for Pb to determine whether the Proposed Action is significant. If so, the emissions estimates support a "no significant impact" conclusion under NEPA. The current US EPA *de minimis* thresholds for maintenance areas have been reproduced in **Table 3-3**.

Table 3-3. General Conformity US EPA *De Minimis* Pollutant Emissions Thresholds

Pollutants	Attainment Status (Severity) Note 2	Pollutants	Threshold (tons per year)
CO	Attainment	CO	**100**
NO_2	Attainment	NO_2	**100**
O_3 Note 1	Attainment	NO_X	**100**
		VOC	**100**
PM_{10} / $PM_{2.5}$	Attainment	PM_{10}/$PM_{2.5}$	**100**
SO_2	Attainment	SO_2	**100**
Pb	Attainment	Pb	**25**

Source: US EPA, 2024, (https://www.epa.gov/general-conformity/de-minimis-tables)
Notes:
1. Following standard industry practice, O_3 was evaluated by evaluating emissions of VOC and NO_x, which are precursors in the formation of O_3.
2. No *de minimis* threshold exists for pollutants designated as "attainment"; therefore, the *de minimis* threshold for maintenance was assumed for determining significant impacts under NEPA.

3.2.8 Construction Emission Impacts Compared to Significance Levels

Construction-related emissions of criteria pollutants during the 2028 construction period under the Proposed Action are summarized in **Table 3-4** and compared with the maintenance area *de minimis* thresholds. The table

[4] The *de minimis* thresholds represent net emission quantities of a NAAQS-regulated pollutant or its applicable precursors that, if exceeded, may cause or contribute to a new or continued violation of the NAAQS in a nonattainment or maintenance area. Put simply, under the CAA, the US EPA recognizes that even maintenance and nonattainment areas can tolerate some pollutant emissions without risking violating the NAAQS. For the FAA, the lack of a violation of the NAAQS means there will not be significant impacts for NEPA purposes.

shows that emission totals for 2028 would be below the established maintenance area designation *de minimis* thresholds for all pollutants; therefore, emissions from construction activities would not result in a significant air quality impact. Additionally, in accordance with the FAA Air Quality Handbook, the Proposed Action can be determined to "not cause a significant air quality impact, since it is unlikely the pollutant concentration analyzed would exceed a NAAQS" (FAA 2024b). No significant adverse air quality impacts would be expected to result from construction of the Proposed Action.

Table 3-4. Total Construction Emissions Compared to *De Minimis* Thresholds

Year	Relevant Criteria Pollutant Emissions (tons per year)						
	CO Note 1	VOC Note 1	NOx Note 1	SO_2 Note 1	PM_{10} Note 1	$PM_{2.5}$ Note 1	Pb Note 1, 2
2028 Construction Emissions							
Off-road	0.943	0.285	3.477	0.028	0.223	0.216	0
On-road	28.701	0.892	1.264	0.024	0.303	0.091	0
Fugitive	4.955	2.595	0.309	0.057	3.623	--	0
Total Emissions of Construction	**34.60**	**3.77**	**5.05**	**0.109**	**4.15**	**0.31**	**0**
US EPA *de minimis* Threshold	*100*	*100*	*100*	*100*	*100*	*100*	*25*
Emissions below de minimis thresholds?	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***

Source: HMMH, 2026

Notes:
1. Since pollutants are designated attainment by US EPA, no *de minimis* thresholds exist. The maintenance area designation *de minimis* thresholds were used to determine significance under NEPA.
2. Pb emissions for construction emissions were not estimated since the fuel use for these sources is gasoline and diesel which do not contain Pb.

Totals may not exactly match due to rounding.

3.2.9 No Action Alternative

The No Action Alternative assumes that the Proposed Action is not implemented, and air quality would remain unchanged for the construction years. Beyond the construction years, the No Action Alternative would not increase the number of aircraft operations or otherwise change air quality beyond the existing projected future activity.

3.2.10 Mitigation

As indicated in **Section 3.2.8**, air quality impacts associated with construction and operations of the Proposed Action would not be significant; therefore, no mitigation measures are required for construction and operational emissions. However, the airport is committed to best management practices to mitigate construction impacts, which could include but not limited to dust suppression, maintaining construction vehicles, limiting engine idling, etc.

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Attachment A Air Emissions Spreadsheet Calculations

Airport Construction Emissions Inventory Tool (ACEIT)
Version 1.0
Run Date & Time: 7/22/2026 8:28:08 AM

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STUDY

Study Name

LVN Runway Extension

Study Description

Construction 2028

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EMISSIONS INVENTORY - SUMMARY
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EMISSIONS INVENTORY - DETAILS:

Non-Road Sources
Units for Non-Greenhouse Gases Emission: Short Ton
Units for Greenhouse Gases (CO2, CH4, and N2O) Emission: Metric Ton

											MOVES Nonroad Emission Factors (grams-horsepower-hour)								MOVES Nonroad Emissions (Tons Per Year)							
Scenario ID	Year	Project	Construction Activity	Equipment	MOVES Equipment	MOVES Lookup	Fuel	HP Average	Load Factor	Hours of Activity	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4
1	2028	Runway Extension	Asphalt Placement	Asphalt Paver	Pavers	Pavers175	Diesel	175	0.59	19.647	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.000171693	0.000540663	3.18398E-06	4.10012E-05	3.97711E-05	2.71887E-05	1.200336611	2.11558E-06
1	2028	Runway Extension	Asphalt Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	70.76015757	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000618751	0.003237825	3.90651E-05	0.000188614	0.000182955	0.000273279	14.82222424	1.10923E-05
1	2028	Runway Extension	Asphalt Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	39.294	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000444167	0.001178998	4.71506E-06	0.000106661	0.000103461	8.06394E-05	1.749528463	6.3514E-06
1	2028	Runway Extension	Asphalt Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	19.647	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.0001718	0.000899002	1.08467E-05	5.23698E-05	5.07987E-05	7.58777E-05	4.1154832	3.07986E-06
1	2028	Runway Extension	Asphalt Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	19.647	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000202866	0.001201848	2.02579E-06	3.70543E-05	3.59427E-05	1.74869E-05	0.761707005	1.43049E-06
1	2028	Runway Extension	Asphalt Placement	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	19.647	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.0010515	0.001364941	7.26285E-07	0.00015088	0.000146353	0.000202329	0.236822478	9.26747E-06
1	2028	Runway Extension	Asphalt Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	25.14816	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.000608154	0.001538347	8.94819E-07	6.95191E-05	6.74336E-05	0.000143755	0.243349945	1.26672E-05
1	2028	Runway Extension	Clearing and Grubbing	Chain Saw	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.7	43.2	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.000901341	0.001533913	8.00516E-07	8.73777E-05	8.47563E-05	0.000307155	0.2177156	2.70654E-05
1	2028	Runway Extension	Clearing and Grubbing	Chipper/Stump Grinder	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	43.2	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.000603851	0.00217626	3.28992E-06	9.67974E-05	9.38934E-05	5.44136E-05	1.220578133	4.02973E-06
1	2028	Runway Extension	Clearing and Grubbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	57.6	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000503674	0.002635646	3.17997E-05	0.000153535	0.000148929	0.000222454	12.06554855	9.02936E-06
1	2028	Runway Extension	Drainage - 24 inch SICPP	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	45.632	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.00032607	0.001060054	7.36797E-06	7.5729E-05	7.34573E-05	5.27637E-05	2.787927267	3.93008E-06
1	2028	Runway Extension	Drainage - 24 inch SICPP	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	45.632	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000399021	0.002088017	2.51924E-05	0.000121634	0.000117985	0.000176233	9.558595682	7.15326E-06
1	2028	Runway Extension	Drainage - 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	45.632	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000280585	0.000920501	7.35112E-06	6.33722E-05	6.1471E-05	4.63281E-05	2.787936861	3.30444E-06
1	2028	Runway Extension	Drainage - 24 inch SICPP	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	45.632	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.002614801	0.005298122	9.11929E-06	0.000551898	0.000535341	0.00083178	3.251637769	4.82045E-05
1	2028	Runway Extension	Drainage - 24 inch SICPP	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	45.632	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.00051581	0.001369167	5.47559E-06	0.000123865	0.000120149	9.36463E-05	2.031721963	7.37587E-06
1	2028	Runway Extension	Drainage - 24 inch SICPP	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	45.632	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000399021	0.002088017	2.51924E-05	0.000121634	0.000117985	0.000176233	9.558595682	7.15326E-06
1	2028	Runway Extension	Drainage - 24 inch SICPP	Roller	Rollers	Rollers100	Diesel	100	0.59	45.632	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000471175	0.002791404	4.7051E-06	8.60621E-05	8.34803E-05	4.06149E-05	1.769135951	3.32244E-06
1	2028	Runway Extension	Drainage - 6 inch Perforated Underdrain	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	25.35111111	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000221679	0.00116001	1.39958E-05	6.75744E-05	6.55471E-05	9.79072E-05	5.310330934	3.97403E-06
1	2028	Runway Extension	Drainage - 6 inch Perforated Underdrain	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	25.35111111	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.001452667	0.002943401	5.06627E-06	0.00030661	0.000297412	0.0004621	1.806465427	2.67803E-05
1	2028	Runway Extension	Drainage - 6 inch Perforated Underdrain	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	25.35111111	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000286561	0.000760648	3.04199E-06	6.88138E-05	6.67495E-05	5.20257E-05	1.128734424	4.0977E-06
1	2028	Runway Extension	Drainage - 6 inch Perforated Underdrain	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	25.35111111	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000221679	0.00116001	1.39958E-05	6.75744E-05	6.55471E-05	9.79072E-05	5.310330934	3.97403E-06
1	2028	Runway Extension	Drainage - 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	25.35111111	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000702093	0.000988429	1.14442E-06	0.000106822	0.000103617	0.000125405	0.408084726	5.12642E-06
1	2028	Runway Extension	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1200	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.010493202	0.054909286	0.000662493	0.003198646	0.003102685	0.004634459	251.3655947	0.000188112
1	2028	Runway Extension	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	87.32	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000623958	0.002028487	1.40991E-05	0.000144913	0.000140566	0.000100967	5.334892378	7.52047E-06
1	2028	Runway Extension	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	87.32	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000763555	0.003995566	4.82074E-05	0.000232755	0.000225772	0.000337234	18.29103644	1.36883E-05
1	2028	Runway Extension	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	87.32	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000763555	0.003995566	4.82074E-05	0.000232755	0.000225772	0.000337234	18.29103644	1.36883E-05
1	2028	Runway Extension	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	40.30153846	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000416135	0.002465328	4.15547E-06	7.60089E-05	7.37286E-05	3.58705E-05	1.562475907	2.93433E-06
1	2028	Runway Extension	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	65.49	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000467969	0.001521366	1.05743E-05	0.000108685	0.000105424	7.57253E-05	4.001169283	5.64036E-06
1	2028	Runway Extension	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	174.64	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001527111	0.007991131	9.64149E-05	0.00046551	0.000451544	0.000674468	36.58207289	2.73765E-05
1	2028	Runway Extension	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	52.392	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000322151	0.001056866	8.44012E-06	7.27603E-05	7.05774E-05	5.31913E-05	3.200946441	3.79397E-06
1	2028	Runway Extension	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	52.392	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000458133	0.002397339	2.89245E-05	0.000139653	0.000135463	0.00020234	10.97462187	8.21295E-06
1	2028	Runway Extension	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	52.392	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000540976	0.003204927	5.40212E-06	9.88115E-05	9.58472E-05	4.66316E-05	2.031218679	3.81463E-06
1	2028	Runway Extension	Excavation (Cut to Fill)	Scraper	Scrapers	Scrapers600	Diesel	600	0.59	65.49	0.096610	0.278752	0.001442	0.018878	0.018312	0.019286	536.774806	0.001284	0.002468914	0.007123653	3.68578E-05	0.00048244	0.000467966	0.000492859	13.71756127	3.2802E-05
1	2028	Runway Extension	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	24.65505882	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000176176	0.000572749	3.98093E-06	4.09165E-05	3.96891E-05	2.85083E-05	1.506322554	2.12343E-06
1	2028	Runway Extension	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	15.73333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000137578	0.000719922	8.68603E-06	4.19378E-05	4.06796E-05	6.07629E-05	3.295682241	2.46635E-06
1	2028	Runway Extension	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	62.93333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00055031	0.002879687	3.47441E-05	0.000167751	0.000162719	0.000243052	13.18272897	9.86541E-06
1	2028	Runway Extension	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	62.93333333	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000711379	0.001888285	7.55165E-06	0.000170828	0.000165704	0.000129152	2.802047589	1.01724E-05
1	2028	Runway Extension	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	62.93333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00055031	0.002879687	3.47441E-05	0.000167751	0.000162719	0.000243052	13.18272897	9.86541E-06
1	2028	Runway Extension	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	62.93333333	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.003368169	0.004372182	2.32644E-06	0.000483299	0.0004688	0.0006481	0.75859052	2.96856E-05
1	2028	Runway Extension	Fencing	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	62.93333333	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.001742925	0.002453744	2.84098E-06	0.000265183	0.000257227	0.000311314	1.013057454	1.27262E-05
1	2028	Runway Extension	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	17.4115	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000124416	0.000404478	2.81135E-06	2.88954E-05	2.80286E-05	2.01327E-05	1.063770942	1.49957E-06
1	2028	Runway Extension	Grading	Grader	Graders	Graders300	Diesel	300	0.59	17.4115	0.026313	0.129058	0.001416	0.007616	0.007388	0.010557	536.800846	0.000484	8.93886E-05	0.000438432	4.81167E-06	2.58741E-05	2.50979E-05	3.5863E-05	1.823598299	1.64331E-06
1	2028	Runway Extension	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	17.4115	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000179783	0.001065097	1.79529E-06	3.28382E-05	3.1853E-05	1.54971E-05	0.675037487	1.26772E-06
1	2028	Runway Extension	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	15.686	0.302645	0.818779	0.001506	0.043786	0.042473	0.046655	536.697850	0.002709	0.001852488	0.005011741	9.21825E-06	0.000268016	0.000259976	0.000285574	3.285124712	1.65824E-05
1	2028	Runway Extension	Hydroseeding	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	15.686	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000137164	0.000717756	8.65989E-06	4.18116E-05	4.05573E-05	6.05801E-05	3.285767266	2.45893E-06
1	2028	Runway Extension	Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	20.21333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000176752	0.000924916	1.11593E-05	5.38794E-05	5.2263E-05	7.80649E-05	4.234113795	3.16864E-06
1	2028	Runway Extension	Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	20.21333333	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.001158263	0.002346877	4.03952E-06	0.000244471	0.000237137	0.000368449	1.440358478	2.13529E-05
1	2028	Runway Extension	Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	20.21333333	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000228485	0.000606492	2.42549E-06	5.48677E-05	5.32217E-05	4.14819E-05	0.899979691	3.26724E-06
1	2028	Runway Extension	Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	20.21333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000176752	0.000924916	1.11593E-05	5.38794E-05	5.2263E-05	7.80649E-05	4.234113795	3.16864E-06
1	2028	Runway Extension	Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	20.21333333	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.00108181	0.001404286	7.4722E-07	0.000155229	0.000150572	0.000208161	0.243648989	9.53461E-06
1	2028	Runway Extension	Lighting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	20.21333333	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000559804	0.000788109	9.12486E-07	8.51731E-05	8.26178E-05	9.99898E-05	0.325380318	4.08747E-06
1	2028	Runway Extension	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	323.6571429	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002830166	0.014809819	0.000178684	0.000862721	0.000836838	0.00124998	67.79689185	5.07364E-05
1	2028	Runway Extension	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	323.6571429	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.003658519	0.009711182	3.88371E-05	0.000878544	0.00085219	0.000664211	14.41053046	5.23153E-05
1	2028	Runway Extension	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	323.6571429	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002830166	0.014809819	0.000178684	0.000862721	0.000836838	0.00124998	67.79689185	5.07364E-05
1	2028	Runway Extension	Soil Erosion/Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	14.4	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000162773	0.000432065	1.72792E-06	3.90878E-05	3.79152E-05	2.95518E-05	0.641146482	2.32759E-06
1	2028	Runway Extension	Soil Erosion/Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	28.8	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000251837	0.001317823	1.58998E-05	7.67675E-05	7.44644E-05	0.000111227	6.032774274	4.51468E-06
1	2028	Runway Extension	Soil Erosion/Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	14.4	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.00018456	0.000314087	1.63915E-07	1.78916E-05	1.73549E-05	6.28937E-05	0.044579861	5.54196E-06
1	2028	Runway Extension	Soil Erosion/Control	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	14.4	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000398805	0.00056145	6.50056E-07	6.06774E-05	5.8857E-05	7.12329E-05	0.231801282	2.91192E-06
1	2028	Runway Extension	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	33.08968421	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000236447	0.00076869	5.34282E-06	5.49143E-05	5.3267E-05	3.82612E-05	2.021643427	2.84986E-06
1	2028	Runway Extension	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	232.8533333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002036148	0.010654842	0.000128553	0.00062068	0.000602059	0.000899291	48.77609718	3.6502E-05
1	2028	Runway Extension	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	33.08968421	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000289347	0.001514109	1.82681E-05	8.82018E-05	8.55557E-05	0.000127794	6.931340126	5.18713E-06
1	2028	Runway Extension	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	32.24123077	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000332908	0.001972263	3.32438E-06	6.08071E-05	5.89829E-05	2.86964E-05	1.249980726	2.34747E-06
1	2028	Runway Extension	Topsoil Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	38.692	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000276479	0.000898835	6.2474E-06	6.42117E-05	6.22855E-05	4.47391E-05	2.363921849	3.33237E-06
1	2028	Runway Extension	Topsoil Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	38.692	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000338336	0.001770458	2.1361E-05	0.000103135	0.000100041	0.00014943	8.104864659	6.06535E-06
1	2028	Runway Extension	Topsoil Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	38.692	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000338336	0.001770458	2.1361E-05	0.000103135	0.000100041	0.00014943	8.104864659	6.06535E-06
2	2028	Demolition - Concrete	Concrete Demolition	Excavator with Bucket	Excavators	Excavators175	Diesel	175	0.59	458.5333333	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.002819455	0.009249658	7.38677E-05	0.000636796	0.000617691	0.000465528	28.01459462	3.32047E-05
2	2028	Demolition - Concrete	Concrete Demolition	Excavator with Hoe Ram	Excavators	Excavators175	Diesel	175	0.59	458.5333333	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.002819455	0.009249658	7.38677E-05	0.000636796	0.000617691	0.000465528	28.01459462	3.32047E-05
2	2028	Demolition - Concrete	Concrete Demolition	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	917.0666667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.008019138	0.041962897	0.000506292	0.002444477	0.002371141	0.003541757	192.0991734	0.000143759
3	2028	Access Road	Asphalt Placement	Asphalt Paver	Pavers	Pavers175	Diesel	175	0.59	22.94575	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.000200521	0.000631441	3.71858E-06	4.78853E-05	4.64488E-05	3.17537E-05	1.40187427	2.47079E-06
3	2028	Access Road	Asphalt Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	82.64085537	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000722639	0.003781459	4.56242E-05	0.000220282	0.000213674	0.000319163	17.3108898	1.29548E-05
3	2028	Access Road	Asphalt Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	45.8915	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000518743	0.001376953	5.50673E-06	0.000124569	0.000120832	9.41788E-05	2.043275957	7.41781E-06
3	2028	Access Road	Asphalt Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	22.94575	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000200645	0.001049946	1.26678E-05	6.11628E-05	5.93279E-05	8.86176E-05	4.806476746	3.59697E-06
3	2028	Access Road	Asphalt Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	22.94575	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000236927	0.001403639	2.36593E-06	4.32758E-05	4.19775E-05	2.04229E-05	0.889598336	1.67067E-06
3	2028	Access Road	Asphalt Placement	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	22.94575	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.001228048	0.001594115	8.48228E-07	0.000176213	0.000170926	0.0002363	0.276585197	1.08235E-05
3	2028	Access Road	Asphalt Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	29.37056	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.000710263	0.001796636	1.04506E-06	8.11914E-05	7.87557E-05	0.000167892	0.284208632	1.4794E-05
3	2028	Access Road	Clearing and Grubbing	Chain Saw	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.7	63.6	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.001326974	0.002258261	1.17854E-06	0.000128639	0.00012478	0.0004522	0.320525744	3.98463E-05

											MOVES Nonroad Emission Factors (grams-horsepower-hour)								MOVES Nonroad Emissions (Tons Per Year)							
Scenario ID	Year	Project	Construction Activity	Equipment	MOVES Equipment	MOVES Lookup	Fuel	HP Average	Load Factor	Hours of Activity	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4
3	2028	Access Road	Clearing and Grubbing	Chipper/Stump Grinder	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	63.6	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.000889003	0.003203938	4.84349E-06	0.000142507	0.000138232	8.01089E-05	1.796962252	5.93266E-06
3	2028	Access Road	Clearing and Grubbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	84.8	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00074152	0.003880256	4.68162E-05	0.000226038	0.000219256	0.000327502	17.76316869	1.32932E-05
3	2028	Access Road	Concrete Placement	Air Compressor	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	61.1888	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.000855299	0.00308247	4.65986E-06	0.000137105	0.000132991	7.70718E-05	1.72883591	5.70774E-06
3	2028	Access Road	Concrete Placement	Concrete Saws	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.59	61.1888	0.278853	2.529068	0.001569	0.020431	0.019818	0.092472	595.882164	0.012377	0.00044388	0.004025789	2.49778E-06	3.25219E-05	3.15463E-05	0.000147198	0.948529535	1.97012E-05
3	2028	Access Road	Concrete Placement	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	254.9533333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002229397	0.011666088	0.000140754	0.000679588	0.0006592	0.000984642	53.40541354	3.99664E-05
3	2028	Access Road	Concrete Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	122.3776	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001383318	0.003671883	1.46846E-05	0.000332185	0.00032222	0.000251144	5.448747759	1.97809E-05
3	2028	Access Road	Concrete Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	183.5664	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001605166	0.008399583	0.000101343	0.000489303	0.000474624	0.000708943	38.45189776	2.87758E-05
3	2028	Access Road	Concrete Placement	Rubber Tired Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	61.1888	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.003506235	0.00710435	1.22282E-05	0.00074005	0.000717849	0.00111535	4.360181739	6.46383E-05
3	2028	Access Road	Concrete Placement	Slip Form Paver	Pavers	Pavers175	Diesel	175	0.59	61.1888	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.000534723	0.001683845	9.91623E-06	0.000127694	0.000123864	8.46768E-05	3.738339533	6.58879E-06
3	2028	Access Road	Concrete Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	61.1888	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.001479718	0.003743001	2.17721E-06	0.000169149	0.000164075	0.000349776	0.592102607	3.08209E-05
3	2028	Access Road	Curbing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	264.6	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002313751	0.012107498	0.00014608	0.000705302	0.000684142	0.001021898	55.42611364	4.14786E-05
3	2028	Access Road	Curbing	Curb/Gutter Paver	Pavers	Pavers175	Diesel	175	0.59	264.6	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.002312313	0.007281487	4.2881E-05	0.000552192	0.000535626	0.00036617	16.16577937	2.8492E-05
3	2028	Access Road	Curbing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	264.6	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.002990956	0.0079392	3.17505E-05	0.000718238	0.000696692	0.000543014	11.78106661	4.27694E-05
3	2028	Access Road	Curbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	264.6	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002313751	0.012107498	0.00014608	0.000705302	0.000684142	0.001021898	55.42611364	4.14786E-05
3	2028	Access Road	Drainage - 24 inch SICPP	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	212	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.001514878	0.004924866	3.42306E-05	0.000351827	0.000341273	0.000245133	12.95232689	1.82586E-05
3	2028	Access Road	Drainage - 24 inch SICPP	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	212	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001853799	0.009700641	0.000117041	0.000565094	0.000548141	0.000818754	44.40792174	3.3233E-05
3	2028	Access Road	Drainage - 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	212	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.001303557	0.004276521	3.41523E-05	0.000294419	0.000285586	0.000215234	12.95237146	1.5352E-05
3	2028	Access Road	Drainage - 24 inch SICPP	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	212	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.012148005	0.024614345	4.2367E-05	0.002564041	0.002487122	0.003864337	15.10666214	0.000223952
3	2028	Access Road	Drainage - 24 inch SICPP	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	212	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.002396382	0.006360961	2.54388E-05	0.000575459	0.000558196	0.000435068	9.439100987	3.42673E-05
3	2028	Access Road	Drainage - 24 inch SICPP	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	212	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001853799	0.009700641	0.000117041	0.000565094	0.000548141	0.000818754	44.40792174	3.3233E-05
3	2028	Access Road	Drainage - 24 inch SICPP	Roller	Rollers	Rollers100	Diesel	100	0.59	212	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.002189015	0.012968478	2.18592E-05	0.000399833	0.000387838	0.000188691	8.219162466	1.54356E-05
3	2028	Access Road	Drainage - 6 inch Perforated Underdrain	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	117.7777778	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001029888	0.005389245	6.50225E-05	0.000313941	0.000304523	0.000454864	24.67106764	1.84628E-05
3	2028	Access Road	Drainage - 6 inch Perforated Underdrain	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	117.7777778	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.006748892	0.013674636	2.35372E-05	0.001424467	0.001381734	0.002146854	8.392590082	0.000124418
3	2028	Access Road	Drainage - 6 inch Perforated Underdrain	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	117.7777778	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001331323	0.003533867	1.41327E-05	0.000319699	0.000310109	0.000241704	5.243944994	1.90374E-05
3	2028	Access Road	Drainage - 6 inch Perforated Underdrain	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	117.7777778	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001029888	0.005389245	6.50225E-05	0.000313941	0.000304523	0.000454864	24.67106764	1.84628E-05
3	2028	Access Road	Drainage - 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	117.7777778	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.00326183	0.004592105	5.31681E-06	0.000496281	0.000481392	0.000582614	1.895905547	2.38166E-05
3	2028	Access Road	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1200	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.010493202	0.054909286	0.000662493	0.003198646	0.003102685	0.004634459	251.3655947	0.000188112
3	2028	Access Road	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	101.9813333	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000728723	0.002369078	1.64664E-05	0.000169244	0.000164167	0.00011792	6.230639461	8.78319E-06
3	2028	Access Road	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	101.9813333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000891759	0.004666435	5.63016E-05	0.000271835	0.00026368	0.000393857	21.36216541	1.59866E-05
3	2028	Access Road	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	101.9813333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000891759	0.004666435	5.63016E-05	0.000271835	0.00026368	0.000393857	21.36216541	1.59866E-05
3	2028	Access Road	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	47.06830769	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000486006	0.002879266	4.85319E-06	8.8771E-05	8.61079E-05	4.18932E-05	1.824821075	3.42702E-06
3	2028	Access Road	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	76.486	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000546542	0.001776808	1.23498E-05	0.000126933	0.000123125	8.84398E-05	4.672979597	6.58739E-06
3	2028	Access Road	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	203.9626667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001783518	0.00933287	0.000112603	0.00054367	0.00052736	0.000787714	42.72433085	3.19731E-05
3	2028	Access Road	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	61.1888	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000376241	0.001234317	9.85725E-06	8.4977E-05	8.24276E-05	6.21223E-05	3.738396541	4.43099E-06
3	2028	Access Road	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	61.1888	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000535055	0.002799861	3.3781E-05	0.000163101	0.000158208	0.000236314	12.81729925	9.59194E-06
3	2028	Access Road	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	61.1888	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000631808	0.003743045	6.30915E-06	0.000115402	0.00011194	5.44612E-05	2.372267398	4.45512E-06
3	2028	Access Road	Excavation (Cut to Fill)	Scraper	Scrapers	Scrapers600	Diesel	600	0.59	76.486	0.096610	0.278752	0.001442	0.018878	0.018312	0.019286	536.774806	0.001284	0.002883453	0.008319739	4.30464E-05	0.000563443	0.00054654	0.000575612	16.02078778	3.83096E-05
3	2028	Access Road	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	28.79466667	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000205757	0.000668915	4.64933E-06	4.77865E-05	4.6353E-05	3.32949E-05	1.759235544	2.47995E-06
3	2028	Access Road	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	73.5	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000642709	0.003363194	4.05777E-05	0.000195917	0.000190039	0.000283861	15.39614268	1.15218E-05
3	2028	Access Road	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	294	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002570834	0.013452775	0.000162311	0.000783668	0.000760158	0.001135443	61.58457071	4.60873E-05
3	2028	Access Road	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	294	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.003323284	0.008821333	3.52784E-05	0.000798042	0.000774102	0.000603349	13.09007401	4.75216E-05
3	2028	Access Road	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	294	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002570834	0.013452775	0.000162311	0.000783668	0.000760158	0.001135443	61.58457071	4.60873E-05
3	2028	Access Road	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	294	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.015734774	0.020425131	1.08682E-05	0.002257783	0.002190049	0.003027669	3.543839187	0.00013868
3	2028	Access Road	Fencing	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	294	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.008142266	0.011462934	1.3272E-05	0.00123883	0.001201664	0.001454337	4.732609505	5.94517E-05
3	2028	Access Road	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	25.7381	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000183915	0.000597909	4.1558E-06	4.27139E-05	4.14326E-05	2.97606E-05	1.572491909	2.21671E-06
3	2028	Access Road	Grading	Grader	Graders	Graders300	Diesel	300	0.59	25.7381	0.026313	0.129058	0.001416	0.007616	0.007388	0.010557	536.800846	0.000484	0.000132136	0.000648101	7.11273E-06	3.82477E-05	3.71003E-05	5.30136E-05	2.695687067	2.42919E-06
3	2028	Access Road	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	25.7381	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.00026576	0.001574453	2.65384E-06	4.85422E-05	4.70859E-05	2.29082E-05	0.997856724	1.87398E-06
3	2028	Access Road	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	23.1875	0.302645	0.818779	0.001506	0.043786	0.042473	0.046655	536.697850	0.002709	0.002738402	0.007408501	1.36267E-05	0.00039619	0.000384304	0.000422144	4.856166598	2.45126E-05
3	2028	Access Road	Hydroseeding	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	23.1875	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000202759	0.001061008	1.28013E-05	6.18072E-05	5.99529E-05	8.95513E-05	4.85711644	3.63486E-06
3	2028	Access Road	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	378	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.003305359	0.017296425	0.000208685	0.001007574	0.000977346	0.001459855	79.18016234	5.92552E-05
3	2028	Access Road	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	378	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.004272794	0.011341714	4.53579E-05	0.001026054	0.000995274	0.000775734	16.83009516	6.10992E-05
3	2028	Access Road	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	378	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.003305359	0.017296425	0.000208685	0.001007574	0.000977346	0.001459855	79.18016234	5.92552E-05
3	2028	Access Road	Sidewalks	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	529.2	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.004627502	0.024214995	0.00029216	0.001410603	0.001368284	0.002043797	110.8522273	8.29572E-05
3	2028	Access Road	Sidewalks	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	529.2	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.004627502	0.024214995	0.00029216	0.001410603	0.001368284	0.002043797	110.8522273	8.29572E-05
3	2028	Access Road	Sidewalks	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	529.2	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.004627502	0.024214995	0.00029216	0.001410603	0.001368284	0.002043797	110.8522273	8.29572E-05
3	2028	Access Road	Sidewalks	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	529.2	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.014656078	0.020633281	2.38895E-05	0.002229894	0.002162996	0.002617807	8.518697109	0.000107013
3	2028	Access Road	Sidewalks	Vibratory Compactor	Plate Compactors	Plate Compactors6	Diesel	6	0.43	529.2	2.487962	4.187541	0.002162	0.245994	0.238615	0.835934	587.973767	0.073569	0.003744465	0.006302389	3.25375E-06	0.000370229	0.000359123	0.001258109	0.884920029	0.000110723
3	2028	Access Road	Soil Erosion/Sediment Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	21.2	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000239638	0.000636096	2.54388E-06	5.75459E-05	5.58196E-05	4.35068E-05	0.943910099	3.42673E-06
3	2028	Access Road	Soil Erosion/Sediment Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	42.4	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00037076	0.001940128	2.34081E-05	0.000113019	0.000109628	0.000163751	8.881584347	6.64661E-06
3	2028	Access Road	Soil Erosion/Sediment Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	21.2	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.000271714	0.000462406	2.4132E-07	2.63404E-05	2.55502E-05	9.25934E-05	0.065631462	8.159E-06
3	2028	Access Road	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	21.2	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000587129	0.000826579	9.57026E-07	8.93306E-05	8.66506E-05	0.000104871	0.341262998	4.28699E-06
3	2028	Access Road	Street Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	176.5333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001543667	0.008077766	9.74602E-05	0.000470556	0.000456439	0.00068178	36.97867193	2.76733E-05
3	2028	Access Road	Street Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	176.5333333	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.010115697	0.020496473	3.52792E-05	0.002135088	0.002071037	0.003217851	12.57938407	0.000186485
3	2028	Access Road	Street Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	176.5333333	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001995478	0.005296801	2.1183E-05	0.000479187	0.000464812	0.000362283	7.859980946	2.85345E-05
3	2028	Access Road	Street Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	176.5333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001543667	0.008077766	9.74602E-05	0.000470556	0.000456439	0.00068178	36.97867193	2.76733E-05
3	2028	Access Road	Street Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	176.5333333	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.009448	0.012264342	6.52585E-06	0.001355694	0.001315023	0.001817974	2.127910695	8.32706E-05
3	2028	Access Road	Street Lighting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	176.5333333	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.004889052	0.006882959	7.9692E-06	0.00074386	0.000721544	0.000873262	2.841712011	3.5698E-05
3	2028	Access Road	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	38.64547368	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000276147	0.000897754	6.23989E-06	6.41345E-05	6.22106E-05	4.46853E-05	2.361079283	3.32836E-06
3	2028	Access Road	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	271.9511111	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002378032	0.012443868	0.000150138	0.000724896	0.000703149	0.001050289	56.96596065	4.2631E-05
3	2028	Access Road	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	38.64547368	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000337929	0.001768329	2.13353E-05	0.000103011	9.99206E-05	0.000149251	8.095118729	6.05805E-06
3	2028	Access Road	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	37.65476923	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000388806	0.00230342	3.88257E-06	7.10171E-05	6.88866E-05	3.35147E-05	1.459861632	2.74162E-06
3	2028	Access Road	Topsoil Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	57.196	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000408703	0.001328692	9.23515E-06	9.49202E-05	9.20728E-05	6.6135E-05	3.494440042	4.92603E-06
3	2028	Access Road	Topsoil Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	57.196	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000500141	0.00261716	3.15766E-05	0.000152458	0.000147884	0.000220894	11.98092213	8.96603E-06
3	2028	Access Road	Topsoil Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	57.196	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000500141	0.00261716	3.15766E-05	0.000152458	0.000147884	0.000220894	11.98092213	8.96603E-06
3	2028	Access Road	Tree Planting	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0	0	0	0	0	0	0	0
3	2028	Access Road	Tree Planting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	0	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0	0	0	0	0	0	0	0
3	2028	Access Road	Tree Planting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	0	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0	0	0	0	0	0	0	0
3	2028	Access Road	Tree Planting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	0	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0	0	0	0	0	0	0	0
4	2028	Taxiways	Asphalt Placement	Asphalt Paver	Pavers	Pavers175	Diesel	175	0.59	51.240375	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.000447785	0.001410076	8.30399E-06	0.000106933	0.000103725	7.09096E-05	3.130538915	5.51754E-06
4	2028	Taxiways	Asphalt Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	184.5460889	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001613733	0.008444412	0.000101884	0.000491915	0.000477157	0.000712726	38.65711449	2.89294E-05
4	2028	Taxiways	Asphalt Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	102.48075	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.00115841	0.003074887	1.22971E-05	0.000278177	0.000269832	0.000210312	4.562859191	1.65648E-05
4	2028	Taxiways	Asphalt Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	51.240375	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000448063	0.002344644	2.82887E-05	0.000136583	0.000132486	0.000197893	10.73338945	8.03242E-06
4	2028	Taxiways	Asphalt Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	51.240375	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000529085	0.00313448	5.28337E-06	9.66396E-05	9.37404E-05	4.56066E-05	1.986570599	3.73078E-06
4	2028	Taxiways	Asphalt Placement	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	51.240375	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.002742366	0.003559835	1.89419E-06	0.000393502	0.000381697	0.000527683	0.617645064	2.417E-05
4	2028	Taxiways	Asphalt Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	65.58768	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.001586096	0.004012086	2.33373E-06	0.000181309	0.00017587	0.000374921	0.634669029	3.30367E-05
4	2028	Taxiways	Clearing and Grubbing	Chain Saw	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.7	112.8	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.002353501	0.004005217	2.09024E-06	0.000228153	0.000221308	0.000802016	0.568479622	7.06707E-05
4	2028	Taxiways	Clearing and Grubbing	Chipper/Stump Grinder	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	112.8	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.001576723	0.005682456	8.59034E-06	0.000252749	0.000245166	0.00014208	3.187065126	1.05221E-05
4	2028	Taxiways	Clearing and Grubbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	150.4	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001315148	0.006881964	8.30325E-05	0.000400897	0.00038887	0.000580852	31.50448787	2.35767E-05
4	2028	Taxiways	Concrete Placement	Air Compressor	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	136.6408	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.00190997	0.006883469	1.04059E-05	0.000306168	0.000296983	0.000172109	3.860666033	1.2746E-05
4	2028	Taxiways	Concrete Placement	Concrete Saws	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.59	136.6408	0.278853	2.529068	0.001569	0.020431	0.019818	0.092472	595.882164	0.012377	0.000991229	0.008989995	5.57781E-06	7.26248E-05	7.04461E-05	0.000328708	2.118162711	4.39947E-05
4	2028	Taxiways	Concrete Placement	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	569.3366667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.004978471	0.026051558	0.000314318	0.001517589	0.00147206	0.002198806	119.2597082	8.9249E-05
4	2028	Taxiways	Concrete Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	273.2816	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.00308909	0.008199687	3.27923E-05	0.000741804	0.000719551	0.00056083	12.1676067	4.41727E-05
4	2028	Taxiways	Concrete Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	409.9224	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.003584499	0.018757122	0.000226309	0.001092664	0.001059883	0.001583141	85.86698989	6.42593E-05
4	2028	Taxiways	Concrete Placement	Rubber Tired Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	136.6408	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.007829779	0.015864735	2.73069E-05	0.001652606	0.00160303	0.002490689	9.736728305	0.000144344
4	2028	Taxiways	Concrete Placement	Slip Form Paver	Pavers	Pavers175	Diesel	175	0.59	136.6408	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.00119409	0.003760197	2.21439E-05	0.000285155	0.0002766	0.000189092	8.348091554	1.47134E-05
4	2028	Taxiways	Concrete Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	136.6408	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.003304361	0.0083585	4.86194E-06	0.000377727	0.000366396	0.000781085	1.322225209	6.88263E-05
4	2028	Taxiways	Drainage - 24 inch SICPP	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	118.496	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000846731	0.002752722	1.91329E-05	0.000196651	0.000190752	0.000137015	7.239617581	1.02055E-05
4	2028	Taxiways	Drainage - 24 inch SICPP	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	118.496	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001036169	0.005422109	6.5419E-05	0.000315856	0.00030638	0.000457637	24.82151459	1.85754E-05
4	2028	Taxiways	Drainage - 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	118.496	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000728615	0.002390333	1.90892E-05	0.000164563	0.000159626	0.000120304	7.239642493	8.58089E-06
4	2028	Taxiways	Drainage - 24 inch SICPP	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	118.496	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.006790047	0.013758026	2.36807E-05	0.001433154	0.00139016	0.002159946	8.443769045	0.000125176
4	2028	Taxiways	Drainage - 24 inch SICPP	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	118.496	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001339442	0.003555417	1.42189E-05	0.000321649	0.000312	0.000243178	5.275923163	1.91535E-05
4	2028	Taxiways	Drainage - 24 inch SICPP	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	118.496	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001036169	0.005422109	6.5419E-05	0.000315856	0.00030638	0.000457637	24.82151459	1.85754E-05

											MOVES Nonroad Emission Factors (grams-horsepower-hour)								MOVES Nonroad Emissions (Tons Per Year)							
Scenario ID	Year	Project	Construction Activity	Equipment	MOVES Equipment	MOVES Lookup	Fuel	HP Average	Load Factor	Hours of Activity	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4
4	2028	Taxiways	Drainage - 24 inch SICPP	Roller	Rollers	Rollers100	Diesel	100	0.59	118.496	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.001223536	0.007248645	1.22181E-05	0.000223484	0.000216779	0.000105468	4.594046583	8.62762E-06
4	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	65.83111111	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000575649	0.003012283	3.63439E-05	0.000175475	0.000170211	0.000254243	13.78973033	1.03197E-05
4	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	65.83111111	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.003772248	0.007643348	1.3156E-05	0.000796196	0.000772311	0.00119997	4.690982802	6.95424E-05
4	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	65.83111111	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000744134	0.001975232	7.89937E-06	0.000178694	0.000173333	0.000135099	2.931068424	1.06408E-05
4	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	65.83111111	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000575649	0.003012283	3.63439E-05	0.000175475	0.000170211	0.000254243	13.78973033	1.03197E-05
4	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	65.83111111	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.001823178	0.002566727	2.9718E-06	0.000277393	0.000269071	0.000325648	1.059703885	1.33121E-05
4	2028	Taxiways	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1200	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.010493202	0.054909286	0.000662493	0.003198646	0.003102685	0.004634459	251.3655947	0.000188112
4	2028	Taxiways	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	227.7346667	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.001627312	0.005290391	3.67712E-05	0.000377939	0.000366602	0.000263327	13.91365022	1.96137E-05
4	2028	Taxiways	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	227.7346667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001991388	0.010420623	0.000125727	0.000607036	0.000588824	0.000879523	47.70388328	3.56996E-05
4	2028	Taxiways	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	227.7346667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001991388	0.010420623	0.000125727	0.000607036	0.000588824	0.000879523	47.70388328	3.56996E-05
4	2028	Taxiways	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	105.1083077	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.0010853	0.006429693	1.08377E-05	0.000198235	0.000192288	9.35519E-05	4.075010649	7.65287E-06
4	2028	Taxiways	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	170.801	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.001220484	0.003967793	2.75784E-05	0.000283454	0.000274951	0.000197495	10.43523767	1.47103E-05
4	2028	Taxiways	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	455.4693333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.003982776	0.020841247	0.000251455	0.001214071	0.001177648	0.001759045	95.40776654	7.13992E-05
4	2028	Taxiways	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	136.6408	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000840184	0.002756355	2.20122E-05	0.000189762	0.000184069	0.000138725	8.348218859	9.89485E-06
4	2028	Taxiways	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	136.6408	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001194833	0.006252374	7.54364E-05	0.000364221	0.000353294	0.000527714	28.62232996	2.14198E-05
4	2028	Taxiways	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	136.6408	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.001410891	0.0083586	1.4089E-05	0.000257705	0.000249974	0.000121617	5.297513843	9.94874E-06
4	2028	Taxiways	Excavation (Cut to Fill)	Scraper	Scrapers	Scrapers600	Diesel	600	0.59	170.801	0.096610	0.278752	0.001442	0.018878	0.018312	0.019286	536.774806	0.001284	0.006439043	0.018578821	9.61269E-05	0.001258226	0.001220478	0.0012854	35.77604494	8.55493E-05
4	2028	Taxiways	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	64.30164706	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000459477	0.00149376	1.03825E-05	0.000106712	0.000103511	7.43512E-05	3.928565813	5.53801E-06
4	2028	Taxiways	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	41.03333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000358809	0.001877593	2.26536E-05	0.000109376	0.000106095	0.000158473	8.595306864	6.43237E-06
4	2028	Taxiways	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	164.1333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001435237	0.00751037	9.06144E-05	0.000437504	0.000424378	0.000633891	34.38122745	2.57295E-05
4	2028	Taxiways	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	164.1333333	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001855312	0.004924744	1.96951E-05	0.000445528	0.000432163	0.000336835	7.307882587	2.65302E-05
4	2028	Taxiways	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	164.1333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001435237	0.00751037	9.06144E-05	0.000437504	0.000424378	0.000633891	34.38122745	2.57295E-05
4	2028	Taxiways	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	164.1333333	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.008784357	0.011402874	6.06747E-06	0.001260467	0.001222653	0.001690277	1.978442648	7.74216E-05
4	2028	Taxiways	Fencing	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	164.1333333	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.004545637	0.006399488	7.40943E-06	0.00069161	0.000670861	0.000811923	2.642105351	3.31905E-05
4	2028	Taxiways	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	45.2136	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000323081	0.001050335	7.30041E-06	7.50347E-05	7.27838E-05	5.22799E-05	2.762364751	3.89404E-06
4	2028	Taxiways	Grading	Grader	Graders	Graders300	Diesel	300	0.59	45.2136	0.026313	0.129058	0.001416	0.007616	0.007388	0.010557	536.800846	0.000484	0.000232121	0.001138506	1.24948E-05	6.7189E-05	6.51734E-05	9.31279E-05	4.73545898	4.2673E-06
4	2028	Taxiways	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	45.2136	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000466855	0.002765809	4.66196E-06	8.5273E-05	8.27149E-05	4.02425E-05	1.752914736	3.29198E-06
4	2028	Taxiways	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	40.733	0.302645	0.818779	0.001506	0.043786	0.042473	0.046655	536.697850	0.002709	0.004810494	0.013014361	2.39377E-05	0.000695978	0.000675099	0.000741571	8.530727074	4.30608E-05
4	2028	Taxiways	Hydroseeding	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	40.733	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000356183	0.00186385	2.24878E-05	0.000108575	0.000105318	0.000157313	8.532395642	6.38529E-06
4	2028	Taxiways	Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	50.57333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00044223	0.002314121	2.79204E-05	0.000134805	0.000130761	0.000195317	10.59366334	7.92786E-06
4	2028	Taxiways	Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	50.57333333	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.002897949	0.005871837	1.01068E-05	0.000611661	0.000593311	0.000921851	3.60374651	5.34244E-05
4	2028	Taxiways	Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	50.57333333	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000571665	0.001517429	6.06852E-06	0.000137278	0.00013316	0.000103787	2.251730191	8.17457E-06
4	2028	Taxiways	Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	50.57333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00044223	0.002314121	2.79204E-05	0.000134805	0.000130761	0.000195317	10.59366334	7.92786E-06
4	2028	Taxiways	Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	50.57333333	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.002706667	0.003513493	1.86953E-06	0.00038838	0.000376728	0.000520814	0.609604628	2.38554E-05
4	2028	Taxiways	Lighting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	50.57333333	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.001400617	0.001971833	2.28302E-06	0.000213101	0.000206708	0.000250172	0.814094687	1.02268E-05
4	2028	Taxiways	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	844.1142857	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.007381218	0.038624761	0.000466017	0.002250019	0.002182517	0.003260011	176.8177412	0.000132323
4	2028	Taxiways	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	844.1142857	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.009541604	0.025327257	0.000101289	0.002291289	0.002222554	0.001732296	37.58339617	0.000136441
4	2028	Taxiways	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	844.1142857	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.007381218	0.038624761	0.000466017	0.002250019	0.002182517	0.003260011	176.8177412	0.000132323
4	2028	Taxiways	Soil Erosion/Sediment Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	37.6	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000425019	0.001128171	4.51179E-06	0.000102063	9.90008E-05	7.71629E-05	1.674104703	6.07759E-06
4	2028	Taxiways	Soil Erosion/Sediment Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	75.2	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000657574	0.003440982	4.15163E-05	0.000200449	0.000194435	0.000290426	15.75224394	1.17883E-05
4	2028	Taxiways	Soil Erosion/Sediment Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	37.6	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.000481907	0.000820116	4.28001E-07	4.6717E-05	4.53155E-05	0.000164222	0.11640297	1.44707E-05
4	2028	Taxiways	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	37.6	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.001041324	0.001466008	1.69737E-06	0.000158435	0.000153682	0.000185997	0.605258903	7.60335E-06
4	2028	Taxiways	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	86.29957895	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000616667	0.002004783	1.39344E-05	0.000143219	0.000138923	9.97871E-05	5.272548854	7.43259E-06
4	2028	Taxiways	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	607.2933333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.005310376	0.027788369	0.000335273	0.001618764	0.0015702	0.002345397	127.2105416	9.51991E-05
4	2028	Taxiways	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	86.29957895	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000754632	0.003948874	4.76441E-05	0.000230035	0.000223134	0.000333293	18.07728749	1.35283E-05
4	2028	Taxiways	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	84.08676923	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000868242	0.005143762	8.67015E-06	0.000158588	0.00015383	7.48416E-05	3.26001329	6.12231E-06
4	2028	Taxiways	Topsoil Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	100.4746667	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000717957	0.002334077	1.62231E-05	0.000166744	0.000161742	0.000116178	6.138588337	8.65342E-06
4	2028	Taxiways	Topsoil Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	100.4746667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000878584	0.004597494	5.54698E-05	0.000267819	0.000259784	0.000388038	21.04656196	1.57504E-05
4	2028	Taxiways	Topsoil Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	100.4746667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000878584	0.004597494	5.54698E-05	0.000267819	0.000259784	0.000388038	21.04656196	1.57504E-05
5	2028	Terminal Apron	Asphalt Placement	Asphalt Paver	Pavers	Pavers175	Diesel	175	0.59	7.8255	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	6.83863E-05	0.000215349	1.2682E-06	1.6331E-05	1.5841E-05	1.08294E-05	0.478100175	8.42647E-07
5	2028	Terminal Apron	Asphalt Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	28.18413056	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000246451	0.001289642	1.55598E-05	7.51259E-05	7.28721E-05	0.000108849	5.903767284	4.41813E-06
5	2028	Terminal Apron	Asphalt Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	15.651	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000176914	0.000469601	1.87803E-06	4.24835E-05	4.12091E-05	3.21191E-05	0.696846083	2.5298E-06
5	2028	Terminal Apron	Asphalt Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	7.8255	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	6.84288E-05	0.000358077	4.32029E-06	2.08592E-05	2.02334E-05	3.02225E-05	1.639217885	1.22672E-06
5	2028	Terminal Apron	Asphalt Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	7.8255	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	8.08025E-05	0.000478702	8.06884E-07	1.47589E-05	1.43162E-05	6.9651E-06	0.303391773	5.6977E-07
5	2028	Terminal Apron	Asphalt Placement	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	7.8255	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.000418818	0.000543663	2.89283E-07	6.00962E-05	5.82933E-05	8.05885E-05	0.094327597	3.69128E-06
5	2028	Terminal Apron	Asphalt Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	10.01664	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.000242231	0.000612731	3.56411E-07	2.76898E-05	2.68591E-05	5.72585E-05	0.09692752	5.0454E-06
5	2028	Terminal Apron	Clearing and Grubbing	Chain Saw	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.7	18	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.000375559	0.00063913	3.33548E-07	3.64074E-05	3.53151E-05	0.000127981	0.090714833	1.12772E-05
5	2028	Terminal Apron	Clearing and Grubbing	Chipper/Stump Grinder	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	18	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.000251605	0.000906775	1.3708E-06	4.03323E-05	3.91223E-05	2.26723E-05	0.508574222	1.67906E-06
5	2028	Terminal Apron	Clearing and Grubbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	24	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000209864	0.001098186	1.32499E-05	6.39729E-05	6.20537E-05	9.26892E-05	5.027311895	3.76223E-06
5	2028	Terminal Apron	Concrete Placement	Air Compressor	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	20.868	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.000291694	0.001051254	1.58921E-06	4.67585E-05	4.53557E-05	2.62848E-05	0.589607048	1.94658E-06
5	2028	Terminal Apron	Concrete Placement	Concrete Saws	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.59	20.868	0.278853	2.529068	0.001569	0.020431	0.019818	0.092472	595.882164	0.012377	0.000151382	0.001372966	8.51851E-07	1.10914E-05	1.07586E-05	5.02008E-05	0.323489173	6.71894E-06
5	2028	Terminal Apron	Concrete Placement	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	86.95	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00076032	0.003978635	4.80032E-05	0.000231769	0.000224815	0.000335805	18.21353205	1.36303E-05
5	2028	Terminal Apron	Concrete Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	41.736	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000471771	0.001252269	5.00809E-06	0.000113289	0.000109891	8.56509E-05	1.858256221	6.74612E-06
5	2028	Terminal Apron	Concrete Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	62.604	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00054743	0.002864617	3.45623E-05	0.000166873	0.000161867	0.00024178	13.11374308	9.81378E-06
5	2028	Terminal Apron	Concrete Placement	Rubber Tired Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	20.868	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.001195776	0.002422887	4.17035E-06	0.000252389	0.000244817	0.000380382	1.487008611	2.20444E-05
5	2028	Terminal Apron	Concrete Placement	Slip Form Paver	Pavers	Pavers175	Diesel	175	0.59	20.868	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.000182363	0.000574263	3.38186E-06	4.35493E-05	4.22428E-05	2.88784E-05	1.274933801	2.24706E-06
5	2028	Terminal Apron	Concrete Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	20.868	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.000504647	0.001276523	7.42523E-07	5.76871E-05	5.59565E-05	0.000119289	0.201932334	1.05113E-05
5	2028	Terminal Apron	Drainage - 24 inch SICPP	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	18.368	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000131251	0.000426698	2.96579E-06	3.04828E-05	2.95684E-05	2.12387E-05	1.122209153	1.58195E-06
5	2028	Terminal Apron	Drainage - 24 inch SICPP	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	18.368	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000160616	0.000840478	1.01406E-05	4.89606E-05	4.74918E-05	7.09381E-05	3.84756937	2.87936E-06
5	2028	Terminal Apron	Drainage - 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	18.368	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000112942	0.000370524	2.959E-06	2.55089E-05	2.47436E-05	1.86482E-05	1.122213014	1.33012E-06
5	2028	Terminal Apron	Drainage - 24 inch SICPP	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	18.368	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.001052521	0.002132624	3.67074E-06	0.000222152	0.000215488	0.000334812	1.308864011	1.94035E-05
5	2028	Terminal Apron	Drainage - 24 inch SICPP	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	18.368	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000207626	0.000551123	2.20406E-06	4.98586E-05	4.8363E-05	3.76949E-05	0.817817957	2.96897E-06
5	2028	Terminal Apron	Drainage - 24 inch SICPP	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	18.368	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000160616	0.000840478	1.01406E-05	4.89606E-05	4.74918E-05	7.09381E-05	3.84756937	2.87936E-06
5	2028	Terminal Apron	Drainage - 24 inch SICPP	Roller	Rollers	Rollers100	Diesel	100	0.59	18.368	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.00018966	0.001123609	1.89392E-06	3.46421E-05	3.36029E-05	1.63485E-05	0.712120642	1.33736E-06
5	2028	Terminal Apron	Drainage - 6 inch Perforated Underdrain	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	10.20444444	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	8.92311E-05	0.000466932	5.63365E-06	2.72003E-05	2.63843E-05	3.94101E-05	2.137538538	1.59965E-06
5	2028	Terminal Apron	Drainage - 6 inch Perforated Underdrain	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	10.20444444	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.000584734	0.001184791	2.0393E-06	0.000123418	0.000119716	0.000186007	0.727146672	1.07797E-05
5	2028	Terminal Apron	Drainage - 6 inch Perforated Underdrain	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	10.20444444	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000115348	0.00030618	1.22448E-06	2.76992E-05	2.68683E-05	2.09416E-05	0.454343309	1.64943E-06
5	2028	Terminal Apron	Drainage - 6 inch Perforated Underdrain	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	10.20444444	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	8.92311E-05	0.000466932	5.63365E-06	2.72003E-05	2.63843E-05	3.94101E-05	2.137538538	1.59965E-06
5	2028	Terminal Apron	Drainage - 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	10.20444444	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.00028261	0.000397867	4.60657E-07	4.29985E-05	4.17086E-05	5.04786E-05	0.164264118	2.06351E-06
5	2028	Terminal Apron	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1200	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.010493202	0.054909286	0.000662493	0.003198646	0.003102685	0.004634459	251.3655947	0.000188112
5	2028	Terminal Apron	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	34.78	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000248526	0.000807957	5.61575E-06	5.77195E-05	5.5988E-05	4.02157E-05	2.124914761	2.99544E-06
5	2028	Terminal Apron	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	34.78	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000304128	0.001591454	1.92013E-05	9.27074E-05	8.99261E-05	0.000134322	7.285412821	5.4521E-06
5	2028	Terminal Apron	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	34.78	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000304128	0.001591454	1.92013E-05	9.27074E-05	8.99261E-05	0.000134322	7.285412821	5.4521E-06
5	2028	Terminal Apron	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	16.05230769	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000165749	0.000981953	1.65515E-06	3.02747E-05	2.93665E-05	1.42874E-05	0.622342098	1.16876E-06
5	2028	Terminal Apron	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	26.085	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000186394	0.000605968	4.21181E-06	4.32896E-05	4.1991E-05	3.01618E-05	1.593686071	2.24658E-06
5	2028	Terminal Apron	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	69.56	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000608256	0.003182908	3.84025E-05	0.000185415	0.000179852	0.000268644	14.57082564	1.09042E-05
5	2028	Terminal Apron	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	20.868	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000128314	0.000420955	3.36174E-06	2.89808E-05	2.81113E-05	2.11863E-05	1.274953243	1.51116E-06
5	2028	Terminal Apron	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	20.868	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000182477	0.000954872	1.15208E-05	5.56245E-05	5.39557E-05	8.05932E-05	4.371247692	3.27126E-06
5	2028	Terminal Apron	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	20.868	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000215473	0.001276539	2.15169E-06	3.93571E-05	3.81764E-05	1.85736E-05	0.809044728	1.51939E-06
5	2028	Terminal Apron	Excavation (Cut to Fill)	Scraper	Scrapers	Scrapers600	Diesel	600	0.59	26.085	0.096610	0.278752	0.001442	0.018878	0.018312	0.019286	536.774806	0.001284	0.000983381	0.002837387	1.46807E-05	0.000192158	0.000186393	0.000196308	5.463774405	1.30652E-05
5	2028	Terminal Apron	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	9.820235294	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	7.0172E-05	0.000228129	1.58562E-06	1.62973E-05	1.58084E-05	1.1355E-05	0.599975932	8.45772E-07
5	2028	Terminal Apron	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	6.266666667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	5.47978E-05	0.000286748	3.45969E-06	1.6704E-05	1.62029E-05	2.42022E-05	1.312686995	9.82361E-07
5	2028	Terminal Apron	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	25.06666667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000219191	0.001146994	1.38388E-05	6.68162E-05	6.48116E-05	9.68087E-05	5.25074798	3.92944E-06
5	2028	Terminal Apron	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	25.06666667	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000283346	0.000752114	3.00786E-06	6.80417E-05	6.60006E-05	5.1442E-05	1.116069802	4.05173E-06
5	2028	Terminal Apron	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	25.06666667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000219191	0.001146994	1.38388E-05	6.68162E-05	6.48116E-05	9.68087E-05	5.25074798	3.92944E-06
5	2028	Terminal Apron	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	25.06666667	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.001341559	0.001741462	9.26632E-07	0.0001925	0.000186725	0.000258141	0.302150461	1.18239E-05
5	2028	Terminal Apron	Fencing	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	25.06666667	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000694216	0.000977339	1.13158E-06	0.000105624	0.000102455	0.000123998	0.403505935	5.0689E-06
5	2028	Terminal Apron	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	7.0085	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	5.00803E-05	0.000162811	1.13163E-06	1.1631E-05	1.12821E-05	8.10384E-06	0.428190486	6.0361E-07
5	2028	Terminal Apron	Grading	Grader	Graders	Graders300	Diesel	300	0.59	7.0085	0.026313	0.129058	0.001416	0.007616	0.007388	0.010557	536.800846	0.000484	3.59808E-05	0.000176478	1.9368E-06	1.04149E-05	1.01024E-05	1.44356E-05	0.734037198	6.61469E-07
5	2028	Terminal Apron	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	7.0085	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	7.23666E-05	0.000428724	7.22643E-07	1.32181E-05	1.28215E-05	6.23793E-06	0.271716982	5.10285E-07
5	2028	Terminal Apron	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	6.314	0.302645	0.818779	0.001506	0.043786	0.042473	0.046655	536.697850	0.002709	0.000745672	0.002017349	3.71057E-06	0.000107883	0.000104647	0.000114951	1.322343327	6.67483E-06
5	2028	Terminal Apron	Hydroseeding	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	6.314	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	5.52117E-05	0.000288914	3.48582E-06	1.68302E-05	1.63253E-05	2.4385E-05	1.322601971	9.89781E-07

											MOVES Nonroad Emission Factors (grams-horsepower-hour)								MOVES Nonroad Emissions (Tons Per Year)							
Scenario ID	Year	Project	Construction Activity	Equipment	MOVES Equipment	MOVES Lookup	Fuel	HP Average	Load Factor	Hours of Activity	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4
5	2028	Terminal Apron	Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	8.853333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	7.74165E-05	0.000405109	4.88773E-06	2.35989E-05	2.28909E-05	3.4192E-05	1.854519499	1.38785E-06
5	2028	Terminal Apron	Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	8.853333333	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.000507313	0.00102792	1.76929E-06	0.000107077	0.000103865	0.000161379	0.630869413	9.35244E-06
5	2028	Terminal Apron	Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	8.853333333	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000100075	0.00026564	1.06235E-06	2.40317E-05	2.33108E-05	1.81689E-05	0.394186356	1.43104E-06
5	2028	Terminal Apron	Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	8.853333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	7.74165E-05	0.000405109	4.88773E-06	2.35989E-05	2.28909E-05	3.4192E-05	1.854519499	1.38785E-06
5	2028	Terminal Apron	Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	8.853333333	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.000473827	0.00061507	3.27278E-07	6.79895E-05	6.59498E-05	9.11733E-05	0.106716971	4.17611E-06
5	2028	Terminal Apron	Lighting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	8.853333333	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000245191	0.000345188	3.99664E-07	3.73054E-05	3.61862E-05	4.3795E-05	0.142514862	1.79029E-06
5	2028	Terminal Apron	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	128.9142857	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00112727	0.005898826	7.11707E-05	0.000343626	0.000333317	0.000497873	27.00384675	2.02086E-05
5	2028	Terminal Apron	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	128.9142857	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001457207	0.003868013	1.5469E-05	0.000349929	0.000339431	0.000264559	5.739787554	2.08375E-05
5	2028	Terminal Apron	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	128.9142857	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00112727	0.005898826	7.11707E-05	0.000343626	0.000333317	0.000497873	27.00384675	2.02086E-05
5	2028	Terminal Apron	Sealing/Fuel Resistant	Distributing Tanker	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	16.6944	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000145981	0.000763898	9.21661E-06	4.44996E-05	4.31645E-05	6.44746E-05	3.496998154	2.61701E-06
5	2028	Terminal Apron	Sealing/Fuel Resistant	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	16.6944	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000188708	0.000500908	2.00324E-06	4.53158E-05	4.39564E-05	3.42603E-05	0.743302488	2.69845E-06
5	2028	Terminal Apron	Sealing/Fuel Resistant	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	16.6944	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000145981	0.000763898	9.21661E-06	4.44996E-05	4.31645E-05	6.44746E-05	3.496998154	2.61701E-06
5	2028	Terminal Apron	Soil Erosion/Sediment Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	6	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	6.78221E-05	0.000180027	7.19967E-07	1.62866E-05	1.5798E-05	1.23132E-05	0.267144368	9.69828E-07
5	2028	Terminal Apron	Soil Erosion/Sediment Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	12	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000104932	0.000549093	6.62493E-06	3.19865E-05	3.10268E-05	4.63446E-05	2.513655947	1.88112E-06
5	2028	Terminal Apron	Soil Erosion/Sediment Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	6	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	7.69001E-05	0.00013087	6.8298E-08	7.45484E-06	7.23119E-06	2.62057E-05	0.018574942	2.30915E-06
5	2028	Terminal Apron	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	6	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000166169	0.000233937	2.70857E-07	2.52822E-05	2.45238E-05	2.96804E-05	0.096583867	1.2133E-06
5	2028	Terminal Apron	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	13.17978947	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	9.41782E-05	0.000306173	2.12807E-06	2.18726E-05	2.12165E-05	1.52396E-05	0.805230856	1.13512E-06
5	2028	Terminal Apron	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	92.74666667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000811008	0.004243878	5.12034E-05	0.00024722	0.000239803	0.000358192	19.42776752	1.45389E-05
5	2028	Terminal Apron	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	13.17978947	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000115248	0.000603077	7.27627E-06	3.51312E-05	3.40773E-05	5.0901E-05	2.760788015	2.06606E-06
5	2028	Terminal Apron	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	12.84184615	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000132599	0.000785562	1.32412E-06	2.42198E-05	2.34932E-05	1.14299E-05	0.497873679	9.35007E-07
5	2028	Terminal Apron	Topsoil Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	15.57466667	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000111291	0.000361807	2.51476E-06	2.58471E-05	2.50717E-05	1.80088E-05	0.95154799	1.34138E-06
5	2028	Terminal Apron	Topsoil Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	15.57466667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00013619	0.000712662	8.59843E-06	4.15149E-05	4.02694E-05	6.01501E-05	3.262446125	2.44148E-06
5	2028	Terminal Apron	Topsoil Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	15.57466667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00013619	0.000712662	8.59843E-06	4.15149E-05	4.02694E-05	6.01501E-05	3.262446125	2.44148E-06
1	2028	Taxiways	Asphalt Placement	Asphalt Paver	Pavers	Pavers175	Diesel	175	0.59	28.207875	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.000246506	0.000776248	4.57135E-06	5.88668E-05	5.71008E-05	3.90358E-05	1.72336464	3.03741E-06
1	2028	Taxiways	Asphalt Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	101.5927968	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000888361	0.004648657	5.60871E-05	0.0002708	0.000262675	0.000392356	21.28077816	1.59257E-05
1	2028	Taxiways	Asphalt Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	56.41575	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000637706	0.001692728	6.76958E-06	0.000153137	0.000148543	0.000115777	2.511858309	9.11893E-06
1	2028	Taxiways	Asphalt Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	28.207875	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000246659	0.001290729	1.55729E-05	7.51892E-05	7.29335E-05	0.00010894	5.908741063	4.42186E-06
1	2028	Taxiways	Asphalt Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	28.207875	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000291262	0.001725534	2.9085E-06	5.32002E-05	5.16042E-05	2.51065E-05	1.093608997	2.0538E-06
1	2028	Taxiways	Asphalt Placement	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	28.207875	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.001509675	0.001959692	1.04275E-06	0.000216623	0.000210125	0.00029049	0.340014193	1.33056E-05
1	2028	Taxiways	Asphalt Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	36.10608	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.000873147	0.002208657	1.28472E-06	9.9811E-05	9.68167E-05	0.000206395	0.349385902	1.81867E-05
1	2028	Taxiways	Clearing and Grubbing	Chain Saw	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.7	62.4	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.001301937	0.002215652	1.1563E-06	0.000126212	0.000122426	0.000443668	0.314478089	3.90944E-05
1	2028	Taxiways	Clearing and Grubbing	Chipper/Stump Grinder	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	62.4	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.00087223	0.003143486	4.7521E-06	0.000139818	0.000135624	7.85974E-05	1.763057304	5.82073E-06
1	2028	Taxiways	Clearing and Grubbing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	83.2	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000727529	0.003807044	4.59329E-05	0.000221773	0.000215119	0.000321323	17.42801457	1.30424E-05
1	2028	Taxiways	Drainage - 24 inch SICPP	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	65.376	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000467154	0.001518717	1.05559E-05	0.000108495	0.000105241	7.55934E-05	3.994204353	5.63054E-06
1	2028	Taxiways	Drainage - 24 inch SICPP	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	65.376	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00057167	0.002991458	3.60926E-05	0.000174262	0.000169034	0.000252485	13.6943976	1.02483E-05
1	2028	Taxiways	Drainage - 24 inch SICPP	Excavator	Excavators	Excavators175	Diesel	175	0.59	65.376	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000401988	0.001318782	1.05318E-05	9.0792E-05	8.80682E-05	6.63733E-05	3.994218097	4.7342E-06
1	2028	Taxiways	Drainage - 24 inch SICPP	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	65.376	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.00374617	0.007590507	1.3065E-05	0.000790692	0.000766972	0.001191674	4.658552568	6.90616E-05
1	2028	Taxiways	Drainage - 24 inch SICPP	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	65.376	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.00073899	0.001961576	7.84476E-06	0.000177459	0.000172135	0.000134165	2.910805029	1.05672E-05
1	2028	Taxiways	Drainage - 24 inch SICPP	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	65.376	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00057167	0.002991458	3.60926E-05	0.000174262	0.000169034	0.000252485	13.6943976	1.02483E-05
1	2028	Taxiways	Drainage - 24 inch SICPP	Roller	Rollers	Rollers100	Diesel	100	0.59	65.376	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000675043	0.003999185	6.74089E-06	0.000123299	0.0001196	5.8188E-05	2.53460361	4.75999E-06
1	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	36.32	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000317594	0.001661921	2.00515E-05	9.68124E-05	9.39079E-05	0.00014027	7.607998667	5.69351E-06
1	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	36.32	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.002081205	0.004216948	7.25834E-06	0.000439273	0.000426096	0.000662041	2.58808476	3.83675E-05
1	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	36.32	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.00041055	0.001089765	4.3582E-06	9.85881E-05	9.56306E-05	7.45361E-05	1.617113905	5.87069E-06
1	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	36.32	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000317594	0.001661921	2.00515E-05	9.68124E-05	9.39079E-05	0.00014027	7.607998667	5.69351E-06
1	2028	Taxiways	Drainage - 6 inch Perforated Underdrain	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	36.32	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.001005874	0.001416101	1.63958E-06	0.000153042	0.00014845	0.000179665	0.584654344	7.34451E-06
1	2028	Taxiways	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1200	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.010493202	0.054909286	0.000662493	0.003198646	0.003102685	0.004634459	251.3655947	0.000188112
1	2028	Taxiways	Excavation (Borrow)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	125.368	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000895836	0.002912362	2.02425E-05	0.000208056	0.000201814	0.000144961	7.659468479	1.07974E-05
1	2028	Taxiways	Excavation (Borrow)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	125.368	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00109626	0.005736556	6.92129E-05	0.000334173	0.000324148	0.000484177	26.26100157	1.96526E-05
1	2028	Taxiways	Excavation (Borrow)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	125.368	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00109626	0.005736556	6.92129E-05	0.000334173	0.000324148	0.000484177	26.26100157	1.96526E-05
1	2028	Taxiways	Excavation (Borrow)	Roller	Rollers	Rollers100	Diesel	100	0.59	57.86215385	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000597458	0.003539548	5.96614E-06	0.000109128	0.000105854	5.15003E-05	2.243294543	4.21291E-06
1	2028	Taxiways	Excavation (Cut to Fill)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	94.026	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000671877	0.002184271	1.51819E-05	0.000156042	0.000151361	0.000108721	5.74460136	8.09803E-06
1	2028	Taxiways	Excavation (Cut to Fill)	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	250.736	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00219252	0.011473112	0.000138426	0.000668346	0.000648296	0.000968355	52.52200313	3.93053E-05
1	2028	Taxiways	Excavation (Cut to Fill)	Excavator	Excavators	Excavators175	Diesel	175	0.59	75.2208	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000462522	0.001517374	1.21177E-05	0.000104464	0.00010133	7.63683E-05	4.595696901	5.44712E-06
1	2028	Taxiways	Excavation (Cut to Fill)	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	75.2208	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000657756	0.003441934	4.15277E-05	0.000200504	0.000194489	0.000290506	15.75660094	1.17916E-05
1	2028	Taxiways	Excavation (Cut to Fill)	Roller	Rollers	Rollers100	Diesel	100	0.59	75.2208	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000776696	0.004601412	7.75599E-06	0.000141867	0.000137611	6.69504E-05	2.916282906	5.47678E-06
1	2028	Taxiways	Excavation (Cut to Fill)	Scraper	Scrapers	Scrapers600	Diesel	600	0.59	94.026	0.096610	0.278752	0.001442	0.018878	0.018312	0.019286	536.774806	0.001284	0.003544695	0.010227647	5.29179E-05	0.000692654	0.000671874	0.000707613	19.69472311	4.70949E-05
1	2028	Taxiways	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	35.39811765	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000252943	0.000822316	5.71555E-06	5.87453E-05	5.69831E-05	4.09304E-05	2.162679203	3.04868E-06
1	2028	Taxiways	Fencing	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	22.58888889	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000197525	0.001033616	1.24708E-05	6.02116E-05	5.84052E-05	8.72394E-05	4.731724575	3.54103E-06
1	2028	Taxiways	Fencing	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	90.35555556	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000790099	0.004134466	4.98833E-05	0.000240846	0.000233621	0.000348958	18.9268983	1.41641E-05
1	2028	Taxiways	Fencing	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	90.35555556	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001021351	0.002711076	1.08422E-05	0.000245264	0.000237906	0.000185428	4.022996291	1.46049E-05
1	2028	Taxiways	Fencing	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	90.35555556	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000790099	0.004134466	4.98833E-05	0.000240846	0.000233621	0.000348958	18.9268983	1.41641E-05
1	2028	Taxiways	Fencing	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	90.35555556	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.004835797	0.006277293	3.34015E-06	0.000693889	0.000673072	0.000930499	1.089134553	4.26206E-05
1	2028	Taxiways	Fencing	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	90.35555556	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.002502377	0.003522924	4.0789E-06	0.000380732	0.00036931	0.000446964	1.4544815	1.82714E-05
1	2028	Taxiways	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	24.945	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000178248	0.000579485	4.02774E-06	4.13977E-05	4.01559E-05	2.88436E-05	1.524036766	2.1484E-06
1	2028	Taxiways	Grading	Grader	Graders	Graders300	Diesel	300	0.59	24.945	0.026313	0.129058	0.001416	0.007616	0.007388	0.010557	536.800846	0.000484	0.000128065	0.00062813	6.89356E-06	3.70692E-05	3.59571E-05	5.138E-05	2.612621518	2.35433E-06
1	2028	Taxiways	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	24.945	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000257571	0.001525937	2.57207E-06	4.70464E-05	4.5635E-05	2.22023E-05	0.967108527	1.81623E-06
1	2028	Taxiways	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	22.473	0.302645	0.818779	0.001506	0.043786	0.042473	0.046655	536.697850	0.002709	0.002654021	0.007180216	1.32068E-05	0.000383981	0.000372462	0.000409136	4.706528602	2.37573E-05
1	2028	Taxiways	Hydroseeding	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	22.473	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000196511	0.001028314	1.24068E-05	5.99026E-05	5.81055E-05	8.67918E-05	4.707449175	3.52286E-06
1	2028	Taxiways	Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	28.44	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000248689	0.00130135	1.57011E-05	7.58079E-05	7.35336E-05	0.000109837	5.957364595	4.45824E-06
1	2028	Taxiways	Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	28.44	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.001629666	0.003302038	5.68357E-06	0.000343968	0.00033365	0.000518404	2.026572978	3.00433E-05
1	2028	Taxiways	Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	28.44	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000321477	0.000853329	3.41264E-06	7.71984E-05	7.48826E-05	5.83647E-05	1.266264302	4.59699E-06
1	2028	Taxiways	Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	28.44	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000248689	0.00130135	1.57011E-05	7.58079E-05	7.35336E-05	0.000109837	5.957364595	4.45824E-06
1	2028	Taxiways	Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	28.44	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.001522099	0.001975819	1.05133E-06	0.000218406	0.000211854	0.000292881	0.342812199	1.34151E-05
1	2028	Taxiways	Lighting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	28.44	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.00078764	0.001108863	1.28386E-06	0.000119838	0.000116243	0.000140685	0.457807532	5.75104E-06
1	2028	Taxiways	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	464.6857143	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.004063368	0.021262967	0.000256543	0.001238638	0.001201478	0.001794639	97.33833412	7.2844E-05
1	2028	Taxiways	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	464.6857143	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.005252662	0.013942679	5.57597E-05	0.001261357	0.001223518	0.000953631	20.68969521	7.51109E-05
1	2028	Taxiways	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	464.6857143	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.004063368	0.021262967	0.000256543	0.001238638	0.001201478	0.001794639	97.33833412	7.2844E-05
1	2028	Taxiways	Soil Erosion/Sediment Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	20.8	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000235117	0.000624094	2.49589E-06	5.64601E-05	5.47664E-05	4.26859E-05	0.926100474	3.36207E-06
1	2028	Taxiways	Soil Erosion/Sediment Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	41.6	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000363764	0.001903522	2.29664E-05	0.000110886	0.00010756	0.000160661	8.714007284	6.5212E-06
1	2028	Taxiways	Soil Erosion/Sediment Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	20.8	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.000266587	0.000453681	2.36766E-07	2.58434E-05	2.50681E-05	9.08464E-05	0.064393132	8.00505E-06
1	2028	Taxiways	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	20.8	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000576051	0.000810983	9.38969E-07	8.76451E-05	8.50157E-05	0.000102892	0.334824074	4.20611E-06
1	2028	Taxiways	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	47.508	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000339476	0.001103635	7.67087E-06	7.88424E-05	7.64773E-05	5.49329E-05	2.902543141	4.09165E-06
1	2028	Taxiways	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	334.3155556	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002923367	0.015297524	0.000184568	0.000891131	0.000864396	0.001291143	70.02952372	5.24072E-05
1	2028	Taxiways	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	47.508	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000415426	0.002173859	2.62281E-05	0.000126634	0.000122835	0.000183478	9.951563895	7.44734E-06
1	2028	Taxiways	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	46.28984615	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000477968	0.002831646	4.77293E-06	8.73028E-05	8.46838E-05	4.12004E-05	1.794640406	3.37034E-06
1	2028	Taxiways	Topsoil Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	55.43333333	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000396107	0.001287744	8.95054E-06	9.19949E-05	8.92353E-05	6.40969E-05	3.386748368	4.77422E-06
1	2028	Taxiways	Topsoil Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	55.43333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000484728	0.002536504	3.06035E-05	0.00014776	0.000143327	0.000214086	11.611694	8.68971E-06
1	2028	Taxiways	Topsoil Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	55.43333333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000484728	0.002536504	3.06035E-05	0.00014776	0.000143327	0.000214086	11.611694	8.68971E-06
2	2028	Rehabilitate Runway	Asphalt Placement	Asphalt Paver	Pavers	Pavers175	Diesel	175	0.59	154.303875	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.001348446	0.004246265	2.50064E-05	0.000322016	0.000312355	0.000213535	9.427219949	1.66154E-05
2	2028	Rehabilitate Runway	Asphalt Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	555.737085	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.004859551	0.025429272	0.00030681	0.001481339	0.001436897	0.002146284	116.4109857	8.71172E-05
2	2028	Rehabilitate Runway	Asphalt Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	308.60775	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.003488405	0.009259632	3.70312E-05	0.000837694	0.000812565	0.000633327	13.74047037	4.98827E-05
2	2028	Rehabilitate Runway	Asphalt Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	154.303875	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001349285	0.007060596	8.51878E-05	0.000411303	0.000398964	0.000595929	32.32223776	2.41886E-05
2	2028	Rehabilitate Runway	Asphalt Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	154.303875	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.001593271	0.009439087	1.59102E-05	0.000291018	0.000282287	0.000137338	5.982304801	1.12348E-05
2	2028	Rehabilitate Runway	Asphalt Placement	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	154.303875	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.008258288	0.010719989	5.7041E-06	0.001184982	0.001149432	0.001589051	1.859959588	7.2785E-05
2	2028	Rehabilitate Runway	Asphalt Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	197.50896	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.004776325	0.012081887	7.02774E-06	0.00054599	0.000529611	0.001129028	1.911225095	9.94857E-05
2	2028	Rehabilitate Runway	Cold Milling	Cold Planer	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.59	246.8862	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.003829133	0.010164061	4.06482E-05	0.000919515	0.000891931	0.000695186	15.08256282	5.4755E-05
2	2028	Rehabilitate Runway	Cold Milling	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	246.8862	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002158856	0.011296954	0.0001363	0.000658085	0.000638342	0.000953487	51.71558041	3.87018E-05
2	2028	Rehabilitate Runway	Cold Milling	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	246.8862	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002158856	0.011296954	0.0001363	0.000658085	0.000638342	0.000953487	51.71558041	3.87018E-05
2	2028	Rehabilitate Runway	Cold Milling	Sweepers	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	246.8862	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.002790724	0.007407706	2.9625E-05	0.000670155	0.000650052	0.000506661	10.99237629	3.99062E-05
2	2028	Rehabilitate Runway	Cold Milling	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	246.8862	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002158856	0.011296954	0.0001363	0.000658085	0.000638342	0.000953487	51.71558041	3.87018E-05
2	2028	Rehabilitate Runway	Concrete Demolition	Concrete Saws	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.59	2224.2	0.278853	2.529068	0.001569	0.020431	0.019818	0.092472	595.882164	0.012377	0.016134949	0.14633658	9.07939E-05	0.001182165	0.001146701	0.00535062	34.47884894	0.000716133
2	2028	Rehabilitate Runway	Concrete Demolition	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2224.2	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.01944915	0.101774362	0.001227932	0.005928691	0.005750826	0.00858997	465.9061298	0.000348665

											MOVES Nonroad Emission Factors (grams-horsepower-hour)								MOVES Nonroad Emissions (Tons Per Year)							
Scenario ID	Year	Project	Construction Activity	Equipment	MOVES Equipment	MOVES Lookup	Fuel	HP Average	Load Factor	Hours of Activity	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4
2	2028	Rehabilitate Runway	Concrete Demolition	Excavator	Excavators	Excavators175	Diesel	175	0.59	2224.2	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.013676284	0.044867162	0.000358309	0.003088896	0.002996225	0.002258131	135.8899274	0.000161066
2	2028	Rehabilitate Runway	Concrete Demolition	Hydralic Hammer	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.59	2224.2	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.034496697	0.091568119	0.0003662	0.008283921	0.008035418	0.006262941	135.8789443	0.000493288
2	2028	Rehabilitate Runway	Concrete Demolition	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	2224.2	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.025141661	0.066736087	0.000266892	0.006037434	0.005856322	0.004564516	99.03041706	0.000359515
2	2028	Rehabilitate Runway	Concrete Demolition	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2224.2	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.01944915	0.101774362	0.001227932	0.005928691	0.005750826	0.00858997	465.9061298	0.000348665
2	2028	Rehabilitate Runway	Concrete Placement	Air Compressor	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	411.4768	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.005751639	0.020728712	3.13362E-05	0.000921988	0.000894328	0.000518286	11.62591631	3.83829E-05
2	2028	Rehabilitate Runway	Concrete Placement	Concrete Saws	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.59	411.4768	0.278853	2.529068	0.001569	0.020431	0.019818	0.092472	595.882164	0.012377	0.002984964	0.027072254	1.67969E-05	0.0002187	0.00021214	0.000989864	6.378583953	0.000132485
2	2028	Rehabilitate Runway	Concrete Placement	Concrete Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1714.486667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.014992046	0.078451032	0.00094653	0.00457003	0.004432926	0.006621432	359.1358006	0.000268762
2	2028	Rehabilitate Runway	Concrete Placement	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	822.9536	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.00930241	0.02469234	9.87499E-05	0.00223385	0.002166838	0.00168887	36.6412365	0.000133021
2	2028	Rehabilitate Runway	Concrete Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1234.4304	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.010794273	0.056484743	0.000681502	0.003290422	0.003191707	0.004767431	258.5777764	0.000193509
2	2028	Rehabilitate Runway	Concrete Placement	Rubber Tired Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	411.4768	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.023578407	0.047774679	8.22313E-05	0.004976619	0.004827325	0.007500401	29.3209481	0.000434674
2	2028	Rehabilitate Runway	Concrete Placement	Slip Form Paver	Pavers	Pavers175	Diesel	175	0.59	411.4768	0.076782	0.241787	0.001424	0.018336	0.017786	0.012159	536.797166	0.000946	0.003595855	0.011323367	6.66837E-05	0.000858708	0.000832947	0.000569427	25.13924098	4.43077E-05
2	2028	Rehabilitate Runway	Concrete Placement	Surfacing Equipment (Grooving)	Other Construction Equipment	Other Construction Equipment25	Diesel	25	0.59	411.4768	1.487334	3.762265	0.002188	0.170020	0.164919	0.351576	595.150063	0.030980	0.009950672	0.025170585	1.46411E-05	0.001137479	0.001103355	0.002352141	3.981717013	0.000207262
2	2028	Rehabilitate Runway	Dust Control	Water Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1200	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.010493202	0.054909286	0.000662493	0.003198646	0.003102685	0.004634459	251.3655947	0.000188112
2	2028	Rehabilitate Runway	Excavation (Cut to Fill) (Assume 20% recon	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	82.2952	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000588053	0.001911759	1.32878E-05	0.000136574	0.000132477	9.51569E-05	5.027897792	7.08771E-06
2	2028	Rehabilitate Runway	Excavation (Cut to Fill) (Assume 20% recon	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	274.3173333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.002398723	0.012552141	0.000151445	0.000731203	0.000709267	0.001059427	57.46161636	4.30019E-05
2	2028	Rehabilitate Runway	Excavation (Cut to Fill) (Assume 20% recon	Excavator	Excavators	Excavators175	Diesel	175	0.59	82.2952	0.054025	0.177239	0.001415	0.012202	0.011836	0.008920	536.805352	0.000636	0.000506021	0.001660081	1.32574E-05	0.000114289	0.00011086	8.35506E-05	5.027915093	5.95941E-06
2	2028	Rehabilitate Runway	Excavation (Cut to Fill) (Assume 20% recon	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	82.2952	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000719617	0.003765642	4.54334E-05	0.000219361	0.00021278	0.000317828	17.23848491	1.29006E-05
2	2028	Rehabilitate Runway	Excavation (Cut to Fill) (Assume 20% recon	Roller	Rollers	Rollers100	Diesel	100	0.59	82.2952	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000849743	0.005034168	8.48542E-06	0.000155209	0.000150553	7.3247E-05	3.190554807	5.99187E-06
2	2028	Rehabilitate Runway	Excavation (Topsoil Stripping)	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	38.72721569	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000276731	0.000899653	6.25309E-06	6.42701E-05	6.23422E-05	4.47798E-05	2.366073383	3.3354E-06
2	2028	Rehabilitate Runway	Grading	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	27.1819	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000194232	0.000631449	4.38892E-06	4.511E-05	4.37568E-05	3.14301E-05	1.660702143	2.34105E-06
2	2028	Rehabilitate Runway	Grading	Grader	Graders	Graders300	Diesel	300	0.59	27.1819	0.026313	0.129058	0.001416	0.007616	0.007388	0.010557	536.800846	0.000484	0.000139549	0.000684457	7.51172E-06	4.03933E-05	3.91815E-05	5.59875E-05	2.846903862	2.56545E-06
2	2028	Rehabilitate Runway	Grading	Roller	Rollers	Rollers100	Diesel	100	0.59	27.1819	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.000280668	0.001662773	2.80271E-06	5.12652E-05	4.97272E-05	2.41933E-05	1.053832322	1.9791E-06
2	2028	Rehabilitate Runway	Hydroseeding	Hydroseeder	Other Construction Equipment	Other Construction Equipment600	Diesel	600	0.59	2.71819	0.302645	0.818779	0.001506	0.043786	0.042473	0.046655	536.697850	0.002709	0.000321013	0.000868473	1.59741E-06	4.64439E-05	4.50506E-05	4.94864E-05	0.569271525	2.87353E-06
2	2028	Rehabilitate Runway	Hydroseeding	Off-Road Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2.71819	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	2.37688E-05	0.000124378	1.50065E-06	7.24544E-06	7.02807E-06	1.04978E-05	0.569382872	4.26103E-07
2	2028	Rehabilitate Runway	Lighting	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	149.6133333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001308269	0.006845968	8.25982E-05	0.0003988	0.000386836	0.000577814	31.33970375	2.34533E-05
2	2028	Rehabilitate Runway	Lighting	Loader	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes175	Diesel	175	0.59	149.6133333	0.503469	1.020131	0.001756	0.106266	0.103078	0.160156	626.088984	0.009282	0.00857313	0.017370916	2.98994E-05	0.001809503	0.00175522	0.002727153	10.66112301	0.000158048
2	2028	Rehabilitate Runway	Lighting	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	149.6133333	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.001691182	0.004489078	1.79528E-05	0.000406115	0.000393932	0.000307037	6.661393217	2.41832E-05
2	2028	Rehabilitate Runway	Lighting	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	149.6133333	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.001308269	0.006845968	8.25982E-05	0.0003988	0.000386836	0.000577814	31.33970375	2.34533E-05
2	2028	Rehabilitate Runway	Lighting	Skid Steer Loader	Skid Steer Loaders	Skid Steer Loaders75	Diesel	75	0.21	149.6133333	3.082663	4.001570	0.002129	0.442331	0.429061	0.593163	694.287881	0.027169	0.008007252	0.010394122	5.53071E-06	0.001148961	0.001114492	0.001540747	1.803420386	7.05725E-05
2	2028	Rehabilitate Runway	Lighting	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	149.6133333	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.004143509	0.00583336	6.75396E-06	0.000630427	0.000611514	0.000740096	2.408372392	3.02543E-05
2	2028	Rehabilitate Runway	Markings	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2541.942857	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.0222276	0.116313556	0.00140335	0.006775647	0.006572373	0.009817109	532.4641484	0.000398474
2	2028	Rehabilitate Runway	Markings	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	2541.942857	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.028733326	0.076269813	0.000305019	0.006899925	0.006692939	0.00521659	113.1776195	0.000410875
2	2028	Rehabilitate Runway	Markings	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	2541.942857	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.0222276	0.116313556	0.00140335	0.006775647	0.006572373	0.009817109	532.4641484	0.000398474
2	2028	Rehabilitate Runway	Sealing Random Cracks	Crack Cleaner	Other Construction Equipment	Other Construction Equipment40	Diesel	40	0.59	31.77428571	0.278853	2.529068	0.001569	0.020431	0.019818	0.092472	595.882164	0.012377	0.000230499	0.002090523	1.29706E-06	1.68881E-05	1.63814E-05	7.64374E-05	0.492554985	1.02305E-05
2	2028	Rehabilitate Runway	Sealing Random Cracks	Crack Filler (Trailer Mounted)	Other Construction Equipment	Other Construction Equipment100	Diesel	100	0.43	31.77428571	0.294898	1.062801	0.001607	0.047272	0.045854	0.026574	596.083156	0.001968	0.000444142	0.001600674	2.41979E-06	7.1196E-05	6.90601E-05	4.00221E-05	0.897754591	2.96393E-06
2	2028	Rehabilitate Runway	Sealing Random Cracks	Flatbed Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	31.77428571	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000277845	0.001453919	1.75419E-05	8.46956E-05	8.21547E-05	0.000122714	6.655801854	4.98093E-06
2	2028	Rehabilitate Runway	Sealing Random Cracks	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	31.77428571	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000359167	0.000953373	3.81274E-06	8.62491E-05	8.36617E-05	6.52074E-05	1.414720243	5.13593E-06
2	2028	Rehabilitate Runway	Sealing Random Cracks	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	31.77428571	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000277845	0.001453919	1.75419E-05	8.46956E-05	8.21547E-05	0.000122714	6.655801854	4.98093E-06
2	2028	Rehabilitate Runway	Soil Erosion/Sediment Control	Other General Equipment	Other Construction Equipment	Other Construction Equipment175	Diesel	175	0.43	22.4	0.136272	0.361721	0.001447	0.032724	0.031742	0.024740	536.761965	0.001949	0.000025203	0.000672102	2.68788E-06	6.08032E-05	5.89792E-05	4.59694E-05	0.997338972	3.62069E-06
2	2028	Rehabilitate Runway	Soil Erosion/Sediment Control	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	44.8	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000391746	0.002049947	2.47331E-05	0.000119416	0.000115834	0.00017302	9.384315537	7.02283E-06
2	2028	Rehabilitate Runway	Soil Erosion/Sediment Control	Pumps	Other Construction Equipment	Other Construction Equipment11	Diesel	11	0.43	22.4	2.458148	4.183306	0.002183	0.238297	0.231149	0.837677	593.756727	0.073813	0.000287094	0.00048858	2.54979E-07	2.78314E-05	2.69965E-05	9.78346E-05	0.06934645	8.62083E-06
2	2028	Rehabilitate Runway	Soil Erosion/Sediment Control	Tractors/Loader/Backhoe	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes100	Diesel	100	0.21	22.4	1.196388	1.684312	0.001950	0.182028	0.176567	0.213694	695.388515	0.008736	0.000620363	0.000873366	1.0112E-06	9.4387E-05	9.15554E-05	0.000110807	0.360579772	4.52965E-06
2	2028	Rehabilitate Runway	Subbase Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	259.8802105	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.001857013	0.006037148	4.19615E-05	0.000431287	0.000418349	0.000300496	15.87761056	2.23823E-05
2	2028	Rehabilitate Runway	Subbase Placement	Dump Truck (12 cy)	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	1828.786667	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.015991523	0.083681142	0.001009633	0.004874702	0.004728457	0.007062865	383.0783735	0.00028668
2	2028	Rehabilitate Runway	Subbase Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	259.8802105	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.00227248	0.011891531	0.000143474	0.000692721	0.000671939	0.00100367	54.43745306	4.07387E-05
2	2028	Rehabilitate Runway	Subbase Placement	Roller	Rollers	Rollers100	Diesel	100	0.59	253.2166154	0.158765	0.940578	0.001585	0.028999	0.028129	0.013685	596.119268	0.001120	0.002614599	0.015489784	2.61091E-05	0.000477568	0.000463241	0.000225376	9.817115571	1.84366E-05
2	2028	Rehabilitate Runway	Topsoil Placement	Dozer	Crawler Tractor/Dozers	Crawler Tractor/Dozers175	Diesel	175	0.59	60.404	0.062783	0.204109	0.001419	0.014581	0.014144	0.010159	536.803504	0.000757	0.000431626	0.001403215	9.75312E-06	0.000100244	9.72369E-05	6.98444E-05	3.69043563	5.20232E-06
2	2028	Rehabilitate Runway	Topsoil Placement	Dump Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60.404	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000528193	0.00276395	3.33477E-05	0.000161009	0.000156179	0.000233283	12.65290615	9.46891E-06
2	2028	Rehabilitate Runway	Topsoil Placement	Pickup Truck	Off-highway Trucks	Off-highway Trucks600	Diesel	600	0.59	60.404	0.022409	0.117261	0.001415	0.006831	0.006626	0.009897	536.802825	0.000402	0.000528193	0.00276395	3.33477E-05	0.000161009	0.000156179	0.000233283	12.65290615	9.46891E-06
																	TOTAL (Tons Per Year)		**0.94**	**3.48**	**0.03**	**0.22**	**0.22**	**0.29**	**10547.65**	**0.01**

On-Road Sources
Units for Non-Greenhouse Gases Emission: Short Ton
Units for Greenhouse Gases (CO2, CH4, and N2O) Emission: Metric Ton

																					MOVES Onroad Emission Factors (grams/mile)										MOVES Onroad Emission Factors (Tons Per Year)									
Scenario ID	Year	Project	Equipment	Equipment Category	MOVES Lookup	On-road Activity	Fuel	Roadway Type	Round Trip Distance (miles)	ance for fuglite	ember of Vehicl	yses Or M^{-1}	iber of Project)	Project Length	Project Width	Project Area	ht (Building Da	ight (Building D	Number of Tree	Activity Rate	VMT	CO_2	NO_x	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	N_2O	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	N_2O
1	2028	Runway Extension	Asphalt 18 Wheeler	Combination Short-haul Truck	DieselUrban Unrestricted AccessCombination Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	1416	100	--	--	--	--	--	2055	2.225668589	3.337426317	0.005395031	0.322857126	0.120208857	0.11116472	1612.84088	0.019351449	0.232627034	0.005041495	0.007558153	1.22212E-05	0.000731356	0.000672305	0.000251817	3.65350644	4.38361E-05	0.000526961
1	2028	Runway Extension	Cement Mixer	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	4	--	108	1416	100	--	--	--	--	--	32745	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.037437328	0.046098942	9.98193E-05	0.004417384	0.001828191	0.002764438	29.76911928	0.000478966	0.004169994
1	2028	Runway Extension	Dump Truck - Asphalt	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	1416	100	--	--	--	--	--	2911	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.003328144	0.004178162	8.87385E-06	0.000392701	0.000162524	0.000245736	2.646446976	4.25797E-05	0.000370709
1	2028	Runway Extension	Dump Truck Subbase Material	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	3	--	108	1416	100	--	--	--	--	--	17464	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.019966575	0.025096102	5.32376-05	0.002355938	0.000975035	0.001474367	15.87686362	0.000255449	0.002223997
1	2028	Runway Extension	Passenger Car	Passenger Car	GasolineUrban Unrestricted AccessPassenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	--	116.358	116.358	108	--	--	--	--	--	--	--	377000	3.082260668	0.074128223	0.002518995	0.027009869	0.007459344	0.093754566	368.0521426	0.009658195	0.00175249	1.280905962	0.030805728	0.00104683	0.011224504	0.003009906	0.038961916	128.018318	0.004013169	0.030728255
2	2028	Demolition - Concrete	Dump Truck	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	3	--	108	3439	100	--	--	--	--	--	21228	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.024269953	0.030485577	6.47111E-05	0.002863711	0.001185184	0.001792136	19.29878958	0.000310505	0.002703333
2	2028	Demolition - Concrete	Passenger Car	Passenger Car	GasolineUrban Unrestricted AccessPassenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	--	282.733	282.733	108	--	--	--	--	--	--	--	916055	3.082260668	0.074128223	0.002518995	0.027009869	0.007459344	0.093754566	368.0521426	0.009658195	0.00175249	3.112414619	0.074853424	0.00254363	0.027273907	0.007532319	0.094671773	311.0658364	0.009752681	0.001769553
3	2028	Access Road	Asphalt 18 Wheeler	Combination Short-haul Truck	DieselUrban Unrestricted AccessCombination Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	6615	25	--	--	--	--	--	2400	2.225668589	3.337426317	0.005395031	0.322857126	0.120208857	0.11116472	1612.84088	0.019351449	0.232627034	0.005887877	0.00882491	1.42729E-05	0.000854138	0.00031802	0.000294093	4.266868883	5.11964E-05	0.000615429
3	2028	Access Road	Cement Mixer	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	5	--	108	6615	25	--	--	--	--	--	38243	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.093725186	0.054890229	0.00011679	0.005159078	0.002155151	0.003228597	34.7674585	0.000559387	0.004670151
3	2028	Access Road	Dump Truck - Asphalt	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	6615	25	--	--	--	--	--	3399	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.003886074	0.004878589	1.03615E-05	0.000458534	0.000189771	0.000286954	0.990697311	4.97137E-05	0.000432854
3	2028	Access Road	Dump Truck Subbase Material	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	3	--	108	6615	25	--	--	--	--	--	20396	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.023318728	0.029274406	6.21766E-05	0.002751472	0.001138732	0.001721896	18.54134021	0.000298536	0.00259738
3	2028	Access Road	Passenger Car	Passenger Car	GasolineUrban Unrestricted AccessPassenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	--	86	86	108	--	--	--	--	--	--	--	278640	3.082260668	0.074128223	0.002518995	0.027009869	0.007459344	0.093754566	368.0521426	0.009658195	0.00175249	0.946715218	0.022768456	0.00077378	0.00829601	0.002291135	0.02879668	94.61810116	0.002966511	0.000538252
4	2028	Taxiways	Asphalt 18 Wheeler	Combination Short-haul Truck	DieselUrban Unrestricted AccessCombination Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	3693	100	--	--	--	--	--	5358	2.225668589	3.335742617	0.005395031	0.322857126	0.120208857	0.11116472	1612.84088	0.019351449	0.232627034	0.013144686	0.019701613	3.18642E-05	0.001906864	0.000709979	0.000656563	3.525784781	0.000114294	0.001373945
4	2028	Taxiways	Cement Mixer	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	10	--	108	3693	100	--	--	--	--	--	85401	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.097638884	0.122576168	0.00028035	0.011520813	0.004768036	0.007209827	77.83971769	0.001249174	0.010879604
4	2028	Taxiways	Dump Truck - Asphalt	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	3693	100	--	--	--	--	--	7595	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.008678783	0.010895372	2.31403E-05	0.001024045	0.000423814	0.000640857	6.901126415	0.000111035	0.000966695
4	2028	Taxiways	Dump Truck Subbase Material	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	6	--	108	3693	100	--	--	--	--	--	45547	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.052073843	0.06537367	0.000138845	0.006144406	0.002542941	0.003845224	41.40796761	0.000666223	0.005800297
4	2028	Taxiways	Passenger Car	Passenger Car	GasolineUrban Unrestricted AccessPassenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	--	860.706	860.706	108	--	--	--	--	--	--	--	2786687	3.082260668	0.074128223	0.002518995	0.027009869	0.007459344	0.093754566	368.0521426	0.009658195	0.00175249	9.474922561	0.227871438	0.00774343	0.08302819	0.022930153	0.288203156	946.9576108	0.029689457	0.005386936
5	2028	Terminal Apron	Asphalt 18 Wheeler	Combination Short-haul Truck	DieselUrban Unrestricted AccessCombination Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	564	100	--	--	--	--	--	818	2.225668589	3.335742617	0.005395031	0.322857126	0.120208857	0.11116472	1612.84088	0.019351449	0.232627034	0.002006785	0.003007824	4.86467E-06	0.000291119	0.000108392	0.000100237	1.454291144	1.74491E-05	0.000209759
5	2028	Terminal Apron	Cement Mixer	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	2	--	108	564	100	--	--	--	--	--	13043	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.01491205	0.018720635	3.97661E-05	0.001759534	0.000728206	0.001101132	11.85764614	0.000190792	0.001660904
5	2028	Terminal Apron	Dump Truck - Asphalt	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	564	100	--	--	--	--	--	1159	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.001325084	0.001663514	3.53308E-06	0.000156352	6.47083E-05	9.78465E-05	1.053698545	1.69529E-05	0.000147596
5	2028	Terminal Apron	Dump Truck Subbase Material	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	564	100	--	--	--	--	--	6956	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.007952788	0.009983956	2.12046E-05	0.000938382	0.000388361	0.000587248	6.323835508	0.000101747	0.000885829
5	2028	Terminal Apron	Passenger Car	Passenger Car	GasolineUrban Unrestricted AccessPassenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	--	76	76	108	--	--	--	--	--	--	--	246240	3.082260668	0.074128223	0.002518995	0.027009869	0.007459344	0.093754566	368.0521426	0.009658195	0.00175249	0.836632054	0.020120961	0.00068374	0.007331358	0.002024724	0.025448229	83.61599637	0.002621568	0.004475664
1	2028	Taxiways	Asphalt 18 Wheeler	Combination Short-haul Truck	DieselUrban Unrestricted AccessCombination Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	2033	100	--	--	--	--	--	2950	2.225668589	3.335742617	0.005395031	0.322857126	0.120208857	0.11116472	1612.84088	0.019351449	0.232627034	0.007237183	0.010847286	1.75438E-05	0.001049878	0.000390899	0.000361489	1.944693002	6.29277E-05	0.000756465
1	2028	Taxiways	Cement Mixer	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	6	--	108	2033	100	--	--	--	--	--	47013	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.053749916	0.067477921	0.000143314	0.006342174	0.00282479	0.003969988	42.74043685	0.000687667	0.005986968
1	2028	Taxiways	Dump Truck - Asphalt	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	1	--	108	2033	100	--	--	--	--	--	4179	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.004777847	0.005998124	1.27302E-05	0.000563758	0.000233318	0.000352805	3.79921055	6.11269E-05	0.000532185
1	2028	Taxiways	Dump Truck Subbase Material	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	3	--	108	2033	100	--	--	--	--	--	25074	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	0.028667581	0.035988746	7.64352E-05	0.003382547	0.00139951	0.002158828	22.79536233	0.000366761	0.003165111
1	2028	Taxiways	Passenger Car	Passenger Car	GasolineUrban Unrestricted AccessPassenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	--	473.825	473.825	108	--	--	--	--	--	--	--	1539193	3.082260668	0.074128223	0.002518995	0.027009869	0.007459344	0.093754566	368.0521426	0.009658195	0.00175249	5.216515563	0.125444927	0.00420828	0.045707638	0.01282322	0.158657988	521.39723	0.016342068	0.002965649
2	2028	Rehabilitate Runway	Asphalt 18 Wheeler	Combination Short-haul Truck	DieselUrban Unrestricted AccessCombination Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	2	--	108	11	121	100	--	--	--	--	--	2.225668589	3.335742617	0.005395031	0.322857126	0.120208857	0.11116472	1612.84088	0.019351449	0.232627034	--	--	--	--	--	--	--	--	--	--
2	2028	Rehabilitate Runway	Cement Mixer	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	30	--	108	11	121	100	--	--	--	--	--	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	--	--	--	--	--	--	--	--	--	--
2	2028	Rehabilitate Runway	Dump Truck - Asphalt	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	3	--	108	11	121	100	--	--	--	--	--	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	--	--	--	--	--	--	--	--	--	--
2	2028	Rehabilitate Runway	Dump Truck Subbase Material	Single Unit Short-haul Truck	DieselUrban Unrestricted AccessSingle Unit Short-haul Truck	Material Delivery	Diesel	Urban Unrestricted Access	40	5	16	--	108	11	121	100	--	--	--	--	--	1.037178052	1.302076661	0.002765433	0.122380895	0.050648899	0.076587049	824.7350627	0.01326947	0.115527111	--	--	--	--	--	--	--	--	--	--
2	2028	Rehabilitate Runway	Passenger Car	Passenger Car	GasolineUrban Unrestricted AccessPassenger Car	Employee Commute	Gasoline	Urban Unrestricted Access	30	--	669.933	669.933	108	--	--	--	--	--	--	--	2175583	3.082260668	0.074128223	0.002518995	0.027009869	0.007459344	0.093754566	368.0521426	0.009658195	0.00175249	7.374834765	0.177396426	0.00607125	0.064625244	0.017847754	0.224323802	737.0673337	0.023108879	0.004192938
																											TOTAL (Tons Per Year)														
																												28.70146503	**1.263600337**	**0.024297123**	**0.302551034**	**0.090037478**	**0.892162641**	**3185.305322**	**0.094233166**	**0.006957423**

Fugitive Sources
Units for Non-Greenhouse Gases Emission: Short Ton

Scenario ID	Year	Project	Fugitive Source Type	Number of Months	CO	NOx	SO_2	PM_{10}	VOC
1	2028	Runway Extension	Asphalt Drying	5	0	0	0	0	0.16848
1	2028	Runway Extension	Asphalt Storage and Batching	5	0.3426	0.0214	0.003936	0.02345	0.0106
1	2028	Runway Extension	Material Movement (Paved Roads)	5	0	0	0	0.02255	0
1	2028	Runway Extension	Material Movement (Unpaved Roads)	5	0	0	0	0.07335	0
1	2028	Runway Extension	Soil Handling	5	0	0	0	0.0401	0
1	2028	Runway Extension	Unstabilized Land and Wind Erosion	5	0	0	0	2.38E-08	0
2	2028	Demolition - Concrete	Material Movement (Paved Roads)	5	0	0	0	0.0075	0
2	2028	Demolition - Concrete	Material Movement (Unpaved Roads)	5	0	0	0	0.03005	0
2	2028	Demolition - Concrete	Soil Handling	5	0	0	0	0.09735	0
2	2028	Demolition - Concrete	Unstabilized Land and Wind Erosion	5	0	0	0	5.78E-08	0
3	2028	Access Road	Asphalt Drying	5	0	0	0	0	0.19708
3	2028	Access Road	Asphalt Storage and Batching	5	0.40015	0.025	0.004597	0.0274	0.0124
3	2028	Access Road	Concrete Mixing/Batching	5	0	0	0	0.1415	0
3	2028	Access Road	Material Movement (Paved Roads)	5	0	0	0	0.02505	0
3	2028	Access Road	Material Movement (Unpaved Roads)	5	0	0	0	0.0896	0
3	2028	Access Road	Soil Handling	5	0	0	0	0.0468	0
3	2028	Access Road	Unstabilized Land and Wind Erosion	5	0	0	0	2.78E-08	0
4	2028	Taxiways	Asphalt Drying	5	0	0	0	0	0.440388
4	2028	Taxiways	Asphalt Storage and Batching	5	0.89355	0.0558	0.01025	0.0612	0.02765
4	2028	Taxiways	Concrete Mixing/Batching	5	0	0	0	0.316	0
4	2028	Taxiways	Material Movement (Paved Roads)	5	0	0	0	0.0451	0
4	2028	Taxiways	Material Movement (Unpaved Roads)	5	0	0	0	0.15075	0
4	2028	Taxiways	Soil Handling	5	0	0	0	0.10455	0
4	2028	Taxiways	Unstabilized Land and Wind Erosion	5	0	0	0	6.21E-08	0
5	2028	Terminal Apron	Asphalt Drying	5	0	0	0	0	0.06708
5	2028	Terminal Apron	Asphalt Storage and Batching	5	0.13645	0.0085	0.001568	0.00935	0.004226
5	2028	Terminal Apron	Concrete Mixing/Batching	5	0	0	0	0.04825	0
5	2028	Terminal Apron	Material Movement (Paved Roads)	5	0	0	0	0.01255	0
5	2028	Terminal Apron	Material Movement (Unpaved Roads)	5	0	0	0	0.0397	0
5	2028	Terminal Apron	Soil Handling	5	0	0	0	0.01595	0
5	2028	Terminal Apron	Unstabilized Land and Wind Erosion	5	0	0	0	9.48E-09	0
1	2028	Taxiways	Asphalt Drying	5	0	0	0	0	0.24232
1	2028	Taxiways	Asphalt Storage and Batching	5	0.4919	0.0307	0.00565	0.0337	0.01525
1	2028	Taxiways	Material Movement (Paved Roads)	5	0	0	0	0.02755	0
1	2028	Taxiways	Material Movement (Unpaved Roads)	5	0	0	0	0.09105	0
1	2028	Taxiways	Soil Handling	5	0	0	0	0.05755	0
1	2028	Taxiways	Unstabilized Land and Wind Erosion	5	0	0	0	3.42E-08	0
2	2028	Rehabilitate Runway	Asphalt Drying	5	0	0	0	0	1.326
2	2028	Rehabilitate Runway	Asphalt Storage and Batching	5	2.6908	0.168	0.0309	0.18425	0.08335
2	2028	Rehabilitate Runway	Concrete Mixing/Batching	5	0	0	0	0.95155	0
2	2028	Rehabilitate Runway	Material Movement (Paved Roads)	5	0	0	0	0.1278	0
2	2028	Rehabilitate Runway	Material Movement (Unpaved Roads)	5	0	0	0	0.4068	0
2	2028	Rehabilitate Runway	Soil Handling	5	0	0	0	0.31475	0
2	2028	Rehabilitate Runway	Unstabilized Land and Wind Erosion	5	0	0	0	1.87E-07	0
				TOTAL (Tons Per Year)	***4.955***	***0.309***	***0.057***	***3.623***	***2.595***

Total Construction Emissions by Emissions Source

Emission Source	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2	CH_4	N_2O	CO_2e	
NonRoad	0.943	3.477	0.028	0.223	0.216	0.285	10547.654	0.015	--	--	
OnRoad	28.701	1.264	0.024	0.303	0.091	0.892	3185.305	0.094	0.067	--	
Fugitive	4.955	0.309	0.057	3.623	--	2.595	--	--	--	--	
	34.60	***5.05***	***0.109***	***4.15***	***0.31***	***3.77***	***12458.33***	***0.099***	***0.06***	***12,477.87***	***GHG totals presented in row 563 are in metric tons per year***

FINAL

Aviation Greenhouse Gas Emissions Technical Report

Airlake Airport
Environmental Assessment
Runway Extension

August 2026

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HMMH Report No: 25-0104A.005

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1. Introduction

Harris Miller Miller & Hanson Inc. (HMMH), as a subconsultant to Mead & Hunt, is assisting the Airlake Airport (LVN) on the Environmental Assessment (EA) for the proposed Runway Extension ("Proposed Action") at Airlake Airport in Dakota County, Minnesota. The Proposed Action will consist of rehabilitating and extending the existing runway and associated taxiways at the airport as described below.

The Proposed Action includes five elements: (1) extend both runway ends to result in a runway length of 4,850 feet, including connector taxiway extensions and rehabilitating the existing runway pavement; (2) displace the Runway 12 end for additional clearance over railroad tracks; (3) relocate 225th Street to accommodate runway changes; (4) modify some taxiway configurations; and (5) expand the aircraft parking apron.

The EA also evaluates the No Action Alternative, which represents the conditions that would occur if the Proposed Action were not implemented and provides a baseline for comparison with the Proposed Action.

This Aviation Greenhouse Gas Emissions Technical Report was prepared to support the EA. The Federal Aviation Administration (FAA) is the lead agency for the environmental review of the Proposed Action. This report describes the methodology and assumptions used to evaluate greenhouse gas (GHG) emissions associated with construction and demolition activities for the Proposed Action and the net change in GHG emissions associated with changes in aircraft operations. **Attachment A** provides the supporting emission calculation spreadsheets.

2. Greenhouse Gases

GHG emissions were evaluated outside of the National Environmental Policy Act (NEPA) analysis for disclosure and transparency for state reporting purposes.

GHG emissions result from anthropogenic sources, including the combustion of fossil fuels. Other emissions include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and fluorinated gases (U.S. EPA 2026a).

Transportation is a major source of GHG emissions in the United States, with most transportation-related emissions resulting from the combustion of petroleum-based fuels in internal combustion engines. Passenger cars and light-duty trucks, including sports utility vehicles, pickup trucks and minivans, account for over half of transportation-related emissions. Other modes of transportation, including freight trucks, commercial aircraft, ships, boats, and trains, account for the remaining transportation-related emissions (U.S. EPA 2026b). In addition to CO_2, small amounts of methane (CH_4) and nitrous oxide (N_2O) are also emitted during fuel combustion, and some hydrofluorocarbon (HFC) emissions occur due to the use of mobile air conditioners and refrigerated transport.

2.1.1 Methodology

For this analysis, emissions associated with the Proposed Action were calculated for CO_2, CH_4, and N_2O and are presented as carbon dioxide equivalent (CO_2e) in metric tons per year based on their respective global warming potentials (GWPs). CO_2e is calculated by multiplying the mass of each pollutant (tons per year) by its GWP and summing the resulting values. Based on the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report, the GWPs used in this analysis are 1 for CO_2, 29.8 for CH_4, and 273 for N_2O (IPCC 2021).

The methodology and assumptions for the analysis are consistent with the air quality analysis discussed in Section 3.2 of the *Aviation Emissions Technical Report* for the Proposed Action. The methodology used to estimate emissions associated with aircraft operations is discussed in the following section.

2.1.2 Aircraft Operations

The FAA Aviation Environmental Design Tool (AEDT) version 4a was used to estimate emissions from auxiliary power units (APUs), ground support equipment (GSE), and aviation activities, including aircraft takeoffs, landings, and ground emissions from aircraft taxiing and idling. AEDT is the required tool for the environmental review of infrastructure projects and other federal actions affecting airports and airspace in the United States (FAA 2024; FAA 2026). The analysis includes an assessment of criteria and CO_2, CH_4, and N_2O air pollutants from these sources for the opening and five-year forecast Proposed Action and No Action Alternative.

The AEDT model estimated emissions for each condition using the same set of model inputs and forecast operations that were used for the noise calculations, as documented in the *Noise Technical Report* for the Proposed Action. In addition, the aircraft operational emission estimates include emissions from GSE and APUs.

The AEDT default taxi times and AEDT default GSE equipment were assumed for the Proposed Action and No Action Alternatives. Aircraft operations emissions were estimated from full flight tracks (below 10,000 feet for departures and below 6,000 feet for arrivals) and include:

- Start up
- Taxi out
- Climb below the mixing height
- Descent below the mixing height
- Taxi in
- GSE
- Landing and takeoff (LTO)

The aircraft engine emission factors are included in AEDT and are based on the most recent version of the International Civil Aviation Organization (ICAO) Engine Emissions Databank. Therefore, through AEDT, the ICAO emission factors are used to estimate emissions from aircraft engines (FAA 2026).

2.1.2.1 Ground Support Equipment (GSE)

GSE at airports such as LVN include baggage tractors, aircraft pushback tractors, diesel and gasoline ground power units that provide services to aircraft while they are on the ground being loaded with passengers and cargo. GSE emissions were estimated using emission factors from FAA's AEDT model.

2.1.2.2 Auxiliary Power Units (APU)

APUs are small utility engines incorporated into the airframe of an aircraft that operate on jet fuel and are used to provide power for lights and navigational equipment and heated/cooled air to the passenger areas of the aircraft while it is parked on the ground. Emissions of criteria pollutants and CO_2, CH_4, and N_2O from APUs were estimated using the FAA's recommended APU time for each aircraft operation being modeled for the Proposed Action and No Action Alternatives. For this analysis, aircraft ground operations were modeled using AEDT's 26-minute default APU time, or 13 minutes per arrival and 13 minutes per departure.

2.1.3 Proposed Action GHG Emission Summary

Table 1-1 presents the annual CO_2, CH_4, and N_2O emissions associated with construction activities of the Proposed Action in 2028 and operational emissions for the Proposed Action and No Action Alternative for the future 2033 Operational Year. Increases in construction emissions of the Proposed Action would be temporary. In 2033, operational emissions under the Proposed Action would be approximately 374 metric tons of CO_2e per year higher than under the No Action Alternative.

Table 2-1. Annual CO_2, CH_4, and N_2O Emissions Associated with Construction and Operations for the Proposed Action and No Action Alternative

Year	Pollutant (metric tons/year)			CO_2e (metric tons/year) [2]
	CO_2	CH_4	N_2O	
Construction [1]				
2028	12,458	0.10	0.06	12,478
Operational [3,4,5]				
2033 No Action	1,402	0.0001	--	1,402
2033 Proposed Action	1,776	0.0001	--	1,776
2033 Change (Proposed Action-No Action)	**374**	**0**	**--**	**374**

Source: HMMH, 2026
Notes:
1. Construction emissions are derived from ACEIT and MOVES.
2. CO_2e was calculated using GWP values from the IPCC Sixth Assessment Report.
3. Aircraft CO_2 emissions were derived from AEDT full fuel burn consistent with FAA AQ Handbook Version 4 and includes all aircraft modes, including GSE and APUs.
4. Based on the nature of operations at LVN, no aircraft that use APU's operate at LVN. Therefore, APU emissions were not reported.
5. AEDT does not report CH_4 and N_2O emissions for aircraft. Therefore, CH_4 and N_2O aircraft emissions were not included in the table. GSE CO_2 and CH_4 emissions were calculated externally using MOVES NONROAD emission factors and were added to the aircraft totals. MOVES NONROAD does not output N_2O emission factors for GSE. Therefore, N_2O emissions were not included.

2.1.4 Mitigation

Various initiatives and strategies exist to reduce aviation-related greenhouse gas emissions. These broader aviation industry initiatives are not specific mitigation measures proposed for the Proposed Action at LVN. They include:

- Sustainable Aviation Fuel
- Develop New Aircraft and Engine Technologies
- Increase Operations Efficiency
- Reduce Airport Emissions and Improve Fuel Efficiency

3. References

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Attachment A Air Emissions Spreadsheet Calculations

2025 Existing Conditions Aircraft Emissions

FAA AEDT CO2 Emission Rate **3.16** kg CO2/ kg Fuel

Emissions in the table below are in tons per day

Operation Group	Mode	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	Pb (ST)	CO_2
LVN_2025	Startup	0	0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	N/A	N/A	0.0000	0.0000
LVN_2025	Taxi Out	0	0	0.02	***0.07***	0.00	0.00	***0.002***	0.00	***0.000***	1.05E-04	3.86E-06	1.83E-05	***2.23E-05***	***0.00***	0.00	6.38E+15	***0.0001***	***0.2486***
LVN_2025	Climb Ground	0	14	0.01	0.09	0.00	0.00	0.003	0.00	0.000	1.31E-04	4.77E-06	4.03E-05	4.53E-05	0.00	0.00	6.70E+15	0.0001	0.3120
LVN_2025	Climb Below 1000 ft AFE	0	174	0.03	0.16	0.00	0.00	0.003	0.00	0.001	2.47E-04	8.08E-06	1.30E-04	1.38E-04	0.00	0.00	6.90E+15	0.0001	0.5868
LVN_2025	Climb Below Mixing Height (3000 ft AFE)	0	501	0.03	***0.29***	0.01	0.01	***0.005***	0.00	***0.001***	4.23E-04	1.46E-05	2.54E-04	***2.68E-04***	***0.00***	0.00	7.50E+15	***0.0002***	***1.0064***
LVN_2025	Climb Below 10000 ft AFE	1	1,620	0.04	0.73	0.01	0.01	0.009	0.01	0.003	9.71E-04	2.94E-05	2.66E-04	2.96E-04	0.00	0.00	9.03E+15	0.0005	2.3063
LVN_2025	Above 10000 ft AFE	0	0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	N/A	N/A	0.0000	0.0000
LVN_2025	Descend Below 10000 ft AFE	1	1,350	0.02	0.59	0.01	0.01	0.007	0.01	0.002	7.97E-04	2.56E-05	3.50E-04	3.76E-04	0.00	0.00	1.21E+16	0.0004	1.8962
LVN_2025	Descend Below Mixing Height (3000 ft AFE)	0	715	0.01	***0.37***	0.01	0.01	***0.005***	0.00	***0.001***	5.15E-04	1.80E-05	3.44E-04	***3.62E-04***	***0.00***	0.00	9.11E+15	***0.0003***	***1.2241***
LVN_2025	Descend Below 1000 ft AFE	0	294	0.01	0.18	0.00	0.00	0.003	0.00	0.001	2.62E-04	8.63E-06	1.52E-04	1.61E-04	0.00	0.00	6.09E+15	0.0001	0.6215
LVN_2025	Descend Ground	0	7	0.02	0.03	0.00	0.00	0.001	0.00	0.000	5.32E-05	1.96E-06	1.41E-05	1.62E-05	0.00	0.00	3.46E+15	0.0000	0.1265
LVN_2025	Taxi In	0	0	0.01	***0.03***	0.00	0.00	***0.001***	0.00	***0.000***	4.45E-05	1.64E-06	7.77E-06	***9.48E-06***	***0.00***	0.00	3.17E+15	***0.0000***	***0.1057***
LVN_2025	Full Flight	1	2,960	0.02	1.31	0.02	0.02	0.016	0.02	0.005	1.77E-03	5.51E-05	6.16E-04	6.72E-04	0.00	0.00	2.11E+16	0.0009	4.1962
LVN_2025	GSE LTO	N/A	N/A	0.04	***0.0017***	0.00	0.00	***0.000***	0.00	***0.000***	7.87E-08	N/A	N/A	***0.00***	***0.00***	N/A	N/A	***N/A***	***#VALUE!***

	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	Pb (ST)	CO_2
Flight below mixing height	0.59	1,216.00	0.00	0.56	0.01	0.01	0.01	0.01	0.00	0.00	2.71E-05	0.00	0.00	0.00	0.00	7.06E+15	0.00	1.88
Taxi	0.11	0.00	0.04	0.10	0.00	0.00	0.00	0.00	0.00	0.00	5.50E-06	0.00	0.00	0.00	0.00	9.55E+15	0.00	0.35
SUBTOTAL: Aircraft (Flight+taxi)	**0.71**	**1,216.00**	**0.04**	**0.66**	**0.01**	**0.01**	**0.00934**	**0.0097**	**0.0023**	**0.00**	**3.26E-05**	**0.00**	**0.00**	**0.00**	**0.00**	**1.66E+16**	**0.0005**	**2.2306**
GSE	N/A	N/A	0.04	0.00	0.00	0.00	0.00005	0.0000	0.0000	0.00	N/A	N/A	0.00	0.00	N/A	N/A	N/A	
Total	**0.71**	**1,216.00**	**0.08**	**0.66**	**0.01**	**0.01**	**0.00939**	**0.0098**	**0.0023**	**0.00**	**3.26E-05**	**0.00**	**0.00**	**0.00**	**0.00**	**1.66E+16**	**0.00**	**2.23**

AEDT Emissions Summary by Operational Mode

Calendar Year	Operational Category	CO *(tons/year)*	VOC *(tons/year)*	NO_x *(tons/year)*	SO_x *(tons/year)*	PM_{10} *(tons/year)*	$PM_{2.5}$ *(tons/year)*	Pb *(tons/year)*	CO_2 *Metric Tons/year)*	CH_4 *Metric Tons/year)*	CO_2e *Metric Tons/year)*
2025 Baseline Emissions	Aircraft	239.44	3.41	0.85	0.34	0.230	0.230	0.17	1,389	--	1,389
	GSE	0.62	0.02	0.01	0.00	0.001	0.000	--	80	7.78E-05	80
	TOTAL	**240.06**	**3.43**	**0.86**	**0.34**	**0.23**	**0.23**	**0.17**	**1,469.14**	**7.78E-05**	**1,469.14**

2033 No Action Aircraft Emissions

FAA AEDT CO2 Emission Rate ***3.16*** kg CO2/ kg Fuel

****Emissions in the table below are in tons per day****

Operation Group	Mode	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	Pb (ST)	CO_2
2033_NA	Startup	0	0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	N/A	N/A	0.0000	0.0000
2033_NA	Taxi Out	0	0	0.02	***0.06***	0.00	0.00	***0.002***	0.00	***0.000***	1.02E-04	3.75E-06	1.77E-05	***2.16E-05***	***0.00***	0.00	8.27E+15	***0.0000***	***0.2420***
2033_NA	Climb Ground	0	13	0.01	0.08	0.00	0.00	0.003	0.00	0.000	1.28E-04	4.64E-06	3.81E-05	4.30E-05	0.00	0.00	8.68E+15	0.0001	0.3045
2033_NA	Climb Below 1000 ft AFE	0	165	0.03	0.15	0.00	0.00	0.003	0.00	0.001	2.43E-04	7.76E-06	1.21E-04	1.29E-04	0.00	0.00	8.94E+15	0.0001	0.5774
2033_NA	Climb Below Mixing Height (3000 ft AFE	0	469	0.03	***0.27***	0.01	0.01	***0.005***	0.00	***0.001***	4.09E-04	1.39E-05	2.36E-04	***2.50E-04***	***0.00***	0.00	9.72E+15	***0.0002***	***0.9717***
2033_NA	Climb Below 10000 ft AFE	1	1,500	0.04	0.67	0.01	0.01	0.009	0.01	0.002	9.24E-04	2.78E-05	2.48E-04	2.76E-04	0.00	0.00	1.17E+16	0.0005	2.1959
2033_NA	Above 10000 ft AFE	0	0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	N/A	N/A	0.0000	0.0000
2033_NA	Descend Below 10000 ft AFE	1	1,250	0.02	0.55	0.01	0.01	0.007	0.01	0.002	7.57E-04	2.41E-05	3.26E-04	3.50E-04	0.00	0.00	1.56E+16	0.0004	1.7984
2033_NA	Descend Below Mixing Height (3000 ft A	0	667	0.01	***0.34***	0.01	0.01	***0.004***	0.00	***0.001***	4.92E-04	1.70E-05	3.20E-04	***3.37E-04***	***0.00***	0.00	1.18E+16	***0.0002***	***1.1705***
2033_NA	Descend Below 1000 ft AFE	0	277	0.01	0.16	0.00	0.00	0.003	0.00	0.001	2.54E-04	8.18E-06	1.41E-04	1.50E-04	0.00	0.00	7.89E+15	0.0001	0.6058
2033_NA	Descend Ground	0	7	0.02	0.03	0.00	0.00	0.001	0.00	0.000	5.19E-05	1.92E-06	1.35E-05	1.55E-05	0.00	0.00	4.48E+15	0.0000	0.1234
2033_NA	Taxi In	0	0	0.01	***0.03***	0.00	0.00	***0.001***	0.00	***0.000***	4.36E-05	1.61E-06	7.59E-06	***9.28E-06***	***0.00***	0.00	4.10E+15	***0.0000***	***0.1038***
2033_NA	Full Flight	1	2,760	0.02	1.22	0.02	0.02	0.015	0.02	0.004	1.68E-03	5.20E-05	5.73E-04	6.26E-04	0.00	0.00	2.73E+16	0.0008	4.0069
2033_NA	GSE LTO	N/A	N/A	0.04	***0.00***	0.00	0.00	***0.000***	0.00	***0.000***	7.42E-08	N/A	N/A	***0.00***	***0.00***	N/A	N/A	***N/A***	***#VALUE!***

	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	Pb (ST)	CO_2
Flight below mixing height	0.57	1,136.00	0.00	0.52	0.01	0.01	0.01	0.01	0.00	0.00	2.55E-05	0.00	0.00	0.00	0.00	9.15E+15	0.00	1.80
Taxi	0.11	0.00	0.04	0.09	0.00	0.00	0.00	0.00	0.00	0.00	5.36E-06	0.00	0.00	0.00	0.00	1.24E+16	0.00	0.35
SUBTOTAL: Aircraft (Flight+taxi)	**0.68**	**1,136.00**	**0.04**	**0.61**	**0.01**	**0.01**	**0.00893**	**0.0093**	**0.0023**	**0.00**	**3.09E-05**	**0.00**	**0.00**	**0.00**	**0.00**	**2.15E+16**	**0.0004**	**2.1422**
GSE	N/A	N/A	0.04	0.00	0.00	0.00	0.00006	0.0001	0.0000	0.00	N/A	N/A	0.00	0.00	N/A	N/A	N/A	#VALUE!
Total	**0.68**	**1,136.00**	**0.08**	**0.61**	**0.01**	**0.01**	**0.00899**	**0.0094**	**0.0023**	**0.00**	**3.09E-05**	**0.00**	**0.00**	**0.00**	**0.00**	**2.15E+16**	**0.00**	**#VALUE!**

AEDT Emissions Summary by Operational Mode

Calendar Year	Operational Category	CO *(tons/year)*	VOC *(tons/year)*	NO_x *(tons/year)*	SO_x *(tons/year)*	PM_{10} *(tons/year)*	$PM_{2.5}$ *(tons/year)*	Pb *(tons/year)*	CO_2 *Metric Tons/year)*	CH4 *Metric Tons/year)*	CO2e *Metric Tons/year)*
2033 No Action Emissions	Aircraft	223.38	3.26	0.84	0.33	0.214	0.214	0.16	1,327	--	1,327
	GSE	0.75	0.02	0.01	0.00	0.001	0.000	--	75	0.0001	75
	TOTAL	***224.13***	***3.28***	***0.85***	***0.33***	***0.21***	***0.21***	***0.16***	***1,402***	***0.0001***	***1,402***

2033 Proposed Action Aircraft Emissions

FAA AEDT CO2 Emission Rate *3.16* kg CO2/ kg Fuel

Operation Group	Mode	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	Pb (ST)	CO_2
2033_PA_V2	Startup	0	0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	N/A	N/A	0.0000	0.0000
2033_PA_V2	***Taxi Out***	***0***	0	0.02	***0.07***	0.00	0.00	***0.004***	0.00	***0.000***	1.80E-04	6.64E-06	2.88E-05	***3.67E-05***	***0.00***	0.00	5.65E+16	***0.0000***	***0.4291***
2033_PA_V2	Climb Ground	0	13	0.01	0.08	0.00	0.01	0.005	0.00	0.001	2.30E-04	8.39E-06	4.94E-05	5.95E-05	0.00	0.00	5.94E+16	0.0001	0.5458
2033_PA_V2	Climb Below 1000 ft AFE	0	167	0.03	0.15	0.01	0.01	0.005	0.01	0.001	3.65E-04	1.22E-05	1.32E-04	1.47E-04	0.00	0.00	6.12E+16	0.0001	0.8676
2033_PA_V2	***Climb Below Mixing Height (3000 ft AFE***	***0***	476	0.03	***0.27***	0.01	0.01	***0.007***	0.01	***0.002***	5.79E-04	2.01E-05	2.48E-04	***2.71E-04***	***0.00***	0.00	6.66E+16	***0.0002***	***1.3756***
2033_PA_V2	Climb Below 10000 ft AFE	1	1,530	0.04	0.68	0.01	0.01	0.011	0.01	0.005	1.20E-03	3.71E-05	2.62E-04	3.04E-04	0.00	0.00	8.04E+16	0.0005	2.8616
2033_PA_V2	Above 10000 ft AFE	0	0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	N/A	N/A	0.0000	0.0000
2033_PA_V2	Descend Below 10000 ft AFE	1	1,300	0.03	0.56	0.01	0.01	0.008	0.01	0.003	9.37E-04	3.03E-05	3.47E-04	3.80E-04	0.00	0.00	1.09E+17	0.0004	2.2274
2033_PA_V2	***Descend Below Mixing Height (3000 ft A***	***0***	697	0.02	***0.35***	0.01	0.01	***0.006***	0.01	***0.002***	6.28E-04	2.20E-05	3.40E-04	***3.64E-04***	***0.00***	0.00	8.19E+16	***0.0002***	***1.4923***
2033_PA_V2	Descend Below 1000 ft AFE	0	295	0.02	0.17	0.00	0.00	0.004	0.00	0.001	3.39E-04	1.13E-05	1.56E-04	1.69E-04	0.00	0.00	5.46E+16	0.0001	0.8045
2033_PA_V2	Descend Ground	0	7	0.02	0.03	0.00	0.00	0.002	0.00	0.000	9.48E-05	3.50E-06	1.96E-05	2.37E-05	0.00	0.00	3.09E+16	0.0000	0.2253
2033_PA_V2	***Taxi In***	***0***	0	0.01	***0.03***	0.00	0.00	***0.002***	0.00	***0.000***	8.24E-05	3.04E-06	1.31E-05	***1.67E-05***	***0.00***	0.00	2.80E+16	***0.0000***	***0.1959***
2033_PA_V2	Full Flight	2	2,830	0.02	1.23	0.02	0.02	0.019	0.02	0.007	2.14E-03	6.74E-05	6.08E-04	6.84E-04	0.00	0.00	1.89E+17	0.0008	5.0796
2033_PA_V2	GSE LTO	N/A	N/A	0.04	***0.01***	0.00	0.00	***0.000***	0.00	***0.000***	9.44E-08	N/A	N/A	0.00	***0.00***	N/A	N/A	***N/A***	***#VALUE!***

	Fuel (ST)	Distance (mi)	Duration	CO (ST)	THC (ST)	TOG (ST)	VOC (ST)	NMHC (ST)	NOx (ST)	SOx (ST)	PMSO (ST)	PMFO (ST)	PM10 (ST)	PM2.5 (ST)	nvPM Mass (ST)	nvPM Number	Pb (ST)	CO_2
Flight below mixing height	0.71	1,173.00	0.01	0.53	0.01	0.01	0.01	0.01	0.00	0.00	3.24E-05	0.00	0.00	0.00	0.00	6.40E+16	0.00	2.24
Taxi	0.20	0.00	0.04	0.10	0.01	0.01	0.01	0.01	0.00	0.00	9.68E-06	0.00	0.00	0.00	0.00	8.45E+16	0.00	0.63
SUBTOTAL: Aircraft (Flight+taxi)	**0.91**	**1,173.00**	**0.04**	**0.62**	**0.01**	**0.01**	**0.01254**	**0.0129**	**0.0040**	**0.00**	**4.21E-05**	**0.00**	**0.00**	**0.00**	**0.00**	**1.49E+17**	**0.0004**	**2.8679**
GSE	N/A	N/A	0.04	0.01	0.00	0.00	0.00026	0.0002	0.0001	0.00	N/A	N/A	0.00	0.00	N/A	N/A	N/A	#VALUE!
Total	**0.91**	**1,173.00**	**0.08**	**0.63**	**0.01**	**0.01**	**0.01280**	**0.0132**	**0.0041**	**0.00**	**4.21E-05**	**0.00**	**0.00**	**0.00**	**0.00**	**1.49E+17**	**0.00**	**#VALUE!**

AEDT Emissions Summary by Operational Mode

Calendar Year	Operational Category	CO *(tons/year)*	VOC *(tons/year)*	NO_x *(tons/year)*	SO_x *(tons/year)*	PM_{10} *(tons/year)*	$PM_{2.5}$ *(tons/year)*	Pb *(tons/year)*	CO_2 *Metric Tons/year)*	CH_4 *Metric Tons/year)*	CO_2e *Metric Tons/year)*
2033 Proposed Action Emissions	Aircraft	227.76	4.58	1.45	0.44	0.232	0.232	0.16	1,682	--	1,682
	GSE	3.51	0.09	0.04	0.00	0.002	0.002	--	94	0	94
	TOTAL	***231.27***	***4.67***	***1.48***	***0.44***	***0.23***	***0.23***	***0.16***	***1,776***	***0.0001***	***1,776***

2025 Baseline GSE GHG Emissions

TEXN2 Lookup	TEXN2 Equip	Duration	Annual Duration	Duration Hours	HP	Load Factor	CO2 Emission Factor	CH4 Emission Factor	CO2 Final	CH4 Final	CO2e
Diesel - F750, Dukes Transportation Services, DART 3000 to 6000 gallon - Fuel Truck175	Off-highway Trucks300	529.491277	193264.3161	3221.071935	175	0.25	536.8047473	0.00038524	83.38757843	5.98434E-05	83.38936176
Diesel - Stewart & Stevenson TUG MC - Aircraft Tractor86	Airport Support Equipment100	1.15373022	421.1115303	7.018525505	86	0.8	596.0814101	0.002364915	0.317282728	1.2588E-06	0.317320241
Diesel - TLD, 28 VDC - Ground Power Unit71	Airport Support Equipment75	2.82985992	1032.898871	17.21498118	71	0.75	595.942243	0.010510858	0.602194616	1.06211E-05	0.602511126
Gasoline - Stewart & Stevenson TUG MA 50 - Baggage Tractor107	Airport Support Equipment100	2.47612743	903.786512	15.06310853	107	0.55	596.0814101	0.002364915	0.582469492	2.31091E-06	0.582538357
Gasoline - TLD - Ground Power Unit107	Airport Support Equipment100	9.22984176	3368.892242	56.14820404	107	0.75	596.0814101	0.002364915	2.960690575	1.17464E-05	2.961040617
							TOTAL (Metric Tons Per Year)		***79.69639806***	***7.78188E-05***	***79.69871706***

2033 No Action GSE GHG Emissions

TEXN2 Lookup	TEXN2 Equip	Duration	Annual Duration	Duration Hours	HP	Load Factor	CO2 Emission Factor	CH4 Emission Factor	CO2 Final	CH4 Final	CO2e
Diesel - F750, Dukes Transportation Services, DART 3000 to 6000 gallon - Fuel Truck175	Off-highway Trucks300	491.9812421	179573.1534	2992.88589	175	0.25	536.8032217	0.000361585	77.48004472	5.21897E-05	77.48159997
Diesel - Stewart & Stevenson TUG MC - Aircraft Tractor86	Airport Support Equipment100	1.38960491	507.2057922	8.453429869	86	0.8	596.1325338	0.000662135	0.382182458	4.24497E-07	0.382195108
Diesel - TLD, 28 VDC - Ground Power Unit71	Airport Support Equipment75	3.17808216	1159.999988	19.33333314	71	0.75	595.9953897	0.009019076	0.676356674	1.02352E-05	0.676661682
Gasoline - Stewart & Stevenson TUG MA 50 - Baggage Tractor107	Airport Support Equipment100	2.78082189	1014.99999	16.9166665	107	0.55	596.1325338	0.000662135	0.654200108	7.26632E-07	0.654221762
Gasoline - TLD - Ground Power Unit107	Airport Support Equipment100	11.11683928	4057.646337	67.62743895	107	0.75	596.1325338	0.000662135	3.566295611	3.96115E-06	3.566413653
							TOTAL (Metric Tons Per Year)		***75.0777956***	***6.12687E-05***	***75.0796214***

2033 Proposed Action GSE GHG Emissions

TEXN2 Lookup	TEXN2 Equip	Duration	Annual Duration	Duration Hours	HP	Load Factor	CO2 Emission Factor	CH4 Emission Factor	CO2 Final	CH4 Final	CO2e
Diesel - F750, Dukes Transportation Services, DART 3000 to 6000 gallon - Fuel Truck175	Off-highway Trucks300	514.2672626	187707.5509	3128.459181	175	0.25	536.8032217	0.000361585	80.98977581	5.45538E-05	80.99140152
Diesel - Stewart & Stevenson TUG MC - Aircraft Tractor86	Airport Support Equipment100	6.5364525	2385.805163	39.76341938	86	0.8	596.1325338	0.000662135	1.797717801	1.99676E-06	1.797777304
Diesel - TLD, 28 VDC - Ground Power Unit71	Airport Support Equipment75	9.97260272	3639.999993	60.66666655	71	0.75	595.9953897	0.009019076	2.122360615	3.21172E-05	2.123317709
Gasoline - Stewart & Stevenson TUG MA 50 - Baggage Tractor107	Airport Support Equipment100	8.72602738	3184.999994	53.08333323	107	0.55	596.1325338	0.000662135	2.052834839	2.28012E-06	2.052902787
Gasoline - TLD - Ground Power Unit107	Airport Support Equipment100	52.29162	19086.4413	318.107355	107	0.75	596.1325338	0.000662135	16.77521553	1.86325E-05	16.77577078
							TOTAL (Metric Tons Per Year)		***94.10947098***	***9.94097E-05***	***94.11243339***

FINAL

Noise Technical Report

Airlake Airport
Runway 12/30 Extension Environmental Assessment

August 2026

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Executive Summary

Harris Miller Miller & Hanson Inc. (HMMH), as a subconsultant to Mead & Hunt, is assisting the Airlake Airport (LVN) on the Environmental Assessment (EA) for the proposed Runway Extension ("Proposed Action") at Airlake Airport in Dakota County, Minnesota. The Proposed Action will consist of rehabilitating and extending the existing runway and associated taxiways at the airport as described below.

The Proposed Action, includes five elements: (1) extend both runway ends to result in a runway length of 4,850 feet, including connector taxiway extensions and rehabilitating the existing runway pavement; (2) displace the Runway 12 end for additional clearance over railroad tracks; (3) relocate 225th Street to accommodate runway changes; (4) modify some taxiway configurations; and (5) expand the aircraft parking apron.

The EA also evaluates the No Action Alternative, which represents the conditions that would occur if the Proposed Action were not implemented and provides a baseline for comparison with the Proposed Action.

The Federal Aviation Administration (FAA) is the lead agency for the environmental review of the Proposed Action. HMMH prepared this Noise Technical Report in support of the EA to evaluate potential changes in aircraft noise associated with the Proposed Action. The analysis was conducted under the National Environmental Policy Act (NEPA) in accordance with FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*, and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*. Aircraft noise exposure was modeled using FAA's Aviation Environmental Design Tool (AEDT) Version 4a and evaluated using the Day-Night Average Sound Level (DNL) metric.

The noise analysis evaluated Existing Conditions for calendar year 2025 and compared the 2033 No Action Alternative with the 2033 Proposed Action Alternative. The 2033 Proposed Action forecast includes 49,281 annual aircraft operations, compared with 48,052 annual operations under the No Action Alternative, an increase of 1,229 annual operations.

Implementation of the Proposed Action would change the size and shape of the aircraft noise contours, primarily along the extended runway centerline north and south of the Airport. The area within the DNL 65 dB and greater contour would increase from 73.17 acres under the No Action Alternative to 74.30 acres under the Proposed Action, an increase of 1.13 acres. The Proposed Action DNL 65 dB contour would remain primarily on airport property, with portions extending over compatible land uses outside airport property. Under the Proposed Action, no population, housing units, or noise-sensitive sites would be exposed to DNL 65 dB or greater.

The FAA considers a noise impact significant when a proposed action would cause an increase of 1.5 dB or greater in a noise-sensitive area exposed to DNL 65 dB or greater. The FAA also identifies reportable increases of 3 dB or greater where noise exposure is between DNL 60 and 65 dB and 5 dB or greater where noise exposure is between DNL 45 and 60 dB. Although the Proposed Action would result in noise increases meeting applicable significant or reportable change thresholds in some locations, those changes would occur on airport property or over compatible land uses. Therefore, the Proposed Action would not result in a significant aircraft noise impact.

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1 Introduction

An Environmental Assessment (EA) is being prepared by Mead & Hunt for the Minneapolis Saint Paul Metropolitan Airports Commission (MAC) to evaluate the potential environmental consequences of the Proposed Action at the Airlake Airport (LVN) in Dakota County, Minnesota. The Federal Aviation Administration (FAA) is the lead agency for the environmental review of the Proposed Action under the National Environmental Policy Act (NEPA).

The Proposed Action consists of rehabilitating and extending the existing runway and associated infrastructure at LVN. Specifically, the Proposed Action includes five elements:

1. Extend both ends of Runway 12/30 to result in a runway length of 4,850 feet, including connector taxiway extensions and rehabilitation of the existing runway pavement;
2. Displace the Runway 12 end to provide additional clearance over railroad tracks;
3. Relocate 225th Street to accommodate the runway changes;
4. Modify certain taxiway configurations; and
5. Expand the aircraft parking apron.

The EA also evaluates the No Action Alternative, which represents conditions that would occur if the Proposed Action were not implemented and provides the baseline for comparison with the Proposed Action.

Harris Miller Miller & Hanson Inc. (HMMH), as a subconsultant to Mead & Hunt, prepared this Noise Technical Report in support of the EA to evaluate potential changes in aircraft noise associated with the Proposed Action. The aircraft noise analysis evaluates three scenarios:

- Existing Conditions (2025)
- Forecast year 2033 No Action Alternative
- Forecast year 2033 Proposed Action

For a NEPA noise analysis of aircraft operations, the FAA requires the use of the Day-Night Average Sound Level (DNL) metric. The 24-hour analysis period must represent the average annual day (AAD), which reflects average daily aircraft operations over a 365-day period. The analysis compares future aircraft noise exposure under the 2033 Proposed Action with the 2033 No Action Alternative to determine whether the Proposed Action would result in significant or reportable changes in noise exposure.

Section 2 of this report presents the regulatory setting applicable to the aircraft noise analysis. Section 3 discusses noise-compatible land use. Section 4 describes the noise modeling methodology. Section 5 presents the Existing Conditions, including aircraft activity and existing noise exposure. Section 6 presents the future alternatives, DNL noise contours, and assessment of potential noise impacts associated with the Proposed Action.

This Noise Technical Report evaluates noise associated with aircraft operations and does not evaluate noise from non-airport-related sources, such as commercial activity, highway traffic, or local roadways.

2 Regulatory Setting

This section summarizes the federal laws, regulations, policies, and guidance applicable to the evaluation of aircraft noise for the Proposed Action.

2.1 Federal Aviation Regulations, Part 36

Federal Aviation Regulations (FAR), Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*, establishes noise standards for the issuance of new aircraft type certificates. Aircraft are certified as Stage 1 through Stage 5 depending on their noise level, weight, and number of engines. Stage 1 and Stage 2 aircraft, which are the noisiest aircraft categories, are no longer permitted to operate in the continental United States.

Although aircraft meeting Part 36 standards are generally quieter than many of the older aircraft, the Part 36 certification does not determine whether aircraft are acceptably quiet for operations at any given airport. Stage 5 aircraft represent the newest and quietest aircraft. All aircraft certificated after January 1, 2018, must meet Stage 5 limits, which are a cumulative 7 decibels (dB) below Stage 4 aircraft and 17 dB below Stage 3 aircraft.

2.2 Federal Aviation Noise Abatement Policy

The Federal Aviation Noise Abatement Policy establishes the noise abatement roles and responsibilities of the Federal Government, airport proprietors, state and local governments, air carriers, air travelers, shippers, and airport area residents and prospective residents. The FAA is primarily responsible for regulating aircraft noise at its source and supporting local efforts to develop airport noise abatement programs. State and local governments and airport proprietors are responsible for land use and certain operational actions intended to promote compatibility between airports and surrounding communities.

2.3 Aviation Safety and Noise Abatement Act of 1979

The Aviation Safety and Noise Abatement Act of 1979 established funding for airport noise compatibility planning and sets the requirements under which airport operators may apply for funding. The Act also directed the FAA to establish a standardized metric for evaluating aircraft noise in airport communities, resulting in the use of the Day-Night Average Sound Level (DNL).

The Act does not require an airport to develop a noise compatibility program. Requirements for the development and submission of airport noise exposure maps and noise compatibility programs are established in 14 Code of Federal Regulations (CFR) Part 150. Part 150 establishes standards that airport operators may use to document noise exposure around airports and develop programs, subject to FAA approval, to reduce noise-related noncompatible land use.

2.4 Airport Noise and Capacity Act of 1990

The Airport Noise and Capacity Act of 1990 (ANCA) established requirements related to aircraft noise and access restrictions at airports. Among its provisions, ANCA established a process for FAA review of certain aircraft noise, airport use, and airport access restrictions proposed by airport proprietors. ANCA also directed the phaseout of Stage 2 aircraft weighing more than 75,000 pounds from operation in the United States. ANCA applies to new local noise and access restrictions and amendments to existing restrictions proposed after October 1990.

2.5 FAA Order 1050.1G, Environmental Impacts: Policies and Procedures

FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*, establishes FAA policy and procedures for compliance with NEPA and implementing regulations issued by the Council on Environmental Quality (CEQ). The provisions of this Order and the CEQ regulations apply to actions directly undertaken by the FAA and to actions undertaken by a non-Federal entity where the FAA has authority to condition a permit, license, or other approval. The requirements in this Order apply to, but are not limited to, the following actions: grants, loans, contracts, leases, construction and installation actions, procedural actions, research activities, rulemaking and regulatory actions, certifications, licensing, permits, plans submitted to the FAA by state and local agencies for approval, and legislation proposed by the FAA. FAA Order 1050.1G and the associated 1050.1G 2020 Desk Reference provide guidance for evaluating potential environmental impacts associated with FAA actions, including aircraft noise impacts (FAA 2025).

2.6 FAA Order 5050.4B, National Environmental Policy Act Implementing Instructions for Airport Actions

FAA Order 5050.4B, *National Environmental Policy Act Implementing Instructions for Airport Actions*, provides guidance for FAA's Office of Airports (ARP) in complying with NEPA airport actions (FAA 2006). After determining that an airport sponsor is proposing a major Federal action such as this EA, ARP is responsible for analyzing the environmental effects of that action and its alternatives. Order 5050.4B provides instruction on evaluating those environmental effects. Order 5050.4B supplements FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures.*

These laws and guidance documents specify the use of DNL as the noise metric used in all FAA aviation noise studies in airport communities. DNL, a cumulative sound level, provides a measure of total sound energy. DNL is a logarithmic average of the sound levels of multiple events at one location over a 24-hour period. A 10 dB penalty is added to all sounds occurring during nighttime hours (between 10:00 p.m. and 6:59 a.m.). The 10 dB increase for nighttime events accounts for the added intrusiveness of noise during typical sleeping hours as ambient sound levels during nighttime hours are typically about 10 dB lower than during daytime hours.

For a NEPA noise analysis, the FAA requires that the 24-hour analysis period represent the AAD. The AAD reflects the daily aircraft operations averaged over a 365-day period. Further details on noise metrics, including DNL, can be found in **Attachment A**.

Estimates of noise effects resulting from aircraft operations can be interpreted in terms of the probable effects on human activities that typically occur within specific land uses. The FAA has adopted guidelines for evaluating land-use compatibility with noise exposure. In general, most land uses are considered compatible with DNL less than 65 dB, but only certain uses are compatible with DNL greater than or equal to 65 dB. **Section 3** contains further details on land use compatibility.

For this EA, potential aircraft noise impacts are evaluated by comparing the 2033 Proposed Action with the 2033 No Action Alternative using FAA noise impact criteria. FAA considers aircraft noise impacts significant when the Proposed Action would cause a DNL increase of 1.5 dB or greater in a noise-sensitive area exposed to DNL 65 dB or greater. FAA also identifies reportable noise increases at lower DNL levels, as summarized in **Table 2-1**.

Table 2-1. Aircraft DNL Thresholds and Impact Categories

	DNL 65 dB or Greater	Greater than or equal to DNL 60 dB but less than DNL 65 dB	Greater than or equal to DNL 45 dB but less than DNL 60 dB
Minimum change in DNL when compared to the higher of the Proposed Action Alternative or No Action Alternative DNL	1.5 dB	3.0 dB	5.0 dB
Level of Change	Significant	Reportable	Reportable
Source: FAA Order 1050.1G and the 1050.1G 2020 Desk Reference			

In addition to defining significant impacts, FAA Order 1050.1G includes additional reporting requirements, including:

- The location and number of noise-sensitive uses at or above DNL 65 dB
- The disclosure of potentially newly noncompatible land use regardless of whether there is a significant noise impact
- Maps reporting the number of residences or people residing at or above DNL 65 dB for at least the 65 dB, 70 dB, and 75 dB exposure levels.

FAA Order 1050.1G states, “Special consideration needs to be given to the evaluation of the significance of noise impacts on noise-sensitive areas within Section 4(f) properties (including, but not limited to, noise-sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR Part 150 are not relevant to the value, significance, and enjoyment of the area in question” (FAA 2025). For example, the DNL 65 dB threshold does not adequately address the impacts of noise on visitors to areas within a national park or national wildlife and waterfowl refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute. There are no areas of natural quiet near the Proposed Action; therefore, special consideration for these areas does not apply.

3 Noise Compatible Land Use

NEPA requires the review of land uses located in the airport environs to understand the relationship between those land uses and the noise exposure associated with arriving and departing aircraft. This includes delineation of land uses within the DNL 65 dB and higher aircraft noise exposure contours on the noise contour exhibits and identification of noise-sensitive uses that may be noncompatible with that level of noise exposure. Identification of a noise-sensitive use within the DNL 65 dB contour does not necessarily mean that the use is either considered noncompatible or that it is eligible for mitigation. Rather, identification merely indicates that the use is generally considered noncompatible but requires further investigation. Factors that influence compatibility and/or eligibility may include but are not limited to previous sound reduction treatments, current interior noise levels, structure condition, ambient and self-generated noise levels, whether a given use is considered temporary or permanent, and the timeframe within which a given structure was constructed.

This chapter provides a description of recommended land uses that are deemed generally compatible under Appendix A of Part 150.

3.1 Land Use Compatibility Guidelines

The objective of airport noise compatibility planning is to promote compatible land use in communities surrounding airports. NEPA requires the review of land uses surrounding an airport to determine land use compatibility associated with aircraft activity at the airport.

The FAA has published land use compatibility designations, as set forth in Part 150, Appendix A, Table 1 (reproduced here as **Table 3-1**). As the table indicates, the FAA generally considers all land uses to be compatible with aircraft-related DNL below 65 dB, including residential, hotels, retirement homes, intermediate care facilities, hospitals, nursing homes, schools, preschools, and libraries. These categories are referenced throughout the EA. Institutional or public land use consists of schools, hospitals, nursing homes, churches, auditoriums, concert halls, governmental services, transportation, and parking. While all these uses are compatible with aircraft-related DNL below 65 dB, schools are not compatible above DNL 65 dB without mitigation and are listed separately in the EA.

Table 3-1. Part 150 Land Use Compatibility with Yearly Day-Night Average Sound Levels

Source: FAA Part 150, Appendix A, Table 1, 2007

Land Use	Yearly Day-Night Average Sound Level [DNL] in Decibels (Key and notes on following page)					
Residential Use						
Residential other than mobile homes and transient lodgings	Y	N[(a)]	N[(a)]	N	N	N
Mobile home park	Y	N	N	N	N	N
Transient lodgings	Y	N[(a)]	N[(a)]	N[(a)]	N	N
Public Use						
Schools	Y	N[(a)]	N[(a)]	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[(b)]	Y[(c)]	Y[(d)]	Y[(d)]
Parking	Y	Y	Y[(b)]	Y[(c)]	Y[(d)]	N
Commercial Use						
Retail trade–general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[(b)]	Y[(c)]	Y[(d)]	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing general	Y	Y	Y[(b)]	Y[(c)]	Y[(d)]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[(f)]	Y[(g)]	Y[(h)]	Y[(h)]	Y[(h)]
Livestock farming and breeding	Y	Y[(f)]	Y[(g)]	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y[(e)]	Y[(e)]	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Key:

SLUCM = Standard Land Use Coding Manual

Y(Yes): Land use and related structures compatible without restrictions.

N(No): Land use and related structures are not compatible and should be prohibited.

NLR: Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35: Land use and related structures generally compatible; measures to achieve NLR of 25 dBA, 30 dBA, or 35 dBA must be incorporated into design and construction of structure.

Notes:

The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

(a) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dBA and 30 dBA should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dBA, thus, the reduction

requirements are often stated as 5 dBA, 10 dBA, or 15 dBA over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(b) Measures to achieve NLR of 25 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(c) Measures to achieve NLR of 30 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.

(d) Measures to achieve NLR of 35 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(e) Land use compatible provided special sound reinforcement systems are installed.

(f) Residential buildings require an NLR of 25 dBA

(g) Residential buildings require an NLR of 30 dBA

(h) Residential buildings not permitted

3.2 Study Area

To adequately capture the effects of aircraft noise, the noise study area (NSA) must include not only the immediate airport environs, where aircraft flight paths are aligned with the runways, but also other potentially affected areas over which aircraft would fly as they follow any modified flight corridors that join the surrounding airspace. The NSA was developed to encompass an area that would contain at least the lateral extent of the estimated DNL 60 dB contour resulting from aircraft flight and ground operations contemplated under the Proposed Action, with an adequate buffer to accommodate potential changes in the contour between the No Action Alternative and the Proposed Action. **Figure 3-1** displays nearby land uses to the airport within the NSA. The NSA is approximately 3 nautical miles (nmi) to the east and west and 3 nmi to the north and south.

3.3 Existing Land Use

LVN is located in Dakota County, Minnesota, in the City of Lakeville, approximately 20 nmi south of downtown Minneapolis, Minnesota. Existing land use in the nearby area consists primarily of airport property, agricultural use, some residential uses, manufacturing and production, and industrial land uses, as shown on **Figure 3-1**. LVN is surrounded to the west, south and east by agricultural areas. The area to the north of the airport is primarily commercial facilities. Any potential noncompatible land use and the noise-sensitive sites within the study area are evaluated in the EA.

Figure 3-1. Existing Land Use

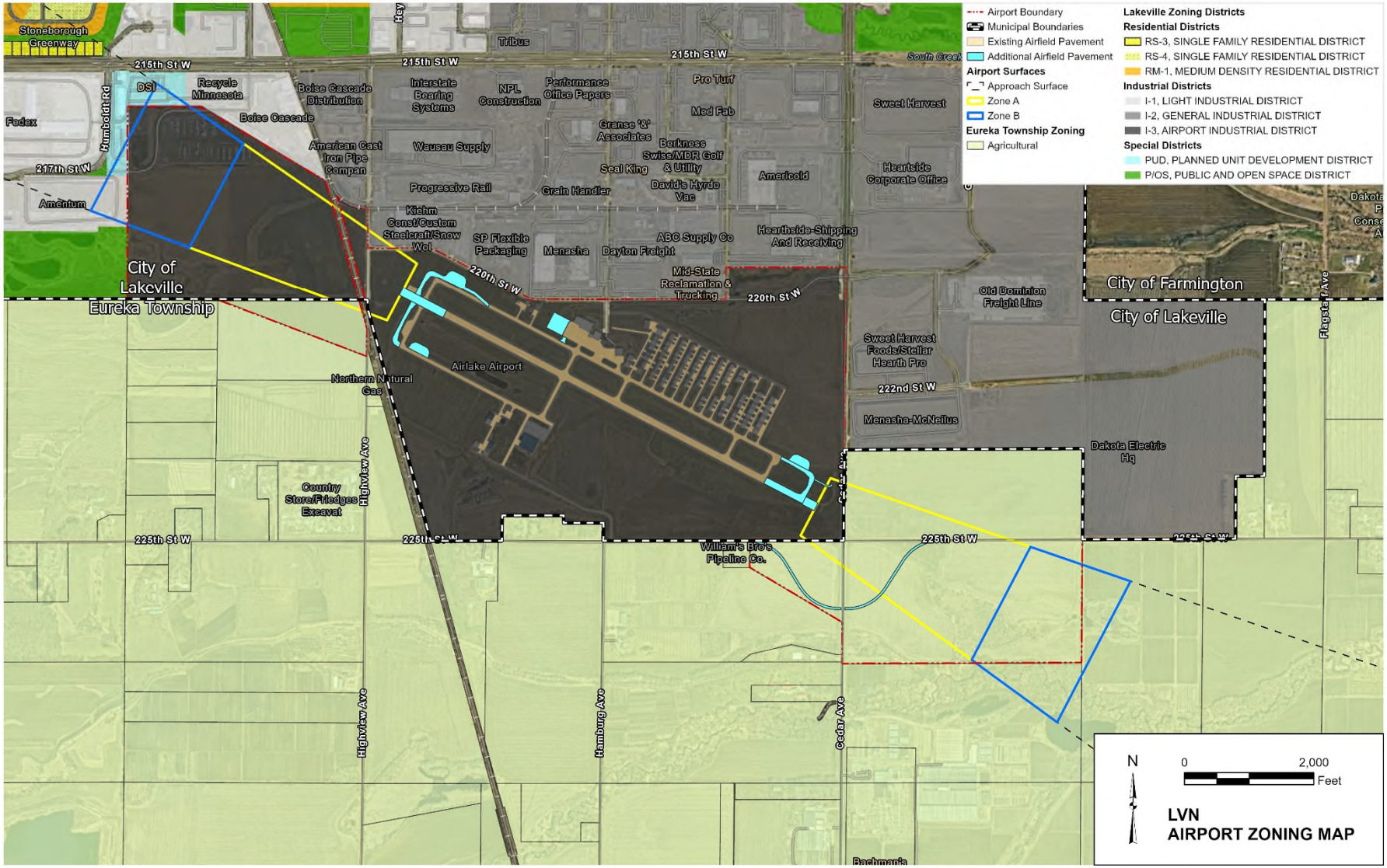


Figure provided by Mead & Hunt.

4 Modeling Methodology

The following sections present the modeling methodology for the noise analysis for the Existing, future No Action, and future Proposed Action alternatives.

4.1 Aviation Environmental Design Tool

For an action occurring on, or in the vicinity of a single airport, or as part of an air traffic action, the FAA directs the use of the latest version of the Aviation Environmental Design Tool (AEDT) for detailed noise modeling or another model, as approved by the FAA. The model must be used to produce DNL 65 dB, DNL 70 dB, and DNL 75 dB contours, and others as needed.

The aircraft noise analysis for the EA uses AEDT Version 4a (released January 28, 2026). All AEDT modeling conducted for this study adheres to *Guidance on Using the AEDT to Conduct Environmental modeling for FAA Actions Subject to NEPA* (FAA 2017). AEDT is a combined noise and emission model that uses a database of aircraft noise and performance characteristics. AEDT predicts ground-based DNL values from user input for aircraft types, AAD aircraft operations, airport operating conditions, aircraft performance, and flight patterns. AEDT also calculates air pollutant emissions from aircraft engines for air quality analyses, enables noise and air quality calculations on a regional basis (as opposed to in the immediate airport environment only), and includes updated databases for newer aircraft models.

The noise pattern calculated by AEDT for an airport is a function of several factors, including the number of aircraft operations during the period evaluated, the types of aircraft flown, the time of day when they are flown, the way they are flown, how frequently each runway is used for landing and takeoff, and the routes of flight used to and from the runways. Substantial variations in any one of these factors may, when extended over a long period of time, cause marked changes to the noise pattern.

The primary data input categories for AEDT are:

- Airfield layout, which includes the coordinates of each runway centerline endpoint, runway widths, approach threshold crossing heights, and runway end elevations.
- Meteorological data, which refers to weather conditions affecting sound propagation and aircraft performance. AEDT's database of airports was accessed to obtain annual average daily LVN weather conditions. AEDT's airport database contains 10-year average meteorological data (from 2015 to 2024), which AEDT uses to adjust aircraft performance and sound propagation parameters from standard day conditions.
    - Temperature: 45.95° F
    - Station Pressure: 980.89 mbar
    - Dew point: 36.9° F
    - Relative humidity: 70.64 percent
    - Wind speed: 5.62 knots

- Terrain data, which refers to ground elevations. AEDT uses terrain data to adjust the aircraft-to-ground path length, which is the distance between the modeled location on the ground and the aircraft in flight, making the ground closer to or farther from the aircraft relative to flat-earth conditions. AEDT does not use terrain data to account for shielding or reflective effects of terrain.
- Specific aircraft types in LVN's fleet mix, defined by airframe and engine type combinations. All aircraft types evaluated for the LVN modeling are either in the AEDT database or have approved substitutions within the model.
- Aircraft flight operations, which are the number of AAD aircraft operations by DNL time periods and by aircraft type. Daytime is defined as 7:00 a.m. to 9:59 p.m. and nighttime is defined as 10:00 p.m. to 6:59 a.m. Departures and arrivals were the two types of flight operations modeled for the EA. Touch-and-go or circuit operations were modeled on the main runway.
- Aircraft noise and performance characteristics. The AEDT database contains noise and performance data for more than 300 different aircraft types. AEDT accesses the noise and performance data for takeoff, landing, and pattern operations by those aircraft. The database provides single-event noise levels for slant distances from 200 feet to 25,000 feet for several thrust or power settings for each aircraft type. Performance data includes thrust, speed, and altitude profiles for takeoffs and landings. For those aircraft types operating at LVN which are not directly represented in the AEDT database, the AEDT contains FAA-approved substitutions for noise modeling.
- Stage length, which is a surrogate for an aircraft's weight that varies according to its fuel load. Stage length is assigned according to each departure's trip distance to its destination, using city-pair information provided in the operations forecast. The assigned stage length then determines the appropriate flight performance profile from the AEDT database.
- Flight profiles, which are based on standard flight procedures for each aircraft type contained in the AEDT database. Information in the flight profiles describes the sequence of altitudes, thrust/power settings, and airspeeds for departure and arrival operations.
- Runway use, which is the allocation of flight operations to each runway, on an AAD basis, by DNL time periods, operation type, and aircraft type.
- Flight tracks and their usage. A flight track is the two-dimensional projection of the aircraft's three-dimensional flight path onto the ground. A modeled flight track represents one or more actual flight tracks. Modeled flight tracks for a given flight corridor typically consist of a backbone track and sub-tracks which represent the average location and dispersion of the actual flights in the corridor. Each backbone flight track typically represents a general heading for departures or originating point for arrivals. As each runway usually has multiple headings and originating points, the distribution of operations, or track use, on an AAD basis, must be specified. Operations are further spread on backbone tracks and sub-tracks via distribution percentages on an AAD basis.

4.2 Noise Exposure Contours

Noise contours (i.e., lines of equal noise exposure, usually expressed in terms of DNL) are typically used to illustrate average daily noise exposure around an airport. Noise contours are conceptually similar to topographic contour maps. A set of concentric contours, representing successively lower DNL, usually extends away from the airport's runways. DNL contours are typically presented in 5 dB increments on a base map, with each successive contour representing a 5 dB decrease in noise exposure on an AAD basis. Contours developed for the EA represent DNL 65 dB, DNL 70 dB, and DNL 75 dB.

For purposes of the EA, the noise contours (refer to **Section 5.6** for the Existing Condition contours) show areas exposed to each DNL level. It is important to recognize that a line drawn on a map does not imply that a particular noise condition exists on one side of the line and not the other. **Attachment A** provides additional information on noise and its effects on people.

4.3 Grid Point Noise Calculations

Besides noise contours, AEDT provides another way to show noise levels in the airport environs. DNL (or other metrics supported by AEDT) can be calculated for specific locations, defined as grid points, and can be presented in several formats. Grid point analyses can show the change in noise levels over specific locations and are helpful in determining where significant or reportable noise changes may occur.

For the EA, noise levels are developed for one area-wide grid set. The NSA grid points are defined to cover the complete NSA area. The NSA grid consists of a rectangle with points spaced 0.0125 nmi (75 feet) apart, extending approximately 3 nmi to the east and west and 3 nmi to the north and south from the Airport Reference Point (which is near the geographic center of LVN's runways).

5 Existing Conditions

This section provides a description of current noise conditions within the study area from aircraft noise. Typically, a recent calendar year data set is utilized to develop the existing condition information, and for this EA, calendar year (CY) 2025 was used.

5.1 Aircraft Activity Levels and Fleet Mix

The existing aircraft noise environment around LVN was evaluated based upon the existing condition aircraft operations and the associated airport operational characteristics. Radar data from MACNOMS for CY2025 were used to determine the operations for the existing noise conditions. The radar data provided the aircraft fleet mix and runway use.

The fleet mix was then scaled to match the final count for CY2025 according to FAA's Terminal Area Forecast (TAF) data. During the existing conditions period, 51,585 annual operations occurred at LVN. **Table 5-1** presents the annual operations modeled for the Existing Conditions along with the average annual day counts.

Table 5-1. Existing Conditions Operations

Modeling Scenario	Air Taxi	General Aviation/Military		Total
		Itinerant	Circuits	
Existing Annual Operations	1,694	41,306	8,584	51,585
Average Annual Day	4.64	113.17	23.52	141.33
Note: Totals may not match exactly due to rounding *Source: MACNOMS, FAA TAF, July 2026*				

Table 5-2 provides the average daily operations, by aircraft type, that were used in AEDT for the Existing Conditions. The average daily number of aircraft arrivals and departures for the CY2025 noise contour is calculated by determining the total annual operations and dividing by 365 (days in a year). The Existing Conditions annual average day included 141 total operations, approximately 2 percent of which occurred during the DNL nighttime hours of 10:00 p.m. to 6:59 a.m.

Table 5-2. LVN Modeled Annual Operations for Existing Conditions (CY2025)

Aircraft Category	AEDT Aircraft Type	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Circuits Day	Circuits Night	Total
	CNA525C	0.05		0.05				0.09
	CNA510	0.04		0.04				0.07
	CIT3	0.05	0.00	0.06		0.01		0.12
Jet	CNA510	0.09		0.09				0.18
	PA30	0.20		0.20				0.41
	CNA172	1.08	0.08	1.10	0.05			2.31
	CNA182	0.34	0.02	0.35	0.01			0.73
	GASEPF	0.55	0.02	0.53	0.04			1.15
	DHC6	0.02		0.02				0.03
Non-Jet	B206B3	0.23		0.22	0.01	0.04		0.50

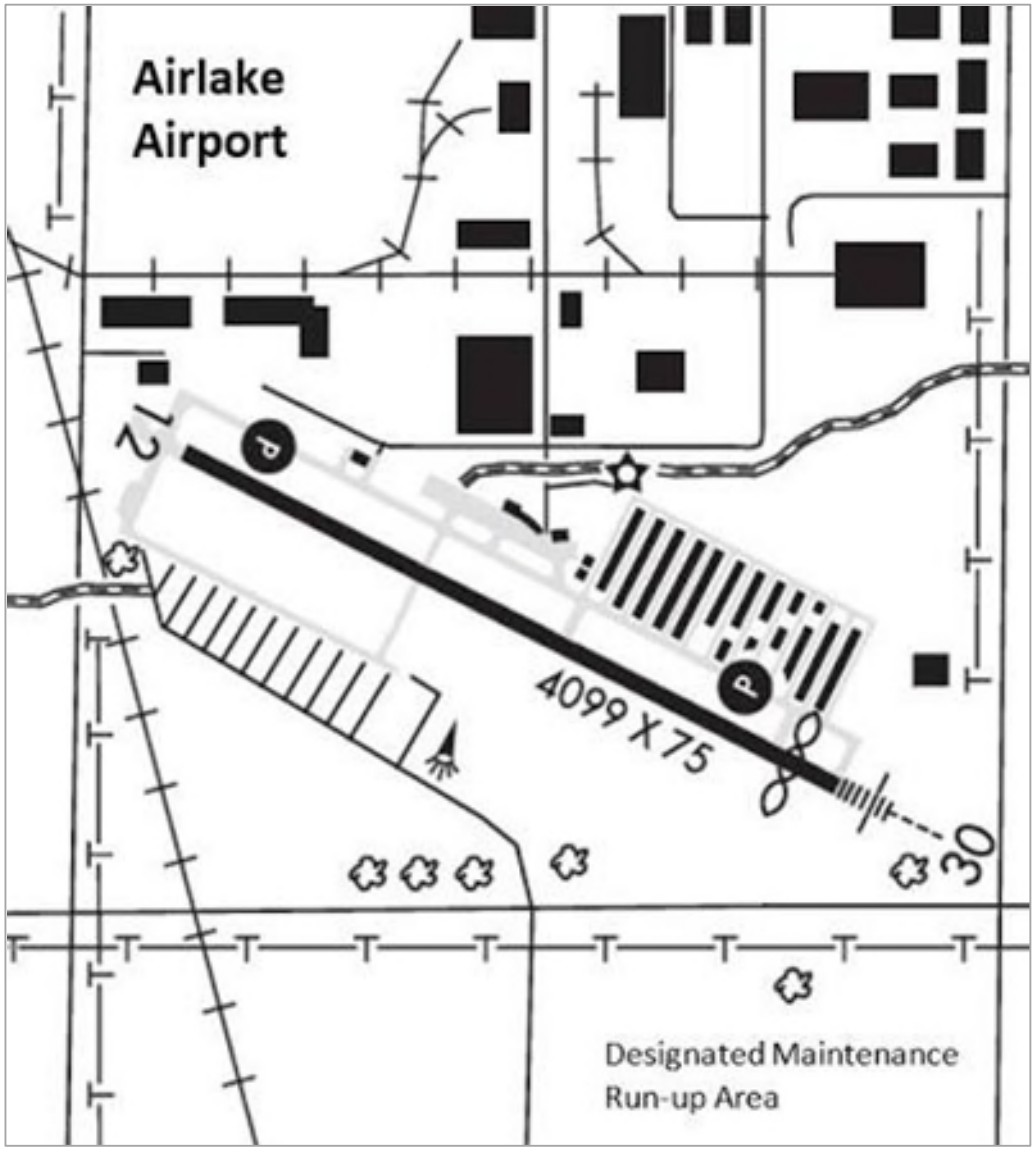
Aircraft Category	AEDT Aircraft Type	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Circuits Day	Circuits Night	Total
	R44	0.26	0.02	0.26	0.02	0.23		0.79
	PA30	0.22		0.22		0.10		0.55
	GASEPF	0.76	0.01	0.77	0.01	0.16		1.71
	GASEPF	1.40		1.40		0.63		3.42
	CNA172	34.38	0.42	34.43	0.37	14.18	0.09	83.88
	CNA182	1.88	0.05	1.87	0.06	0.52		4.39
	GASEPF	0.69	0.01	0.69	0.01	0.15		1.55
	GASEPF	9.17	0.35	9.18	0.34	5.88	0.08	25.01
	GASEPF	1.36	0.02	1.35	0.04	0.42		3.18
	GASEPF	1.64	0.10	1.66	0.08	0.28	0.00	3.77
	GASEPV	0.46	0.01	0.46	0.01	0.17		1.10
	GASEPV	0.51	0.01	0.52	0.01	0.13		1.18
	COMSEP	1.05		1.05		0.35		2.45
	COMSEP	0.84	0.01	0.84	0.01	0.09		1.80
	DHC6	0.05	0.01	0.05	0.01			0.11
	CNA208	0.13	0.00	0.13				0.26
	S70	0.25	0.04	0.25	0.04			0.60

Note: Totals may not match exactly due to rounding
Source: MACNOMS, FAA TAF, HMMH 2026

5.2 Airfield Layout

As shown in **Figure 5-1**, the airport includes one 75-foot-wide 4,099-foot-long runway, which is oriented in a northeast-southwest direction (Runway 12/30). In the proposed action forecast year scenario, Runway 12/30, will be extended at both ends to allow more small jets to operate out of LVN.

Figure 5-1. LVN Airport Diagram



Runway width, instrumentation, and declared distances do not directly affect noise calculations. **Table 5-3** provides the detailed parameters for each runway end.

Table 5-3. Existing and Future Runway Information

Existing Runways							
Runway End	**Latitude (degrees)**	**Longitude (degrees)**	**Elevation (feet, MSL)**	**Displaced Landing Threshold (feet)**	**Glide Slope (degrees)**	**Threshold Crossing (feet, AGL)**	**Length (feet)**
12	44.630451	-93.235082	960.4	0	3	45	4,099
30	44.625271	-93.221096	951.3	392	3	36	
Future Alternative Runways							
Runway End	**Latitude (degrees)**	**Longitude (degrees)**	**Elevation (feet, MSL)**	**Displaced Landing Threshold (feet)**	**Glide Slope (degrees)**	**Threshold Crossing (feet, AGL)**	**Length (feet)**
12_ext	44.630794	-93.236008	961	391	3	45	4,850
30_ext	44.624664	-93.219471	951.4	872	3	36	

MSL = mean sea level; AGL = above ground level
Sources: FAA ADIP, July 2026; Mead & Hunt, 2026

5.3 Runway Utilization

Weather, particularly wind direction and wind speed, is the primary factor affecting runway use at airports. Additional factors that may affect runway use include the position of a facility (such as a hangar) relative to the runways and temporary runway closures, generally for airfield maintenance and construction.

In the development of the LVN noise exposure maps, runway usage rates were calculated for all aircraft operations data from the MACNOMS data. Jet and non-jet activity were calculated together due to the limited jet use currently at LVN. Non-jet aircraft include piston and turboprop aircraft. With no anticipation of significant difference in runway use for the future forecast year, the same runway usage was modeled for the no action and the proposed action alternatives as for the existing conditions.

Table 5-4 provides the modeled aircraft runway use percentages for departures and arrivals for the day and nighttime periods used in the calculation of DNL. Based on historical conditions, the Airport is operated in one of two main operating configurations: south flow (approximately 70 percent of the time) or north flow (approximately 30 percent of the time).

Table 5-4. Modeled Average Daily Aircraft Runway Use for Arrivals and Departures

Operation Type	Time of Day	Runway		Total
		12	30	
Arrivals	**Day**	37.4%	62.6%	100%
	Night	22.3%	77.7%	100%
Departures	**Day**	19.3%	80.7%	100%
	Night	8.9%	91.1%	100%

Note: Totals may not add up to 100% due to rounding.
Source: MACNOMS, HMMH 2026

5.4 Aircraft Stage Length and Operational Profiles

Within the AEDT database, aircraft departure profiles are defined by a range of trip distances identified as "stage lengths" as shown in **Table 5-5**. Higher stage lengths (longer trip distances) are associated with heavier aircraft due to the increase in fuel requirements for the flight. For example, a departure aircraft with a trip distance less than 500 nmi would be assigned a stage length value of one, where a departure aircraft with a trip distance of 3,000 nmi would be assigned a stage length value of five.

All aircraft operations at LVN were modeled at stage length 1 classification.

Table 5-5. AEDT Stage Length Categories

Category	Stage Length (nmi)
1	0-500
2	500-1000
3	1000-1500
4	1500-2500
5	2500-3500
6	3500-4500
7	4500-5500
8	5500-6500
9	6500+

Note: Stage Length is defined as the distance an aircraft travels from takeoff to landing
Source: AEDT 4a User Guide, January 2026

The stage lengths flown from LVN are based on the City Pair information provided by the radar data operations.

AEDT includes standard flight procedure data for each aircraft that represents each phase of flight to or from the airport. Information related to aircraft speed, altitude, thrust settings, flap settings, and distance is available and used by AEDT to calculate noise levels on the ground. Standard aircraft departure profiles are supplied from the runway (field elevation) up to 10,000 feet above ground level (AGL). Aircraft arrival profiles are supplied from 6,000 feet AGL down to the runway, including the application of reverse thrust and rollout. The FAA requires that these standard arrival and departure profiles be used unless there is evidence that they are not applicable. The noise calculations presented in this document used the standard AEDT departure profiles.

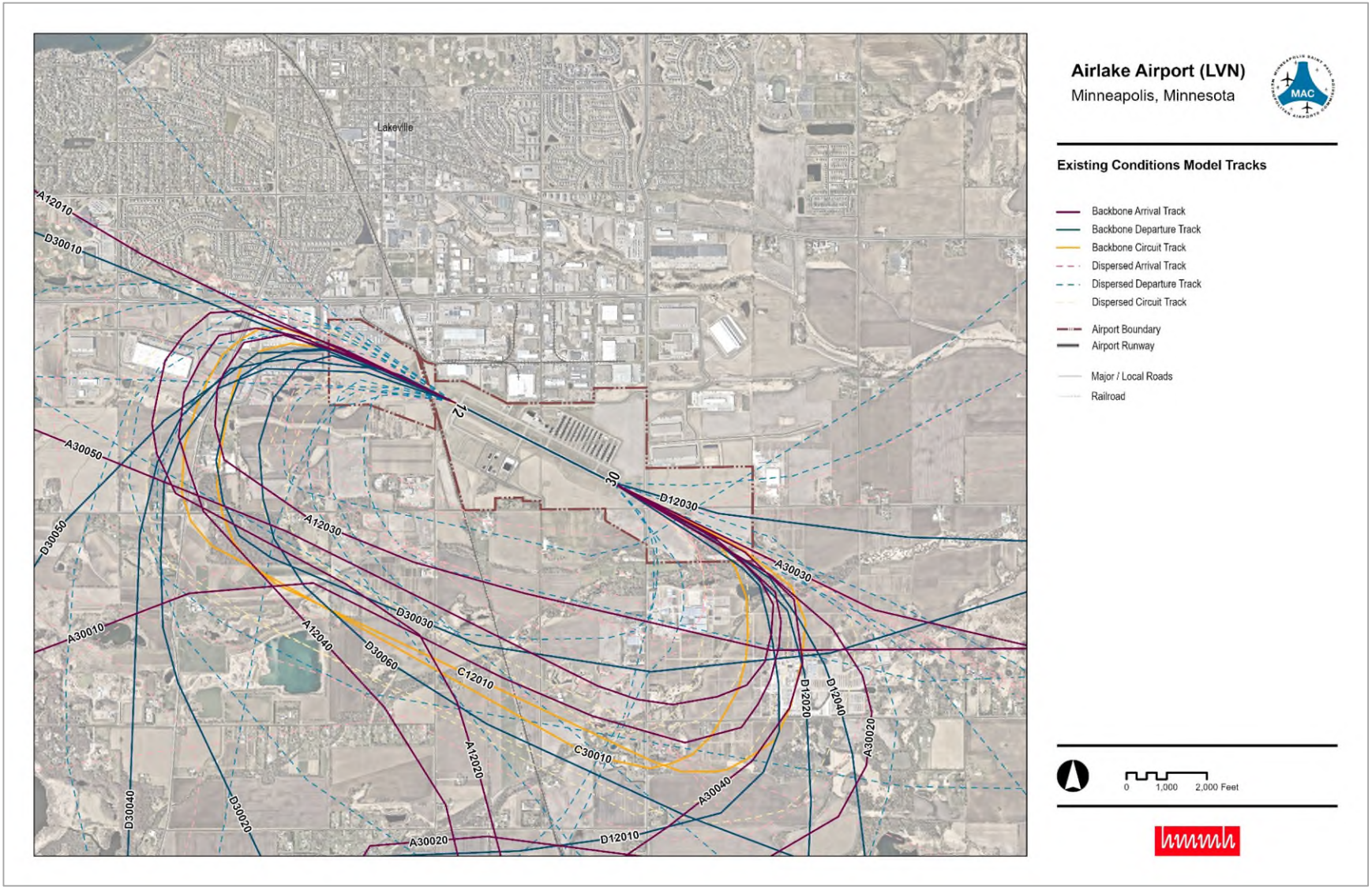
5.5 Flight Tracks

For the noise analysis, model flight tracks were developed representing the path along the ground over which aircraft generally fly. For the Existing Conditions analysis, radar data for the Existing Conditions period (CY2025) was used to develop AEDT model tracks to ensure they are representative of where aircraft fly at LVN. Radar data gathered was analyzed to verify the location, density, and width of existing flight corridors. Departure corridors are defined by a series of individual flight tracks located across the width of the corridor. Generally, aircraft on approach to a runway end are located within a smaller corridor due to the use of

navigational instruments. Flight tracks consisting of similar operations and routes were grouped into bundles representing flight corridors. To model the flight corridors in AEDT, consolidated flight tracks were developed from the radar data bundles and given a track ID. Flight tracks modeled for the existing conditions are shown in **Figure 5-2**.

A total of 21 AEDT model tracks bundles were developed through this process, consisting of nine arrival track bundles, two circuit tracks, and ten departure track bundles. Each track bundle may include a collection of three (backbone and two sub-tracks). Detailed AEDT model track use tables can be found in **Attachment B**.

Figure 5-2. Existing Modeled Flight Tracks



5.6 Existing Noise Exposure Contours

Figure 5-3 displays the DNL 65 dB–75 dB noise contours for the 2025 Existing Conditions over an aerial map of the study area. The FAA's guidelines for land use compatibility presented in Appendix A of Part 150 (**Table 3-1** above) state that all land uses are generally compatible with aircraft noise below DNL 65 dB. The DNL 65 dB noise contour remains mostly on airport property; the contour crosses a road and railroad right-of-way that splits the airport parcels on the northwest side. There is no residential land use within the DNL 65 dB or higher contours.

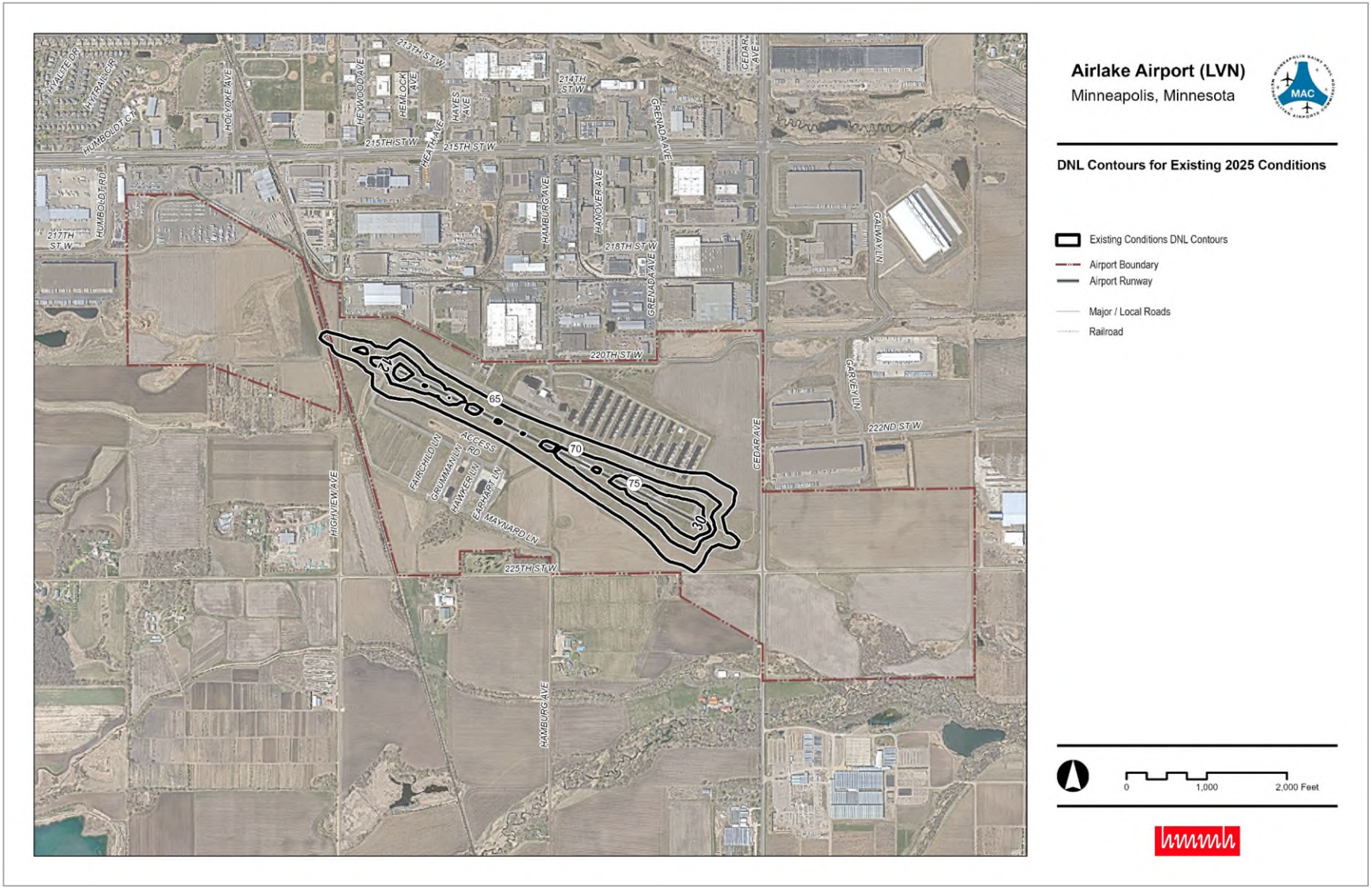
Table 5-6 provides the population exposure, housing unit count, and contour areas for the 2025 DNL noise contours. The DNL 65+ dB noise contour—which covers 76.76 acres—contains no residents and no housing units. In addition, no individual noise-sensitive locations, such as schools or places of worship, are within the 2025 DNL 65+ dB noise contour.

Table 5-6. 2025 Existing Conditions Noise Contours Population, Housing, and Area

DNL (dB) Noise Contour	2020 Population Census	2020 Housing Units	Area (acres)
65 - 70	0	0	48.03
70 - 75	0	0	20.08
> 75	0	0	8.65
Total	**0**	**0**	**76.76**

Sources: HMMH, 2026; U.S. Census Bureau, 2020

Figure 5-3. 2025 Existing Conditions



6 Future Alternatives

This section discusses the development of the future 2033 aircraft operational forecast, runway use, flight tracks, and flight track usage for the future 2033 No Action Alternative and the Proposed Action.

6.1 Forecast

The forecast projects an overall decrease in total operations between the existing year and the future forecast year (2033). The Proposed Action forecast projects a growth in small jet operations due to the extension of runway 12/30. There is also a small increase in helicopter and turboprop operations between the base case and the future forecast cases. HMMH utilized the forecast as provided by Mead & Hunt.

Table 6-1 provides the annual and average annual day operations for each of the future 2033 alternatives.

Table 6-1. 2033 Future Condition Annual Operations

Future Scenarios	Air Taxi	General Aviation/Military Itinerant	General Aviation/Military Local	Total
2033 No Action Annual	1,577	38,503	7,971	48,052
2033 Proposed Action Annual	1,666	39,619	7,995	49,281
2033 Annual Difference	**89**	**1,116**	**24**	**1,229**
2033 No Action Average Annual Day	4.3	105.5	21.8	131.6
2033 Proposed Action Average Annual Day	4.6	108.5	21.9	135.0
2033 Average Annual Day Difference	**0.2**	**3.1**	**0.1**	**3.4**

Note: Totals may not match exactly due to rounding
Sources: HMMH, 2026; Mead & Hunt

Table 6-2 and **Table 6-3** display the fleet mix breakdown for 2033 No Action Alternative and Proposed Action operations, respectively.

Table 6-2. 2033 Future No Action Alternative Annual Operations

Aircraft Category	AEDT Aircraft Type	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Circuits Day	Circuits Night	Total
	CNA525C	0.20		0.20				0.40
	CNA510	1.00	0.07	1.02	0.05			2.14
	CIT3	0.32	0.02	0.33	0.01			0.68
Jet	CNA510	0.51	0.02	0.49	0.04			1.07
Non-Jet	PA30	0.02		0.02				0.04

Aircraft Category	AEDT Aircraft Type	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Circuits Day	Circuits Night	Total
	CNA172	0.28		0.27	0.01	0.05		0.60
	CNA182	0.28	0.02	0.28	0.02	0.25		0.84
	GASEPF	0.06		0.06				0.12
	DHC6	0.05		0.05				0.10
	B206B3	0.07	0.00	0.07		0.01		0.15
	R44	0.12		0.12				0.24
	PA30	0.22		0.22		0.10		0.53
	GASEPF	0.71	0.01	0.71	0.01	0.15		1.59
	GASEPF	1.29		1.29		0.58		3.17
	CNA172	31.85	0.39	31.90	0.35	13.14	0.09	77.71
	CNA182	1.74	0.05	1.73	0.06	0.49		4.07
	GASEPF	0.64	0.01	0.64	0.01	0.14		1.44
	GASEPF	8.50	0.32	8.51	0.32	5.45	0.07	23.17
	GASEPF	1.26	0.02	1.25	0.03	0.39		2.95
	GASEPF	1.52	0.09	1.54	0.08	0.26	0.00	3.49
	GASEPV	0.43	0.01	0.43	0.01	0.15		1.02
	GASEPV	0.48	0.01	0.48	0.01	0.12		1.09
	COMSEP	0.97		0.97		0.33		2.27
	COMSEP	0.78	0.01	0.78	0.01	0.09		1.67
	DHC6	0.06	0.01	0.06	0.01			0.12
	CNA208	0.14	0.00	0.15				0.29
	S70	0.31	0.05	0.31	0.05			0.72

Source: HMMH, 2026

Table 6-3. 2033 Future Proposed Action Annual Operations

Aircraft Category	AEDT Aircraft Type	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Circuits Day	Circuits Night	Total
	CNA525C	0.20		0.20				0.40
	CNA510	1.00	0.07	1.02	0.05			2.14
	CIT3	0.32	0.02	0.33	0.01			0.68
Jet	CNA510	0.51	0.02	0.49	0.04			1.07
	PA30	0.14		0.14				0.28
	CNA172	0.28		0.27	0.01	0.05		0.60
	CNA182	0.28	0.02	0.28	0.02	0.25		0.84
	GASEPF	0.41		0.41				0.83
	DHC6	0.22		0.22				0.44
	B206B3	0.66	0.03	0.70		0.07		1.47
	R44	0.40		0.40				0.79
	PA30	0.22		0.22		0.10		0.53
Non-Jet	GASEPF	0.71	0.01	0.71	0.01	0.15		1.59

Aircraft Category	AEDT Aircraft Type	Arrivals Day	Arrivals Night	Departures Day	Departures Night	Circuits Day	Circuits Night	Total
	GASEPF	1.29		1.29		0.58		3.17
	CNA172	31.85	0.39	31.90	0.35	13.14	0.09	77.71
	CNA182	1.74	0.05	1.73	0.06	0.49		4.07
	GASEPF	0.64	0.01	0.64	0.01	0.14		1.44
	GASEPF	8.50	0.32	8.51	0.32	5.45	0.07	23.17
	GASEPF	1.26	0.02	1.25	0.03	0.39		2.95
	GASEPF	1.52	0.09	1.54	0.08	0.26	0.00	3.49
	GASEPV	0.43	0.01	0.43	0.01	0.15		1.02
	GASEPV	0.48	0.01	0.48	0.01	0.12		1.09
	COMSEP	0.97		0.97		0.33		2.27
	COMSEP	0.78	0.01	0.78	0.01	0.09		1.67
	DHC6	0.10	0.01	0.10	0.01			0.22
	CNA208	0.19	0.00	0.19				0.39
	S70	0.31	0.05	0.31	0.05			0.72

Source: HMMH, 2026

6.2 Future Alternative Model Tracks

Future year No Action Alternative scenario assumes there are no changes to the runway complex. The flight tracks remain the same as the 2025 Existing Conditions. Flight tracks modeled for the future No Action conditions are shown in **Figure 6-1.**

The future-year Proposed Action scenario accounts for Runway 12/30 being extended at both ends to allow for use of more small jet aircraft. The flight track points near the runway were modified to adjust to the new runway ends and new runway thresholds resulted from the planned runway extensions at both ends of Runway 12/30. Flight tracks modeled for the future Proposed Action are shown in **Figure 6-2**.

Figure 6-1. 2033 Future No Action Modeled Flight Tracks

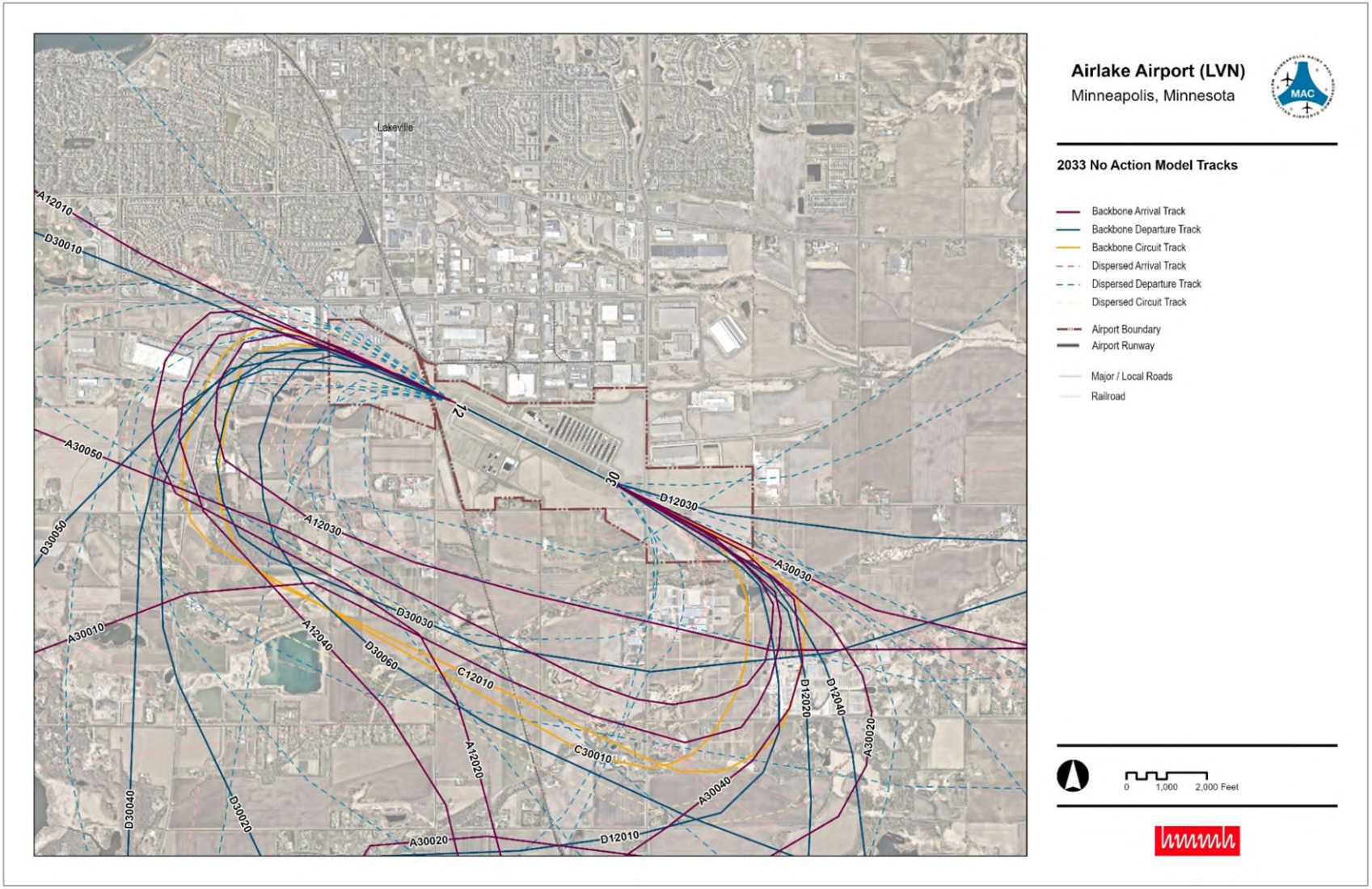
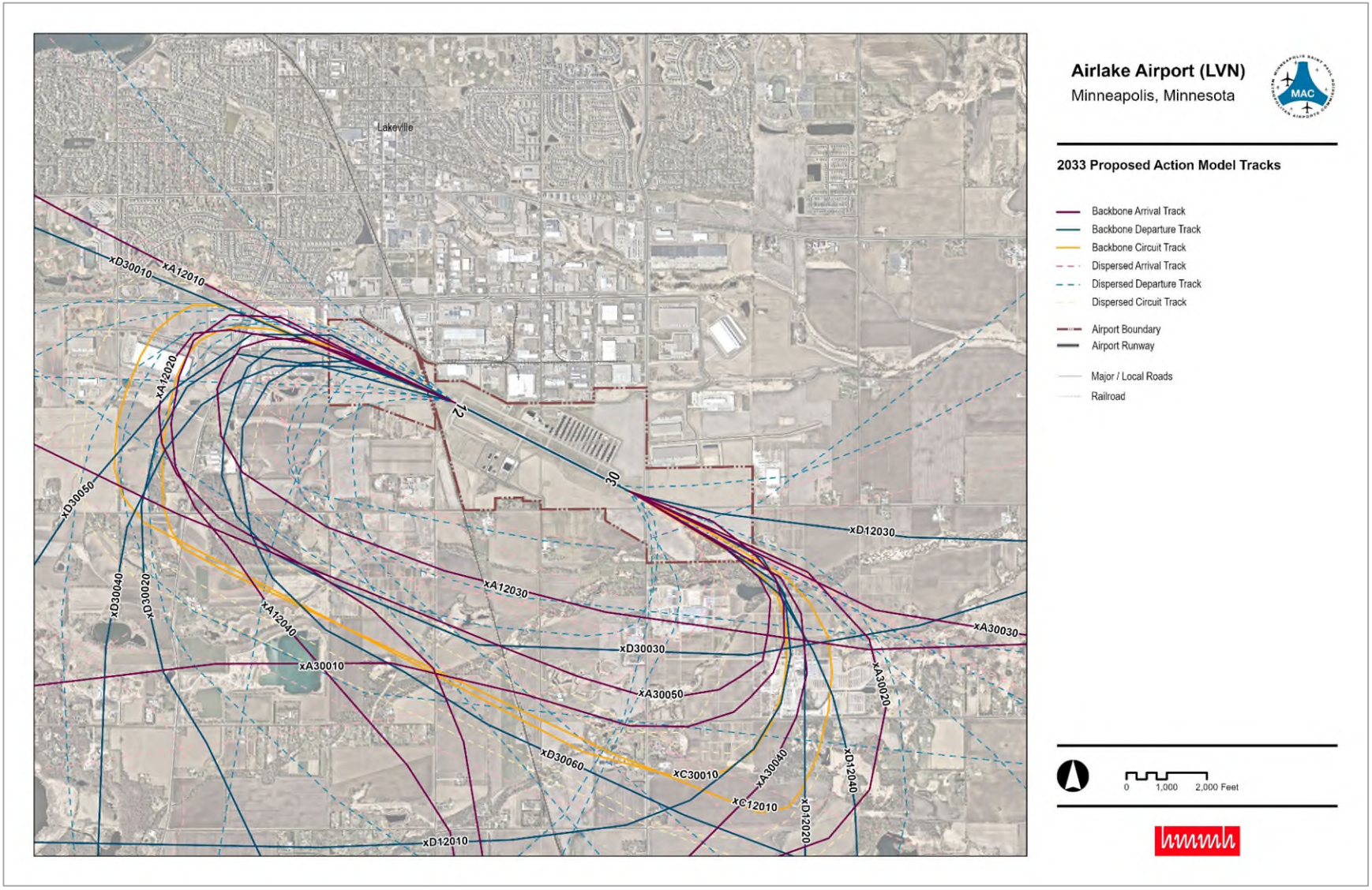


Figure 6-2. 2033 Future Proposed Action Modeled Flight Tracks



6.3 Future Noise Analysis

This section presents the noise modeling results along with an analysis of noise-impacted population and noise-sensitive sites. Aircraft noise effects can be assessed based on the potential effects of noise exposure on human activities associated with the various land uses. The FAA has established guidelines for evaluating land-use compatibility with noise exposure. In general, most land uses are generally considered compatible with DNL less than 65 dB, but only certain uses are compatible with DNL greater than or equal to 65 dB. This section describes the potential noise effects associated with the implementation of the No Action Alternative or the Proposed Action Alternative.

6.3.1 No Action Alternative (2033)

Figure 6-3 displays the DNL 65 dB–75 dB noise contours for the 2033 No Action Alternative over an aerial map of the study area. The FAA's guidelines for land use compatibility presented in Appendix A of Part 150 (**Table 3-1** above) state that all land uses are generally compatible with aircraft noise below DNL 65 dB. The DNL 65 dB noise contour for Runway 12/30 remains mostly on airport property and compatible land use; the contour crosses a road and railroad right-of-way that splits the airport parcels on the northwest side.

There is no residential land use within the DNL 65 dB or higher contours.

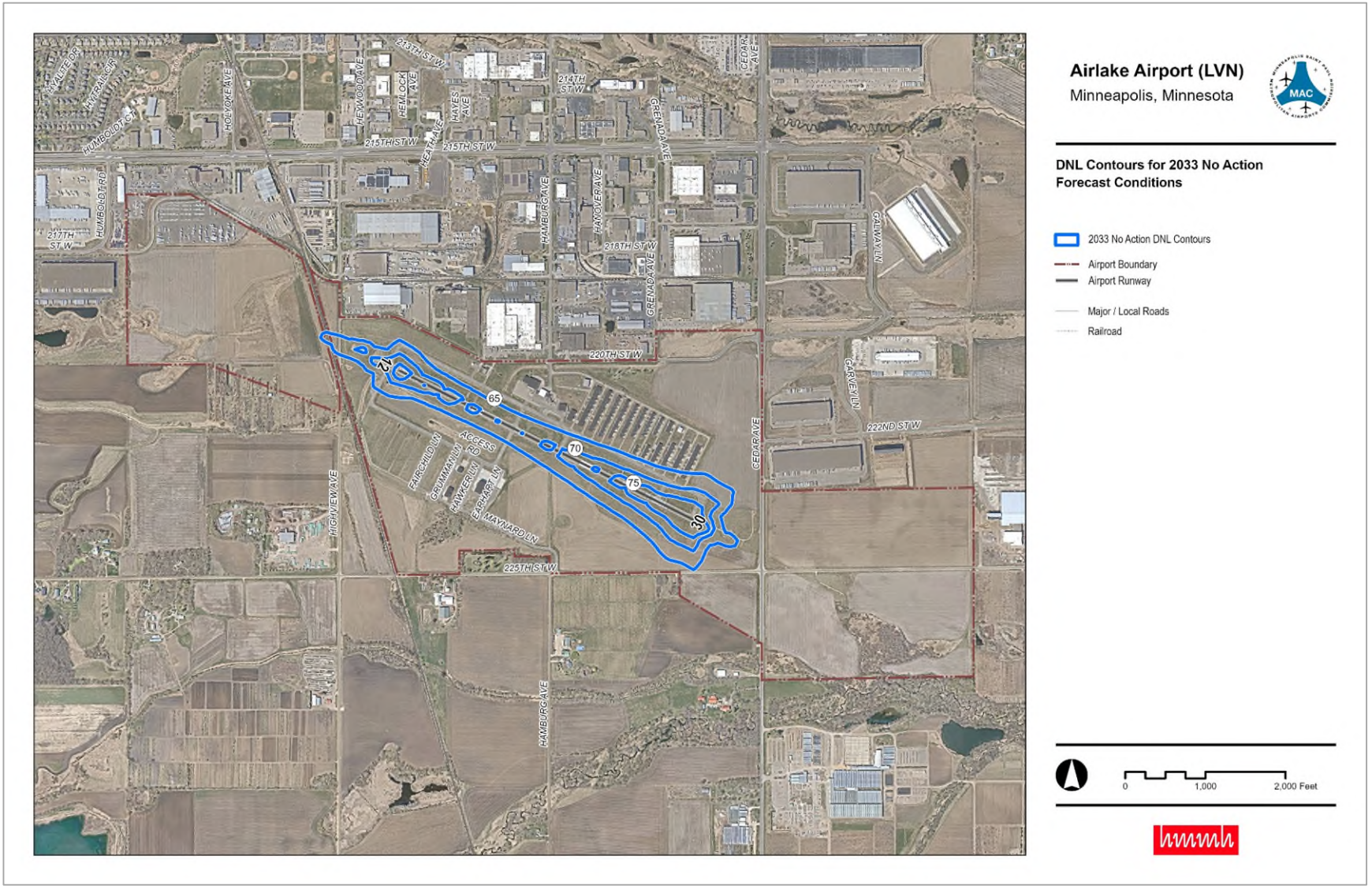
Table 6-4 provides the population exposure, housing unit count, and contour areas for the 2033 Future No Action DNL noise contours. The DNL 65+ dB noise contour—which covers 73.17 acres—contains no residents and no housing units. In addition, no individual noise-sensitive locations, such as schools or places of worship, are within the 2033 Future No Action DNL 65+ dB noise contour.

Table 6-4. 2033 Future No Action Noise Contours Population, Housing, and Area

DNL (dB) Noise Contour	2020 Population Census	2020 Housing Units	Area (acres)
65 - 70	0	0	46.43
70 - 75	0	0	18.72
> 75	0	0	8.02
Total	**0**	**0**	**73.17**

Sources: HMMH, 2026; U.S. Census Bureau, 2020

Figure 6-3. 2033 Future Forecast No Action DNL Contours



6.3.2 Proposed Action (2033)

Figure 6-4 displays the DNL 65 dB – 75 dB noise contours for the 2033 Proposed Action. The FAA's guidelines for land use compatibility presented in Appendix A of Part 150 (**Table 3-1** above) state that all land uses are generally compatible with aircraft noise below DNL 65 dB. The DNL 65 dB noise contour for Runway 12/30 remains mostly on airport property and compatible land use; the contour crosses a road and railroad right-of-way that splits the airport parcels on the northwest side.

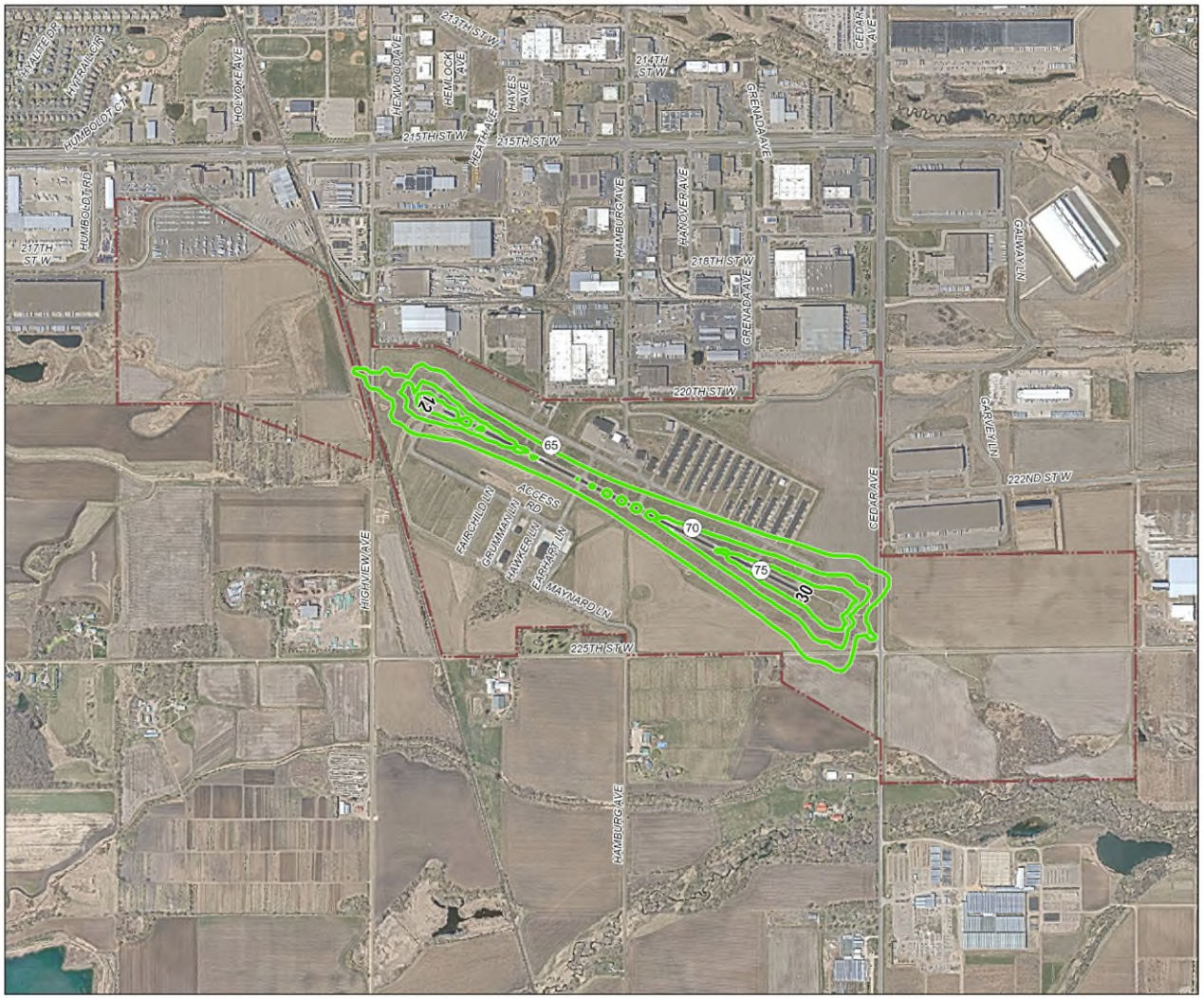
There is no residential land use within the DNL 65 dB or higher contours.

Table 6-5 provides the population exposure, housing unit count, and contour areas for the 2033 Future Proposed Action DNL noise contours. The DNL 65+ dB noise contour—which covers 74.30 acres—contains no residents and no housing units. In addition, no individual noise-sensitive locations, such as schools or places of worship, are within the 2033 Future Proposed Action DNL 65+ dB noise contour.

Table 6-5. 2033 Proposed Action Noise Contours Population, Housing, and Area

DNL (dB) Noise Contour	2020 Population Census	2020 Housing Units	Area (acres)
65 - 70	0	0	46.68
70 - 75	0	0	18.55
> 75	0	0	9.07
Total	**0**	**0**	**74.30**
Sources: HMMH, 2026; U.S. Census Bureau, 2020.			

Figure 6-4. 2033 Future Forecast Proposed Action DNL Contours



6.3.3 2033 No Action and Proposed Action Comparison

The 2033 Proposed Action DNL 65 dB contour is larger than the No Action DNL 65 dB contour primarily along the extended runway centerline north and south of the airport. This results in an increase of acreage. The number of people exposed to a DNL 65 dB or greater noise level remains unchanged at 0. There is an increase in the DNL 65 dB contour area of 1.13 acres.

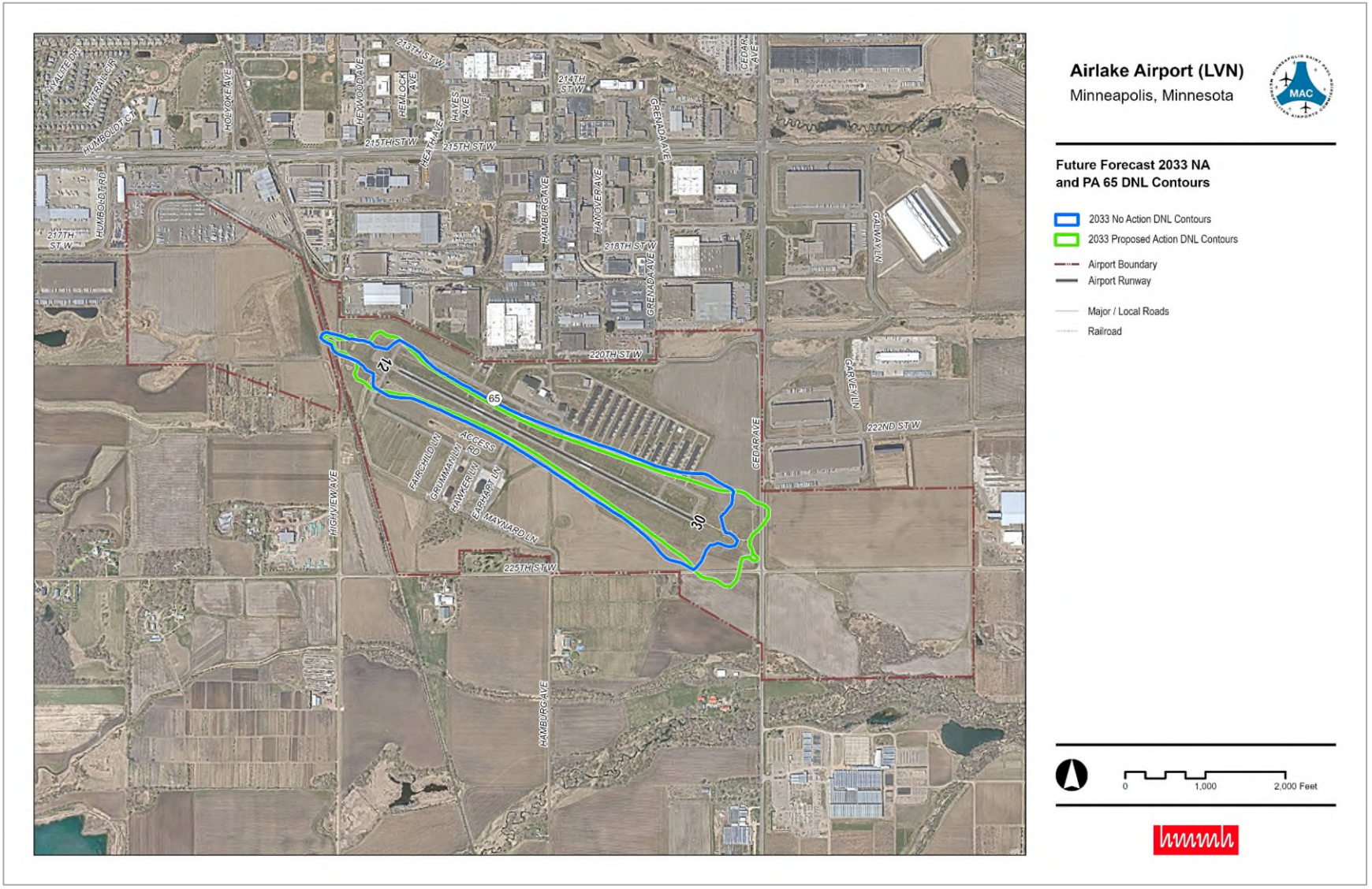
Table 6-6 provides a summary of changes between the 2033 No Action and Proposed Action DNL 65 dB contours.

With the extension of Runway 12/30, there are noise increases between the Proposed Action and No Action; however, all changes occur over compatible land use.

Table 6-6. Summary of Changes with the 2033 No Action and Proposed Action DNL 65 dB Contour

DNL > 65 dB	No Action	Proposed Action	Difference
2020 Population	0	0	0
2020 Housing Units	0	0	0
Acres	73.17	74.30	1.13
Noise-Sensitive Sites	0	0	0

Figure 6-5. 2033 Future Forecast No Action and Proposed Action DNL 65 dB



6.3.4 Mitigation Measures

There are projected to be no housing units or noise-sensitive sites within the Proposed Action DNL 65 dB contours for 2033. Therefore, no mitigation is proposed or required for these areas.

7 References

FAA. 2025. *Order 1050.1G – FAA National Environmental Policy Act Implementing Procedures.* June 30, 2025. https://www.faa.gov/documentLibrary/media/Order/FAA_Order_1050.1G.pdf

FAA. 2017. *Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA.* October 27.

FAA. 2006. *FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.* April 28, 2006. https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentid/14836

Attachment A Aircraft Noise Terminology

List of Acronyms

AAD	Average annual day
ANSI	American National Standards Institute
ASA	Acoustical Society of America
CFR	Code of Federal Regulations
CI	Confidence Intervals
dB	Decibels
dBA	A-Weighted Decibel
DNL	Day-Night Average Sound Level
EA	Environmental Assessment
FAA	Federal Aviation Administration
FICAN	Federal Interagency Committee on Aviation Noise
FICON	Federal Interagency Committee on Noise
HUD	Department of Housing and Urban Development
Hz	Hertz
ISO	International Organization for Standardization
L_{eq}	Equivalent Sound Level
L_{max}	Maximum Sound Level
NES	Neighborhood Environmental Survey
NLR	Noise Level Reduction
SEL	Sound Exposure Level
SLUCM	Standard Land Use Coding Manual
SPL	Sound pressure level
TNO	The Netherlands Organisation for Applied Scientific Research
U.S.	United States

A.1.1 Introduction to Acoustics and Noise Terminology

Noise is a complex physical quantity. The properties, measurement, and presentation of noise involve specialized terminology that is often difficult to understand. To assist reviewers in interpreting the complex noise metrics used in evaluating airport noise, this attachment introduces six acoustical descriptors of noise, listed in order of increasing complexity:

- Sound Pressure Level and Decibels (dB)
- A-Weighted Decibel (dBA)
- Maximum Sound Level (L_{max})
- Sound Exposure Level (SEL)
- Equivalent Sound Level (L_{eq})
- Day-Night Average Sound Level (DNL)

The following sections introduce basic acoustics terminology and metrics, followed by an overview of the effects of noise on human activity, community annoyance, and the current guidelines for land uses within various noise exposure levels.

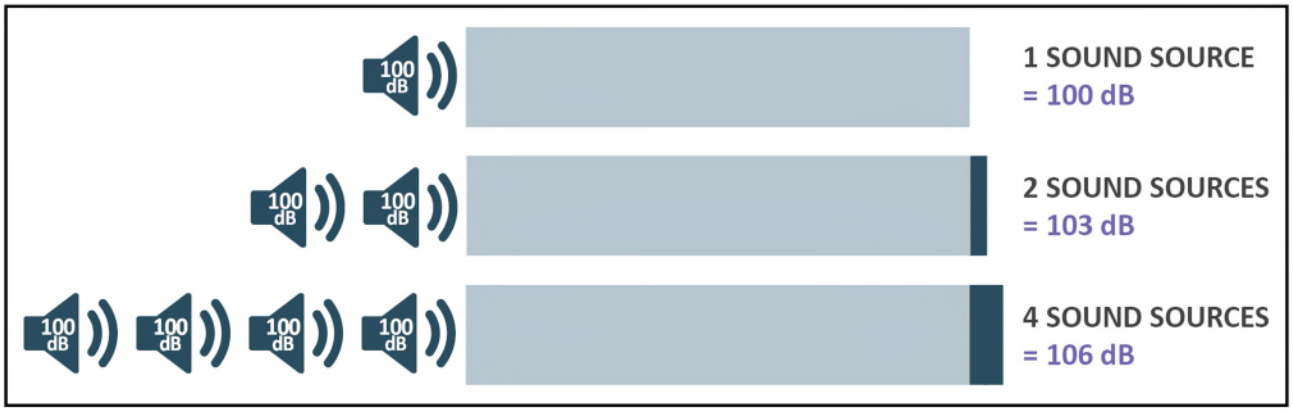
A.1.2 Sound Pressure Level and Decibels (dB)

All sounds come from a source, such as a musical instrument, a speaking voice, or an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any noise source travels through the air as sound waves: tiny, quick oscillations of pressure slightly above and below atmospheric pressure. The human ear detects these pressure fluctuations and interprets them as *sound*.

Because humans cannot detect small differences in the wide range of sound pressures we can hear, a logarithmic scale is used to represent sound pressure level (SPL) in a way that corresponds more closely to the sensitivity of human hearing. SPL expresses how the sound pressure from a given source compares to the quietest sound that a person can detect. The units of SPL are decibels (abbreviated dB).

Because decibels are logarithmic quantities, they cannot be added in the same way as ordinary numbers. For example, if two sound sources each produce 100 dB at the same time, together they create a combined level of 103 dB, not 200 dB, as one might expect. Four equal and simultaneous 100 dB sources produce a combined level of 106 dB. In general, each time the number of equal sources doubles, the noise level increases by 3 dB. Figure A-1 illustrates this concept.

Figure A-1. Combined Sound Levels for Equal Sources



Source: HMMH 2025

If one source is much louder than another, the two sources together produce the same noise level (and sound to our ears) as if the louder source were operating alone. For example, a 100 dB source combined with an 80 dB source still produces 100 dB (rounded to the nearest whole decibel). The louder source "masks" the quieter one. However, if the quieter source increases in level, it will have an increasing effect on the total noise level.

It is important to clarify that, in general, the combining of two sound sources of equivalent level does not result in a doubling of SPL. Doubling or halving of SPL is a change of +/- 6 dB. For an increase of 6 dB to result from the combination of two equivalent SPL sources, the peaks and troughs of their pressure fluctuations must align perfectly at a listener's position. The degree to which the peaks and troughs of multiple sounds align with each other is called phase correlation. In real world situations the phase correlation of two (or more) sounds is random and thus results only in changes of +/- 3 dB for every doubling or halving.

People hear SPL changes according to the following principles:

A change of 1 dB or less is generally not noticeable, except under controlled laboratory conditions.

A change of 5 dB is usually noticeable in a community setting.

An increase of 10 dB is typically heard as a doubling of a sound's loudness (i.e., perceived volume); similarly, a 10 dB decrease is perceived as halving the loudness.

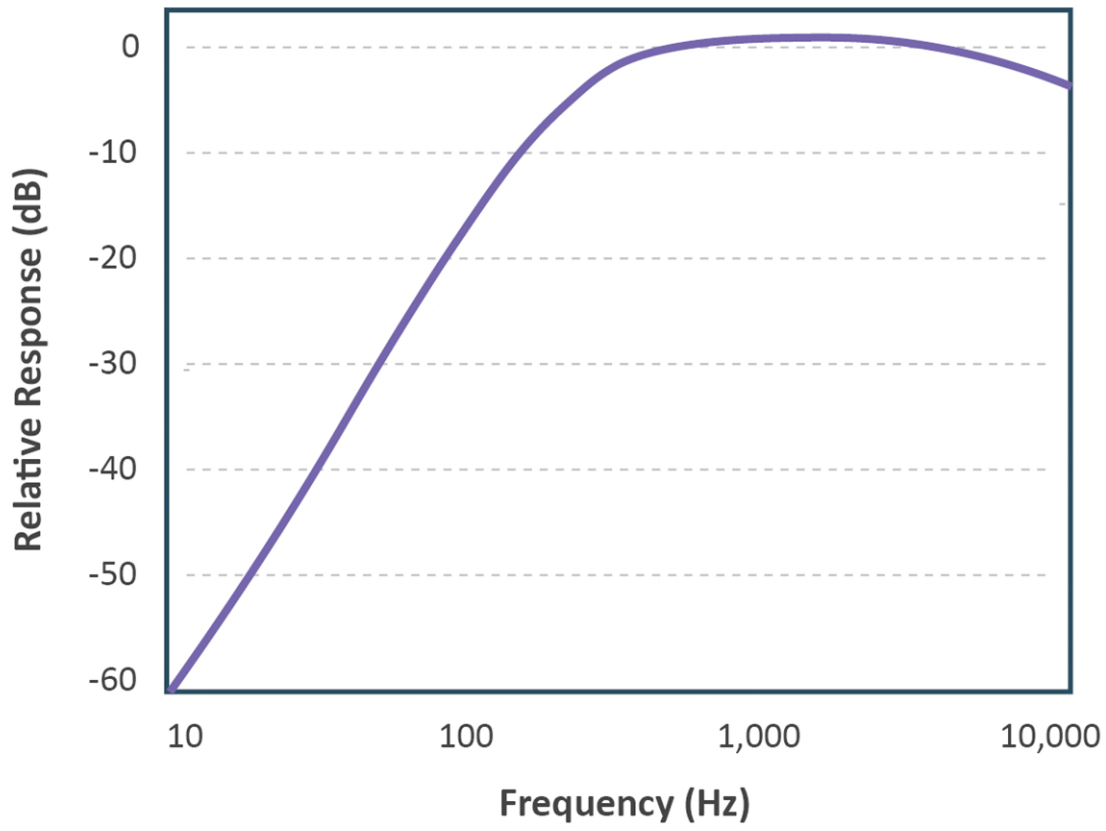
A.1.3 A-Weighted Decibel (dBA)

Frequency (sometimes called *pitch*) is another important characteristic of sound. Frequency is the rate at which sound waves repeat as they reach our ears. The units of frequency are known as Hertz (Hz). The human ear does not respond equally to sounds of equal noise levels at different frequencies. The maximum frequency range of hearing for people ranges from 20 Hz to 20,000 Hz, though the high end of that range is generally only audible to very young people. People are most sensitive to sounds in the range of about 1,000 Hz to 5,000 Hz, which corresponds to the frequency range most important for speech intelligibility.

To adjust noise levels to resemble the way humans perceive them, an "A-weighting" filter is applied. After applying the filter, the result is reported as an A-weighted sound level, with units noted as A-weighted decibels (dBA). A-weighting reduces the influence of frequencies that people do not hear well. As shown in Figure A-2,

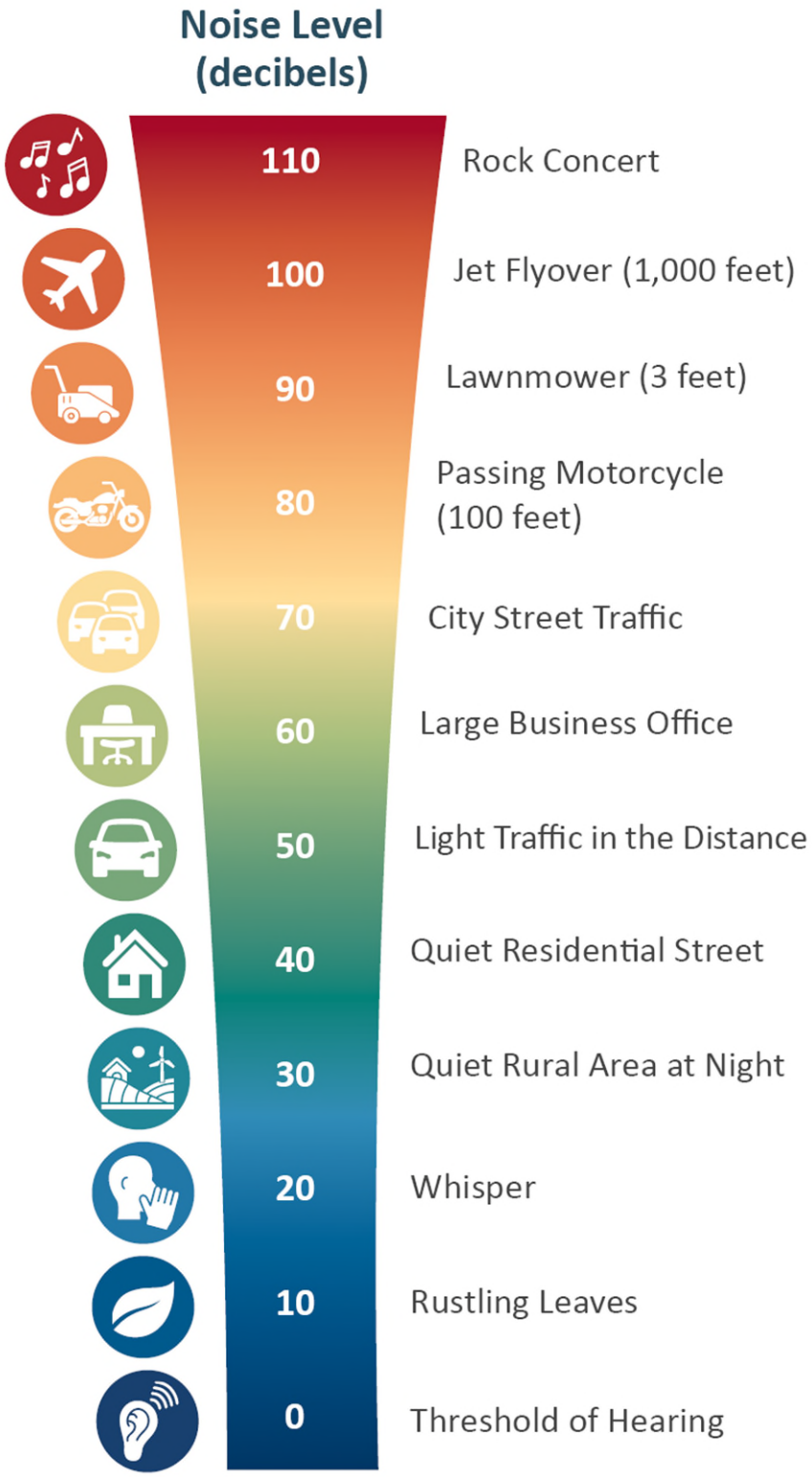
the weighting has relatively little effect in the frequency range of 800 Hz to 8,000 Hz, where the weighting adjustments are within +/- 1 dB. Studies have shown that A-weighted sound levels correlate well with how people judge the “noisiness” of transportation sources, such as aircraft. Most government agencies, including the FAA, have adopted the A-weighted level as the standard measure of environmental sound. All noise metrics presented in this document use A-weighting in the context of quantifying aviation noise levels. Figure A-3 shows A-weighted noise levels for a variety of noise environments.

Figure A-2. A-Weighted Sound Level



Source: HMMH 2025

Figure A-3. Comparative A-Weighted Noise Levels

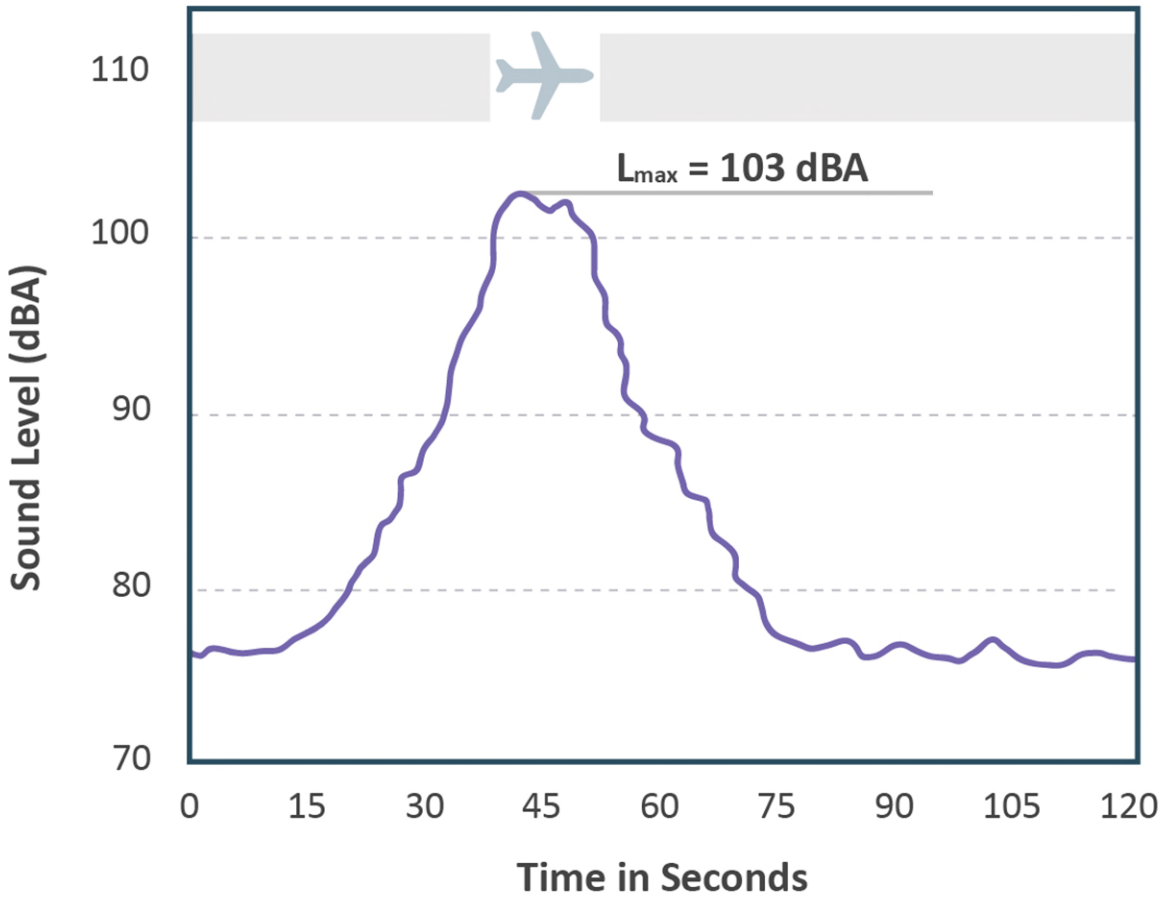


Source: HMMH 2025

A.1.4 Maximum Noise Level (L_{max})

Sound levels vary over time. Even quiet background noise fluctuates—birds chirp, the wind blows, or a vehicle passes by. For an aircraft, sound typically rises as the aircraft approaches, momentarily reaches a maximum level when the aircraft is closest, and then falls and blends into the background as the aircraft recedes into the distance. Because noise changes over time, it is often useful to describe a specific “noise event" by its maximum sound level, abbreviated as L_{max}. Figure A-4 illustrates this concept showing a noise event with an L_{max} of about 103 dBA. The L_{max} represents the moment of maximum SPL occurring during the event.

Figure A-4. Variations in the A-Weighted Sound Level Over Time, Including L_{max}



Source: HMMH 2025

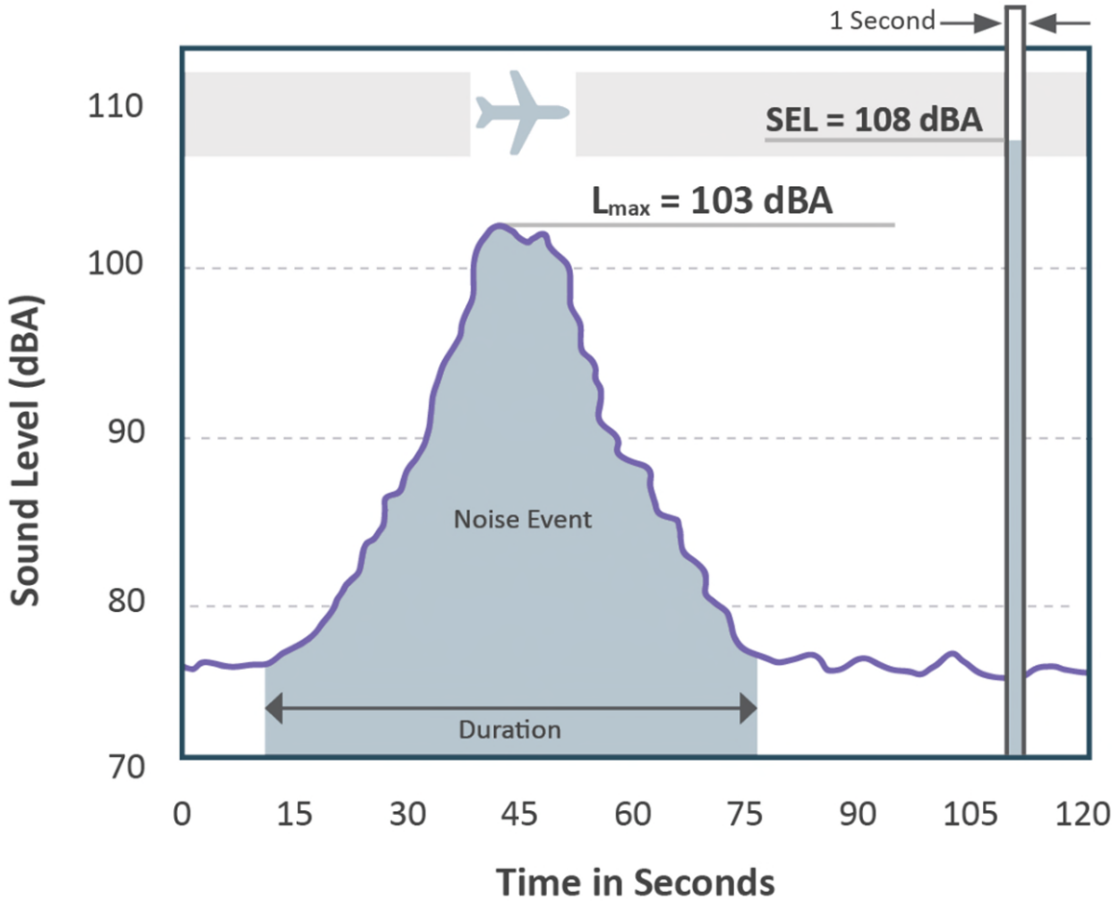
While L_{max} indicates the highest SPL of an event, it provides no information about cumulative noise exposure. Two events with identical L_{max} values may produce very different human responses. One may be of very short duration, while the other may continue for an extended period and be perceived as much more annoying. To account for the duration of noise events, the Sound Exposure Level metric is used.

A.1.5 Sound Exposure Level (SEL)

Sound Exposure Level (SEL) measures the total noise energy produced over the duration of an individual event. SEL is an integrated metric that essentially sums up the energy from a noise event over the duration its SPL is above the ambient background noise level. The SEL for an event represents the constant SPL that would produce the same total energy in one second as the event did over its entire duration. In effect, the SEL "compresses" the entire noise event's energy into one second.

Because the SEL metric compresses all events into the same time duration, it allows direct comparison of total sound energy from events of different durations. Figure A-5 depicts this process for a sample noise event. The duration shows the times at which the noise exceeded and then dropped below the ambient background noise. The shaded region includes the entire noise event, which lasted approximately 60 seconds and had a maximum (L_{max}) of about 103 dB. The shaded vertical bar, which is 108 dB high and just one second in duration, contains the same exact sound energy as the full event.

Figure A-5. Sound Exposure Level



Source: HMMH 2025

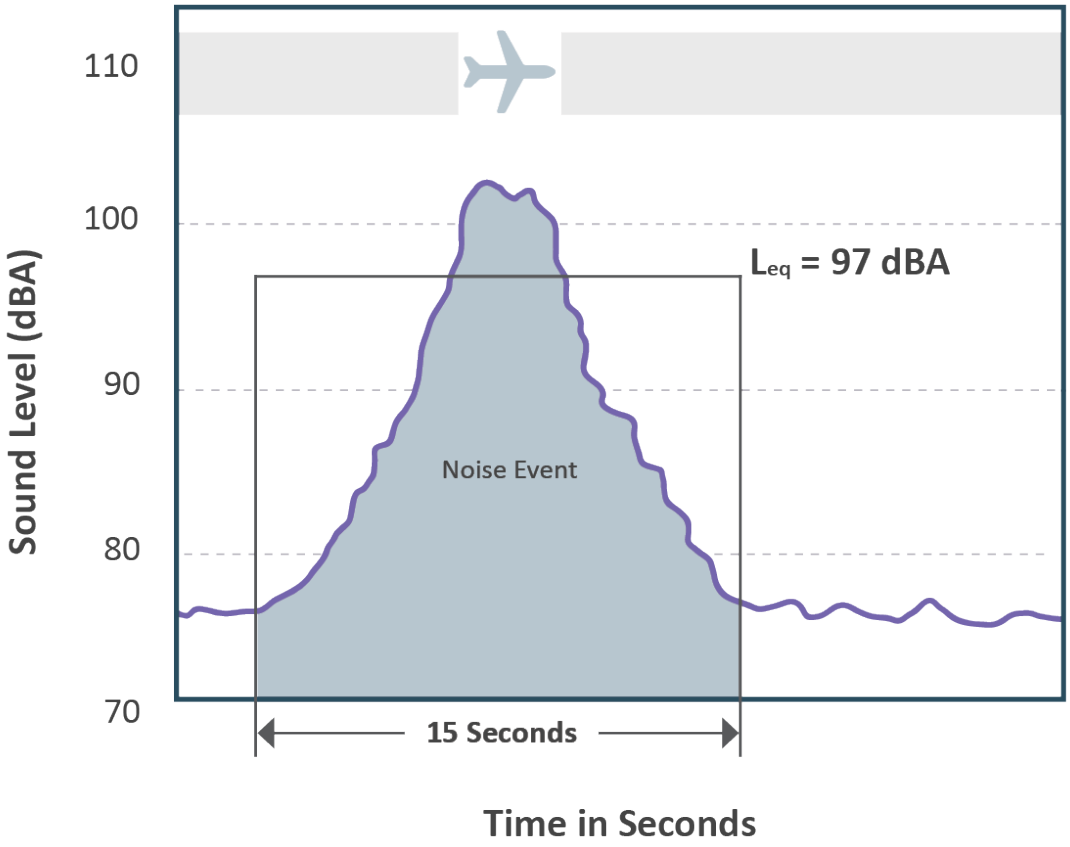
The SEL value is always larger than L_{max} for events that last longer than one second. For most aircraft overflights, SEL is normally about 7 dB to 12 dB higher than the L_{max}. Longer exposure to slower, quieter aircraft (e.g., propeller aircraft) can yield the same or higher SEL values than a shorter time exposure to faster, louder aircraft (e.g., corporate jets). SEL captures both duration and level; higher SEL values generally correspond to events that are more annoying.

Aircraft noise models use SEL as the basis for computing exposure from multiple events such as the computation of DNL.

A.1.6 Equivalent Sound Level (L_{eq})

The Equivalent Sound Level (L_{eq}) is a measure of sound exposure that represents the accumulation of sound energy over a specified period, such as one hour, an eight-hour school day, nighttime, or a full 24-hour day. Hourly L_{eq} values can be plotted to illustrate how noise exposure varies over the course of a day and to show how a small number of loud aircraft events can disproportionately influence noise levels during certain hours. L_{eq} represents the constant sound level over the period of interest that would contain the same total sound energy as the actual, time-varying sound. In this way, it assigns a single value to a fluctuating noise environment. Figure A-6 illustrates this concept for the same hypothetical event shown in Figures A-4 and A-5. As shown, the L_{eq} is lower than both the L_{max} and the SEL.

Figure A-6. Equivalent Sound Level (L_{eq})

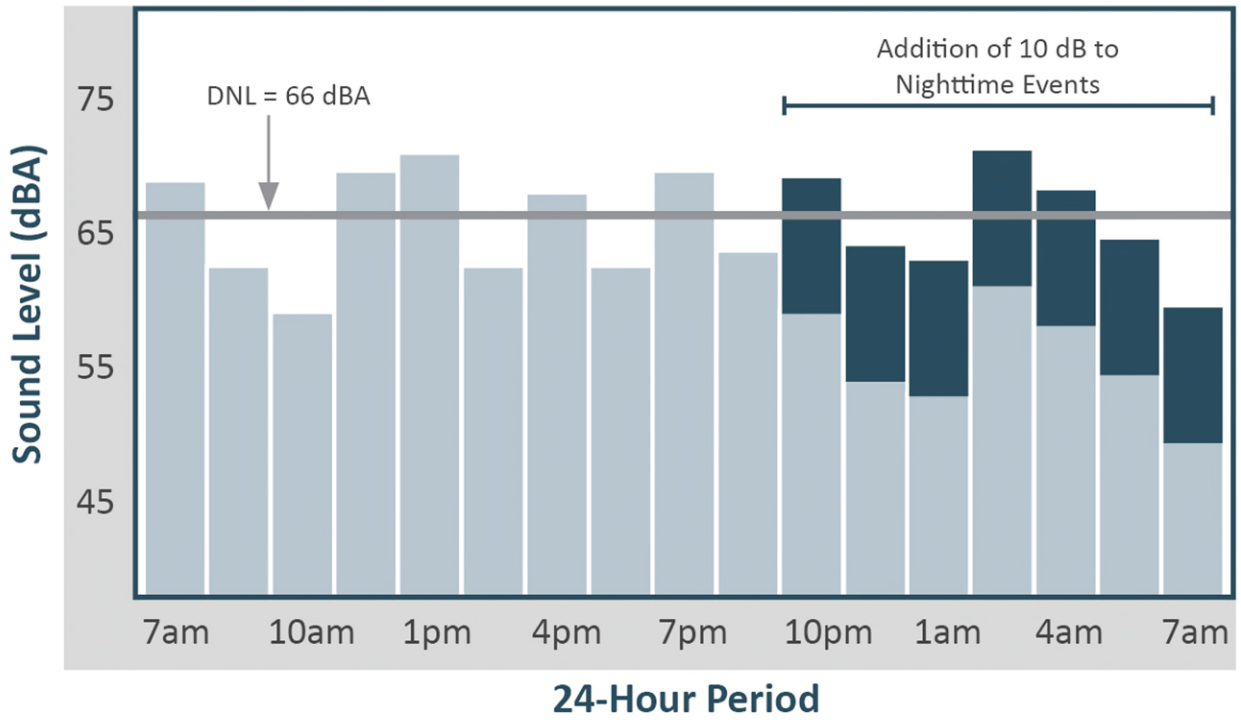


Source: HMMH 2025

A.1.7 Day-Night Average Sound Level (DNL)

The previous sections describe noise metrics that account for short-term fluctuations in sound levels; however, DNL represents noise exposure as it occurs over a 24-hour period, with one adjustment: DNL treats noise occurring at night differently from daytime noise. The calculation adds 10 dB to events occurring between 10:00:00 p.m. and 6:59:59 a.m. This increase reflects the fact that people have a greater sensitivity to nighttime sound. People often judge noises at night as more intrusive because background noise at night is generally lower. Figure A-6 depicts this adjustment graphically.

Figure A-7. Example of a Day-Night Average Sound Level Calculation



Source: HMMH 2025

DNL can be measured or estimated. It can be measured using community noise monitors; however, the measurement is limited to the specific locations where monitors are placed and to the period during which they operate, unless a permanent system is installed. Most noise studies use computer-generated DNL estimates. The computer model adds up all the SEL values for every event over an entire year of aircraft operations and computes the equivalent DNL for an AAD. Results are displayed as noise contours—lines connecting points with equal DNL. The contours usually reflect long-term (annual average) operating conditions, considering the average flights per day, how often each runway is used throughout the year, and where over the surrounding communities the aircraft normally fly. Sometimes color-coded grid points on a map report the computed DNL at locations of interest.

Most public agencies involved in noise regulation, including the FAA, Department of Defense, and Department of Housing and Urban Development (HUD), have adopted DNL as their primary metric.

The Federal Interagency Committee on Noise (FICON) reaffirmed the appropriateness of DNL in 1992. The FICON summary report stated, "There are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric" (FICON 1992). This determination was reaffirmed in 2018 in a report from the Federal Interagency Committee on Aviation Noise (FICAN), the successor to FICON. Additionally, in response to a requirement in the FAA Reauthorization Act of 2018 stating that the FAA "evaluate alternative noise metrics to current average day-night level standard, such as the use of actual noise sampling to address community airplane noise concerns" (United States (U.S.) 2018, §188), in 2020 the FAA published a report that recommended the continued use of DNL for its decision-making regarding noise compatibility (FAA 2020).

A.1.8 The Effects of Aircraft Noise on People

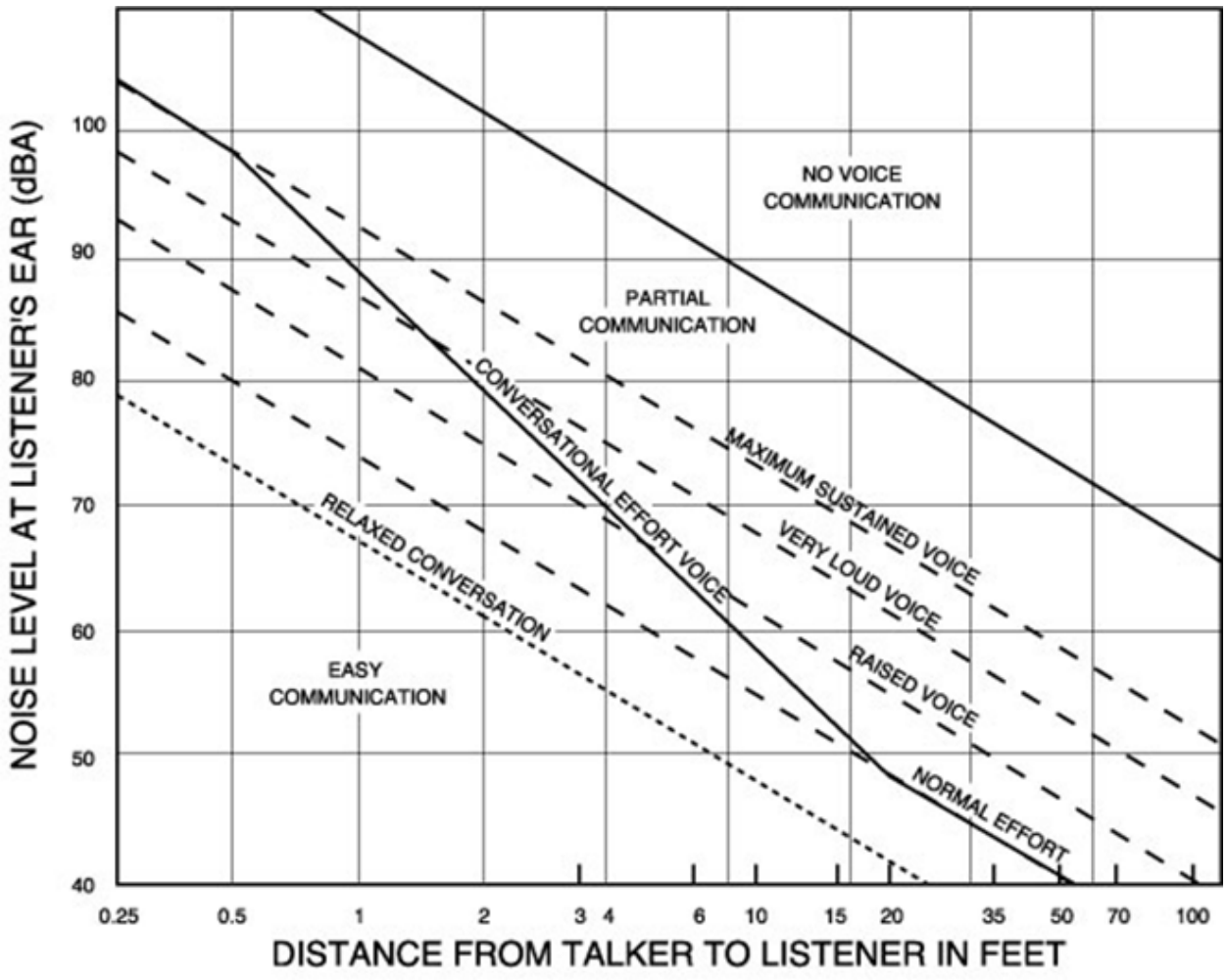
Aircraft noise can be an annoyance and a nuisance to residents living near airports. It can interfere with conversation and listening to television, disrupt classroom activities in schools, and disrupt sleep. Relating these effects to specific noise metrics helps explain how and why people react to their environment.

A.1.9 Speech Interference

Aircraft noise tends to "mask" speech, making normal conversation difficult. The sound level of speech decreases as the distance between a talker and listener increases. Additionally, as the background sound level increases, it becomes harder to hear speech. Figure A-7 presents typical distances between talker and listener for satisfactory outdoor conversations, in the presence of different steady background noise levels for raised, normal, and relaxed voice effort. As the background level increases, the speaker must talk louder or the listeners must move closer to maintain intelligibility.

Normal conversational effort does not require hearing every word; 95 percent intelligibility is acceptable for many conversations. Listeners can infer a few unheard words when they occur in a familiar context. However, in relaxed conversation, we have higher expectations of hearing speech and generally require closer to 100 percent intelligibility. Any combination of talker-listener distances and background noise that falls below the bottom line in Figure A-7 (thus assuring 100 percent intelligibility) represents an ideal environment for outdoor speech communication and is considered necessary for acceptable indoor conversation as well.

Figure A-8. Outdoor Speech Intelligibility



Source: U.S. Environmental Protection Agency, 1974, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety*, p. D-5.

For typical communication distances of 3–4 feet (1–1.5 meters), outdoor conversations in a normal voice are intelligible if background noise is below approximately 65 dBA. If the noise exceeds this level, as might occur when an aircraft passes overhead, intelligibility would be lost unless vocal effort were increased or communication distance were decreased.

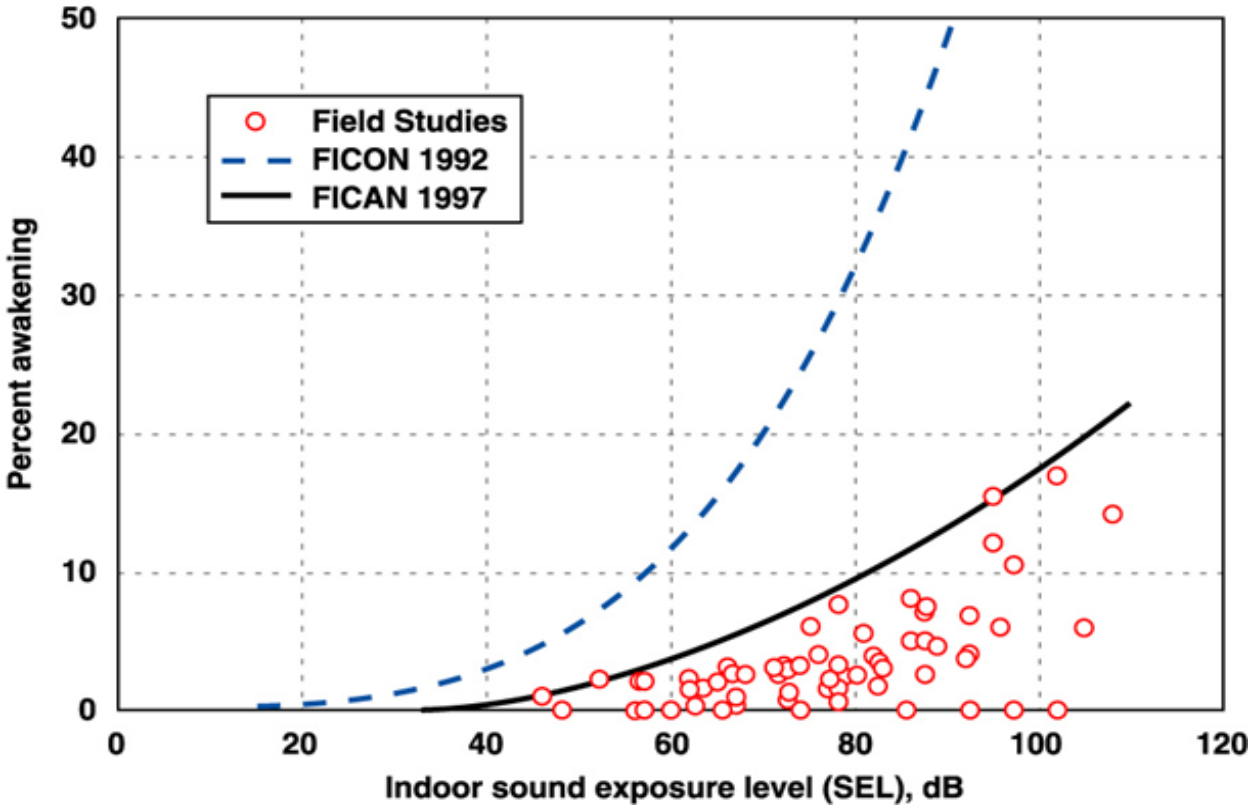
Indoors, acceptable speech generally requires a background level less than 45 dBA. With windows partly open, housing generally provides approximately 10 dBA to 15 dBA of interior-to-exterior noise level reduction. Thus, if the outdoor sound level is 60 dBA or less, there is a reasonable chance that the resulting indoor sound level will afford acceptable conversation. Closed windows typically provide about 24 dBA of noise reduction.

A.1.10 Sleep Interference

Research on sleep disruption from noise shows varying results, due to factors such as (1) sleep disturbances can occur without awakening; (2) deeper sleep requires more noise to cause arousal, and (3) the tendency to

awaken increases with age and other factors. Figure A-8 shows a summary of findings on the topic from the 1997 FICAN. It estimates the maximum percentage of people awakened from indoor aircraft SEL for long-term residential adults. An indoor SEL of 80 dB results in a maximum of 10 percent awakening.

Figure A-9. Sleep Interference



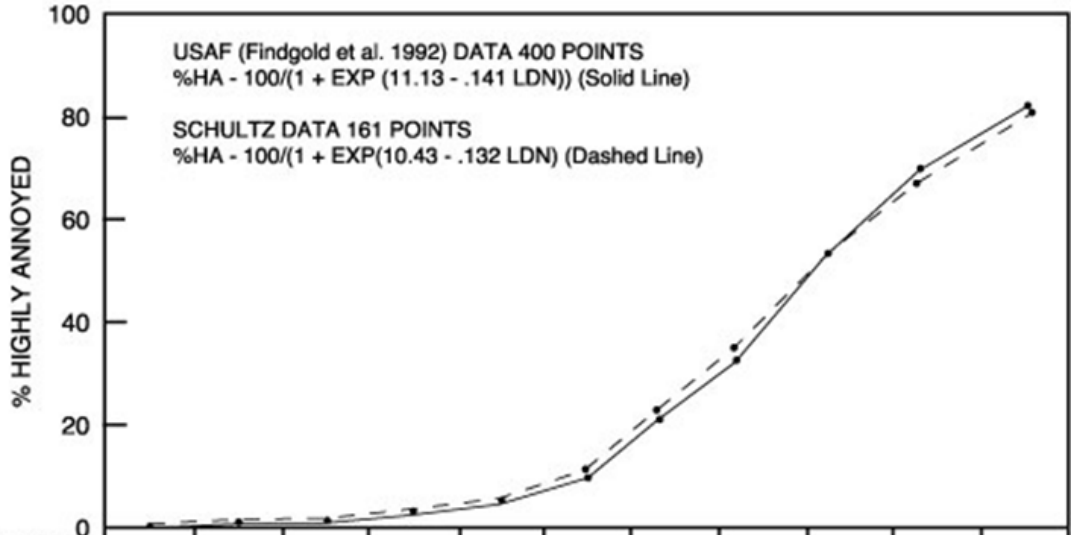
Source: FICAN, 1997, *Effects of Aviation Noise on Awakenings From Sleep*, p. 6, June.

In 2008, the American National Standards Institute (ANSI) and the Acoustical Society of America (ASA) published a method for the estimation of awakenings from outdoor noise events. This standard was withdrawn in 2017 for reasons of technical inadequacy and stated that the 2008 methodology is not obviously superior to other predictive methods, such as the FICAN 1997 method described above. The results from FAA's National Sleep Study, expected to conclude in 2026, is anticipated to update and inform U.S. policy on sleep disturbance.

A.1.11 Community Annoyance

Numerous psychoacoustic surveys provide substantial evidence that individual reactions to noise vary widely for a given noise exposure level. However, research has confirmed that a community's aggregate response is generally predictable and relates reasonably well to measures of cumulative noise exposure such as DNL. Figure A-9 shows the Schultz curve, a widely recognized relationship between environmental noise and the percentage of people "highly annoyed," with annoyance being the key indicator of community response usually cited in this body of research.

Figure A-10. Percentage of People "Highly Annoyed"



Day - Night Average Sound Level in dB	40	45	50	55	60	65	70	75	80	85	100
Calculated %HA Points: USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
Calculated %HA Points: SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

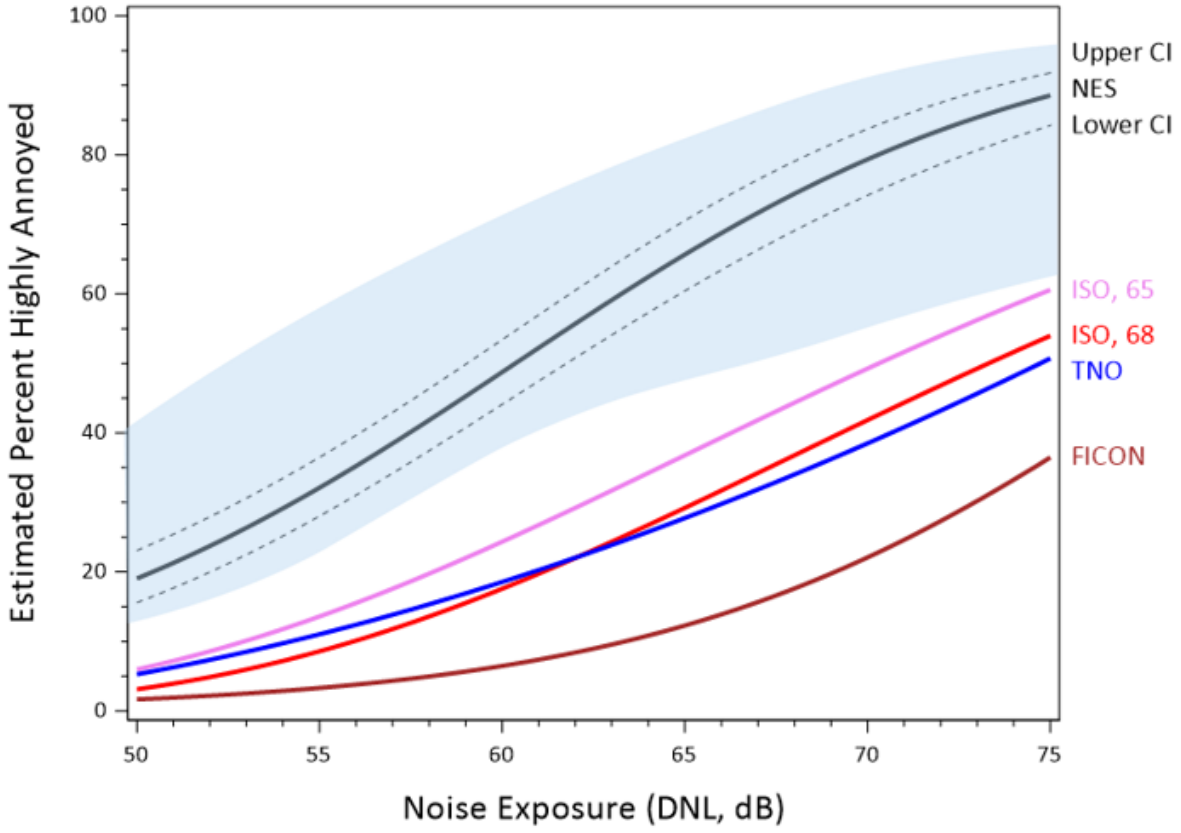
Source: FICON, 1992, *Federal Agency Review of Selected Airport Noise Analysis Issues*, pp. 3-6, applied using data provided by the U.S. Air Force Armstrong Laboratory

Based on data from 18 surveys conducted worldwide, the curve indicates that at levels as low as DNL 55 dB, approximately 3 percent to 4 percent of people would be "highly annoyed," with this percentage increasing rapidly above 65 dB DNL. The study was originally conducted in 1974 and validated in 1992 by FICON.

Published in 2021, the FAA's Neighborhood Environmental Survey (NES) was a multi-year research program to update scientific evidence on the relationship between aircraft noise exposure and its effects on communities around airports (FAA 2021). The NES resulted in an updated dose-response curve for the percentage of people highly annoyed by environmental noise at varying levels of DNL. This updated curve, provided in Figure A-10, shows a marked increase in the number of people highly annoyed by environmental noise at a given DNL compared to the FICON (1992) curve. Figure A-10 also compares the national curve to three other curves from frequently cited research:

- Two community tolerance level analyses from the International Organization for Standardization (ISO) (2016) and
- The Netherlands Organisation for Applied Scientific Research (TNO) curve (2011).

Figure A-11. National Dose-Response Curve (NES), with 95 Percent Confidence Intervals (CI), and TNO, FICON and ISO Curves on Annoyance for a Given DNL



Source: FAA, 2021, *Analysis of the Neighborhood Environmental Survey*

In 2023, the FAA initiated a review of its policies regarding civil aviation noise in response to public and stakeholder input on the FAA's ongoing research. This National Policy Review includes a review of research on the effects of exposure to aviation noise and review and possible revision of the noise metrics used to describe exposure to aircraft and vehicle noise, the defined thresholds for significant noise exposure, and thresholds for land uses compatible with airport operations (FAA 2023). Specifically, the FAA is reviewing the use of DNL as the primary noise metric for cumulative aircraft noise exposure, as well as the significance threshold for noise impact and land use compatibility.

A.1.12 Noise/Land Use Compatibility Guidelines

The FAA, other federal agencies, and several states have developed guidelines for identifying compatible land uses. Increasingly noise-sensitive land uses require lower noise exposure to achieve compatibility. Thus, DNL serves two principal purposes for aviation noise analysis:

- Provides a basis for comparing existing and future noise conditions
- Provides a quantitative basis for identifying potential noise impacts

Both functions require the application of objective criteria for evaluating noise impacts. Title 14 of the Code of Federal Regulations (CFR), Part 150, provides the FAA's recommended guidelines for determining noise/land use compatibility, as shown in Table A-1. According to these FAA guidelines, all identified land uses—even those that are more noise sensitive—normally are compatible with aircraft noise at DNL levels below 65 dB. The significance of this level is formally supported in standards adopted by HUD. Title 24 CFR Part 51 indicates that areas exposed to DNL levels less than or equal to 65 dB are acceptable for HUD funding. Areas exposed to noise levels between DNL 65 dB and 75 dB are "normally unacceptable" and require special abatement measures and review. Those at DNL 75 dB and above are "unacceptable" except under very limited circumstances.

Table A-1. Land Use Compatibility with Yearly Day-Night Average Sound Levels

Residential						
Residential, other than mobile homes and transient lodgings	**Y**	**N(1)**	**N(1)**	**N**	**N**	**N**
Mobile home park	**Y**	**N**	**N**	**N**	**N**	**N**
Transient lodgings	**Y**	**N(1)**	**N(1)**	**N(1)**	**N**	**N**
Public Use						
Schools	**Y**	**N(1)**	**N(1)**	**N**	**N**	**N**
Hospitals and nursing homes	**Y**	**25**	**30**	**N**	**N**	**N**
Churches, auditoriums, and concert halls	**Y**	**25**	**30**	**N**	**N**	**N**
Governmental services	**Y**	**Y**	**25**	**30**	**N**	**N**
Transportation	**Y**	**Y**	**Y(2)**	**Y(3)**	**Y(4)**	**Y(4)**
Parking	**Y**	**Y**	**Y(2)**	**Y(3)**	**Y(4)**	**N**
Commercial						
Offices, business and professional	**Y**	**Y**	**25**	**30**	**N**	**N**
Wholesale and retail—building materials, hardware, and farm equipment	**Y**	**Y**	**Y(2)**	**Y(3)**	**Y(4)**	**N**
Retail trade—general	**Y**	**Y**	**Y(2)**	**Y(3)**	**Y(4)**	**N**
Utilities	**Y**	**Y**	**Y(2)**	**Y(3)**	**Y(4)**	**N**
Communication	**Y**	**Y**	**25**	**30**	**N**	**N**
Manufacturing and Production Use						
Manufacturing, general	**Y**	**Y**	**Y(2)**	**Y(3)**	**Y(4)**	**N**
Photographic and optical	**Y**	**Y**	**25**	**30**	**N**	**N**
Agriculture (except livestock) and forestry	**Y**	**Y(6)**	**Y(7)**	**Y(8)**	**Y(8)**	**Y(8)**
Livestock farming and breeding	**Y**	**Y(6)**	**Y(7)**	**N**	**N**	**N**
Mining and fishing, resource production and extraction	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
Recreational Use						
Outdoor sports arenas and spectator sports	**Y**	**Y(5)**	**Y(5)**	**N**	**N**	**N**
Outdoor music shells, amphitheaters	**Y**	**N**	**N**	**N**	**N**	**N**
Nature exhibits and zoos	**Y**	**Y**	**N**	**N**	**N**	**N**
Amusements, parks, resorts, and camps	**Y**	**Y**	**Y**	**N**	**N**	**N**
Golf courses, riding stables, and water recreation	**Y**	**Y**	**25**	**30**	**N**	**N**

Source: 14 CFR Part 150, Appendix A, Table 1.
Numbers in parentheses refer to the notes below.

Key to Table 1:

SLUCM:	Standard Land Use Coding Manual
Y (Yes):	Land use and related structures compatible without restrictions
N (No):	Land use and related structures are not compatible and should be prohibited
NLR:	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure
25, 30, or 35:	Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dBA must be incorporated into design and construction of structure

Notes for Table 1:

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dBA and 30 dBA should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dBA, thus, the reduction requirements are often started as 5, 10, or 15 dBA over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR of 25 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(3) Measures to achieve NLR of 30 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(4) Measures to achieve NLR of 35 dBA must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(5) Land-use compatible, provided special sound reinforcement systems are installed.
(6) Residential buildings require an NLR of 25 dBA.

A.1.13 References

Federal Aviation Administration (FAA). 2023. Noise Policy Review, The Foundational Elements of the Federal Aviation Administration Civil Aviation Noise Policy: The Noise Measurement System, its Component Noise Metrics, and Noise Thresholds. FAA Office of Environment and Energy. April. https://www.faa.gov/noisepolicyreview/NPR-framing.

FAA. 2021. Analysis of the Neighborhood Environmental Survey. February. https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/ArtMID/3682/ArticleID/2845/Analysis-of-NES.

FAA. 2020. Report to Congress – Evaluation of Alternative Noise Metrics. April 14. https://www.flychicago.com/SiteCollectionDocuments/Community/Noise/OHare/N101/2020FAAreportDNL.pdf.

Federal Interagency Committee on Noise (FICON). 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. Washington, DC: Federal Interagency Committee on Noise.

United States. FAA Reauthorization Act of 2018. Pub. L. 115254, § 188, 132 Stat. 3186. https://www.congress.gov/115/plaws/publ254/PLAW-115publ254.pdf.

Attachment B AEDT Existing and Future Model Flight Track Use

Existing/No Action

Track Bundle	Daytime Percent Use	Nighttime Percent Use
A1201	36%	48%
A1202	22%	29%
A1203	22%	16%
A1204	21%	6%
A3001	6%	4%
A3002	26%	40%
A3003	26%	24%
A3004	15%	2%
A3005	27%	29%
C1201	100%	100%
C3001	100%	100%
D1201	43%	36%
D1202	22%	32%
D1203	24%	32%
D1204	11%	-
D3001	45%	40%
D3002	10%	10%
D3003	21%	19%
D3004	7%	4%
D3005	12%	23%
D3006	5%	4%

Proposed Action

Track Bundle	Daytime Percent Use	Nighttime Percent Use
xA1201	36%	48%
xA1202	22%	29%
xA1203	22%	16%
xA1204	21%	6%
xA3001	6%	4%
xA3002	26%	40%
xA3003	26%	24%
xA3004	15%	2%
xA3005	27%	29%
xC1201	100%	100%
xC3001	100%	100%
xD1201	43%	36%
xD1202	22%	32%
xD1203	24%	32%
xD1204	11%	-
xD3001	45%	40%
xD3002	10%	10%
xD3003	21%	19%
xD3004	7%	4%
xD3005	12%	23%
xD3006	5%	4%

APPENDIX E:
IPAC, BAT HABITAT ASSESSMENT, AND USFWS DOCUMENTATION

From: Jenny, Melissa M (FAA)
To: Sarah Emmel; Gilles, Eric
Cc: Evan Barrett; Sebesta, Kyle E (FAA); Colleen Bosold; Cole Kiernan
Subject: FW: [EXTERNAL] 2026-07-08 FAA to FWS - Airlake Airport - Request for TCB NLAA concurrence
Date: Wednesday, July 22, 2026 9:53:20 AM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png
image008.png
image009.png

M&H/MAC:

Please see FWS concurrence for the LVN project below.

Thank you,

Melissa Jenny
Environmental Protection Specialist
FAA-Dakota Minnesota Airports Office
U.S. Department of Transportation
(612) 253-4633
Melissa.m.jenny@faa.gov

From: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Sent: Tuesday, July 21, 2026 10:43 AM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Cc: Tawes, Robert <robert_tawes@fws.gov>; Galbraith, Betsy M <betsy_galbraith@fws.gov>
Subject: RE: [EXTERNAL] 2026-07-08 FAA to FWS - Airlake Airport - Request for TCB NLAA concurrence

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Dear Melissa Jenny,

The U.S. Fish and Wildlife Service (Service) has reviewed your July 8th, 2026 email and enclosures, requesting informal consultation on the proposed project “Airfield Improvements and Road Relocation”, in Dakota County, MN (Project Code: 2026-0088781) and submits these comments pursuant to the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531-1544).

The analysis using MN-WI FO Determination Keys for the proposed action resulted in a “may affect” determination for Tricolored Bat (*Perimyotis subflavus*). Based on the additional information you have provided, and the avoidance measures you are implementing to mitigate impact to listed species; we anticipate the effects of the proposed action to be insignificant or discountable. Thus, the Service concurs with your determination that the proposed action “may affect, but is not likely to adversely affect” Tricolored Bat (*Perimyotis subflavus*).

This concludes consultation under Section 7 of the Endangered Species Act, as amended. Should the scope, timing, or manner of activity change, please contact this office. If you have questions, please contact Lainet Garcia-Rivera at lainet_garcia-rivera@fws.gov.

Thank you for the opportunity to review the proposed actions.

Sincerely,

Lainet

Lainet Garcia-Rivera
Biologist/AOC Coordinator
U.S. Fish and Wildlife Service
Minnesota-Wisconsin Ecological Services Field Office
505 Science Dr. Suite A
Madison, Wisconsin 53711
Phone: (612) 289-9497 (cell)
https://www.fws.gov/midwest/

From: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Sent: Wednesday, July 8, 2026 4:14 PM
To: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Subject: [EXTERNAL] 2026-07-08 FAA to FWS - Airlake Airport - Request for TCB NLAA concurrence

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Good afternoon, Lainet.

Please see the attached request for FWS concurrence with FAA's "May Affect, Not Likely to Adversely Affect" determination made for the tricolored bat (TCB) for the Airlake Airport Runway Improvement Project, in Lakeville, MN.

The project will require some culvert relocation work and approximately 0.70-acre of tree removal, with no suitable bat habitat nearby, as described in the attached memo.

Please reach out with questions.

Thank you,

Melissa Jenny
Environmental Protection Specialist
FAA-Dakota Minnesota Airports Office
U.S. Department of Transportation
(612) 253-4633
Melissa.m.jenny@faa.gov

From: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Sent: Monday, June 15, 2026 1:21 PM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

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Sounds great! Thanks for getting back to me quickly.

Best,

Lainet

Lainet Garcia-Rivera
Biologist/AOC Coordinator

U.S. Fish and Wildlife Service
Minnesota-Wisconsin Ecological Services Field Office
250 East Wisconsin Ave, Suite 1100
Milwaukee, Wisconsin 53202
Phone: (612) 289-9497 (cell)
https://www.fws.gov/midwest/

From: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Sent: Monday, June 15, 2026 1:05 PM
To: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

Thank you, Lainet. We'll get the LVN Runway Project TCB D-key to you soon for concurrence. And no need to attend meeting tomorrow just wanted to share invite in case you were interested.

Thanks again!

Thank you,

Melissa Jenny
Environmental Protection Specialist
FAA-Dakota Minnesota Airports Office
U.S. Department of Transportation
(612) 253-4633
Melissa.m.jenny@faa.gov

From: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Sent: Monday, June 15, 2026 12:16 PM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Melissa,

Thank you very much for taking the time to meet with me and for sending the additional information. I do not have any further questions about the culvert. In that case, do I still need to attend the meeting tomorrow, or is it not needed?

If you receive a May Affect determination after completing the DKey, please send me the IPaC letter, and I will write the concurrence letter.

Have a nice day,

Lainet

Lainet Garcia-Rivera
Biologist/AOC Coordinator
U.S. Fish and Wildlife Service
Minnesota-Wisconsin Ecological Services Field Office
250 East Wisconsin Ave, Suite 1100
Milwaukee, Wisconsin 53202
Phone: (612) 289-9497 (cell)
https://www.fws.gov/midwest/

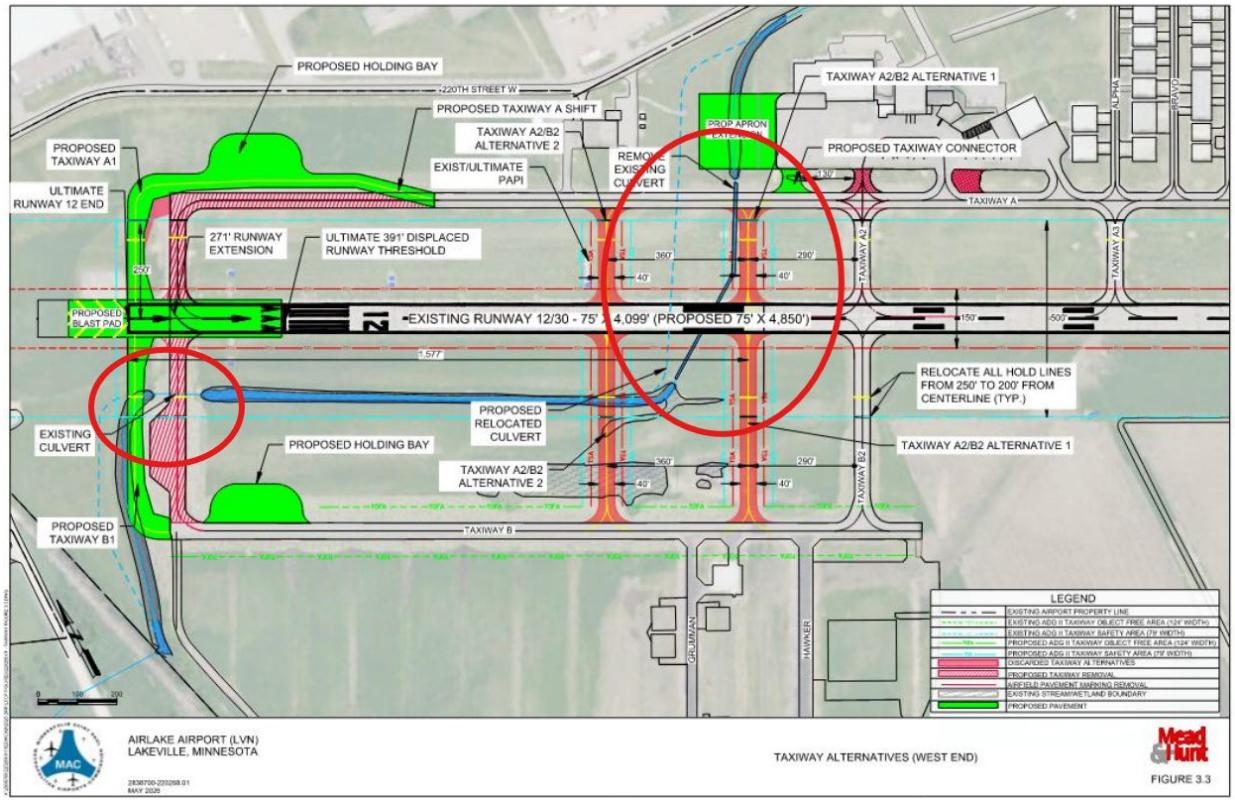
From: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Sent: Friday, June 12, 2026 10:54 AM

To: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

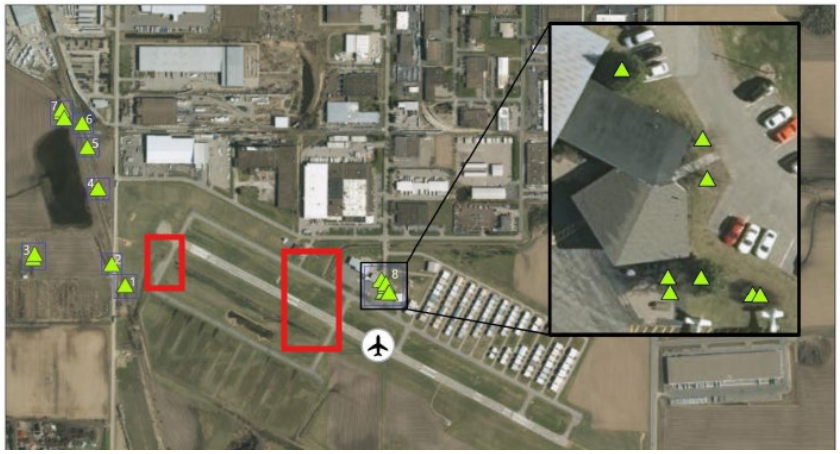
Hi Lainet,

Thank you so much for the call just now.

As discussed, the proposed culvert work at the Airlake Airport (LVN) is circled in the figure below:



We understand that the NLEB is no longer listed in this area, but the NLEB survey completed for the project a few years ago (before the Tri-colored bat/TCB was listed) shows what kind of trees are located near the culverts proposed to be modified (red polygon areas):



The trees closest to culvert work, Groups, 1, 2 & 8 are described here:

Table 1. Results of the field-based habitat assessment of potential suitability of trees selected for clearing at the Airlake Airport in Dakota County, Minnesota.

Assessment Area	Habitat Description	Suitability Determination	Recommendation
1	Small emergent trees and shrubby vegetation	Unsuitable	Approved for clearing
2	Small emergent trees and shrubby vegetation	Unsuitable	Approved for clearing
3	Small shrubby trees along tree line	Unsuitable	Approved for clearing
4	No trees present	Unsuitable	Approved for clearing
5	No trees present	Unsuitable	Approved for clearing
6	No trees present	Unsuitable	Approved for clearing
7	Small emergent cottonwood trees	Unsuitable	Approved for clearing
8	Ornamental trees and shrubs	Unsuitable	Approved for clearing
9	No trees present	Unsuitable	Approved for clearing
10	Small emergent box elder on edge of forested homestead	Unsuitable	Approved for clearing
11	Small emergent box elder trees or shrubby trees	Unsuitable	Approved for clearing

In summary, the trees located near the proposed culvert work do not provide suitable habitat for the TCB. In addition, this project is located in a busy airport environment (100+ operations a day) with minimal trees and no nearby contiguous forest (see aerial below), the chances that TCBs are using culverts at the airport is minimal. This project will not jeopardize the existence of the species.



With your concurrence, the FAA will check yes to question #18 in the TCB D-key (see clip below), and move forward with a May Affect, Not Likely to Adversely Affect determination for the TCB for this project.

18. Has the local Service Field Office confirmed that culvert surveys are not needed because project activities are not expected to impact bats, or because NLEBs and TCBs are not using culverts within the action area?

☑ No

And as discussed, we will condition our NEPA approval for the project to require reporting to FAA and FWS for any discovery of TCBs during construction of the project.

Also, fyi there is an Agency Technical Advisory Committee meeting for this project scheduled on Tuesday 6/16 @ 0830-0930. The meeting will include regulatory agencies involved with the stream relocation part of the project, and you are welcome to attend if you have further questions about culverts or the airport environment. I'll forward you an invite after sending this email.

Thank you again for your time today, and I hope that you have a nice weekend!

Thank you,

Melissa Jenny
Environmental Protection Specialist
FAA-Dakota Minnesota Airports Office
U.S. Department of Transportation
(612) 253-4633
Melissa.m.jenny@faa.gov

From: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Sent: Thursday, June 11, 2026 3:03 PM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Subject: Re: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Melissa,

I am in a meeting until 4 pm today, but tomorrow at 10 am works for me. Feel free to send me an invite.

I look forward to talking to you,

Best,

Lainet

Lainet Garcia-Rivera
Biologist/AOC Coordinator
U.S. Fish and Wildlife Service
Minnesota-Wisconsin Ecological Services Field Office
505 Science Dr. Suite A
Madison, Wisconsin 53711
Phone: (612) 289-9497 (cell)
https://www.fws.gov/midwest/

From: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Sent: Thursday, June 11, 2026 2:29 PM
To: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

Hi Lainet,

Do you have time for a quick call to discuss? I'm free today until 4 and tomorrow 9-12.

Thank you,

Melissa Jenny

Environmental Protection Specialist

FAA-Dakota Minnesota Airports Office

U.S. Department of Transportation

(612) 253-4633

Melissa.m.jenny@faa.gov

From: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Sent: Thursday, June 11, 2026 2:08 PM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Melissa,

The report was attached to the original email. I have reviewed and noticed that the assessment was conducted to determine whether any potentially suitable summer habitat for NLEB was present within the areas where tree clearing was proposed. However, due to the recent reduction in the NLEB's range, the species is no longer considered present within the project area. Currently, the tricolored bat is the only listed bat species present in the project area.

Could you clarify how this report relates to the TCB bat? Additionally, were the trees evaluated in the assessment located near the culverts that are proposed for replacement or modification? I am attempting to understand the relevance of the report to the current project.

If the assessed trees were located within or adjacent to the culverts, then the answer to Question #18 would be "Yes."

Thanks, and have a nice day,

Lainet

Lainet Garcia-Rivera

Biologist/AOC Coordinator

U.S. Fish and Wildlife Service

Minnesota-Wisconsin Ecological Services Field Office

250 East Wisconsin Ave, Suite 1100

Milwaukee, Wisconsin 53202

Phone: (612) 289-9497 (cell)

https://www.fws.gov/midwest/

From: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Sent: Wednesday, June 10, 2026 12:16 PM
To: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Subject: FW: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

Hi Lainet,

The answer to both of your questions below is no.

- Are there any TCB suitable trees near the culverts that need to be replaced or modified? No, based on the attached 2022 bat survey.
- Do you believe the project would jeopardize the existence of the species? No, there is no suitable habitat within project area.

If we receive your concurrence that culvert surveys are not needed via this informal consultation do we then answer "yes" to the D-key question #18 pasted below, allowing us to move forward in the key ending with a NLAA determination for the project?

Thank you for your help with this!

Thank you,

Melissa Jenny

Environmental Protection Specialist

FAA-Dakota Minnesota Airports Office

U.S. Department of Transportation

(612) 253-4633

Melissa.m.jenny@faa.gov

From: Sarah Emmel <sarah.emmel@meadhunt.com>
Sent: Wednesday, June 10, 2026 9:59 AM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Cc: Evan Barrett <Evan.Barrett@meadhunt.com>; Colleen Bosold <Colleen.Bosold@meadhunt.com>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

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Hi Melissa,

After reviewing the 2022 survey, we agree, the answer to both of those questions is no.

Let us know if you need anything further!

-Sarah

Sarah Emmel Tvedten, AICP
Direct: 952-641-8805 | Transfer Files
meadhunt.com | Experience Exceptional

From: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Sent: Friday, June 5, 2026 1:35 PM
To: Sarah Emmel <sarah.emmel@meadhunt.com>
Cc: Evan Barrett <evan.barrett@meadhunt.com>; Colleen Bosold <colleen.bosold@meadhunt.com>
Subject: FW: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

Hi Sarah,

Can you please answer questions below?

I'm fairly certain the answer for both is no (based on 2022 survey), but please confirm.

And it looks like FAA's FWS contact is still Lainet Garcia-Rivera out of Madison, but I doubt they'll want to join for TAC meetings once we get ESA determinations resolved.

Thank you,

Melissa Jenny

Environmental Protection Specialist

FAA-Dakota Minnesota Airports Office

U.S. Department of Transportation

(612) 253-4633

Melissa.m.jenny@faa.gov

From: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Sent: Friday, June 5, 2026 1:25 PM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Subject: FW: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Melissa,

I contacted the species lead to seek advice, and this is what she suggested: "If there are no suitable roosting habitats within 1000 feet of the culvert, we would not expect TCB to use the culvert for roosting." My questions are:

- Are there any TCB suitable trees near the culverts that need to be replaced or modified?
- Do you believe the project would jeopardize the existence of the species?

I look forward to hearing from you.

Best,

Lainet

Lainet Garcia-Rivera

Biologist/AOC Coordinator

U.S. Fish and Wildlife Service

Minnesota-Wisconsin Ecological Services Field Office

250 East Wisconsin Ave, Suite 1100

Milwaukee, Wisconsin 53202

Phone: (612) 289-9497 (cell)

https://www.fws.gov/midwest/

From: Garcia-Rivera, Lainet
Sent: Thursday, June 4, 2026 12:57 PM
To: 'Jenny, Melissa M (FAA)' <Melissa.M.Jenny@faa.gov>; Mahoney, Kathleen R <kathleen_mahoney@fws.gov>
Subject: RE: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

Hi Melissa,

I am back from the field. I will review your consultation request and reach out to you soon.

Kathleen, please share any insights about bat culvert surveys, as you have more experience on that topic.

Best,

Lainet

Lainet Garcia-Rivera

Biologist/AOC Coordinator

U.S. Fish and Wildlife Service

Minnesota-Wisconsin Ecological Services Field Office

250 East Wisconsin Ave, Suite 1100

Milwaukee, Wisconsin 53202

Phone: (612) 289-9497 (cell)

https://www.fws.gov/midwest/

From: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>
Sent: Tuesday, June 2, 2026 2:39 PM
To: Mahoney, Kathleen R <kathleen_mahoney@fws.gov>
Cc: Garcia-Rivera, Lainet <lainet_garcia-rivera@fws.gov>
Subject: [EXTERNAL] FAA question for FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Hi Kathleen,

I see on your website that you are the POC for MN DOT projects. I've previously worked with Lainet Garcia-Rivera out of your Madison office, so I sent her the email below but received an out of office. Looks like she's out doing some field work.

Please see email below and feel free to reach out with questions.

And fyi I'm based out of FAA's Minneapolis office on the north side of MSP – I think that our offices are pretty close to each other!

Thank you,

Melissa Jenny

Environmental Protection Specialist

FAA-Dakota Minnesota Airports Office

U.S. Department of Transportation

(612) 253-4633

Melissa.m.jenny@faa.gov

From: Jenny, Melissa M (FAA)
Sent: Tuesday, June 2, 2026 1:59 PM
To: 'Garcia-Rivera, Lainet' <lainet_garcia-rivera@fws.gov>
Subject: FAA question to FWS - does the Airlake Airport Runway Project (MN) require a bat culvert survey?

Hi Lainet,

I hope that you're doing well.

And I hope that you are still the FWS POC for FAA ESA reviews for MN projects? If not please forward this note and let me know if I should be coordinating with someone else.

I have a question about the need for bat culvert survey for a runway reconstruction and extension project at the Airlake Airport (LVN).

LVN is a busy little airport in the southern Twin Cities metro, in Lakeville, MN. LVN has about 39,000 operations a year, averaging over 100 aircraft operations a day.

The airport is planning to reconstruct and extend their runway, including relocating a small stretch of culverted stream as shown on the attached proposed action exhibit. They'll be modifying a few culverts at the airport with project construction.

Please see the email below, the airport's consultant is wondering if they need to do a bat culvert survey for this project to assess impacts to the tri-colored bat?

They completed a NLEB habitat assessment in 2022 with negative survey results, attached, but this survey was focused on trees that will be removed and did not include a culvert review.

The FAA has made a preliminary determination that this project may affect, but is not likely adversely affect the tri-colored bat. The chances of a tri-colored bat living in a culvert at LVN are extremely low.

It's our understanding that in Minnesota, tri-colored bats are found almost exclusively in the southeastern corner of the state (such as the limestone karst regions near Winona or Lanesboro). Lakeville sits right on the edge of their northernmost range boundary.

Also, with the level of operations at this airport it's unlikely that bats are using these culverts for summer roosting.

Please let me know if you need additional information to make a bat survey determination for this project. I can have the consultant draft up a more formal memo for you to respond to if needed.

Please feel free to give me a call if you have questions about this.

Thank you,

Melissa Jenny

Environmental Protection Specialist

FAA-Dakota Minnesota Airports Office

U.S. Department of Transportation

(612) 253-4633

Melissa.m.jenny@faa.gov

From: Sarah Emmel <sarah.emmel@meadhunt.com>
Sent: Thursday, May 28, 2026 1:15 PM
To: Jenny, Melissa M (FAA) <Melissa.M.Jenny@faa.gov>; Evan Barrett <Evan.Barrett@meadhunt.com>
Cc: Watson, Marcus S (FAA) <Marcus.S.Watson@faa.gov>; Mitchell, Gina (FAA) <Gina.Mitchell@faa.gov>; Terry, Lindsay (FAA) <Lindsay.Terry@faa.gov>
Subject: RE: LVN Noise - updated plan ok & please send over IPAC reports

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon Melissa,

Attached you will find the LVN EA IPAC species list and the bat field assessment conducted in 2022.

We did not fully complete the d-key for the tricolored bat because the culvert question halted us and directed us to reach out. I've included a screen shot of this instruction and the preceding questions here:

16. Does the culvert or tunnel equal or exceed 23 feet (7.0 meters) in length?

☑ Yes

17. Do the interior dimensions of the culvert or tunnel **equal or exceed 3.0 feet (0.9 meters) in height (minimum height for tricolored bat)**?

☑ Yes

18. Has the local Service Field Office confirmed that culvert surveys are not needed because project activities are not expected to impact bats, or because NLEBs and TCBs are not using culverts within the action area?

☑ No

19. Has a site-specific culvert assessment following USFWS guidelines been completed? Note: For information on conducting a bridge/structure assessment, please see the USFWS' Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines. Additional resources can be found at: https://www.fws.gov/media/bats-and-transportation-structures-references-and-additional-resources and a training video is located at: https://www.youtube.com/watch?v=iuFwkT7q8Ws.

⊘ No

Habitat assessments and presence/probable absence surveys should be reviewed by the appropriate Ecological Services Field Office before use of this key. If the assessment has not been reviewed and approved by the appropriate Ecological Services Field Office, please contact the Field Office for review. If reviewed and approved, you can return to this determination key and continue through the remaining questions. If prompted to upload a document, please upload the communication from the appropriate field office including their directions.

Let us know what other questions you have on this!

-Sarah

Sarah Emmel Tvedten, AICP
Airport Planner
Direct: 952-641-8805 | Transfer Files
Mead&Hunt
LinkedIn | Facebook | Instagram | My LinkedIn

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

Dakota-Minnesota
Airports District Office

6020 28th Avenue South, Suite 102
Minneapolis, MN 55450

2301 University Drive, Building 23B
Bismarck, ND 58504

July 08, 2026

Lainet Garcia-Rivera
Biologist/AOC Coordinator
U.S. Fish and Wildlife Service
Minnesota-Wisconsin Ecological Services Field Office
505 Science Dr. Suite A
Madison, Wisconsin 53711

Dear Ms. Garcia-Rivera:

The Federal Aviation Administration (FAA) is requesting concurrence from the U.S. Fish and Wildlife Service that the proposed airport improvement project at the Airlake Airport, detailed on the attached figure, is not likely to adversely affect the Tricolored Bat (TLB). The project is in Dakota County, Minnesota. The FAA is the lead federal agency for this project and is reviewing the proposal to ensure compliance under the National Environmental Policy Act and numerous federal laws, including Section 7 of the Endangered Species Act.

Based on the information provided in the attached memo the FAA has determined that the proposed project may affect, but is not likely to adversely affect the TCB. We request your concurrence with our determination. The FAA has also determined that the project will have no effect on the monarch butterfly, western regal fritillary and the whooping crane.

If you have any questions about this project, please feel free to contact me at Melissa.m.jenny@faa.gov or at (612) 253-4633.

Sincerely,

Melissa Jenny
Environmental Protection Specialist
FAA Dakota-Minnesota Airports District Office

PROPOSED ACTIONS:

1. RECONSTRUCT THE EXISTING 4,099 FEET OF RUNWAY 12/30 PAVEMENT.
2. LENGTHEN RUNWAY 12/30 TO 4,850 FEET BY EXTENDING THE RUNWAY 12 END APPROXIMATELY 271 FEET AND EXTENDING THE RUNWAY 30 END APPROXIMATELY 480 FEET. SHIFT THE RUNWAY 12 LANDING THRESHOLD 120 FEET EAST TO PROVIDE A CLEAR APPROACH SURFACE OVER THE RAILROAD AND REVISE RUNWAY 12 INSTRUMENT APPROACH PROCEDURES ACCORDINGLY. THE FULL 4,850 FEET WILL BE AVAILABLE TO TORA/TODA/ASDA, WHILE REDUCED LDA WILL BE EMPLOYED TO MITIGATE APPROACH SURFACE OBSTRUCTIONS.
3. EXTEND TAXIWAYS A & B TO, RELOCATE TAXIWAYS A1 & B1 TO, AND CONSTRUCT NEW HOLDING BAYS NORTH AND SOUTH OF THE NEW RUNWAY 12 END.
4. EXTEND TAXIWAY A TO, RELOCATE TAXIWAY A5 TO, AND CONSTRUCT A NEW HOLDING BAY NORTH OF THE NEW RUNWAY 30 END.
5. MODIFY TAXIWAYS A AND A1 TO ALLOW AIRCRAFT TO HOLD PERPENDICULAR TO THE RUNWAY CENTERLINE.
6. MODIFY RUNWAY 30 MALSR TO INCLUDE NEW IN-PAVEMENT LIGHTS AND ADJUSTED LIGHT TOWER HEIGHTS.
7. EXTEND RUNWAY EDGE LIGHTING AND RELOCATE AIRFIELD GUIDANCE SIGNS.
8. REMOVE ON-AIRPORT TREES WITHIN PART 77, APPROACH, AND DEPARTURE SURFACES. MITIGATE OTHER OBSTRUCTIONS AND OBSTACLES AS DETERMINED IN AN AERONAUTICAL STUDY.
9. RELOCATE 225TH STREET W OUTSIDE THE RUNWAY 30 RPZ ON THE EAST SIDE OF CEDAR AVENUE.
10. RELOCATE STREAM ON AIRPORT PROPERTY AS NECESSARY TO ACCOMMODATE PROPOSED IMPROVEMENTS.
11. RELOCATE APRON TO PARALLEL TAXIWAY CONNECTOR SEGMENT OF TAXIWAY A2 TO ADDRESS DIRECT ACCESS FROM APRON TO RUNWAY.
12. REMOVE ACCESS ROAD FROM RUNWAY 12/30 TO GLIDESLOPE FACILITY AND RELOCATE MALSR EQUIPMENT SHELTER ACCESS ROAD.
13. RECONSTRUCT BLAST PADS ON BOTH RUNWAY ENDS TO MEET DESIGN STANDARDS.
14. EXPAND THE FIXED BASE OPERATOR (FBO) AIRCRAFT PARKING APRON.
15. RELOCATE PUBLIC AIRCRAFT VIEWING AREA.
16. EXPAND STORMWATER INFILTRATION BASIN.

TREES TO BE REMOVED (TYP)

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #2

INTERMITTENT STREAM

STREAM RELOCATION

220TH STREET W

CEDAR AVENUE

AIRPORT PROPERTY LINE

ULTIMATE 271' EXTENSION

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #1

EXISTING RUNWAY 12/30 - 75' X 4,099'

TAXIWAY A

TAXIWAY B

HIGHVIEW AVENUE

225TH STREET W

AREA OF POTENTIAL EFFECTS

AIRPORT PROPERTY LINE

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #3

ARCHAEOLOGY AND WETLANDS GROUND DISTURBANCE LIMITS

ULTIMATE 480' EXTENSION

POTENTIAL CONTRACTOR STORAGE AND MATERIAL STOCKPILE AREA #4

225TH STREET W RELOCATION OUTSIDE OF RUNWAY 30 RPZ ON WEST SIDE OF CEDAR AVENUE WAS CLEARED UNDER MINNESOTA ENVIRONMENTAL ASSESSMENT WORKSHEET FINDING DATED APRIL 2026, NOT SUBJECT TO NEPA

LEGEND:

	TREE REMOVAL
	PAVEMENT REMOVAL
	NEW AND/OR REPURPOSED PAVEMENT
	AIRPORT PROPERTY LINE
	ARCHAEOLOGY AND WETLANDS GROUND DISTURBANCE LIMITS
	HISTORIC ARCHITECTURE AREA OF POTENTIAL EFFECTS
	STREAM RELOCATION

N

0 400 800

AIRLAKE AIRPORT
LAKEVILLE, MINNESOTA

2838700-220268.01
MAY 2026

AIRPORT SPONSOR'S PROPOSED PROJECT

FIGURE 2.7

7/7/2026 10:19:33 AM
X:\2838700\220268.01\TECH\CAD\2026 DRP LTCP FIGURES\220268.01 - AREA OF POTENTIAL EFFECTS EXHIBIT FIGURE 3.7.DWG

Technical Memorandum

To:	Melissa Jenny, Environmental Protection Specialist, FAA
From:	Cole Kiernan
Reviewed by:	Sarah Emmel
Date:	07/07/2026
Subject:	Informal Section 7 Consultation Support – Tricolored Bat (May Affect, NLAA)

1. Project Introduction

This memorandum supports the FAA's Section 7 consultation for a project at Airlake Airport (LVN, Airport, or Airlake) in Lakeville, Minnesota.

The Metropolitan Airports Commission (MAC) is proposing improvements at Airlake to meet long-term operational, safety, and design objectives identified in the Airport's 2035 Long-Term Comprehensive Plan. Project planning initially began in July 2022 but was suspended in August 2023 awaiting completion of MAC negotiations with utility companies and the Federal Aviation Administration (FAA) regarding underground utilities on MAC property. In January 2026, negotiations reached a point at which project planning could resume. The proposed action includes reconstruction of the existing Runway 12-30 pavement, extension of the runway from 4,099 feet to approximately 4,850 feet, relocation and modification of associated taxiways and navigational aids, relocation of an unnamed intermittent stream located on airport property, expansion of the aircraft apron, relocation of 225th Street, and limited tree removal. These improvements are needed to address deteriorating pavement conditions, improve safety for aircraft operations, and meet current FAA design standards.

2. Tricolored Bat Suitable Habitat

As part of the Proposed Action, approximately 0.7 acres of trees would be removed within FAA Part 77 approach, departure, and transitional surfaces. Tree removal is necessary to eliminate existing and future airspace obstructions, maintain compliance with FAA design standards, and support safe aircraft operations. The proposed clearing is limited to the minimum extent necessary to maintain required approach and departure clearances and provide obstruction-free airspace around the airfield.

To help determine if the project could affect protected bat species, the project completed the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) Determination Key for the Northern Long-eared Bat (NLEB) in 2022. At this time, the IPaC determined that NLEB may be present within the project vicinity.

A field-based habitat assessment was conducted by a federally permitted bat biologist to evaluate suitable NLEB habitat within proposed tree clearing areas. The assessment included evaluation of 30 trees across 11 assessment areas, with each tree examined for characteristics consistent with potential NLEB roost habitat, including suitable size, exfoliating bark, cavities, and proximity to forested areas. The results determined that none of the trees proposed for removal exhibited features associated with suitable roost trees.

When the project was resumed in 2026, the IPaC Determination Key for the NLEB and Tricolored Bat

was re-run. The 2026 updated determination key resulted in a “May affect” determination for the Tricolored Bat. The NLEB was no longer listed as a species that may occur within the project vicinity. To reflect this update, the 2022 habitat assessment was reviewed relative to Tricolored Bat habitat requirements. Per the USFWS[1], Tricolored bats primarily roost in “both live and dead trees with live and dead leaf clusters, large live pines with clusters of dead pine needles, and trees containing Spanish moss.” Although the 2022 assessment was conducted to evaluate NLEB habitat, the assessment remains relevant to Tricolored Bat because both species use forested habitats during the active season and depend on trees for summer roosting. While Tricolored Bats may use a broader range of roosting substrates than northern long-eared bats, including foliage and leaf clusters, they still rely on forest structure and canopy cover to support roosting habitat. The 2022 assessment documented that the proposed clearing areas consisted primarily of small, immature, ornamental, shrubby, or otherwise isolated vegetation and lacked the forested characteristics typically associated with either NLEB or Tricolored Bat summer roosting habitat. As a result, the assessment provides an appropriate basis for evaluating Tricolored Bat habitat suitability within the project area.

The proposed project also involves culvert work on airport property. In 2026, coordination between the FAA and USFWS was initiated to discuss Tricolored Bats roosting in airport culverts. The consultation determined that due to the culvert work occurring within a busy airport environment, and a lack of mature trees and/or contiguous forest near culverts, there is minimal chance Tricolored Bats are using airport culverts as roosting habitat. A culvert survey was determined to be unnecessary because project activities are not expected to impact bat species.

3. Conclusions and Best Management Practices

To avoid or minimize potential effects, the Airport is committing to the following conservation measures consistent with U.S. Fish and Wildlife Service guidance for bat species:

- All tree removal activities will occur during the winter to avoid the active summer roosting season, consistent with applicable USFWS timing recommendations
- Tree clearing will be limited to the minimum extent necessary to meet FAA safety and design standards

Based on the limited extent of tree removal, the absence of suitable roosting habitat identified during the 2022 habitat assessment, and the commitment to conduct tree clearing during the winter season, Mead & Hunt concludes that the Proposed Action may affect, but is not likely to adversely affect, the Tricolored Bat. This memorandum provides the technical basis for the FAA's consideration of an NLAA determination for the Tricolored Bat and informal consultation with the USFWS.

The project also ran the IPaC Minnesota-Wisconsin Federal Endangered Species Determination Key, which resulted in a No Effect determination for the Monarch Butterfly (proposed threatened) and the Whooping Crane (experimental population, non-essential). The Western Regal Fritillary (proposed threatened) was not included in the Determination Key; the project is making a No Effect determination

[1] U.S. Fish & Wildlife Service, *Northern Long-eared Bat and Tricolored Bat Voluntary Environmental Review Process for Development Projects Version 1.1,* accessed at nleb_tcb_consultation_guidance_version-1.1_final_.pdf

for this species based on a lack of suitable habitat.

Attachments:
IPaC Official Species List
IPaC Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key
IPaC Minnesota-Wisconsin Federal Endangered Species Determination Key
2022 NLEB Habitat Assessment

Memorandu

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 256-7289

In Reply Refer To: 09/21/2026 18:51:25 UTC
Project Code: 2026-0088781
Project Name: Airfield Improvements and Road Relocation

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

Threatened and Endangered Species
The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance
Please refer to refer to our Section 7 website for guidance and technical assistance, including step-by-step instructions for making effects determinations for each species that might be present and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, USDA Rural Development projects, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

We recommend running the project (if it qualifies) through our **Minnesota-Wisconsin Federal Endangered Species Determination Key (Minnesota-Wisconsin ("D-key"))**. A demonstration video showing how-to access and use the determination key is available. Please note that the Minnesota-Wisconsin D-key is the third option of 3 available d-keys. D-keys are tools to help Federal agencies and other project proponents determine if their proposed action has the potential to adversely affect federally listed species and designated critical habitat. The Minnesota-Wisconsin D-key includes a structured set of questions that assists a project proponent in determining whether a proposed project qualifies for a certain predetermined consultation outcome for all federally listed species found in Minnesota and Wisconsin (except for the northern long-eared bat- see below), which includes determinations of “no effect” or “may affect, not likely to adversely affect." In each case, the Service has compiled and analyzed the best available information on the species’ biology and the impacts of certain activities to support these determinations.

If your completed d-key output letter shows a "No Effect" (NE) determination for all listed species, print your IPaC output letter for your files to document your compliance with the Endangered Species Act.

For Federal projects with a “Not Likely to Adversely Affect” (NLAA) determination, our concurrence becomes valid if you do not hear otherwise from us after a 30-day review period, as indicated in your letter.

If your d-key output letter indicates additional coordination with the Minnesota-Wisconsin Ecological Services Field Office is necessary (i.e., you get a “May Affect” determination), you will be provided additional guidance on contacting the Service to continue ESA coordination outside of the key; ESA compliance cannot be concluded using the key for “May Affect” determinations unless otherwise indicated in your output letter.

Note: Once you obtain your official species list, you are not required to continue in IPaC with d-keys, although in most cases these tools should expedite your review. If you choose to make an effects determination on your own, you may do so. If the project is a Federal Action, you may want to review our section 7 step-by-step instructions before making your determinations.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of “There are no listed species found within the vicinity of the project,” then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **no effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species on our office website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **no effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

For projects that intersect with or are adjacent to Tribal lands: The Service has federal Trust responsibilities and a strong commitment to working with Tribal governments to help sustain fish and wildlife resources for future generations.?Tribal governments should be provided with sufficient opportunity to express their perspectives and/or concerns for proposed projects.?If your project intersects with Tribal lands or impacts culturally sensitive resources, please engage with the federally recognized Tribe to ensure they have an opportunity to provide input on this project.

Northern Long-Eared Bats
Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected. For bat activity dates, please review Appendix A in the Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A monoculture stand of shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or

- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

If any of the above activities are proposed, and the northern long-eared bat appears on the user's species list, the federal project user will be directed to either the northern long-eared bat and tricolored bat range-wide D-key or the Federal Highways Administration, Federal Railways Administration, and Federal Transit Administration Indiana bat/Northern long-eared bat D-key, depending on the type of project and federal agency involvement. Similar to the Minnesota-Wisconsin D-key, these d-keys helps to determine if prohibited take might occur and, if not, will generate an automated verification letter. Additional information about available tools can be found on the Service's northern long-eared bat website.

Whooping Crane
Whooping crane is designated as a non-essential experimental population in Wisconsin and consultation under Section 7(a)(2) of the Endangered Species Act is only required if project activities will occur within a National Wildlife Refuge or National Park. If project activities are proposed on lands outside of a National Wildlife Refuge or National Park, then you are not required to consult. For additional information on this designation and consultation requirements, please review "Establishment of a Nonessential Experimental Population of Whooping Cranes in the Eastern United States."

Other Trust Resources and Activities
Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. It is the responsibility of the project proponent to survey the area for any migratory bird nests. If there is an eagle nest on-site while work is on-going, eagles may be disturbed. We recommend avoiding and minimizing disturbance to eagles whenever practicable. If you cannot avoid eagle disturbance, you may seek a permit. A nest take permit is always required for removal, relocation, or obstruction of an eagle nest. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination
While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. **Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.**

Minnesota
Minnesota Department of Natural Resources - Endangered Resources Review Homepage
Email: Review.NHIS@state.mn.us

Wisconsin
Wisconsin Department of Natural Resources - Endangered Resources Review Homepage
Email: DNRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
(952) 256-7289

PROJECT SUMMARY

Project Code: 2026-0088781
Project Name: Airfield Improvements and Road Relocation
Project Type: Airport - Maintenance/Modification
Project Description: 1. Reconstruct the existing 4,099 feet of Runway 12/30 pavement.
2. Lengthen Runway 12/30 to 4,850 feet by extending Runway 12 end approximately 271 feet and extending Runway 30 end approximately 480 feet.
3. Extend Taxiways A & B to, relocate Taxiways A1 & B1 to, and construct new holding bays north and south of the new Runway 12 end.
4. Extend Taxiway A to, relocate Taxiway A5 to, and construct a new holding bay north of the new Runway 30 end.
5. Modify Taxiways A and A1 to allow aircraft to hold perpendicular to the runway centerline.
6. Modify Runway 30 MALSR to include new in-pavement lights and adjusted light tower heights.
7. Extend runway edge lighting and relocate airfield guidance signs.
8. Remove on-airport trees within Part 77, approach, and departure surfaces.
9. Relocate 225th Street West outside the Runway 30 RPZ on the east side of Cedar Avenue.
10. Relocate stream on airport property as necessary to accommodate proposed improvements.
11. Relocate apron to parallel taxiway connector segment of Taxiway A2 to address direct access from apron to runway.
12. Remove access road from Runway 12/30 to glideslope facility and relocate MALSR equipment shelter access road.
13. Reconstruct blast pads on both runway ends to meet design standards.
14. Expand the fixed base operator (FBO) aircraft parking apron.
15. Approve concurrent use for utility pipelines underneath Runway 12/30.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.626839700000005,-93.22717554619933,14z



Counties: Dakota County, Minnesota

ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Tricolored bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Whooping crane *Grus americana* Population: Eastern Migratory NEP - U.S.A. (AL, AR, FL, GA, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, OH, SC, TN, VA, WI, WV) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/758	Experimental Population, Non-Essential

INSECTS

NAME	STATUS
Monarch butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Western regal fritillary *Argynnis idalia occidentalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/12017	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/ activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete
If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

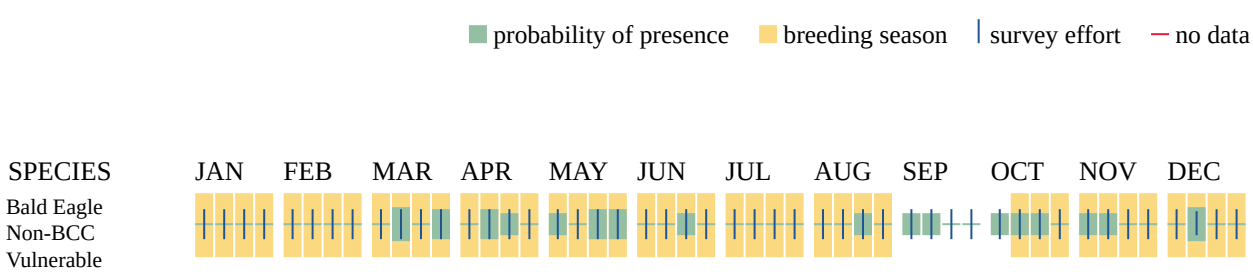
Probability of Presence (▪)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds

- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Grasshopper Sparrow *Ammodramus savannarum perpallidus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8329	Breeds Jun 1 to Aug 20
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31

NAME	BREEDING SEASON
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Semipalmated Sandpiper *Calidris pusilla* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9603	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

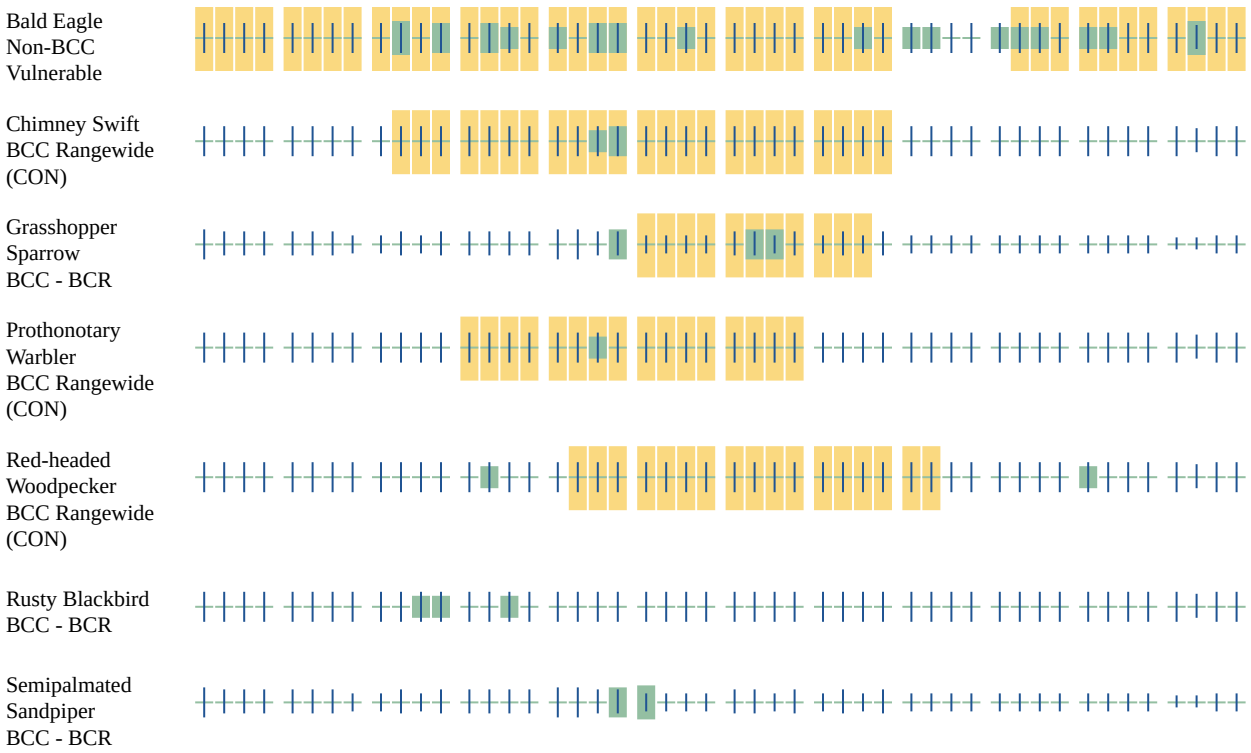
Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

■ probability of presence ■ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE VISIT HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPAC USER CONTACT INFORMATION

Agency: Metropolitan Airports Commission
Name: Sarah Emmel
Address: 7900 International Drive, Suite 980
City: Bloomington
State: MN
Zip: 55425
Email sarah.emmel@meadhunt.com
Phone: 9526418808

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

IPAC USER CONTACT INFORMATION

Agency: Metropolitan Airports Commission
Name: Sarah Emmel
Address: 7900 International Drive, Suite 980
City: Bloomington
State: MN
Zip: 55425
Email sarah.emmel@meadhunt.com
Phone: 9526418808

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 256-7289

In Reply Refer To: 06/23/2026 16:19:24 UTC
Project code: 2026-0088781
Project Name: Airfield Improvements and Road Relocation

Federal Nexus: yes
Federal Action Agency (if applicable): Federal Aviation Administration

Subject: Technical assistance for 'Airfield Improvements and Road Relocation'

Dear Sarah Emmel:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on June 23, 2026, for 'Airfield Improvements and Road Relocation' (here forward, Project). This project has been assigned Project Code 2026-0088781 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements are not complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project. **Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key (Dkey), invalidates this letter.**

Determination for the Northern Long-Eared Bat and Tricolored Bat

Based on your IPaC submission and a standing analysis completed by the Service, you determined the proposed Project will have the following effect determinations:

Species	Listing Status	Determination
Tricolored bat (*Perimyotis subflavus*)	Proposed Endangered	May affect

Federal agencies must consult with U.S. Fish and Wildlife Service under section 7(a)(2) of the Endangered Species Act (ESA) when an action *may affect* a listed species. Tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can *confer* under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if and when the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a NE or NLAA determination from the key to confirm that the determination is still accurate. Projects that receive a may affect determination for tricolored bat through the key, should contact the appropriate Ecological Services Field Office if they want to conference on this species.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination key for the northern long-eared bat and tricolored bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch butterfly *Danaus plexippus* Proposed Threatened
- Western regal fritillary *Argynnis idalia occidentalis* Proposed Threatened
- Whooping crane *Grus americana* Experimental Population, Non-Essential

You may coordinate with our Office to determine whether the Action may cause prohibited take of the species listed above.

Conclusion

Consultation with the Service is not complete. Further consultation or coordination with the Service is necessary for those species or designated critical habitats with a determination of “May Affect.” A “May Affect” determination in this key indicates that the project, as entered, is not consistent with the questions in the key. Not all projects that reach a “May Affect” determination are anticipated to result in adverse impacts to listed species. These projects may result in a “No Effect”, “May Affect, Not Likely to Adversely Affect”, or “May Affect, Likely to Adversely Affect” determination depending on the details of the project. Please contact our Minnesota-Wisconsin Ecological Services Field Office to discuss methods to avoid or minimize potential adverse effects to those species or designated critical habitats.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Airfield Improvements and Road Relocation

2. Description

The following description was provided for the project 'Airfield Improvements and Road Relocation':

1. Reconstruct the existing 4,099 feet of Runway 12/30 pavement.
2. Lengthen Runway 12/30 to 4,850 feet by extending Runway 12 end approximately 271 feet and extending Runway 30 end approximately 480 feet.
3. Extend Taxiways A & B to, relocate Taxiways A1 & B1 to, and construct new holding bays north and south of the new Runway 12 end.
4. Extend Taxiway A to, relocate Taxiway A5 to, and construct a new holding bay north of the new Runway 30 end.
5. Modify Taxiways A and A1 to allow aircraft to hold perpendicular to the runway centerline.
6. Modify Runway 30 MALSR to include new in-pavement lights and adjusted light tower heights.
7. Extend runway edge lighting and relocate airfield guidance signs.
8. Remove on-airport trees within Part 77, approach, and departure surfaces.
9. Relocate 225th Street West outside the Runway 30 RPZ on the east side of Cedar Avenue.
10. Relocate stream on airport property as necessary to accommodate proposed improvements.
11. Relocate apron to parallel taxiway connector segment of Taxiway A2 to address direct access from apron to runway.
12. Remove access road from Runway 12/30 to glideslope facility and relocate MALSR equipment shelter access road.
13. Reconstruct blast pads on both runway ends to meet design standards.
14. Expand the fixed base operator (FBO) aircraft parking apron.
15. Approve concurrent use for utility pipelines underneath Runway 12/30.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.628443149999995,-93.2325983,14z


Lakeville
235TH ST W
235TH ST W
HAMBURG AVE
CO RD

DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect” for a least one species covered by this determination key.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed bats or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. Is the action area wholly within Zone 2 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

3. Does the action area intersect Zone 1 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

4. Does any component of the action involve leasing, construction or operation of wind turbines? Answer 'yes' if the activities considered are conducted with the intention of gathering survey information to inform the leasing, construction, or operation of wind turbines.

   No

5. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Note for projects in Pennsylvania: Projects requiring authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act would be considered as having a federal nexus. Since the U.S. Army Corps of Engineers (Corps) has issued the Pennsylvania State Programmatic General Permit (PASPGP), which may be verified by the PA Department of Environmental Protection or certain Conservation Districts, the need to receive a Corps authorization to perform the work under the PASPGP serves as a federal nexus. As such, if proposing to use the PASPGP, you would answer ‘yes’ to this question.

   Yes

6. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

   No

7. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

   Note: This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

   No

8. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

   No

9. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   No

10. [Semantic] Is the action area located within 0.5 miles of a known bat hibernaculum or winter roost? Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your state wildlife agency.

    Automatically answered

    No

11. Does the action area contain any winter roosts or caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating bats?

    No

12. Does the action area contain (1) talus or (2) anthropogenic or naturally formed rock shelters or crevices in rocky outcrops, rock faces or cliffs?

    No

13. Is the action located in New England (CT, MA, ME, NH, RI, or VT)?

    No

14. Will the action cause effects to a bridge?

    Note: Covered bridges should be considered as bridges in this question.

    No

15. Will the action result in effects to a culvert or tunnel at any time of year?

    Yes

16. Does the culvert or tunnel equal or exceed 23 feet (7.0 meters) in length?

    Yes

17. Do the interior dimensions of the culvert or tunnel **equal or exceed 3.0 feet (0.9 meters) in height (minimum height for tricolored bat)**?

    Yes

18. Has the local Service Field Office confirmed that culvert surveys are not needed because project activities are not expected to impact bats, or because NLEBs and TCBs are not using culverts within the action area?

    Yes

19. Are trees present within 1000 feet of the action area? **Note:** If there are trees within the action area that are of a sufficient size to be potential roosts for bats answer "Yes". If unsure, additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines.

    Yes

20. Does the action include the intentional exclusion of bats from a building or building-like structure? **Note:** Exclusion is conducted to deny bats' entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats or tricolored bats are present, answer "Yes." Answer "No" if there are no signs of bat use in the building/structure. If unsure, contact your local Ecological Services Field Office to help assess whether northern long-eared bats or tricolored bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term "National Wildlife Control Operators Association bats"). Also see the White-Nose Syndrome Response Team's guide for bat control in structures.

    No

21. Does the action involve removal, modification, or maintenance of a human-made building-like structure (barn, house, or other building) **known or suspected to contain roosting bats?**

    No

22. Will the action cause construction of one or more new roads open to the public?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

23. Will the action include or cause any construction or other activity that is reasonably certain to increase average night-time traffic permanently or temporarily on one or more existing roads? **Note:** For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

    No

24. Will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

25. Will the proposed Action involve the creation of a new water-borne contaminant source (e.g., leachate pond, pits containing chemicals that are not NSF/ANSI 60 compliant)?

    Note: For information regarding NSF/ANSI 60 please visit https://www.nsf.org/knowledge-library/nsf-ansi-standard-60-drinking-water-treatment-chemicals-health-effects

    No

26. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

    No

27. Will the action include drilling or blasting?

    No

28. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use at night)?

    No

29. Will the proposed action involve the use of herbicides or pesticides (e.g., fungicides, insecticides, or rodenticides)?

    No

30. Will the action include or cause activities that are reasonably certain to cause chronic or intense nighttime noise (above current levels of ambient noise in the area) in suitable summer habitat for the northern long-eared bat or tricolored bat during the active season? Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time. Sources of chronic or intense noise that could cause adverse effects to bats may include, but are not limited to: road traffic; trains; aircraft; industrial activities; gas compressor stations; loud music; crowds; oil and gas extraction; construction; and mining. **Note:** Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines.

    No

31. Does the action include, or is it reasonably certain to cause, the use of permanent or temporary artificial lighting within 1000 feet of suitable forested northern long-eared bat or tricolored bat roosting habitat? **Note:** Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines.

    Yes

32. Will the action cause an increase in the extent of suitable forested habitat exposed to artificial lighting?

    No

33. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

    Yes

34. Is the project related to the production of coal, including projects that support the mining of coal, as well as the production and/or distribution of energy produced from coal?

    No

35. Will the proposed action occur exclusively in an already established and currently maintained utility right-of-way?

    No

36. Does the action include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property? See hazard tree note at the bottom of the key for text that will be added to response letters

    Note: A "hazard tree" is a tree that is an immediate threat to lives, public health and safety, or improved property.

    No

37. Does the project intersect with the 0- 9.9% forest density category?

    Automatically answered
    Yes

38. Does the project intersect with the 10.0- 19.9% forest density category map?

    Automatically answered
    No

39. Does the project intersect with the 20.0- 29.9% forest density category map?

    Automatically answered
    No

40. Does the project intersect with the 30.0- 100% forest density category map?

    Automatically answered
    No

41. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 0.5 acre in total extent?

    Yes

42. Does the action area intersect the tricolored bat species list area?

    Automatically answered
    Yes

43. Is the action area located within 0.5-mile of radius of an entrance/opening to any known tricolored bat hibernacula or winter roost?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your state wildlife agency.

    Automatically answered
    No

44. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats? **Note:** The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

45. Has a presence/probable absence bat survey targeting the tricolored bat and following the Service's Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines been conducted within the project area?

    No

46. Is suitable summer habitat for the tricolored bat present within 1000 feet of project activities? (If unsure, answer ""Yes."") **Note:** If there are trees within the action area that may provide potential roosts for tricolored bats (e.g., clusters of leaves in live and dead deciduous trees, Spanish moss (*Tillandsia usneoides*), clusters of dead pine needles of large live pines) answer ""Yes."" For a complete definition of suitable summer habitat for the tricolored bat, please see the Service's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines.

    Yes

47. Do you have any documents that you want to include with this submission?

    Yes

    SUBMITTED DOCUMENTS

    - *Airlake Airport Habitat Assessment_draft for MAC-FAA review.pdf https://ipac.ecosphere.fws.gov/project/YHXXTTG4XRGARGQUYC7OGYAERA/projectDocuments/183336053*

PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

0.7

If tree cutting will be part of the proposed action, at what time of year will tree cutting be conducted?

Winter months

Can the proposed action be modified to ensure that tree cutting will be conducted outside of the season when bats will be present and roosting in trees?

Yes

IPAC USER CONTACT INFORMATION

Agency: Metropolitan Airports Commission
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State: MN
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Email sarah.emmel@meadhunt.com
Phone: 9526418808

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 256-7289

In Reply Refer To: 09/22/2026 15:02:17 UTC
Project code: 2026-0088781
Project Name: Airfield Improvements and Road Relocation

Subject: Technical Assistance letter for 'Airfield Improvements and Road Relocation' for specified threatened and endangered species that may occur in your proposed project location consistent with the Minnesota-Wisconsin Endangered Species Determination Key (Minnesota-Wisconsin DKey).

Dear Sarah Emmel:

The U.S. Fish and Wildlife Service (Service) received on **September 22, 2026** your effect determination(s) for the 'Airfield Improvements and Road Relocation' (Action) using the Minnesota-Wisconsin DKey within the Service's Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 et seq.).

Based on your responses to the Service's Minnesota-Wisconsin DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Monarch butterfly (*Danaus plexippus*)	Proposed Threatened	No effect
Whooping crane (*Grus americana*)	Experimental Population, Non-Essential	No effect

Determination Information
Thank you for informing the Service of your "No Effect" determination(s).

Additional Information
Sufficient project details: Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your

project than what the Dkey concludes, you can and should proceed based on the best available information.

Future project changes: The Service recommends that you contact the Minnesota-Wisconsin Ecological Services Field Office or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect federally listed species or federally designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. Please include the Federal action agency in additional correspondence regarding this project.

Species-specific information

Bald and Golden Eagles: Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the "taking" of bald and golden eagles and defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Eagle Act's implementing regulations define disturb as "… to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

If you observe a bald eagle nest in the vicinity of your proposed project, you should follow the National Bald Eagle Management Guidelines (May 2007). For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit our regional eagle website or contact Margaret at Margaret_Martin@fws.gov. If the Action may affect bald or golden eagles, additional coordination with the Service under the Eagle Act may be required.

Additional Species Requiring Review

In addition to the species described above, the following species or critical habitats may also occur in your project area and are not covered by this conclusion:

- Tricolored bat *Perimyotis subflavus* Proposed Endangered
- Western regal fritillary *Argynnis idalia occidentalis* Proposed Threatened

Coordination with the Service is not complete if additional coordination is advised above for any species.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Airfield Improvements and Road Relocation

2. Description

The following description was provided for the project 'Airfield Improvements and Road Relocation':

1. Reconstruct the existing 4,099 feet of Runway 12/30 pavement.
2. Lengthen Runway 12/30 to 4,850 feet by extending Runway 12 end approximately 271 feet and extending Runway 30 end approximately 480 feet.
3. Extend Taxiways A & B to, relocate Taxiways A1 & B1 to, and construct new holding bays north and south of the new Runway 12 end.
4. Extend Taxiway A to, relocate Taxiway A5 to, and construct a new holding bay north of the new Runway 30 end.
5. Modify Taxiways A and A1 to allow aircraft to hold perpendicular to the runway centerline.
6. Modify Runway 30 MALSR to include new in-pavement lights and adjusted light tower heights.
7. Extend runway edge lighting and relocate airfield guidance signs.
8. Remove on-airport trees within Part 77, approach, and departure surfaces.
9. Relocate 225th Street West outside the Runway 30 RPZ on the east side of Cedar Avenue.
10. Relocate stream on airport property as necessary to accommodate proposed improvements.
11. Relocate apron to parallel taxiway connector segment of Taxiway A2 to address direct access from apron to runway.
12. Remove access road from Runway 12/30 to glideslope facility and relocate MALSR equipment shelter access road.
13. Reconstruct blast pads on both runway ends to meet design standards.
14. Expand the fixed base operator (FBO) aircraft parking apron.
15. Approve concurrent use for utility pipelines underneath Runway 12/30.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.626839700000005,-93.22717554619933,14z


Lakeville
225TH ST W
Vermillion River
235TH ST W

QUALIFICATION INTERVIEW

1. This determination key is intended to assist the user in evaluating the effects of their actions on Federally listed species in Minnesota and Wisconsin. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Additionally, this key DOES NOT cover wind development, purposeful take (e.g., for research or surveys), communication towers that have guy wires or are over 450 feet in height, aerial or other large-scale application of any chemical (such as insecticide or herbicide), and approval of long-term permits or plans (e.g., FERC licenses, HCP's).

   Click **YES** to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

   Yes
2. Is the action being funded, authorized, or carried out by a Federal agency?

   Yes
3. Are you the Federal agency or designated non-federal representative?

   No
4. Does the action involve the installation or operation of wind turbines?

   No
5. Does the action involve purposeful take of a listed animal?

   No
6. Does the action involve a new communications tower?

   No
7. Does the activity involve aerial or other large-scale application of ANY chemical, including pesticides (insecticide, herbicide, fungicide, rodenticide, etc)?

   No
8. Will your action permanently affect local hydrology?

   Yes

9. Does your project have the potential to impact the riparian zone or indirectly impact a stream/river (e.g., cut and fill; horizontal directional drilling; construction; vegetation removal; pesticide or fertilizer application; discharge; runoff of sediment or pollutants; increase in erosion, etc.)?

   Note: Consider all potential effects of the action, including those that may happen later in time and outside and downstream of the immediate area involved in the action.

   Endangered Species Act regulation defines "effects of the action" to include all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (50 CFR 402.02).

   Yes

10. Will your action disturb the ground or existing vegetation?

    Note: This includes any off-road vehicle access, soil compaction (enough to collapse a rodent burrow), digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application (herbicide, fungicide), vegetation management (including removal or maintenance using equipment or prescribed fire), cultivation, development, etc.

    Yes

11. Will your action include spraying insecticides?

    No

12. Does your action area occur entirely within an already developed area?

    Note: Already developed areas are already paved, covered by existing structures, manicured lawns, industrial sites, or cultivated cropland, AND do not contain trees that could be roosting habitat. Be aware that listed species may occur in areas with natural, or semi-natural, vegetation immediately adjacent to existing utilities (e.g. roadways, railways) or within utility rights-of-way such as overhead transmission line corridors, and can utilize suitable trees, bridges, or culverts for roosting even in urban dominated landscapes (so these are not considered "already developed areas" for the purposes of this question). If unsure, select NO..

    No

13. Have you determined that the action will have no effect on individuals within the whooping crane nonessential experimental population (NEP)?

    Yes

14. [Hidden Semantic] Does the action area intersect the monarch butterfly species list area?

    Automatically answered

    Yes

15. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

    If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project.

    Are you making a "no effect" determination for monarch?

    No

16. Is this project funded, authorized, or carried out by the U.S. Fish and Wildlife Service?

    No

IPAC USER CONTACT INFORMATION

Agency: Metropolitan Airports Commission
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LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

Northern Long-eared Bat
Field Assessment for Summer Habitat Suitability
Airlake Airport in Dakota County, Minnesota

September 8, 2022



Prepared for:

Mead & Hunt, Inc.

7900 International Drive, Suite 980
Bloomington, Minnesota 55425

Prepared by:

Brenna Hyzy

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 300
Golden Valley, Minnesota 55427

September 27, 2022

WEST

Privileged and Confidential – Not For Distribution

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Appendix A. Representative Photographs from the Airlake Airport Habitat Assessment

INTRODUCTION

Limited tree clearing is planned at the Airlake Airport in Dakota County, Minnesota. Mead & Hunt, Inc. (Mead & Hunt) contracted Western EcoSystems Technology, Inc. (WEST) to conduct a field-based habitat assessment to determine whether or not these tree clearing areas qualify as potentially suitable summer habitat for the federally listed as threatened northern long-eared bat (NLEB; *Myotis septentrionalis*).

The objective of this assessment was to identify whether any potentially suitable summer habitat for the NLEB, as defined by the US Fish and Wildlife Service's (USFWS) *Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines* (2022), was present in the areas of trees selected to be cleared.

The USFWS defines potentially suitable NLEB roost trees as snags or live trees with a diameter at breast height (DBH) greater than or equal to 3.0 inches (in; 7.6 centimeters [cm]) with exfoliating bark and/or cavities. Individual trees with the characteristics of a potential roost may be considered suitable habitat when they are within 1,000 feet (ft; 305 meters) of other forested/wooded habitat (USFWS 2022). Linear forested features, such as wooded fencerows and tree lines, and smaller patches of trees may provide commuting habitat for this species; however, these areas of potential commuting habitat are not considered suitable habitat if they are separated from larger suitable roosting and foraging areas by more than 1,000 ft (USFWS 2022).

METHODS

The field-based habitat assessment was completed by a federally permitted bat biologist, Brenna Hyzy, M.S. (TE26854C-1). During the assessment, each individual tree marked for clearing was evaluated according to the USFWS definition of suitability for NLEB roost trees (USFWS 2022). Nearby forest characteristics were also noted and considered in the determination of suitability for individual trees, such as:

- vegetation type
- estimated forest age structure (immature, mixed, mature)
- dominant tree species and preferred roost tree species
- size composition of live trees as small, medium, or large (tree DBH 3.0 in or less, DBH 3.0–5.0 in [7.6–12.7 cm], DBH 5.0 in or greater, respectively)

WEST took multiple representative photographs of all areas of trees selected to be cleared to provide a visual record of the habitat being evaluated (Appendix A).

RESULTS

The field-based habitat assessment was completed on August 25, 2022, by federally permitted bat biologist Brenna Hyzy. Mead & Hunt provided spatial files displaying 30 points representing trees that were selected for clearing (Figure 1). These 30 points were grouped into 11 assessment areas, and all points within a given assessment area were evaluated at the same time (Figure 1). A summary description of each assessment area along with recommendations regarding tree clearing are provided in Table 1. Representative photographs of each assessment area are included in Appendix A.

None of the trees marked with a point within each of the assessment areas were determined to display characteristics associated with potentially suitable roost trees for NLEB (Table 1). The dominant tree species documented across the assessment areas were box elder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), and black walnut (*Juglans nigra*). Assessment areas 1 and 2 each consisted of small emergent trees surrounded by shrubby habitat. The two points within Assessment Area 3 represented small shrubby trees along a small tree line. Assessment areas 4, 5, and 6 contained no trees at all. Assessment Area 7 contained three points representing three small emergent cottonwood trees. Assessment Area 8 consisted of eight points representing ornamental trees and shrubs. Assessment Area 9 contained no trees. Assessment Area 10 contained one point that represented a small emergent box elder on the edge of a forested homestead. Assessment Area 11 contained 10 points representing either shrubby trees or young emergent box elder trees; these 10 points were the only points evaluated during the assessment that were found to be located near larger tracts of forested habitat (Figure 1). None of the 30 points representing trees to be cleared were trees that exhibit characteristics associated with potentially suitable roost trees per the USFWS.

Table 1. Results of the field-based habitat assessment of potential suitability of trees selected for clearing at the Airlake Airport in Dakota County, Minnesota.

Assessment Area	Habitat Description	Suitability Determination	Recommendation
1	Small emergent trees and shrubby vegetation	Unsuitable	Approved for clearing
2	Small emergent trees and shrubby vegetation	Unsuitable	Approved for clearing
3	Small shrubby trees along tree line	Unsuitable	Approved for clearing
4	No trees present	Unsuitable	Approved for clearing
5	No trees present	Unsuitable	Approved for clearing
6	No trees present	Unsuitable	Approved for clearing
7	Small emergent cottonwood trees	Unsuitable	Approved for clearing
8	Ornamental trees and shrubs	Unsuitable	Approved for clearing
9	No trees present	Unsuitable	Approved for clearing
10	Small emergent box elder on edge of forested homestead	Unsuitable	Approved for clearing
11	Small emergent box elder trees or shrubby trees	Unsuitable	Approved for clearing

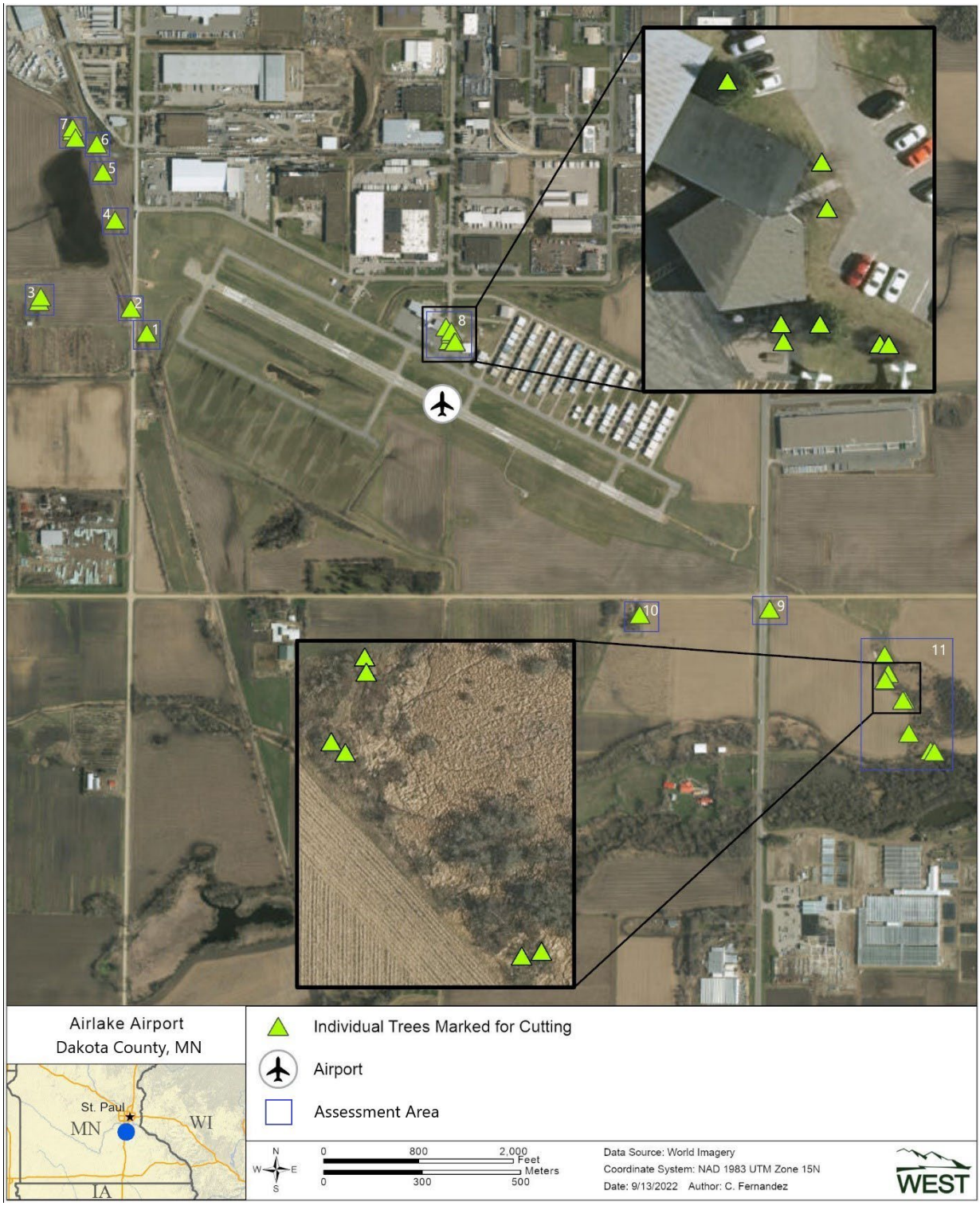


Figure 1. Trees selected for clearing at the Airlake Airport in Dakota County, Minnesota.

CONCLUSIONS

All 30 points representing trees selected for cutting were determined to be unsuitable and did not exhibit the characteristics associated with potential roost trees for NLEB, per USFWS definitions. The 10 points within Assessment Area 11 representing small shrubs or emergent box elder trees close to a larger forest stand are not of concern, given the trees marked for clearing within that assessment area do not exhibit characteristics of potentially suitable roost trees for NLEB, and, therefore, removing them from an otherwise intact forest stand will not result in any significant impacts. Tree clearing can occur immediately or at any time during the year, and no additional consultation or surveys are required.

LITERATURE CITED

Esri. 2022. World Imagery and Aerial Photos (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Accessed September 2022. Available online: https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=10df2279f9684e4a9f6a7f08febac2a9

US Fish and Wildlife Service (USFWS). 2022. Range-Wide Indiana Bat & Northern Long-Eared Bat Survey Guidelines. USFWS, Department of the Interior. March 2022. 67 pp. Available online: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines

Appendix A. Representative Photographs from the Airlake Airport Habitat Assessment



Appendix A1. Assessment Area 1.





Appendix A2. Assessment Area 2.



Appendix A3. Assessment Area 3.



Appendix A4. Assessment Area 4.





Appendix A5. Assessment Area 5.



Appendix A6. Assessment Area 6.



Appendix A7. Assessment Area 7.







Appendix A8. Assessment Area 8.



Appendix A9. Assessment Area 9.



Appendix A10. Assessment Area 10.







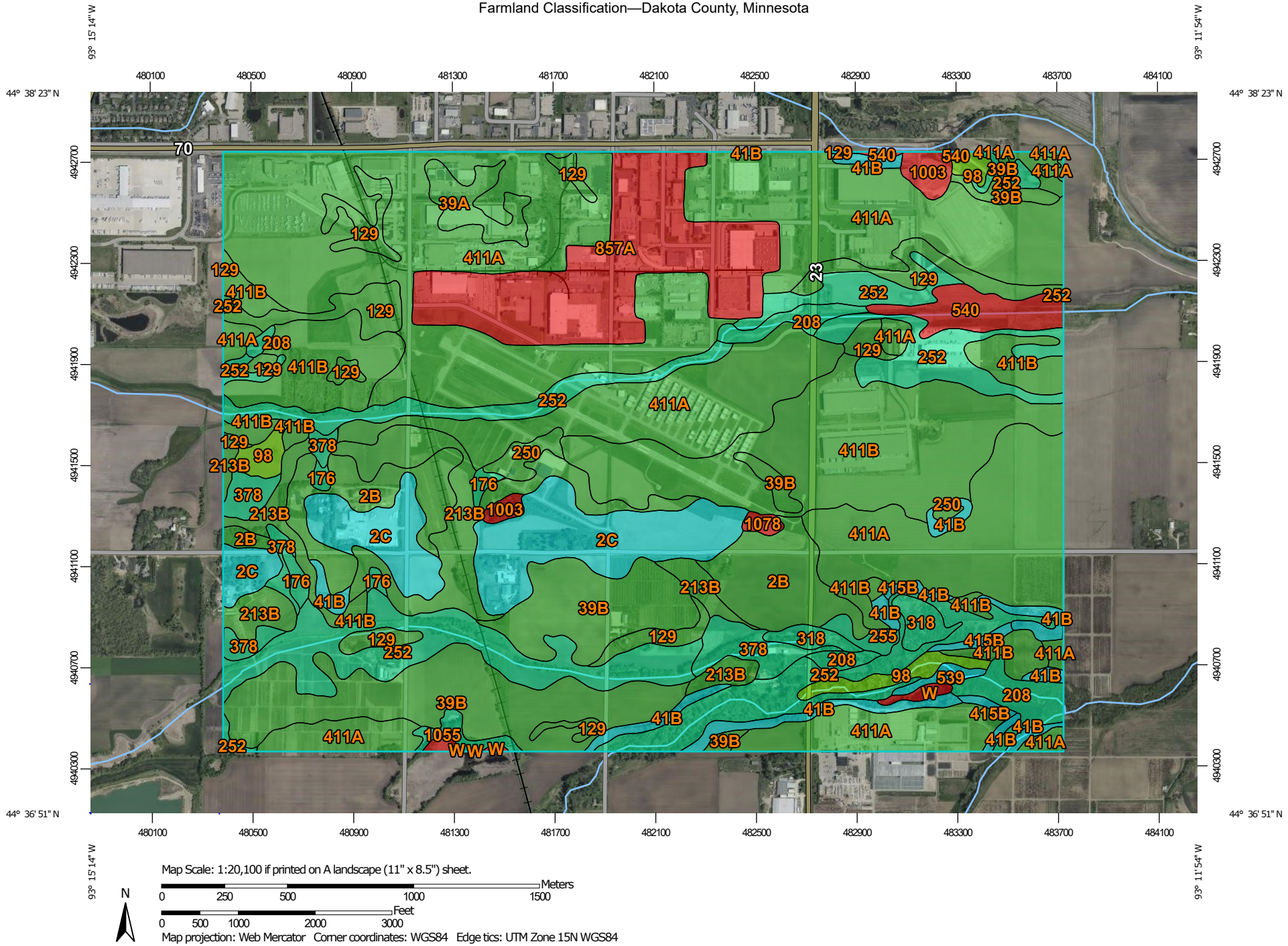
Appendix A11. Assessment Area 11.





Appendix A11 (*continued*). Assessment Area 11.

APPENDIX F:
FARMLAND DOCUMENTATION


93° 15' 14" W
93° 11' 54" W
44° 38' 23" N
44° 36' 51" N
480100
480500
480900
481300
481700
482100
482500
482900
483300
483700
484100
4942700
4942300
4941900
4941500
4941100
4940700
4940300
70
23
41B
129
540
1003
98
39B
252
411A
39A
857A
208
411B
213B
176
378
2B
2C
1078
250
415B
318
255
539
W
1055
WWW
Map Scale: 1:20,100 if printed on A landscape (11" x 8.5") sheet.
Meters
0 250 500 1000 1500
Feet
0 500 1000 2000 3000
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

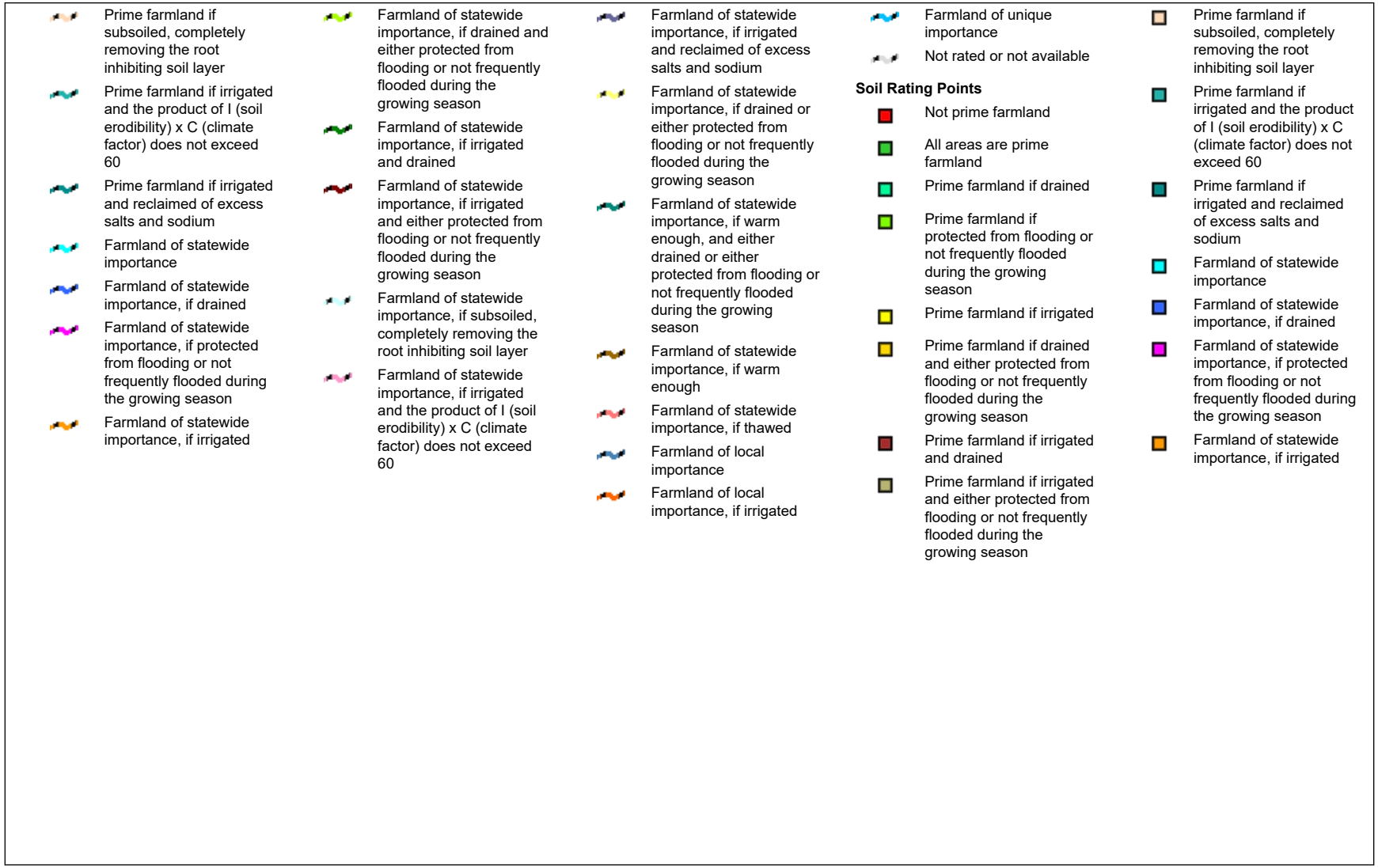
Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season


Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 21, Sep 10, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2024—Jul 1, 2024

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.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2B	Ostrander loam, 1 to 6 percent slopes	All areas are prime farmland	79.9	4.1%
2C	Ostrander loam, 6 to 12 percent slopes	Farmland of statewide importance	109.0	5.5%
39A	Wadena loam, 0 to 2 percent slopes	All areas are prime farmland	17.4	0.9%
39B	Wadena loam, 2 to 6 percent slopes	All areas are prime farmland	161.4	8.2%
41B	Estherville sandy loam, 2 to 6 percent slopes	Farmland of statewide importance	39.9	2.0%
98	Colo silt loam, occasionally flooded	Prime farmland if protected from flooding or not frequently flooded during the growing season	20.1	1.0%
129	Cylinder loam, 0 to 2 percent slopes	All areas are prime farmland	76.5	3.9%
176	Garwin silty clay loam	Prime farmland if drained	8.3	0.4%
208	Kato silty clay loam	Prime farmland if drained	29.7	1.5%
213B	Klinger silt loam, 1 to 5 percent slopes	All areas are prime farmland	92.2	4.7%
250	Kennebec silt loam	All areas are prime farmland	8.4	0.4%
252	Marshan silty clay loam	Prime farmland if drained	218.6	11.1%
255	Mayer silt loam	Prime farmland if drained	5.1	0.3%
318	Mayer loam, swales	Prime farmland if drained	13.7	0.7%
378	Maxfield silty clay loam	Prime farmland if drained	33.5	1.7%
411A	Waukegan silt loam, 0 to 1 percent slopes	All areas are prime farmland	635.9	32.4%
411B	Waukegan silt loam, 1 to 6 percent slopes	All areas are prime farmland	236.7	12.0%
415B	Kanaranzi loam, 2 to 6 percent slopes	Farmland of statewide importance	6.0	0.3%
539	Klossner muck, 0 to 1 percent slopes	Farmland of statewide importance	4.0	0.2%
540	Seelyeville muck	Not prime farmland	23.6	1.2%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
857A	Urban land-Waukegan complex, 0 to 1 percent slopes	Not prime farmland	127.4	6.5%
1003	Anthroportic Udorthents-Pits-Dumps complex, abandoned, 2 to 45 percent slopes	Not prime farmland	10.5	0.5%
1055	Aquolls and Histosols, ponded	Not prime farmland	1.8	0.1%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	Not prime farmland	2.8	0.1%
W	Water	Not prime farmland	3.2	0.2%
Totals for Area of Interest			**1,965.5**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 7/7/2026	
Name of Project Airlake Airport Lakeville		Federal Agency Involved FAA	
Proposed Land Use Airport Runway		County and State Dakota County, Minnesota	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS 7/7/2026	Person Completing Form: Stuart Veith, RSS
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated 60105	Average Farm Size 248
Major Crop(s) Corn, Soybeans	Farmable Land In Govt. Jurisdiction Acres: 291612 % 77.68	Amount of Farmland As Defined in FPPA Acres: 260767 % 69.46	
Name of Land Evaluation System Used Crop Productivity Index	Name of State or Local Site Assessment System N/A	Date Land Evaluation Returned by NRCS 7/8/2026	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	15.1			
B. Total Acres To Be Converted Indirectly	28			
C. Total Acres In Site	43.1			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	39.6			
B. Total Acres Statewide Important or Local Important Farmland	2.1			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.01429			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	47.3262			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	74.7517			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	10			
2. Perimeter In Non-urban Use	(10)	4			
3. Percent Of Site Being Farmed	(20)	20			
4. Protection Provided By State and Local Government	(20)	20			
5. Distance From Urban Built-up Area	(15)	0			
6. Distance To Urban Support Services	(15)	0			
7. Size Of Present Farm Unit Compared To Average	(10)	4			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	5			
10. On-Farm Investments	(20)	10			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	7			
TOTAL SITE ASSESSMENT POINTS	160	80			
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	74.7517			
Total Site Assessment *(From Part VI above or local site assessment)*	160	80			
TOTAL POINTS ***(Total of above 2 lines)***	260	154.75			

Site Selected: A	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

Contiguousness to existing airport infrastructure, and minimal impacts.

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map**,** or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.