



Salina Airport Authority
3237 Arnold Avenue
Salina, KS 67401

Report 2 – Cause and Origin Report

Buildings 120, 412, and 959

FEBRUARY 9, 2022

PREPARED FOR:

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Claim: 5630075143

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VERTEX Project: 76253



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Report 2 – Cause and Origin Report - Buildings 120, 412, and 959
Claim: 5630075143
Salina Airport Authority – 3237 Arnold Avenue, Salina, KS 67401
VERTEX Project 76253

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1.0 ASSIGNMENT

As requested by Zurich American Insurance Company (“Zurich”), The Vertex Companies, Inc. (“VERTEX”) visited the property of the Salina Airport Authority (“Insured”) to evaluate the cause and extent of reported elevated winds to multiple buildings, structures, and roofs. Christopher Leaton, PE inspected Buildings 120, 412, and 959 on January 11, 2022. Mr. Leaton revisited the property and inspected the Runway 17-35 PAPI system on February 1, 2022. Mr. Leaton prepared this report, and Isaac M. Gaetz reviewed the findings. Robert Ezold PE, also of VERTEX, assisted in the review of the rooftop mechanical units. The inspection included the taking of photographs, measurements, and observations. Maynard Cunningham (Salina Airport Authority) and Asheiki Preston (Building Consultant with the RMC Group) were present during our investigation.

2.0 PROPERTY DESCRIPTION

The property was a regional airport that was at 3237 Arnold Avenue located in Salina, Saline County, Kansas. The Salina Regional Airport was operated by the Salina Airport Authority. The Salina Airport Authority managed a total of approximately (75) facilities that included buildings, multiple hangars of various sizes and configurations, and other structures which included a water storage tank and a water tower.

VERTEX inspected a total of sixteen buildings and hangars which were the subject of the investigation. Buildings 120, 412, and 959 and the Precision Approach Path Indicator (PAPI) system were the subject of this report. Separate reports address the other structures of the investigation. For the purposes of this report, Building 120 faced east, Building 412 faced north, and Building 959 faced west (see **Attachment A**, Location Map and Aerial Views and **Attachment C**, Building Layout and Number).



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Building 412 had a front office on the east and a warehouse on the west. The front office was approximately 45 feet wide (east-west) by 67 feet long (north-south). The front office was clad with brick. The warehouse was approximately 81 feet wide (north-south direction) by 143 feet long (east-west direction). The warehouse walls were concrete masonry unit (CMU) block. The front office and warehouse roofs were covered by a mechanically anchored, single-ply thermoplastic membrane roof. Both the front office (lower) roof and the warehouse (upper) roof were low-slope gabled roofs that had a ridge which was oriented in the east-west direction (see **Attachment D**, for Layout and **Attachment F**, Photos 1 thru 4).

Building 959 was a large hangar facility with an office on the west side. The office was approximately 47 feet wide (east-west direction) by 75 feet long (north-south direction). The walls were clad with metal panels. The north and south elevations had rolling hangar doors that were the length of the building. The hangar roof was the subject of this report for Building 959. The hangar roof was a low-slope roof and approximately 296 feet wide (north-south direction) by 450 feet long (east-west direction) which included the hangar door roof extensions. The hangar roof was covered with a mechanically anchored, single-ply thermoplastic membrane (see **Attachment D**, for Layout and **Attachment F**, Photos 5 and 6).

Building 120 was the Terminal for the Salina Regional Airport. The Terminal included the Terminal Building and a Gate Concourse on the west. The Terminal building was approximately 75 feet wide (east-west direction) by 204 feet long (north-south direction). The walls were CMU block construction. The roofs were covered by with a single-ply thermoplastic membrane. The Terminal Building had six mechanical rooftop units (RTU). The RTU's and the roof were the subject of this report for Building 120 (see **Attachment D**, for Layout and **Attachment F**, Photos 7 thru 9).

The Precision Approach Path Indicator (PAPI) systems were part of the Approach Light Systems (ALS) for the Salina Regional Airport. The PAPI assists pilots by providing visual glide slope guidance for a non-precision approaches environment. The PAPI systems are a row of lights



whose light combinations indicate whether the plane was in the proper glide path angle of approach.¹ The Salina Regional Airport had a total of four PAPI systems. Three of the PAPI systems were owned and maintained by the Federal Aviation Administration (FAA), and the other PAPI system was owned and maintained by the Salina Airport Authority. The Salina Airport Authority PAPI system was reported to be auxiliary and was not required for the airport operation. The Salina Airport Authority PAPI system was located at the south end of Runway 17-35 on its east (right) side (see **Attachment D**, for Layout and **Attachment F**, Photo 10).

3.0 EVENT SUMMARY

Maynard Cunningham reported that on or around December 15, 2021, elevated winds and windborne debris had affected the following airport buildings roofs and their components.

- Building 412: The elevated winds had uplifted the TPO roof membrane of both the Front Office and Warehouse.
- Building 959: The elevated winds had uplifted the TPO roof membrane for the Hangar Roof.

Building 120: The elevated winds had affected the internal components of four (4) HVAC rooftop units (RTU). The units affected were RTU's 1 thru 3 and 6. Specifically, Mr. Cunningham reported the RTU 1 controller card, the RTU 2 and 6 heat exchangers, and the RTU 3 main disconnect switch had been affected. A small roof area on the west side of the south lower roof was reported with withdrawn fasteners.

- Runway 17-35 PAPI system: The elevated winds had rotated the units about their vertical axis. It was further reported that the units had been adjusted and were within range (tolerance) for vertical angle (glide slope) and azimuth (roll). Mr. Cunningham reported

¹ https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/lsg/papi

that despite adjustment of these settings, the PAPI failed to operate correctly due to either the compass reading or lights themselves being out of tolerance.

4.0 METEOROLOGICAL DATA

VERTEX reviewed storm data as reported by the National Weather Service (NWS) for December 15, 2021. The NWS reported:

A low pressure system of historic strength led to a variety of high-end weather impacts from the central Plains to the Upper Midwest and Great Lakes December 15-16. An unprecedented December severe weather unfolded over portions of Minnesota and Wisconsin Wednesday evening, with the Storm Prediction Center issuing their farthest-north Moderate Risk for the month of December. A serial derecho moving at 60-80 mph tracked from Kansas to Wisconsin, resulting in over 560 reports of damaging wind and over 60 tornadoes. A total of 57 "significant severe" wind gusts (75+ mph) were reported, breaking the daily record of 53 set on August 10, 2020.²

VERTEX also reviewed monthly climate data for the Salina Regional Airport, and the greatest reported wind was 89 mph from the west-southwest on December 15, 2021 (see **Attachment C**, Meteorological Data).

5.0 DOCUMENTATION REVIEW

VERTEX reviewed User's Information Manual of models LGH/LCH036, 048, 060, 072 (3, 4, 5 & 6 Tons) for Rooftop Units 1 and 2. Page 5 of the manual stated to "Securely fasten roof frame to

² <https://www.weather.gov/mpx/HistoricStormDecember2021>

roof per local codes” for the rooftop units (see **Attachment G**, Lennox User’s Information Manual).

6.0 AERIAL IMAGERY

VERTEX reviewed aerial imagery by Google Earth for Buildings 412 and 959 that was dated June 27, 2019. The imagery for Building 412 indicated that the roof color was white and that the north and south ends for both the front office and warehouse roofs were discolored and stained. The roof had vertical lines across the roofs from apparent lapped seams of the roof membrane. The aerial imagery did not indicate displaced or torn areas to the roof membrane.

The imagery for the upper hangar roof of Building 959 indicated that the roof was gray in color without apparent joints or seams in the roof. Additionally, the upper hangar roof was discolored and stained, and there were substantially darkened areas in the center of the roof between the apparent roof expansion joints (see **Attachment E**, Aerial Imagery).

7.0 OBSERVATIONS

VERTEX inspected the exterior and roofs for Buildings 120, 412, and 959. The equipment and their supports were inspected for the rooftop units (RTU’s) of Building 120 and the PAPI system for Runway 17-35. We observed the following conditions (see **Attachment A** for orientation, **Attachment D** for layout, and **Attachment F** for photographs):

Building 412

The roof membrane was a thermoplastic roof membrane. The north and south ends of both the lower and upper roofs were discolored and stained from apparent sediment buildup. The thermoplastic roof had a manufacturer stamp that indicated the roof membrane had been manufactured by IB Systems. The membrane segments were approximately (6) feet wide that

ran in the north-south direction. The lapped seams of the membrane segments had been heat welded. The lapped side seams were approximately 1.5 inches wide (see Photos 11 thru 13).

The roof membrane had rows of apparently withdrawn fasteners at the lapped seams in the north-south direction that had pushed and stretched the roof membrane upward at each apparent fastener. Additional rows of apparently withdrawn insulation fasteners were seen between the lapped joints, and the spacing of the rows for the apparently withdrawn fasteners was not consistent. The spacing of the apparent fasteners was approximately 12 inches on center in the north-south direction. The roof membrane at the apparently withdrawn fasteners had a bright appearance, and the surrounding area was not discolored or faded. The apparently withdrawn fasteners within the discolored and stained of the areas with sediment stains at the north and south ends of the roof were also bright and not faded. A semi-oval area approximately ten inches wide was bubbled at the east end of the upper roof ridge. The bubbled area was bright in appearance. The east end of the upper roof rake had several additional withdrawn fasteners at the metal termination bar. The threads of the fasteners at the termination bar were discolored from corrosion due to apparent surface rust (see Photos 14 thru 18).

The roof had linear tears to the roof membrane at several locations. The roof tears appeared to align with the apparently withdrawn fastener locations and were approximately 1 to 2 inches in length. The torn edges were rounded and worn. The exposed membrane reinforcement at the tears was faded. The areas surrounding the tears appeared to have a surface applied liquid repair material, and the repair material was alligator cracked and faded (see Photos 19 and 20).

Building 959

The roof membrane was a thermoplastic roof membrane. The roof had large circular area with an apparently black-colored pigment applied to the roof membrane at the southeast roof corner. The membrane segments were approximately ten feet wide that ran in the north-south direction. The membrane segments had lapped seams that had been heat welded, and the lapped seams

were approximately three inches wide (see Photos 21 thru 23).

The roof membrane had numerous rows of apparently withdrawn fasteners in the north-south direction at and between the lapped seams. The row spacing of the withdrawn fasteners was not consistent across the roof. The roof membrane at the apparently withdrawn fasteners had pushed and stretched the roof membrane upward at each apparent fastener. The roof membrane at the withdrawn fasteners had a bright appearance, and the surrounding area was not discolored or faded. The roof surface was uneven, and the roof materials below the roof membrane appeared to be mounded. The mounding of the roof materials was in elongated piles of different heights in the north-south direction that were irregularly spaced across the roof in the east-west direction (see Photos 24 thru 26).

The southwest corner of the roof had a tear at a seam of an apparent roof curb. The material at the exposed edges at the roof seam were not discolored or faded. The roof membrane edges below the roof curb cover were mechanically anchored, and the fasteners were not withdrawn. The thermoplastic roof membrane appeared to have been installed over an older ballasted roofing system. The roof membrane at the lapped seam east of the roof curb had several punctures from fasteners. The edges at the punctures were not discolored, stained, or worn (see Photos 27 thru 30).

Building 120 – Rooftop Units

The rooftop units (RTU's) were not centered on the roof curbs, and the RTU's appeared to be horizontally offset to the east. The RTU frames did not sit flush with the roof membrane on each side of the roof curbs. The RTU's appeared to be offset approximately 1/4 to 1/2 inch from the center of the roof curb (see Photos 31 thru 36).

Building 120 – Roof Membrane

The roof membrane was a thermoplastic roof membrane. The membrane segments were approximately (6) feet wide that ran in the east-west direction. The lapped seams of the membrane segments had been heat welded. The roof membrane on the west side of the south lower roof had approximately four fasteners at a single lapped seam that were apparently withdrawn. The spacing of the apparently withdrawn fasteners was approximately (12) inches. The roof membrane at the withdrawn fasteners had a bright appearance, and the surrounding area was not discolored or faded. The roof insulation below the lapped seam appeared to be mounded (see Photos 37 and 38).

PAPI System

The Precision Approach Path Indicator (PAPI) system for Runway 17-35 had four light boxes that pointed south, and the light boxes were approximately aligned in the east-west direction. The PAPI system control box was to the east of the light boxes. The light boxes and control box were apparently supported by electrical conduit. The light boxes would illuminate. The front and back supports for the light boxes were not aligned in the north-south direction. The supports for the two east light boxes were checked for plumb with a torpedo level and were out of plumb (see Photos 39 thru 42).

8.0 CONCLUSIONS

Based on our investigation and within a reasonable degree of engineering certainty, it is the opinion of VERTEX that the following building components had been affected by elevated winds on or around December 15, 2021:

- Building 120: Rooftop Units 1 thru 3 and 6 had been displaced by elevated winds. Approximately five feet of the roofing membrane on the west side of the south lower roof appeared to have been uplifted by wind.

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- Building 412: Wind uplift had lifted substantial areas of the lower and the upper thermoplastic membrane roofs.
- Building 959: Wind uplift had lifted substantial areas of the upper hangar thermoplastic membrane roof.
- Runway 17-35: The PAPI light boxes appeared to have been rotated on their vertical axis.

Review of meteorological data indicated that elevated winds at approximately 89 mph from the west-southwest had occurred at the property of the Salina Regional Airport on or around December 15, 2021. These elevated winds would have been capable of affecting building systems along with building and roof components and of generating windborne debris. Additionally, the elevated winds would have been capable of generating wind pressures that could move or shift equipment such as mechanical rooftop units (RTU's). Similarly, the elevated winds would have been capable of laterally displacing the supports for the lights of the PAPI system.

Although the roof of Building 412 appeared to have mechanical tears at fastener locations from historical, ongoing roof movement, the lower and upper roofs had been affected by recent wind uplift due to the elevated winds on or around December 15, 2021. Elevated winds can cause uplift pressures that can lift roof membranes and the insulation boards below. This lifting of the roof membrane and insulation board can result in withdrawn fasteners along the lapped seams and to the insulation fasteners between the membrane seams. The even spacing of the pushed up and stretched membrane in regularly spaced lines for the roofs was consistent with withdrawn mechanical fasteners due to uplifting suction forces from elevated winds. The bright color of the stretched membrane at these fasteners was an indicator that the fasteners had been withdrawn in recent weeks or months. However, the roof membrane tears were not recent and appeared to be from historical, ongoing movement at fastener locations that had been previously repaired. The faded reinforcement at the membrane tears and the alligator cracking of the surrounding surface applied repair material were indicators that these tears predated the elevated winds on or around December 15, 2021, and had occurred over an extended period, years.

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Similar with building 412, the upper hangar roof for Building 959 had been affected by wind uplift on or around December 15, 2021. The widespread withdrawal of roof fasteners and the uneven distribution of the insulation materials beneath indicated that the roof membrane had been lifted (ballooned) due to elevated winds. As the roof membrane ballooned, the insulation materials beneath the roof membrane appeared to have been shifted to the east and to the north, causing visible mounds. Multiple roof membrane punctures and the tear at a roof curb at the southwest corner were also consistent with having resulted from elevated winds. This indicated that the uplift roof pressures had been greater at the southwest roof corner and would be consistent with prevailing winds from the west-southwest direction.

The short length of lapped seam at the (4) withdrawn fasteners on west side of the south lower roof of Building 120 was similar with the withdrawn fasteners found on Buildings 412 and 959 and was also consistent with wind uplift. The withdrawal of roof fasteners and the uneven distribution of the insulation materials beneath indicated that the roof membrane had been lifted due to elevated winds. However, the lifting of the roof membrane appeared to be localized and not widespread across the entirety of the roof.

The specifically reported components for Rooftop Units (RTU's) 1 thru 3 and 6 on the roof of Building 120 were reportedly repaired prior to VERTEX's inspection and the cause of the reported damage to these components could not be determined. Moreover, although the User's Information Manual for Units 1 and 2 indicated that the RTU's should be fastened to the roof, the RTU's were not apparently attached to the roof curbs. Since the RTU's were not fastened, the RTU's appeared to have been laterally displaced approximately between 1/4 to 1/2 of one inch to the east. While the RTU's did rest evenly on the roof curbs, the RTU's could have been temporarily lifted during the elevated winds and displaced. This horizontal and vertical movement could have cracked the heat exchangers for Units 2 and 6. Also, the movement of Unit 3 could have caused the wires for the main disconnect box to be pulled when the unit moved and



caused the wires to either be loosened or be disconnected from the switch. Although lateral movement of the Unit 1 would not be expected to affect the controller card, an electronic disturbance could have occurred due to movement of the unit and affected the controller card operation.

The PAPI system for Runway 17-35 appeared to have been rotated due to the elevated winds on or around December 15, 2021. The front and back vertical supports for the two east light boxes were not aligned and were out of vertical plumb. The light boxes were reportedly operational and used by pilots prior to the elevated winds. The Insured reported that the light boxes had been adjusted for their vertical angle (glide slope) and azimuth (roll) following the elevated winds but could not be adjusted about their vertical axis. VERTEX understands that a single light box out of tolerance will result in improper operation of the PAPI system. Hence, it is reasonable that if one or more of the light boxes were rotated by the elevated winds that the PAPI would not properly operate until all the light boxes were properly aligned with the runway approach.

9.0 GENERAL REPAIR PROTOCOL

Irrespective of insurance coverage, VERTEX offers the following general repair recommendations to address observed damages. All work should be performed in accordance with building codes adopted by the governing jurisdiction.

One feasible repair is as follows:

- Building 120: Replace the controller card for Rooftop Unit 1.
- Building 120: Replace the heat exchangers for Rooftop Units 2 and 6.
- Building 120: Inspect and repair the main disconnect switch for Rooftop Unit 4.
- Building 120: Repair an area of approximately (60) square feet of thermoplastic membrane (5 feet long by 12 feet wide) at the (4) mechanical anchors of the lifted

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lapped seam for the thermoplastic roof on the south side of the lower roof. Cut and reset the insulation board at the lapped seam as required.

- Building 412: Remove and replace the lower and upper thermoplastic membrane roofs as required. Replace any damaged or displaced roof insulation.
- Building 959: Remove and replace the upper hangar thermoplastic membrane roof as required. Replace any damaged or displaced roof insulation.
- Runway 17-35: Plumb and adjust the supports for the light boxes of the runway PAPI system. Calibrate the PAPI system by a qualified technician.

Although there were substantial areas throughout the thermoplastic membrane roofs for Buildings 412 and 959 that had been uplifted, these roofs should be evaluated to determine if the roof membrane and insulation board below can be feasibly removed and reinstalled in lieu of complete replacement. Since the thermoplastic membrane had been apparently stretched at the fasteners, the long-term serviceability of the thermoplastic roof membrane could have been affected at the fastener locations and should be evaluated by a qualified roofing contractor. Any repairs or the replacement of the roofs for Buildings 412 and 959 should comply with the requirements of the International Building Code (IBC) as adopted by the City of Salina, Kansas. The roof repairs or a replacement roof should be also designed and specified by a qualified, licensed design professional in the state of Kansas. Also, it should be noted that the mechanically anchored roof system for Building 959 appeared to have been installed over a ballasted roof. The installation of the replacement roof system for Building 959 may require the removal and disposal of the older ballasted roof materials in addition to the mechanically anchored roof to be removed.

The User's Information Manual for the Building 120 RTU's indicates that the unit roof frames should be securely fastened to the roof per local codes. Best engineering practice is to fasten the RTU's to the roof. VERTEX recommends that the RTU's be attached to the roof and that their



attachment comply with the requirements of both the International Mechanical Code (IMC) and International Building Code (IBC) as adopted by the City of Salina, Kansas.

10.0 CLOSING

A visual inspection of the property was performed and reviewed as part of our investigation. Unless noted in this report, no destructive testing was performed. A complete analysis of the existing framing members or the connections for structural design capacity versus existing codes was not conducted. All repairs and construction should conform to the currently applicable Building Code. The repairs, including any temporary shoring that may be needed, should be specified, designed, and installed by properly licensed professionals familiar with that type of construction.

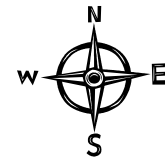
This report was prepared for the exclusive use of Zurich and is not intended for any other purpose. VERTEX has not reviewed the applicable insurance policy, if any, for the purpose of forming an opinion as to coverage and is not offering a coverage opinion. Our report was based on observed site conditions and the information available at the time of our inspection. We reserve the right to amend this report and our conclusions if new information becomes available and revisions are necessary and warranted. Not all photographs taken by VERTEX during the site inspection were included with this report. Additional photographs in our records are available upon request.

If you have questions or comments, please contact Christopher Leaton or Isaac Gaetz at (888) 298-5162. We appreciate this opportunity to assist Zurich and the policy holder.

ATTACHMENT A:

1

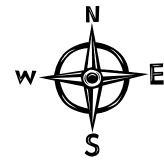
SITE LOCATION MAP



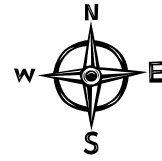
ATTACHMENT A:

2

AERIAL VIEW



Airport Aerial View

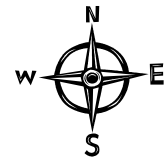


Building 412 Aerial View

ATTACHMENT A:

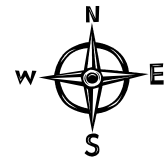
4

AERIAL VIEW



Building 959 Aerial View

AERIAL VIEW

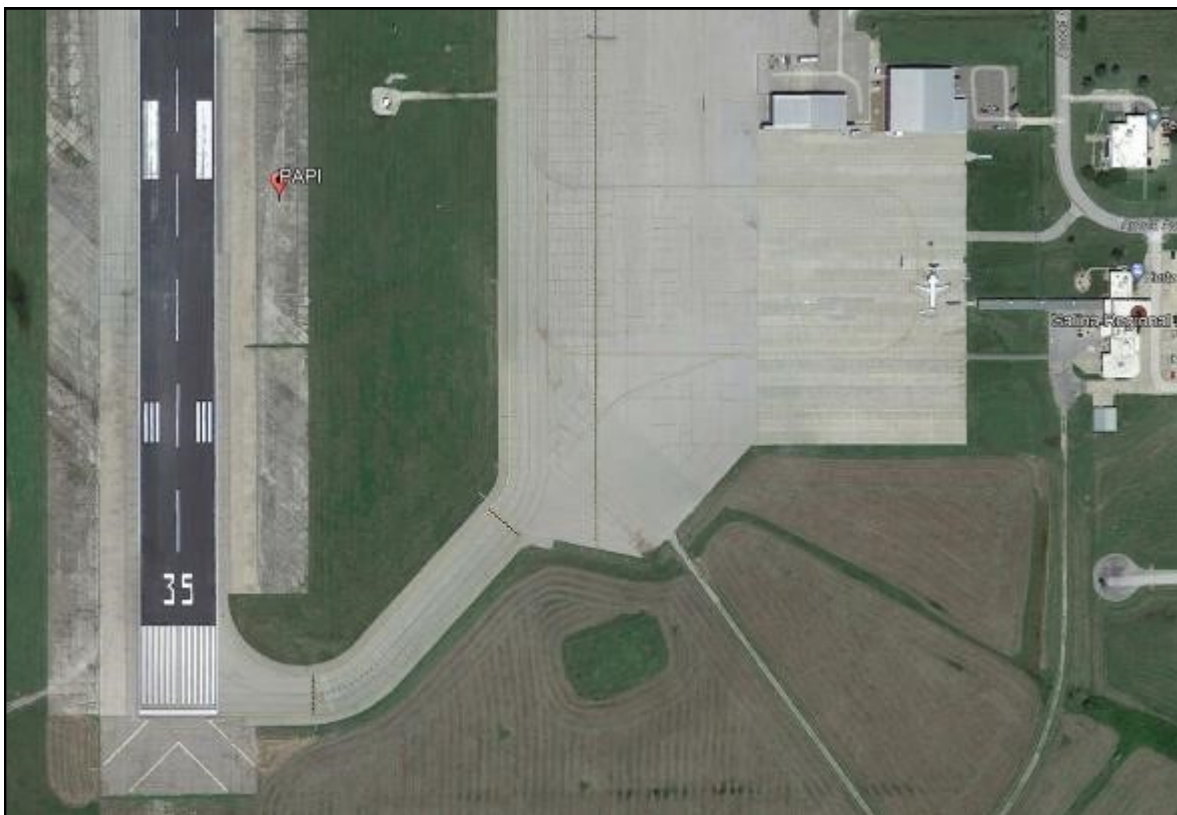
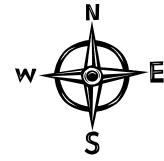


Aerial View
Building 120 (Terminal Building)

ATTACHMENT A:

6

AERIAL VIEW

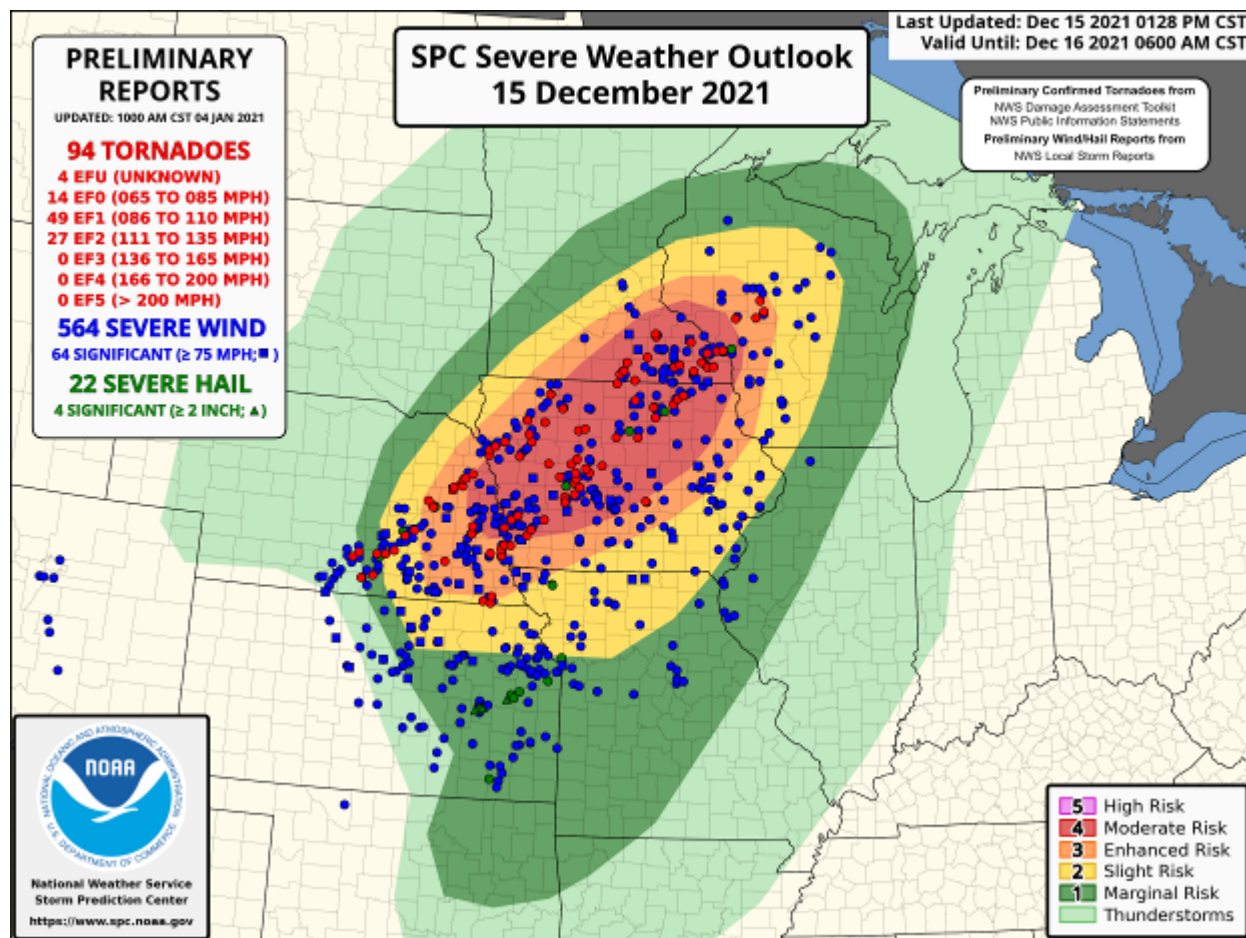


PAPI Location

ATTACHMENT B:

7

METEOROLOGICAL DATA

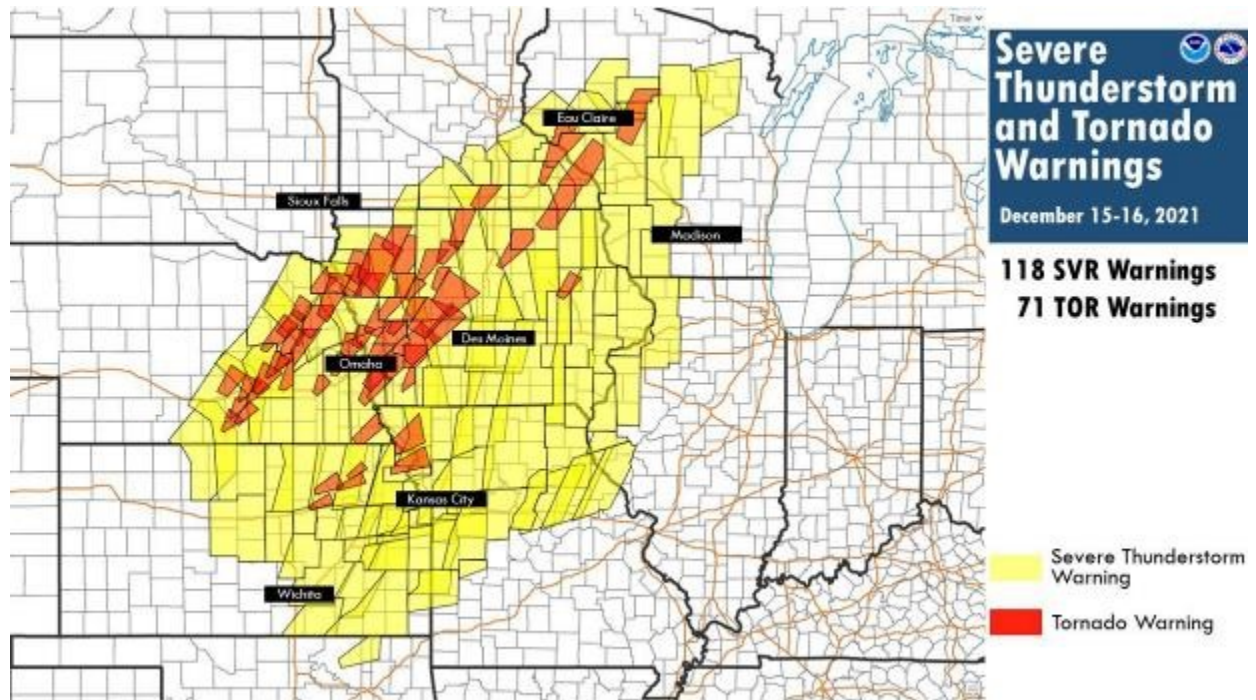


Reference: <https://www.weather.gov/mpx/HistoricStormDecember2021>

ATTACHMENT B:

8

METEOROLOGICAL DATA



Reference: <https://www.weather.gov/mpx/HistoricStormDecember2021>

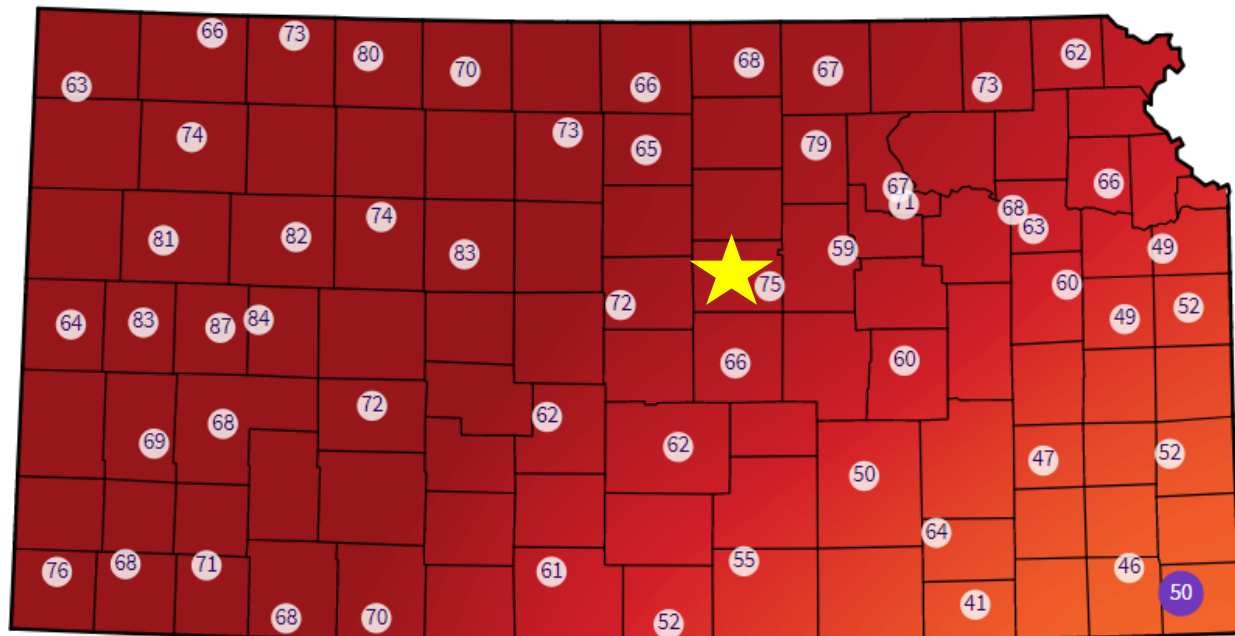
ATTACHMENT B:

9

METEOROLOGICAL DATA

24HR Peak Winds (mph)			
Russell Municipal Airport	100	3.2 E New Cambria (UPR)	95
K-61 @ K-153 Interchange McPherson	85	Hutchinson Municipal Airport	84
2.4 W Bunker Hill	75	Wichita	71
Wichita Eisenhower Airport	69	1.8 N Marlon	68
2.8 W Langdon (UPR)	66	Newton City County Airpt	66
Colonel James Jabara Airport	66	6.4 E Kanopolis (UPR)	64
Great Bend Municipal Airpt	63	I-35 bridge over Whitewater River	63
Lyons-Rice County Municipal Airp	62	Lyons Rice Co. Municipal Airpt	62
0.8 W Canton (UPR)	61	Chanute Martin Johnson Airpt	61
US-54 - Eureka	60	Lloyd Stearman Field Airport	60
Strother Field Airport	58	Beech Factory Airport	58
Haysville	57	Coffeyville Municipal Airpt	56
		Salina Regional Airport	89
		5.7 NW Smolan (UPR)	78
		1.9 NE Durham	70
		Allen Co. Airpt. Iola	68
		El Dorado Memorial Airpt	66
		McConnell AFB	63
		Augusta	63
		Rose Hill	62
		I-135 @ 17th St.	61
		Tallgrass Prairie	58
		Kingman	58
		0.7 SW Whitewater	55

10m Wind Gust



Mesonet Data - 10m Wind Gusts at Dec 15 2021 21:55 (CST)

Reference: https://www.weather.gov/ict/event_2021Dec15thWindFireSVR

ATTACHMENT B:

10

METEOROLOGICAL DATA

000
CXUS53 KICT 082307
CF6SLN
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

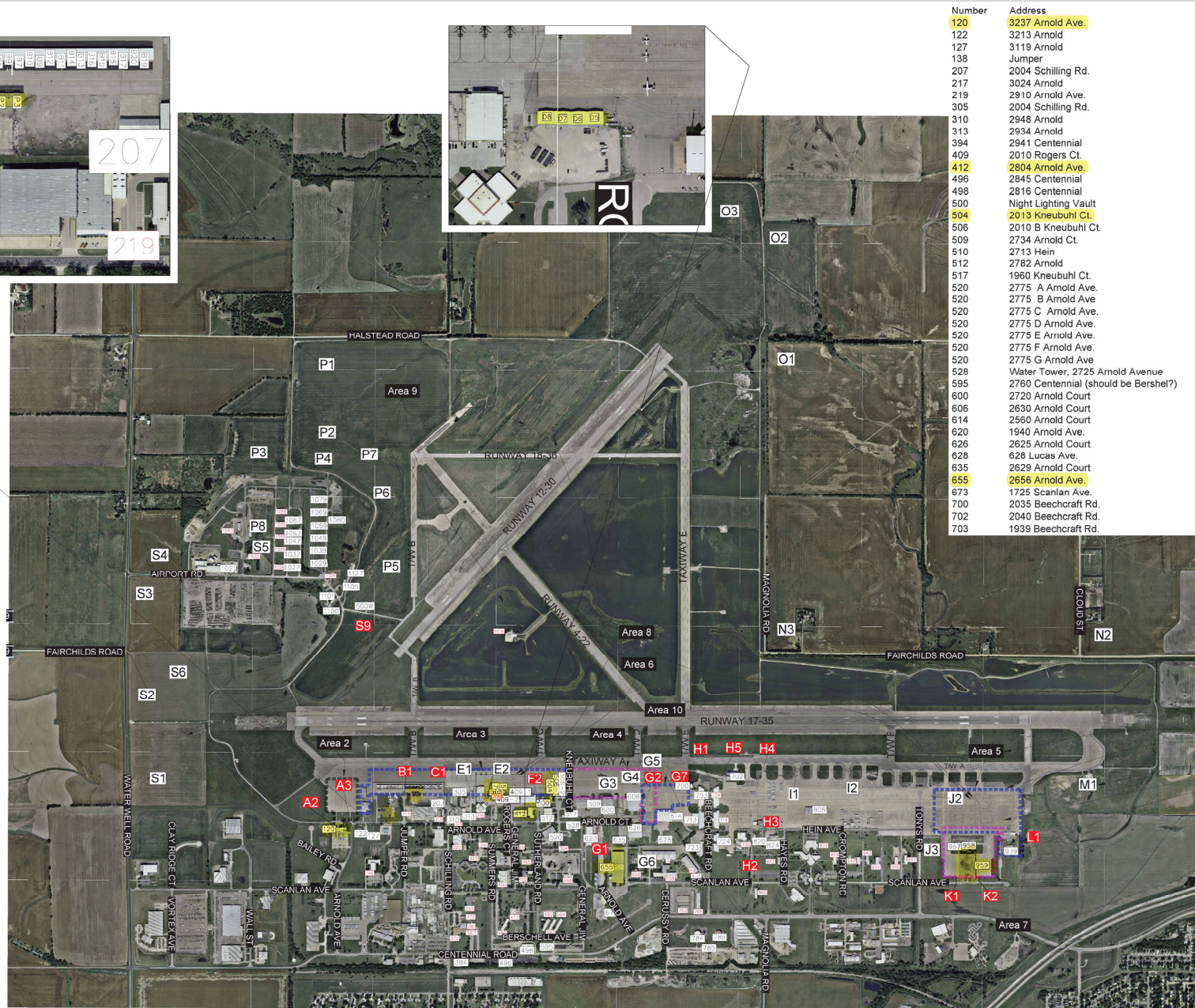
STATION: SALINA KS
MONTH: DECEMBER
YEAR: 2021
LATITUDE: 38 47 N
LONGITUDE: 97 39 W

TEMPERATURE IN F:					:PCPN:			SNOW:		WIND		:SUNSHINE:			SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
12Z AVG MX 2MIN																		
DAY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	69	29	49	12	16	0	0.00	M	M	6.1	16	230	M	M	0		21	220
2	72	37	55	18	10	0	0.00	M	M	4.2	12	240	M	M	0		16	250
3	65	34	50	14	15	0	T	M	M	9.8	22	20	M	M	0		30	30
4	53	29	41	5	24	0	0.00	M	M	8.0	15	150	M	M	2		19	150
5	63	38	51	15	14	0	0.00	M	M	14.8	37	350	M	M	1	1	46	350
6	38	24	31	-4	34	0	0.00	M	M	12.0	35	340	M	M	0		44	340
7	47	25	36	1	29	0	0.00	M	M	10.7	21	200	M	M	1		29	190
8	59	20	40	6	25	0	0.00	M	M	10.6	20	170	M	M	0		29	170
9	65	34	50	16	15	0	0.00	M	M	9.0	23	300	M	M	0		31	310
10	70	32	51	17	14	0	0.00	M	M	16.8	32	320	M	M	2		45	340
11	49	22	36	2	29	0	0.00	M	M	11.1	31	330	M	M	1		42	310
12	56	30	43	10	22	0	0.00	M	M	12.8	25	190	M	M	0		32	190
13	60	25	43	10	22	0	0.00	M	M	5.8	16	160	M	M	0	8	21	160
14	64	38	51	18	14	0	0.00	M	M	12.5	23	190	M	M	0		36	170
15	76	13	45	12	20	0	0.00	M	M	25.1	61	260	M	M	4	1378	88	250
16	48	27	38	6	27	0	0.00	M	M	5.0	8	100	M	M	0		8	100
17	50	19	35	3	30	0	0.00	M	M	6.5	12	350	M	M	0		12	350
18	30	10	20	-12	45	0	0.00	M	M	9.9	16	340	M	M	2		29	310
19	43	12	28	-4	37	0	0.00	M	M	15.0	23	190	M	M	0		32	170
20	46	19	33	1	32	0	0.00	M	M	9.0	18	360	M	M	0		23	360
21	52	13	33	1	32	0	0.00	M	M	4.2	14	320	M	M	0	8	20	70
22	61	17	39	8	26	0	0.00	M	M	9.7	22	210	M	M	0		29	210
23	61	30	46	15	19	0	0.00	M	M	8.1	20	200	M	M	0	12	26	200
24	70	36	53	22	12	0	0.00	M	M	9.9	23	190	M	M	0	1	29	190
25	54	28	41	10	24	0	0.00	M	M	4.7	14	310	M	M	0		16	310
26	64	29	47	16	18	0	0.00	M	M	12.1	28	280	M	M	1		39	270
27	59	30	45	14	20	0	0.00	M	M	8.6	30	310	M	M	0		38	290
28	52	21	37	6	28	0	0.00	M	M	14.9	26	310	M	M	1		32	310
29	30	18	24	-7	41	0	T	M	M	7.5	15	10	M	M	7		21	20
30	50	18	34	3	31	0	0.00	M	M	6.5	15	180	M	M	3		21	160
31	49	21	35	5	30	0	0.00	M	M	13.4	24	350	M	M	3		30	360
SUM 1725 778 755 0 0.00 M 314.3 M 28																		
AV 55.6 25.1 10.1 FASTST M M 1 MAX(MPH) 88 250																		
MISC ----> 61 260																		

<https://forecast.weather.gov/product.php?site=ICT&issuedby=SLN&product=CF6&format=CI&version=2&glossary=0>

AIRPORT BUILDING LAYOUT & NUMBERS

Airport Building Layout & Number



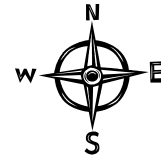
Number	Address	Number	Address
120	3237 Arnold Ave.	713	1935 Beechcraft Rd.
122	3213 Arnold	723	1915 Beechcraft Rd.
127	3119 Arnold	724	1910 Beechcraft Rd.
138	Jumper	730	2425 Hein Ave.
207	2004 Schilling Rd.	782	2503 Centennial Rd.
217	3024 Arnold	784	lot south of 784 is 2545
219	2910 Arnold Ave.	785	2503 Centennial
305	2004 Schilling Rd.	786	2503 Centennial Rd.
310	2948 Arnold	808	2328 Hein Ave.
313	2934 Arnold	809	2328 Hein Ave.
394	2941 Centennial	814	2328 B Hein Ave.
409	2010 Rogers Ct.	816	2328 Hein Ave.
412	2804 Arnold Ave.	820	2413 Hein
496	2845 Centennial	824	2359 Hein
498	2816 Centennial	939	1932 Scanlan
500	Night Lighting Vault	957	2044 Scanlan
504	2013 Kneubuhl Ct.	958	2044 Scanlan
506	2010 B Kneubuhl Ct.	959	2044 Scanlan
509	2734 Arnold Ct.	1021	3600 Airport Rd
510	2713 Hein	1027	3334 Airport Rd
512	2782 Arnold	1029	3306 Airport Rd
517	1960 Kneubuhl Ct.	1037	3334 Airport Rd
520	2775 A Arnold Ave.	1039	3313 Airport Rd
520	2775 B Arnold Ave.	1047	3334 Airport Rd
520	2775 C Arnold Ave.	1049	3313 Airport Rd
520	2775 D Arnold Ave.	1057	3334 Airport Rd
520	2775 E Arnold Ave.	1059	3313 Airport Rd
520	2775 F Arnold Ave.	1067	3334 Airport Rd
520	2775 G Arnold Ave.	1069	3313 Airport Rd
528	Water Tower, 2725 Arnold Avenue	1079	3313 Airport Rd
595	2760 Centennial (should be Bershel?)	1100	3275 Airport Rd
600	2720 Arnold Court	1101	3275 Airport Rd
606	2630 Arnold Court	1103	3313 Airport Rd
614	2560 Arnold Court	1105	3232 Airport Rd
620	1940 Arnold Ave.	1127	3222 Airport Rd
626	2625 Arnold Court		
628	628 Lucas Ave.		
635	2629 Arnold Court		
655	2656 Arnold Ave.		
673	1725 Scanlan Ave.		
700	2035 Beechcraft Rd.		
702	2040 Beechcraft Rd.		
703	1939 Beechcraft Rd.		

- LEGEND:**
- Area number for gate cards.
 - Area number boundary for specific gate cards.
 - Gate controlled by pad lock.
 - Gate controlled by card reader.
 - Building owned by SAA.
 - Building owned by others.

Drawing Number 2003

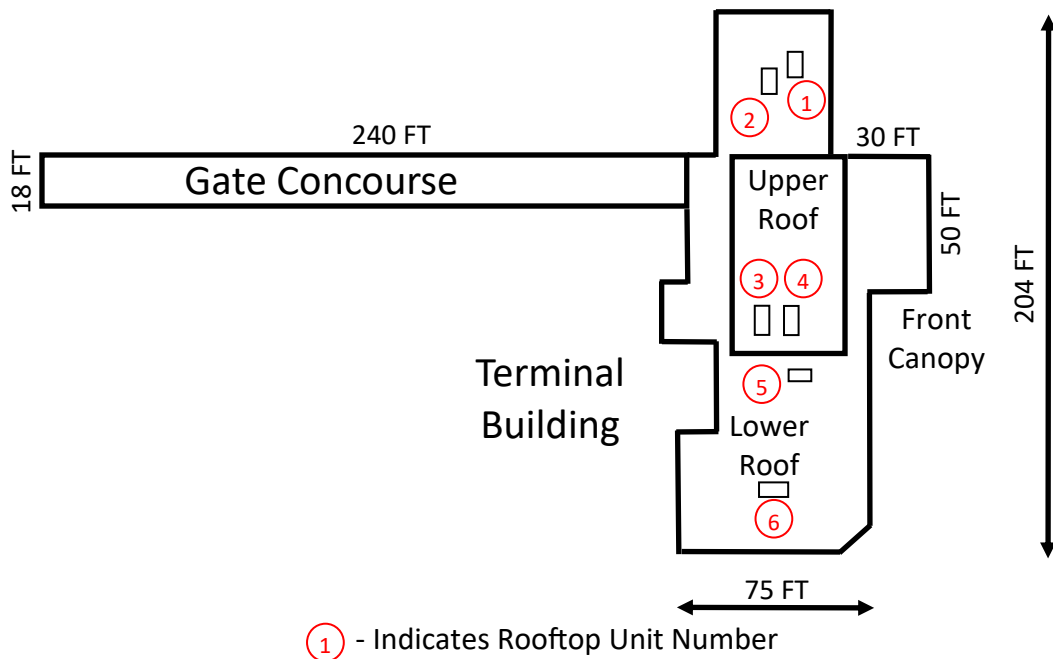
3237 ARNOLD, SALINA, KS 67401
(785)-827-3814 FAX (785)-827-2221

NONE: REVISIONS
KRB: DESIGNED BY
KRB: DRAWN BY
10/31/20 09:47: DATE



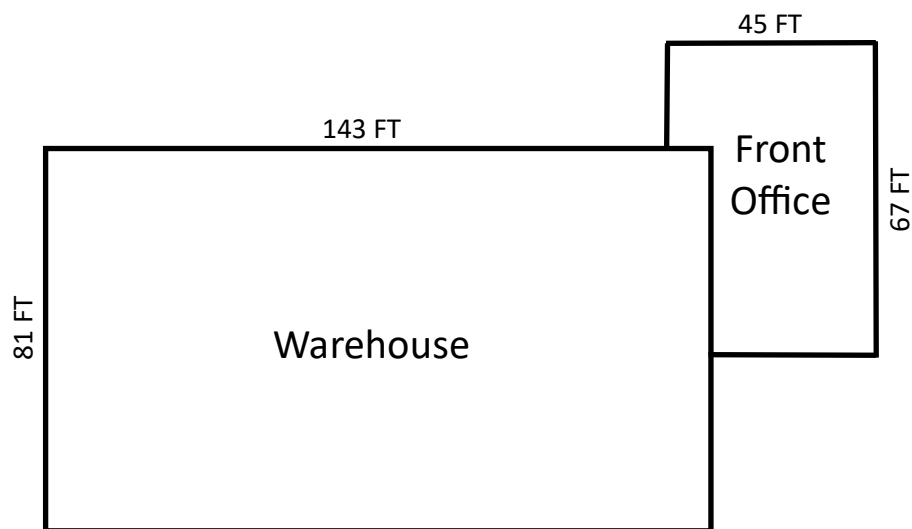
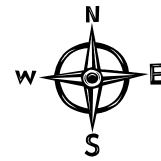
Rooftop Unit Table

Unit	Manufacturer	Model
1	Lennox	LGH036H4ES1Y
2	Lennox	LGH036H4ES1Y
3	Lennox	LGH120H4BH1Y
4	Lennox	LGH120H4BH1Y
5	Trane	YSC048E3RZA0F97
6	Lennox	LGH120H4BH1Y

**Building 120 (Terminal) Layout**

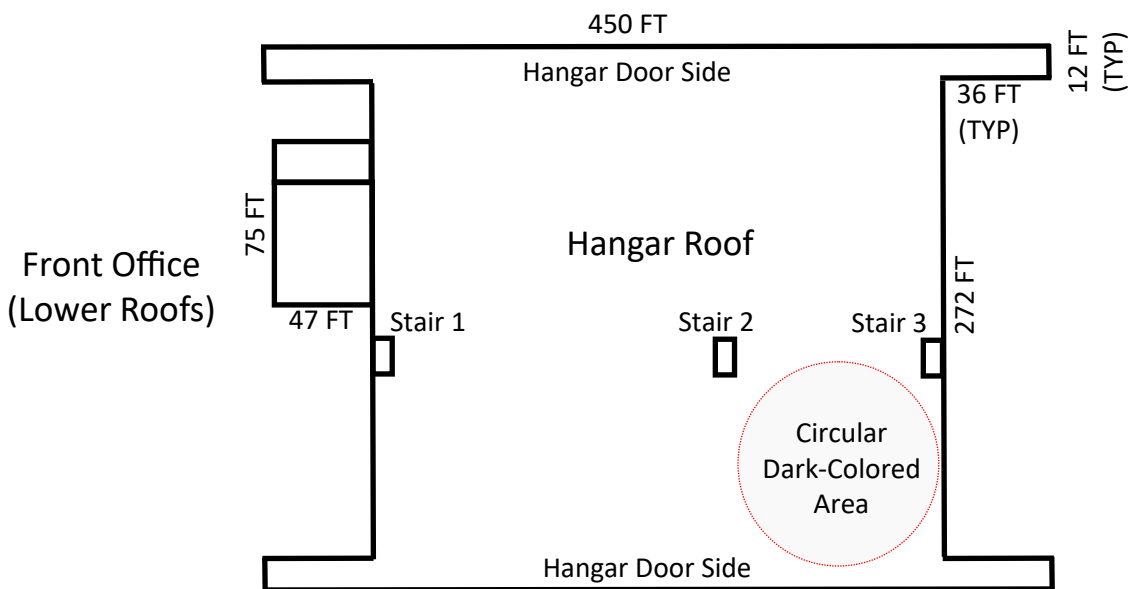
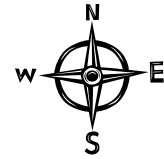
Not to Scale

Reference: <https://www.salinaairport.com/media/36478/sln-master-plan-draft-final-100520.pdf>



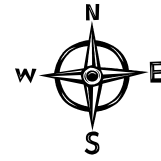
Building 412 Layout

Not to Scale

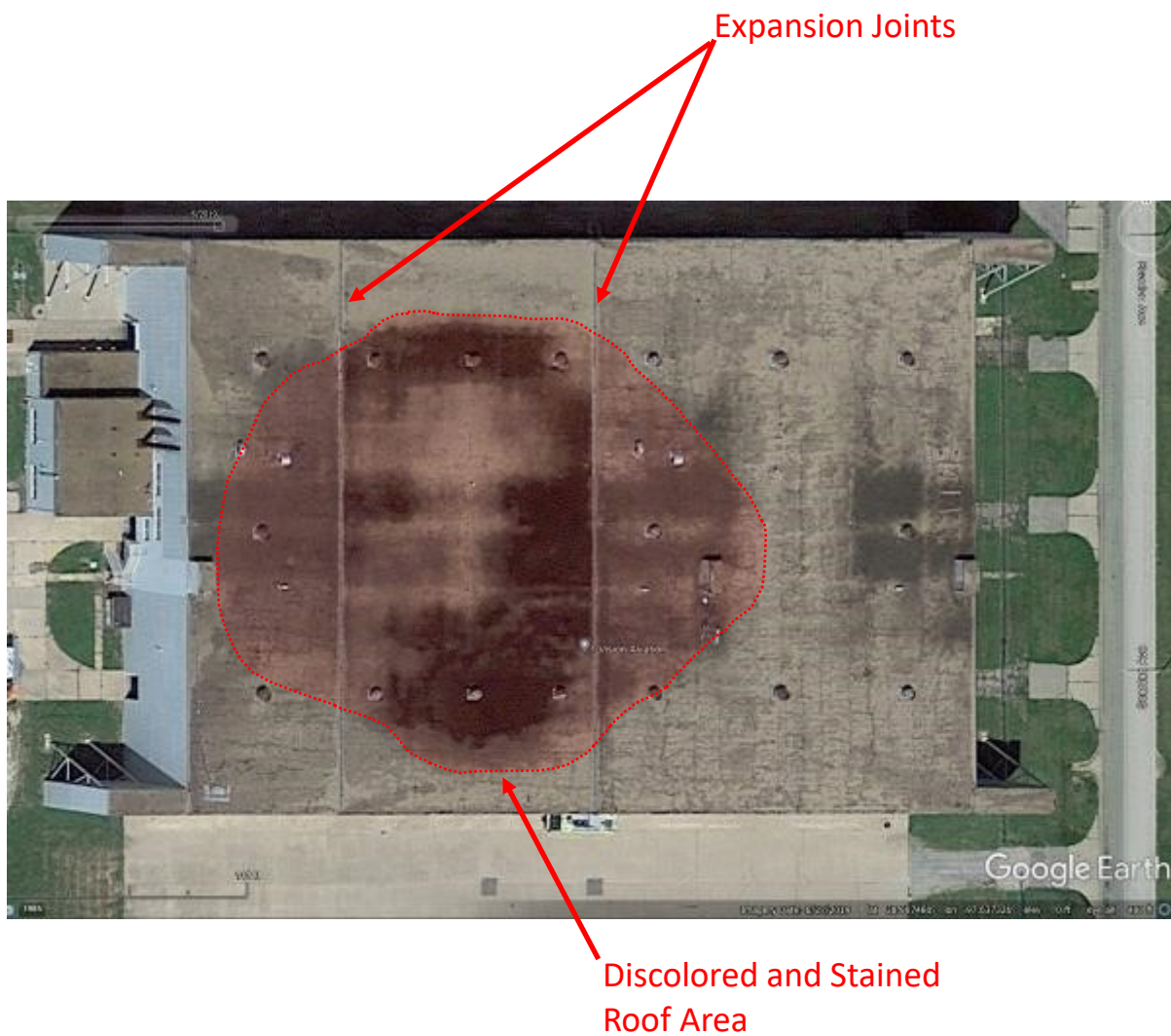
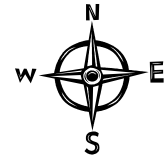


Building 959 Layout

Not to Scale



Building 412
(Imagery Date 6/27/2019)



Building 959
(Imagery Date 6/27/2019)

PHOTOGRAPHIC DOCUMENTATION

Photograph: 1

Description:

Building 412: View of the front office from the northeast.



Photograph: 2

Description:

Building 412: View of the front office and warehouse from the southeast.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 3

Description:

Building 412: View the west elevation of the warehouse.



Photograph: 4

Description:

Building 412: View of the warehouse north elevation.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 5

Description:

Building 959: View from the northwest.



Photograph: 6

Description:

Building 959: View from the southeast.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 7

Description:

Building 120 (Terminal):
View from the east.



Photograph: 8

Description:

Building 120 (Terminal):
View from the north.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 9**Description:**

Building 120 (Terminal):
View from the south.

**Photograph: 10****Description:**

View looking west of the
PAPI system by Runway
17-35.

The PAPI system had a
controller box on the east
with a set of (4)
lights that were aligned
in the east-west direc-
tion.



PHOTOGRAPHIC DOCUMENTATION**Photograph: 11****Description:**

Building 412: View of the upper roof looking west.

The roof had discolored and stained areas along the north and south ends.

**Photograph: 12****Description:**

Building 412: View of the upper roof looking south.

The roof had discolored and stained areas along the north and south ends.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 13**Description:**

Building 412: View of the roof membrane width.

The roof membrane edges were side lapped approximately 1.5 inches (inset photo).

**Photograph: 14****Description:**

Building 412: View of rows of apparently with-drawn fasteners where the roof membrane was pushed and stretched upward.

The apparent fastener spacing was approximately 12 inches (inset photo).



PHOTOGRAPHIC DOCUMENTATION

Photograph: 15

Description:

Building 412: Closeup of a row of apparently withdrawn fasteners.



Photograph: 16

Description:

Building 412: View of apparently withdrawn fasteners along the south roof eave. An inset image in the top left corner provides a magnified view of the fasteners, with a red arrow pointing from the main image to the inset.



PHOTOGRAPHIC DOCUMENTATION**Photograph: 17****Description:**

Building 412: View of an apparently stretched area of roof membrane at the roof ridge at the east side of the roof.

**Photograph: 18****Description:**

Building 412: View of partially withdrawn fasteners on the east roof rake of the upper roof.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 19**Description:**

Building 412: View of a tear in the roof membrane.

**Photograph: 20****Description:**

Building 412: Closeup of a roof tear in the roof membrane.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 21

Description:

Building 959: View of the upper hangar roof looking east.



Photograph: 22

Description:

Building 959: Additional view of the upper hangar roof looking east.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 23**Description:**

Building 959: View of the southeast corner of the roof.

The roof had circular area from an apparently black-colored pigment applied to the roof membrane (red arrow).

**Photograph: 24****Description:**

Building 959: View of apparent rows of mechanical fasteners in the north-south direction. (red polygons).

Note the apparent mounding of the roof materials below the roof membrane (green arrows).



PHOTOGRAPHIC DOCUMENTATION

Photograph: 25**Description:**

Building 959: View of apparently withdrawn fasteners in the black-colored area of the roof (red arrows).

Note the apparent mounding of the materials below the roof membrane.

**Photograph: 26****Description:**

Building 959: Closeup view of apparently withdrawn fasteners (red arrows).



PHOTOGRAPHIC DOCUMENTATION

Photograph: 27**Description:**

Building 959: View of the west side of the roof.

A corner of a apparently covered skylight had been torn (red arrow), and a fastener had penetrated the membrane (green arrow).

**Photograph: 28****Description:**

Building 959: Closeup of the torn corner of the roof membrane at an apparent skylight.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 29**Description:**

Building 959: View beneath the membrane at the torn skylight corner area.

The membrane appeared to have been placed over a ballasted roof (inset photo)

**Photograph: 30****Description:**

Building 959: View of a withdrawn fasteners that had penetrated the roof membrane.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 31**Description:**

Building 120: View of the two rooftop units (Units 1 and 2) on the lower north roof.

**Photograph: 32****Description:**

Building 120: View of the northeast unit (Unit 1) on the lower roof.

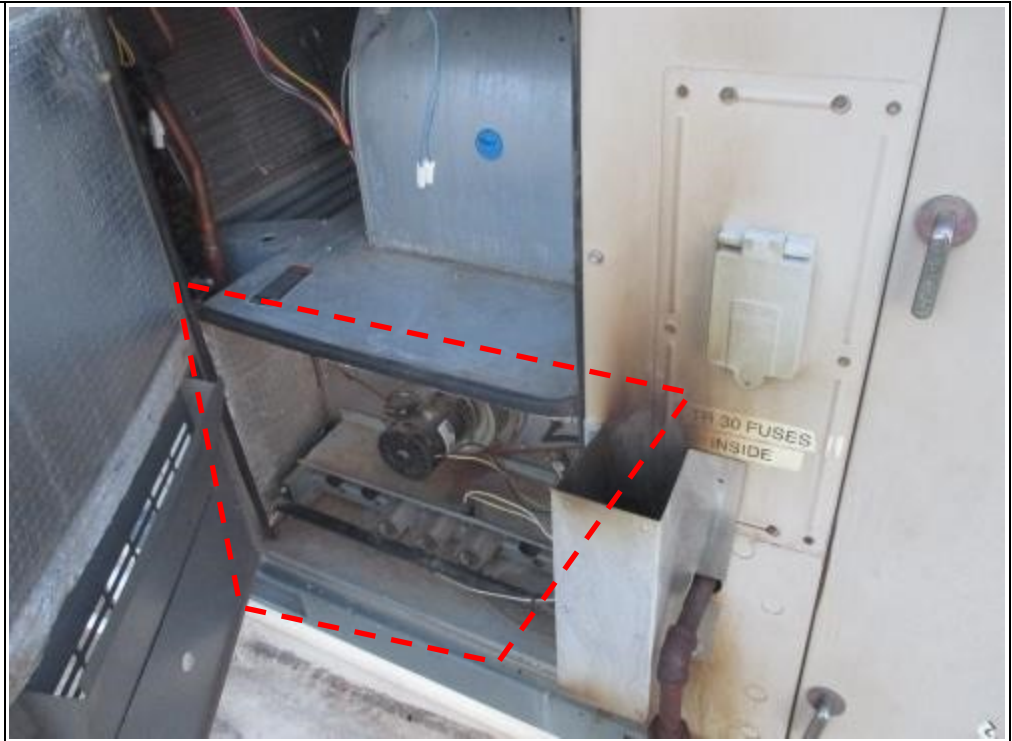
Both Units 1 and 2 appeared to have been shifted to the east (red arrow indicating shifted direction).



PHOTOGRAPHIC DOCUMENTATION

Photograph: 33**Description:**

Building 120: Interior view of the heat exchanger assembly for Unit 2.

**Photograph: 34****Description:**

Building 120: View of Units 3 and 4 on the upper roof.

Unit 3 had been apparently shifted to the east (red arrow indicating shifted direction).



PHOTOGRAPHIC DOCUMENTATION**Photograph: 35****Description:**

Building 120: View of the gap between the roof curb and unit support frame on the east side of Unit 3.

**Photograph: 36****Description:**

Building 120: View of the gap between the roof curb and unit support frame on the west side of Unit 3.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 37

Description:

Building 120: View of approximately four fasteners withdrawn on the south side of the lower roof.



Photograph: 38

Description:

Building 120: Closeup at an apparently withdrawn fastener.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 39**Description:**

PAPI System: View looking west.

The PAPI system had a control box on the east side with the four light boxes to the west.

**Photograph: 40****Description:**

PAPI System: View of a light box illuminated.



PHOTOGRAPHIC DOCUMENTATION

Photograph: 41**Description:**

PAPI System: View of the east light box from the south.

The supports for the light box were not apparently aligned and appeared to have been rotated along the vertical axis of the light box.

**Photograph: 42****Description:**

PAPI System: View of a plumb reading taken on the front support for the east light box.



Lennox User's Information Manual

USER'S INFORMATION MANUAL

**LGH/LCH036, 048, 060, 072
(3, 4, 5 & 6 Tons)**

This book includes the following manuals:

UNIT INSTALLATION INSTRUCTIONS	507155-01
OWNER'S MANUAL	506372-01
AGENCY MANUAL	506373-01
IMC MANUAL	506215-01
ECONOMIZER INSTRUCTIONS	507030-01
IMC MODULE INSTRUCTIONS (LONTALK GATEWAY)	506217-01
IMC MODULE INSTRUCTIONS (LONTALK PRODIGY)	506693-01
WARRANTY	W-022-L3



- Air filters must be replaced and pre-filters must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The unit operating conditions (including airflow, cooling operation, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

Unit Support

In downflow discharge installations, install the unit on a non-combustible surface only. Unit may be installed on combustible surfaces when used in horizontal discharge applications or in downflow discharge applications when installed on an T1CURB / C1CURB / E1CURB roof mounting frame.

NOTE - Securely fasten roof frame to roof per local codes.

A-Downflow Discharge Application

Roof Mounting with T1CURB / C1CURB / E1CURB

- 1- The roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The roof mounting frame should be square and level to 1/16" per linear foot (5mm per linear meter) in any direction.
- 3- Duct must be attached to the roof mounting frame and not to the unit; supply and return plenums must be installed before setting the unit.

Installer's Roof Mounting Frame

Many types of roof frames can be used to install the unit depending upon different roof structures. Items to keep in mind when using the building frame or supports are:

- 1- The base is fully enclosed and insulated, so an enclosed frame is not required.
- 2- The frames or supports must be constructed with non-combustible materials and should be square and level to 1/16" per linear foot (5mm per linear meter) in any direction.
- 3- Frame or supports must be high enough to prevent any form of moisture from entering unit. Recommended minimum frame height is 14" (356mm).
- 4- Duct must be attached to the roof mounting frame and not to the unit. Supply and return plenums must be installed before setting the unit.

- 5- Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

NOTE-When installing a unit on a combustible surface for downflow discharge applications, a T1CURB / C1CURB / E1CURB roof mounting frame is required.

B-Horizontal Discharge Applications

- 1- Units which are equipped with an optional economizer and installed in horizontal airflow applications must use a horizontal conversion kit.
- 2- Specified installation clearances must be maintained when installing units. Refer to figure 1.
- 3- Top of support slab should be approximately 4" (102mm) above the finished grade and located so no run-off water from higher ground can collect around the unit.
- 4- Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

Duct Connection

All exterior ducts, joints and openings in roof or building walls must be insulated and weather-proofed with flashing and sealing compounds in accordance with applicable codes. Any duct passing through an unconditioned space must be insulated.

⚠ CAUTION

In downflow applications, do not drill or punch holes in base of unit. Leaking in roof may occur if unit base is punctured.

Rigging Unit For Lifting

Rig unit for lifting by attaching four cables to holes in unit base rail. See figure 2.

- 1- Detach wooden base protection before rigging.
- 2- Remove all six base protection brackets before setting unit.
- 3- Connect rigging to the unit base using both holes in each corner.
- 4- All panels must be in place for rigging.
- 5- Place field-provided H-style pick in place just above top edge of unit. Frame must be of adequate strength and length. (H-style pick prevents damage to unit.)