APPENDIX A - CORRESPONDENCE

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Chris Shewchuk
City of Bellevue Planning Department
1510 Wall Street
Bellevue, NE 68005

Dear Mr. Shewchuk,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

In March 2019, Offutt AFB was inundated with floodwaters as part of a record flood event that occurred in eastern Nebraska, western Iowa, and northern Missouri. Approximately 137 buildings and structures including the headquarters facilities of the 55th Wing Group, 55th Security Forces Squadron, 97th Intelligence Squadron, 343d Reconnaissance Squadron, the Bennie L. Davis maintenance facility, flight simulators, 557th Weather Wing facilities, fuel tanks and other structures were damaged by the floodwaters. Approximately 44 were occupied buildings with office space totaling 1.2 million square feet. About one-third of the base, including everything south and east of the runway, which sits on lower ground, were flooded (see attached Figure 2). An overview of the Proposed Action is provided below for your review.

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If you have additional information regarding the Proposed Action and alternatives for inclusion and consideration during the NEPA compliance process, we would appreciate receiving such information. To ensure that the USAF has sufficient time to consider your input in the preparation of the draft EA, please forward written issues or concerns within 30 days of the receipt of this letter to: Ms. Krista Hoffart, 55 CES/CENPL; 106 Peacekeeper Drive, Suite 2N3, Offutt AFB, NE 68113-4019 or email at: krista.hoffart@us.af.mil.

Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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Date: 2020.03.10 10:19:06 -05'00'

BRUCE A. MCCAULEY, R.A., LEED AP
Deputy Director, 55th Civil Engineer Squadron

3 Attachments:
1. Offutt Air Force Base Location
2. Aerial of March, 2019 Flooding
3. Proposed Action

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Jeff Robichaud
U.S. Environmental Protection Agency
11201 Renner Blvd.
Lenexa, KS 66219

Dear Mr. Robichaud,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

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Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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Date: 2020.03.10 10:21:07 -05'00'

BRUCE A. MCCAULEY, R.A., LEED AP
Deputy Director, 55th Civil Engineer Squadron

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Scott Tener
Federal Aviation Administration
901 Locust Street
Kansas City, MO 64106-2641

Dear Mr. Tener,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

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Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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Date: 2020.03.10 10:22:27 -05'00'

BRUCE A. MCCAULEY, R.A., LEED AP
Deputy Director, 55th Civil Engineer Squadron

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Jim Macy
Nebraska Department of the Environment and Energy
1200 N Street, Suite 400
Lincoln, NE 68509

Dear Mr. Macy,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

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Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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Date: 2020.03.10 10:23:38 -05'00'

BRUCE A. MCCAULEY, R.A., LEED AP
Deputy Director, 55th Civil Engineer Squadron

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NEBRASKA

Good Life. Great Resources.

DEPT. OF ENVIRONMENT AND ENERGY

Pete Ricketts, Governor

March 31, 2020

ATTN: Mr. Bruce McCauley, R.A.

RE: Offutt AFB Flood Recovery and Rebuild Activities

Dear Mr. McCauley,

The Nebraska Department of Environment and Energy (NDEE) has reviewed the above referenced project. As with any project, permits may be required prior to beginning construction or operation. At a minimum, you should be aware of the possible requirements or permits:

	Contact	Phone
Air – No permit needed	Lindsey Hollmann	(402) 471-4212
Construction Storm Water - General Permit	Reuel Anderson	(402) 471-1367
Wastewater – Construction Permit	Hillary Stoll	(402) 471-4252
Water Quality - Federal 404 permit may be needed	Dane Pauley	(402) 471-1056
Waste Disposal - No permit needed	Erik Waiss	(402) 471-8308

Fugitive Dust regulations within Title 129 Chapter 32 shall apply to all demolition, grading, and construction activities.

Land Disturbances of an acre or more require coverage under the construction storm water general permit. Disturbances under an acre can be controlled under existing permits such as industrial storm water and MS4. Excavation groundwater dewatering requires coverage under the general permit for that activity. Contact the NPDES Section at 402-471-4220 or view the Department website for more information.

New drinking water lines need to maintain the minimum separation distances specified in Title 123. Manholes or sanitary sewers that are disturbed during construction must be returned to their original condition or a permit may be required. New manholes or sanitary sewers may require a Title 123 construction permit, however, this does not apply to service lines.

Should the project affect waters of the United States or adjacent wetlands, a CWA Section 404 permit from the U.S. Army Corps of Engineers and a 401 Certification from NDEE is required.

No waste permit is required for this project. All wastes generated must be properly handled, contained, and disposed as per all applicable regulations in Titles 128 & 132. Demolition materials must be disposed at a Municipal Solid Waste (MSW) landfill, or if available a Construction and Demolition (C&D) landfill. Valuable materials like copper, other metals, and structural lumber may be recycled before removal to an MSW or C&D landfill.

All structures must undergo an Asbestos Inspection from a Licensed inspector (see NE DHHS for list/contacts), and if found the asbestos must be removed by a licensed abatement contractor before the buildings can be razed.

If hazardous materials are generated or discovered on site, they will need to undergo a hazardous waste determination to assess whether Title 128 regulations apply to their disposal. Similarly, excavations conducted during construction/utility work will need to be aware of possibly of encountering contaminated soils. Discoloration, odor, or sheen are tip-offs that something has been discovered. Conduct a waste determination, or if obviously petroleum contact the NDEE's Petroleum Remediation Section.

If you have questions about the permitting process, or any other questions, feel free to contact me or any of the individuals listed above. For more information, please visit our website at deq.ne.gov.

Sincerely,

Sam Capps

Samantha Capps
PROGRAM ASSOCIATE II
EMERGENCY RESPONSE

Nebraska Department of Environment and Energy
P.O. Box 98922
Lincoln, Nebraska 68509-8922

DIRECT **402-471-2588**

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Gordon Fassett
Nebraska Department of Natural Resources
301 Centennial Mall South
Lincoln, NE 68509

Dear Mr. Fassett,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

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Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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Date: 2020.03.10 10:35:22 -05'00'

BRUCE A. MCCAULEY, R.A., LEED AP
Deputy Director, 55th Civil Engineer Squadron

3 Attachments:
1. Offutt Air Force Base Location
2. Aerial of March, 2019 Flooding
3. Proposed Action

Project Review

DATE: March 30, 2020
TO: Ms. Krista Hoffart, Offutt AFB
FROM: John J. Miller, NeDNR
SUBJECT: Offutt AFB Flood Recovery Projects

As requested, the Nebraska Department of Natural Resources (NeDNR) has reviewed the proposed project for potential impacts to jurisdictional dams, floodplain management, registered groundwater wells, stream gages, and surface water rights, and has listed the comments below:

Dams
According to NeDNR records, no existing or proposed jurisdictional dams are within 1000 feet of the proposed project area.

Floodplain Management
The proposed project is located within a regulated (1% annual chance) floodplain and/or floodway, please see the attached figure. All new structures within the floodplain must be constructed with the lowest floor elevation at least one foot above the base flood elevation. Alternatively, non-residential structures may be flood-proofed to at least one foot above the base flood elevation. Lastly, any construction will need to comply with local floodplain regulations, which includes obtaining a floodplain development permit. If you have any questions concerning floodplain management and permitting, please contact the local floodplain administrator, Tami Palm, at 402-293-3038 or Tammi.Palm@bellevue.net.

However, please note that it is not within NeDNR's authority to confirm if a construction project located within the floodplain will increase the base flood elevation greater than one foot. This requirement must be satisfied by the project owner when applying for the floodplain development permit. It is the responsibility of the project owner to contact the local floodplain administrator and meet all floodplain regulation requirements. If an elevation certificate or no-rise certificate is required, it will need to be certified by a registered engineer or surveyor; NeDNR does not complete these certifications. Therefore, please remove "We feel that this construction in the floodplain would not raise the flood level over 1 foot, please confirm this," from your standard letter language. This statement does not apply to all projects in the floodplain, and NeDNR does not complete these certifications.

Groundwater Wells
According to NeDNR records, there is one (1) public supply well within the 1,000-foot spacing for the proposed project area and six (6) other registered wells within the proposed project area. Please note that the attached map shows the 1,000-foot spacing, but does not show the public supply well locations. Please contact the local municipality for more information on public supply well names and locations. All other registered wells are shown on the map. Special care should be taken to locate and avoid impacting these wells in any significant way. If the registration status, use, or ownership of a well changes due to the project, one or both of the following forms must be filed with NeDNR: the water well registration modification form and/or the change of ownership form. Furthermore, the appropriate Natural Resources District (NRD), which may have additional rules and regulations regarding such changes, should be notified. If you have any questions on groundwater well registration, please contact Mike Thompson at 402.471.0587 or reference the groundwater links below.

Groundwater general information: http://dnr.nebraska.gov/groundwater
Groundwater well data: http://nednr.nebraska.gov/dynamic/wells/Menu.aspx
Groundwater forms: https://dnr.nebraska.gov/groundwater/forms
Local NRD Information: https://www.nrdnet.org/nrds/find-your-nrd

Stream Gaging
NeDNR did not identify any active state or federal stream gages within the proposed project area.

Surface Water Rights
According to NeDNR records there are no appropriations appurtenant to the proposed project location.

If you have any questions about this review, please feel free to contact me at 402-471-3969 or john.j.miller@nebraska.gov.

Enclosure(s)

Cc: Mike Thompson, NeDNR
Tammi Palm, City of Bellevue

Offutt AFB Flood Recovery Projects
Bellevue, Sarpy County, Nebraska
3/30/2020

NEBRASKA
Good Life. Great Water.
DEPT. OF NATURAL RESOURCES

N

Legend

Approximate Project Area

Registered Wells

Registered Wells

Abandoned Wells

1,000 ft PWS Spacing

Surface Water

Irrigated Fields

Major Stream

Jurisdictional Dam

Active Stream Gages

Flood Hazard Zones

Zone Type

1% Annual Chance Flood Hazard

Regulatory Floodway

Special Floodway

Area of Undetermined Flood Hazard

0.2% Annual Chance Flood Hazard

Future Conditions 1% Annual Chance Flood Hazard

Area with Reduced Risk Due to Levee

0 1,500 3,000 Feet

Floodplain and Dam Safety Division, Cartographer: JM

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Ms. Jill Dolberg
Nebraska State Historic Preservation Office
PO Box 82554
1500 R Street
Lincoln, NE 58501

Dear Ms. Dolberg,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1). The USAF is seeking your comments to ensure that any issues of concern to your Tribe are addressed within our NEPA and Section 106 processes.

In March 2019, Offutt AFB was inundated with floodwaters as part of a record flood event that occurred in eastern Nebraska, western Iowa, and northern Missouri. Approximately 137 buildings and structures including the headquarters facilities of the 55th Wing Group, 55th Security Forces Squadron, 97th Intelligence Squadron, 343d Reconnaissance Squadron, the Bennie L. Davis maintenance facility, flight simulators, 557th Weather Wing facilities, fuel tanks and other structures were damaged by the floodwaters. Approximately 44 were occupied buildings with office space totaling 1.2 million square feet. About one-third of the base, including everything south and east of the runway, which sits on lower ground, were flooded (see attached Figure 2). An overview of the Proposed Action is provided below for your review.

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Section 106 compliance for the Proposed Action would be completed as outlined in the Programmatic Agreement (PA) among the 55th Wing, the State Historic Preservation Officer in Nebraska, and the Advisory Council on Historic Preservation Regarding the Operation, Maintenance, and Development of Offutt Air Force Base and its Annexes. The CRM has determined that it is an undertaking that would affect an Appendix C property. A report is being prepared and further coordination with your office will occur in accordance with the PA.

If you have additional information regarding the Proposed Action and alternatives for inclusion and consideration during the NEPA compliance process, we would appreciate receiving such information. To ensure that the USAF has sufficient time to consider your input in the preparation of the draft EA, please forward written issues or concerns within 30 days of the receipt of this letter to: Ms. Krista Hoffart, 55 CES/CENPL; 106 Peacekeeper Drive, Suite 2N3, Offutt AFB, NE 68113-4019 or email at: krista.hoffart@us.af.mil.

Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

Digitally signed by MCCAULEY.BRUCE.ALAN.1098991855
Date: 2020.03.10 10:36:14 -05'00'

BRUCE A. MCCAULEY, R.A.
Deputy Director, 55th Civil Engineer Squadron

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From: HOFFART, KRISTA A GS-12 USAF ACC 55 CES/CENPL
To: Quinn, Aaron T CIV USARMY CENWO (US); Miller, Sarah J CIV USARMY CENWO (US)
Subject: FW: flood recovery and rebuild activities
Date: Monday, March 30, 2020 8:18:30 AM
Attachments: image001.jpg
image002.jpg
image003.jpg
image004.jpg
image005.jpg

FYI

From: HOFFART, KRISTA A GS-12 USAF ACC 55 CES/CENPL
Sent: Monday, March 30, 2020 7:03 AM
To: Dolberg, Jill <jill.dolberg@nebraska.gov>
Subject: RE: flood recovery and rebuild activities

Ms. Dolberg,

Thank you for taking the time to let me know that you received the letter about the upcoming EA for the Offutt Flood Recovery. We have one building that is considered historic that is being evaluated for demolition. Our cultural folks are already working with your office to address any issues pertaining to that facility. If there are any additional questions or comments you may have, please don't hesitate to ask. Additional review time will be provided as the draft is released.

Thanks,

Krista Hoffart, AICP

Community Planner, 55th Civil Engineer Squadron

55 CES/CENPL

106 Peacekeeper Drive

Bldg 301D, Ste 2N3

Offutt AFB, NE 68113

DSN: 271-5411 Comm: 402-294-5411

From: Dolberg, Jill <jill.dolberg@nebraska.gov <mailto:jill.dolberg@nebraska.gov> >
Sent: Friday, March 27, 2020 1:33 PM
To: HOFFART, KRISTA A GS-12 USAF ACC 55 CES/CENPL <krista.hoffart@us.af.mil <mailto:krista.hoffart@us.af.mil> >
Subject: [Non-DoD Source] flood recovery and rebuild activities

Hello Krista,

I am in receipt of a letter from Mr. Bruce McCauley indicating that an Environmental Assessment is being prepared in order to plan the recovery of Offutt AFB from the March 2019 floods and asking for my comments. As long as the EA is taking into account the Programmatic Agreement agreed upon by History Nebraska, Offutt and the Advisory Council, I have no concerns about the planning as it progresses. As a reminder, there is a list of buildings in one of the appendices that shows which buildings are considered historic and which are not; as long as the demolitions are on the buildings that are not considered historic, this process should be pretty efficient. We'll just have to discuss if there are some that are not on the list and how we want to deal with them. I'll be anxious to read the report and work with you all going forward.

Thank you!

Jill Dolberg

Jill Dolberg
Deputy State Historic Preservation Officer

1500 R Street
Lincoln, Nebraska 68508-1651

t . 402-471-4773 | c . 402-525-4927
jill.dolberg@nebraska.gov <mailto:jill.dolberg@nebraska.gov> | history.nebraska.gov <Blockedhttps://urldefense.proofpoint.com/v2/url?u=https-3A__history.nebraska.gov_&d=DwMFAg&c=Cu5g146wZdoqVuKpTNsYHeFX_rg6kWhlkLF8Eft-wwo&r=EhOq4f93tPoAvKzk-4IZKA&m=iAartIx2AsDF7iCA53f326cRlAitYxzLcpBbxnQfjiw&s=NVNhMISyWvWhpNeLIK9xx2A0sxRTfBAZLjPrTZHfi_I&e=>

Preserving the Past. Building the Future

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History NEBRASKA

Preserving the past. Building the future.

July 7, 2020

Marvin Riedel
Environmental Compliance
55 CES/CEIEC
106 Peacekeeper Drive, Suite 2N3
Offutt AFB NE 68113-4019

RE: HP# 2006-161-01 Offutt AFB Flood Recovery Rebuild Project

Dear Mr. Riedel,

Thank you for submitting the project proposal for our review and comment. Our comment on this project and its potential to affect historic properties is required by Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulations 36 CFR Part 800.

According to the information you have provided, the plan calls for the demolition of 63 buildings, most of which have been damaged beyond repair by the flooding, and the construction of twenty-one new buildings. Your report further indicates that Building 500, which is eligible for listing in the NRHP will be repurposed, which will have *no adverse effect* to the historic property. In addition, Building 524, which was also eligible for listing in the NRHP at the time we wrote our Programmatic Agreement in 2018 no longer retains its historic integrity due to flood water inundation, so its demolition will have *no adverse effect* on it as it is no longer considered eligible.

I concur with your findings. Thirty-three inches of flood water is difficult for anything to withstand. However, I do have a concern that I would like you to take into account going forward. The report asserts that remodeling done to Bldg 524 in 2018 made the building ineligible. I see from our database we reviewed the work done in 2015, and we believed the work would have no adverse effect when done. The news that it did indicates either we didn't understand the full scope of the plans, the scope changed and we weren't notified, or we made a mistake. Can we figure out which is true so that we can all learn from the experience?

Should any changes in the project be made or in the type of funding or assistance provided through federal or state agencies, please notify this office of the changes before further project planning continues. Please retain this correspondence and your documented finding in order to show compliance with Section 106 of the National Historic Preservation Act, as amended. If you have any questions, please contact me at 402-471-4773.

Sincerely,

Jill Dolberg

Jill E. Dolberg
Deputy State Historic Preservation Officer

1500 R Street
Lincoln, NE 68508-1651
P: 402.471.3270
P: 800.833.6747
F: 402.471.3100
history.nebraska.gov

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Shannon Sjolie
Nebraska Game and Parks Commission
2200 North 33rd Street
Lincoln, NE 68503

Dear Mr. Sjolie,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

In March 2019, Offutt AFB was inundated with floodwaters as part of a record flood event that occurred in eastern Nebraska, western Iowa, and northern Missouri. Approximately 137 buildings and structures including the headquarters facilities of the 55th Wing Group, 55th Security Forces Squadron, 97th Intelligence Squadron, 343d Reconnaissance Squadron, the Bennie L. Davis maintenance facility, flight simulators, 557th Weather Wing facilities, fuel tanks and other structures were damaged by the floodwaters. Approximately 44 were occupied buildings with office space totaling 1.2 million square feet. About one-third of the base, including everything south and east of the runway, which sits on lower ground, were flooded (see attached Figure 2). An overview of the Proposed Action is provided below for your review.

The Proposed Action would re-establish critical facilities and infrastructure to support the full functioning of Offutt AFB and would also consolidate functions that were spread around the AFB prior to the flood event. The Proposed Action would consolidate related functions into eight different campuses that would allow for more effective and efficient operations. The Proposed Action involves construction and demolition related to each of the functions that experienced flood damage (see attached Figure 3). These functions include: Alert facilities, MILSTAR satellite communications, intelligence facilities, security forces facilities, flight line maintenance facilities, logistics facilities, emergency power generation, and base lake facilities. Utility needs and locations will be determined in final design, but it is anticipated that utility work would occur within the overall project limits identified in the attached Figure 3 or in other areas of Offutt AFB that have already been developed. Approximately 22 new buildings would be constructed, 23 flood-damaged buildings rehabilitated, and 62 flood-damaged structures would be demolished. The approximate limits of flood recovery activities would occur on a roughly 600 acre area in the southeast portion of the AFB. All project activities would occur in areas of the AFB that have already been developed. It should be noted that although some facilities may be moved or reconfigured in final design, the changes would occur within the broader outlined project limits in Figure 3.

Based on the January 2017 Natural Heritage Program Estimated Current Ranges of Threatened and Endangered Species: List of Species by County, the following state listed species are known to occur within Sarpy County:

Mammals	**State Status**
River Otter (*Lontra canadensis*)	Threatened
Northern Long-Eared Bat *(Myotis septentrionalis)*	Threatened
Birds	
Interior Least Tern (*Sterna antillarum*)	Endangered
Piping Plover (*Charadrius melodus*)	Threatened
Fish	
Pallid Sturgeon (*Scaphirhnchus albus*)	Endangered
Sturgeon Chub (*Macrhybopsis gelida*)	Endangered
Lake Sturgeon (*Acipenser fulvescens*)	Threatened
Plants	
Western Prairie Fringed Orchid (*Plantanthera praeclara)*	Threatened
American Ginseng (*Panax quinquefolius*)	Threatened

We respectfully request your review to provide concurrence on these species and provide any addition information regarding listed species or habitats in the area. In addition to information on listed species we would appreciate receiving any information your agency has regarding potential impacts of the Proposed Action on the environmental aspects of the project area so it can be considered in the NEPA process.

If you have additional information regarding the Proposed Action and alternatives for inclusion and consideration during the NEPA compliance process, we would appreciate receiving such information. To ensure that the USAF has sufficient time to consider your input in the preparation of the draft EA, please forward written issues or concerns within 30 days of the receipt of this letter to: Ms. Krista Hoffart, 55 CES/CENPL; 106 Peacekeeper Drive, Suite 2N3, Offutt AFB, NE 68113-4019 or email at: krista.hoffart@us.af.mil.

Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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Date: 2020.03.10 10:38:02 -05'00'

BRUCE A. MCCAULEY, R.A., LEED AP
Deputy Director, 55 th Civil Engineer Squadron

3 Attachments:
1. Offutt Air Force Base Location
2. Aerial of March, 2019 Flooding
3. Proposed Action

2200 N. 33rd St. • P.O. Box 30370 • Lincoln, NE 68503-0370 • Phone: 402-471-0641

April 8, 2020

Ms. Krista Hoffart
55 CES/CENPL
106 Peacekeeper Drive
Suite 2N3
Offut AFB, NE 68113-4019

RE: Preparation of an Environmental Assessment, Flood recovery and rebuild activities at Offut Air Force Base (AFB), Sarpy County, NE

Dear Ms. Hoffart:

Nebraska Game and Parks Commission (NGPC) staff members have reviewed the information for the proposal identified above. This review was requested pursuant to the National Environmental Policy Act (NEPA). These comments are related to the potential project site location on Offutt Air Force Base in Sarpy County, Nebraska.

The proposed project will not impact any NGPC State Park, State Recreation Area, or State Wildlife Management Areas, as none are located in the immediate project area.

Based on our review of the information provided, aerial photographs, and the Nebraska Natural Heritage database, we found that the project is located within the range of several state-listed endangered or threatened species, including the state-listed endangered interior least tern (*Sternula antillarum athalassos*), the state-listed threatened western prairie fringed orchid (*Platanthera praeclara*), river otter (*Lontra canadensis*), northern long-eared bat (*Myotis septentrionalis*) and piping plover (*Charadrius melodus*). We have no records of the interior least tern, western prairie fringed orchid, river otter, or piping plover in the project area, nor does there appear to be any suitable habitat for these species within the identified project location. The project is not likely to have any adverse impacts on these state-listed species. However, there does appear to be potential habitat for the northern long-eared bat within the project area.

<u>Northern Long-eared Bat</u>
During the summer, northern long-eared bats (NLEBs) typically roost singly or in colonies underneath bark or in cavities, crevices or hollows of live and dead trees and/or snags (typically ≥ 3 inches dbh). This species of bat seems opportunistic in selecting roosts, using trees based on the presence of cavities, crevices or peeling bark. They forage on insects in upland and lowland woodlots and tree lined corridors. NLEBs typically overwinter in hibernacula that include caves and abandoned mines, but may also use other structures resembling caves or mines, such as abandoned railroad tunnels, storm sewer entrances, dry wells, aqueducts and other similar structures. To avoid adverse impacts to NLEB, NGPC recommends that any tree clearing, which may take place as part of this project, be timed to avoid

potential impacts to NLEB during the summer maternity roosting period of June 1 – July 31. Therefore, tree clearing should be scheduled to occur outside the June 1 – July 31 timeframe.

In general, NGPC has concerns for impacts to wetlands, streams and riparian habitats. We recommend that impacts to wetlands, streams, and associated riparian corridors be avoided and minimized, and that any unavoidable impacts to these habitats be mitigated. If any fill materials will be placed into any wetlands or streams as a result of the proposed project, the U.S. Army Corps of Engineers should be contacted to determine if a 404 permit is needed.

For construction activities near waterways, we recommend that appropriate sediment and erosion control methods be established during and after construction to prevent increased sediment input into the aquatic system in order to avoid impacting aquatic species and habitat. Care should be taken to avoid the input of contaminants into waterways during construction, such as construction byproducts, petroleum products, and other contaminants from equipment. Areas disturbed during construction should be re-seeded with a mix of native grasses and forbs appropriate for the area, while avoiding the use of invasive or exotic vegetative species.

Thank you for opportunity to review this proposal. Please contact me if you have any questions regarding these comments at 402-471-5423 or shannon.sjolie@nebraska.gov.

Sincerely,

Shannon Sjolie
Environmental Analyst Supervisor
Planning and Programming Division

From:	HOFFART, KRISTA A GS-12 USAF ACC 55 CES/CENPL
To:	Quinn, Aaron T CIV USARMY CENWO (US); Miller, Sarah J CIV USARMY CENWO (US)
Subject:	FW: re: USAF_EA_Offut AFB flood recovery_Sarpy County
Date:	Monday, April 06, 2020 9:22:42 AM

FYI

From: Sjolie, Shannon <Shannon.sjolie@nebraska.gov>
Sent: Friday, April 3, 2020 2:38 PM
To: HOFFART, KRISTA A GS-12 USAF ACC 55 CES/CENPL <krista.hoffart@us.af.mil>
Subject: [Non-DoD Source] re: USAF_EA_Offut AFB flood recovery_Sarpy County

Good afternoon Krista,

I have received and am reviewing your request for comments regarding the preparation of an EA for the recovery efforts on Offut AFB. Based on the information I have been given I was wondering if trees will be cut down/cleared as part of the project? If trees are needing to be cleared, we ask that they not be taken down between June 1 – July 31. The limits of the project, according to the letter I have, will be on current base property which has already been disturbed. If that is correct, the only species I would have concern for would be northern long-eared bat. The species that I have identified as being in range of the current project limits are: interior least tern, piping plover, river otter, western prairie fringed orchid, and northern long-eared bat. When I receive word back from you I can prepare a memo for this project. If you have any questions, please feel free to contact me. Thank you.

Shannon Sjolie

NGPC – Environmental Analyst Supervisor

402-471-5423

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Isaac Sherman Jr.
Chairperson
Omaha Tribe of Nebraska
P.O. Box 368
Macy, Nebraska 68039-0368

Dear Chairman Sherman,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1). The USAF is seeking your comments to ensure that any issues of concern to your Tribe are addressed within our NEPA and Section 106 processes.

In March 2019, Offutt AFB was inundated with floodwaters as part of a record flood event that occurred in eastern Nebraska, western Iowa, and northern Missouri. Approximately 137 buildings and structures including the headquarters facilities of the 55th Wing Group, 55th Security Forces Squadron, 97th Intelligence Squadron, 343d Reconnaissance Squadron, the Bennie L. Davis maintenance facility, flight simulators, 557th Weather Wing facilities, fuel tanks and other structures were damaged by the floodwaters. Approximately 44 were occupied buildings with office space totaling 1.2 million square feet. About one-third of the base, including everything south and east of the runway, which sits on lower ground, were flooded (see attached Figure 2). An overview of the Proposed Action is provided below for your review.

The Proposed Action would re-establish critical facilities and infrastructure to support the full functioning of Offutt AFB and would also consolidate functions that were spread around the AFB prior to the flood event. The Proposed Action would consolidate related functions into eight different campuses that would allow for more effective and efficient operations. The Proposed Action involves construction and demolition related to each of the functions that experienced flood damage (see attached Figure 3). These functions include: Alert

facilities, MILSTAR satellite communications, intelligence facilities, security forces facilities, flight line maintenance facilities, logistics facilities, emergency power generation, and base lake facilities. Utility needs and locations will be determined in final design, but it is anticipated that utility work would occur within the overall project limits identified in the attached Figure 3 or in other areas of Offutt AFB that have already been developed. Approximately 22 new buildings would be constructed, 23 flood-damaged buildings rehabilitated, and 62 flood-damaged structures would be demolished. The approximate limits of flood recovery activities would occur on a roughly 600 acre area in the southeast portion of the AFB. All project activities would occur in areas of the AFB that have already been developed. It should be noted that although some facilities may be moved or reconfigured in final design, the changes would occur within the broader outlined project limits in Figure 3.

On 27 October 1999, the Department of Defense (DoD) promulgated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with Tribal governments on a government-to-government basis. This Policy requires and assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected Tribal resources, Tribal rights, and Indian lands before decisions are made by the respective services. With this letter, the USAF requests your consultation on impacts of this Proposed Action on Tribal resources.

If you have additional information regarding the Proposed Action and alternatives for inclusion and consideration during the NEPA compliance process, we would appreciate receiving such information. To ensure that the USAF has sufficient time to consider your input in the preparation of the draft EA, please forward written issues or concerns within 30 days of the receipt of this letter to: Ms. Krista Hoffart, 55 CES/CENPL; 106 Peacekeeper Drive, Suite 2N3, Offutt AFB, NE 68113-4019 or email at: krista.hoffart@us.af.mil.

Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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Date: 2020.03.10 10:38:46 -05'00'

BRUCE A. MCCAULEY, R.A.
Deputy Director, 55th Civil Engineer Squadron

3 Attachments:

1. Offutt Air Force Base Location
2. Aerial of March, 2019 Flooding
3. Proposed Action

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Larry Wright Jr.
Chairperson
Ponca Tribe of Nebraska
P.O. Box 288
Niobrara, Nebraska 68760

Dear Chairman Wright,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1). The USAF is seeking your comments to ensure that any issues of concern to your Tribe are addressed within our NEPA and Section 106 processes.

In March 2019, Offutt AFB was inundated with floodwaters as part of a record flood event that occurred in eastern Nebraska, western Iowa, and northern Missouri. Approximately 137 buildings and structures including the headquarters facilities of the 55th Wing Group, 55th Security Forces Squadron, 97th Intelligence Squadron, 343d Reconnaissance Squadron, the Bennie L. Davis maintenance facility, flight simulators, 557th Weather Wing facilities, fuel tanks and other structures were damaged by the floodwaters. Approximately 44 were occupied buildings with office space totaling 1.2 million square feet. About one-third of the base, including everything south and east of the runway, which sits on lower ground, were flooded (see attached Figure 2). An overview of the Proposed Action is provided below for your review.

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facilities, MILSTAR satellite communications, intelligence facilities, security forces facilities, flight line maintenance facilities, logistics facilities, emergency power generation, and base lake facilities. Utility needs and locations will be determined in final design, but it is anticipated that utility work would occur within the overall project limits identified in the attached Figure 3 or in other areas of Offutt AFB that have already been developed. Approximately 22 new buildings would be constructed, 23 flood-damaged buildings rehabilitated, and 62 flood-damaged structures would be demolished. The approximate limits of flood recovery activities would occur on a roughly 600 acre area in the southeast portion of the AFB. All project activities would occur in areas of the AFB that have already been developed. It should be noted that although some facilities may be moved or reconfigured in final design, the changes would occur within the broader outlined project limits in Figure 3.

On 27 October 1999, the Department of Defense (DoD) promulgated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with Tribal governments on a government-to-government basis. This Policy requires and assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected Tribal resources, Tribal rights, and Indian lands before decisions are made by the respective services. With this letter, the USAF requests your consultation on impacts of this Proposed Action on Tribal resources.

If you have additional information regarding the Proposed Action and alternatives for inclusion and consideration during the NEPA compliance process, we would appreciate receiving such information. To ensure that the USAF has sufficient time to consider your input in the preparation of the draft EA, please forward written issues or concerns within 30 days of the receipt of this letter to: Ms. Krista Hoffart, 55 CES/CENPL; 106 Peacekeeper Drive, Suite 2N3, Offutt AFB, NE 68113-4019 or email at: krista.hoffart@us.af.mil.

Sincerely,

MCCAULEY.BRUCE.ALAN.1098991855

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BRUCE A. MCCAULEY, R.A.
Deputy Director, 55th Civil Engineer Squadron

3 Attachments:
1. Offutt Air Force Base Location
2. Aerial of March, 2019 Flooding
3. Proposed Action

From:	HOFFART, KRISTA A GS-12 USAF ACC 55 CES/CENPL
To:	GIBB, MARISA GS-12 USAF ACC 55 CES/CEIEC
Cc:	TUNGLAND, LYNETTE K GS-12 USAF ACC 55 CES/CEIE; RIEDEL, MARVIN J GS-11 USAF ACC 55 CES/CEIEC; Quinn, Aaron T CIV USARMY CENWO (US); Miller, Sarah J CIV USARMY CENWO (US)
Subject:	FW: RE: Offutt AFB Flood Recovery and Rebuild Activities
Date:	Wednesday, March 25, 2020 4:01:44 PM

Marisa –

Below is an email we received from the Ponca tribe concerning our Flood EA. Can you talk with all the Cultural crew and answer his question concerning a cultural resource survey. If we don't have one, maybe we can program for one – just to show that we're working it as well.

Let me know if there are any questions!

Thanks,

Krista Hoffart, AICP

Community Planner, 55th Civil Engineer Squadron

55 CES/CENPL

106 Peacekeeper Drive

Bldg 301D, Ste 2N3

Offutt AFB, NE 68113

DSN: 271-5411 Comm: 402-294-5411

From: Nicholas Mauro <nmauro@poncatribe-ne.org>
Sent: Wednesday, March 25, 2020 9:19 AM
To: HOFFART, KRISTA A GS-12 USAF ACC 55 CES/CENPL <krista.hoffart@us.af.mil>
Subject: [Non-DoD Source] RE: Offutt AFB Flood Recovery and Rebuild Activities

RE: Offutt AFB Flood Recovery and Rebuild Activities

Ms. Hoffart,

I received a letter in the mail regarding the above mentioned project. While I am not currently aware of any Ponca or Ponca-affiliated sites within the project APE, that area was historically used by the Ponca. Within two miles of the base, there is an Omaha village that an early ethnographer indicates may have dated from the Omaha and Ponca were one tribe. Furthermore, I do have Ponca and Omaha names for streams within the vicinity of the base. Historical events such as forced removal and termination have led to a loss of traditional knowledge of other locations. With all that in mind, my question is, has a cultural resource survey ever been done on Offutt AFB? If so, what, if any resources were discovered and what methodology was used? If not, I would request that one be done, and the report and SHPO comments reforwarded to my office when they become available. If you have any questions or comments, please let me know. Thank you!

Nick Mauro
Tribal Historic Preservation Officer/ Interim Culture Director
Ponca Tribe of Nebraska
Niobrara, NE 68760
402-750-8121 (cell)

402-857-3519 (office)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

MEMORANDUM FOR Tribal Historic Preservation Officer
Ponca Tribe of Nebraska
Niobrara, NE 68760
Attn: Nick Mauro

FROM: 55 MSG/CD
105 Washington Square, Ste 173
Offutt AFB NE 68113

SUBJECT: Cultural Resource Surveys at Offutt AFB NE

1. As Offutt AFB's Installation Tribal Liaison Officer (ITLO), I am responding to your 25 Mar 20 e-mail to Ms. Krista Hoffart inquiring about cultural resource surveys.

2. Two cultural resource surveys have been completed on the land now occupied by Offutt AFB and the three communication annexes. Copies of both documents are attached.

a. The reconnaissance level survey titled, "*Archeological Reconnaissance Survey of Offutt Air Force Base, Sarpy County, Nebraska"* was prepared by Steven L. De Vore with the United States Department of the Interior, National Park Service, Interagency Archeological Services, Denver, Colorado, dated 1992. This survey included the main base area and the residential housing, hospital/clinic and golf course that are located east of the main base area and across the Papillion Creek.

b. The archeological survey titled, "*An Archeological Assessment of Three Communication Annexes of Offutt Air Force Base in Douglas, Dodge, and Nance Counties, Nebraska*" was prepared by Thomas D. Thiessen with the Midwest Archeological Center, National Park Service, Lincoln, Nebraska, dated 1997. This survey included the Offutt AFB communication annexes in Nebraska near Elkhorn, Scribner and Silver Creek. The annexes near Elkhorn and Scribner remain active sites. The Silver Creek annex was decommissioned, declared as excess, and eventually transferred to the United States Army in Oct 11.

3. If you have any questions or require additional information, my point of contact is Mr. Marvin Riedel, Cultural Resources Manager for the installation. He can be reached by mail: ATTN: Marvin Riedel, 55 CES/CEIEC, 106 Peacekeeper Drive, STE 2N3, Offutt AFB NE 68113.

HOGAN.GARRETT.K.1172520550 Digitally signed by HOGAN.GARRETT.K.1172520550 Date: 2020.05.06 16:38:03 -05'00'

GARRETT K. HOGAN, Lt Col, USAF
Deputy Commander, 55th Mission Support Group

Attachments:
1. Archeological Reconnaissance Survey
2. Archeological Assessment

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Roger Trudell
Chairperson
Santee Sioux Nation
108 West Spirit Lake Avenue
Niobrara, Nebraska 68760

Dear Chairman Trudell,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1). The USAF is seeking your comments to ensure that any issues of concern to your Tribe are addressed within our NEPA and Section 106 processes.

In March 2019, Offutt AFB was inundated with floodwaters as part of a record flood event that occurred in eastern Nebraska, western Iowa, and northern Missouri. Approximately 137 buildings and structures including the headquarters facilities of the 55th Wing Group, 55th Security Forces Squadron, 97th Intelligence Squadron, 343d Reconnaissance Squadron, the Bennie L. Davis maintenance facility, flight simulators, 557th Weather Wing facilities, fuel tanks and other structures were damaged by the floodwaters. Approximately 44 were occupied buildings with office space totaling 1.2 million square feet. About one-third of the base, including everything south and east of the runway, which sits on lower ground, were flooded (see attached Figure 2). An overview of the Proposed Action is provided below for your review.

The Proposed Action would re-establish critical facilities and infrastructure to support the full functioning of Offutt AFB and would also consolidate functions that were spread around the AFB prior to the flood event. The Proposed Action would consolidate related functions into eight different campuses that would allow for more effective and efficient operations. The Proposed Action involves construction and demolition related to each of the functions that experienced flood damage (see attached Figure 3). These functions include: Alert

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Sincerely,

MCCAULEY.BRUCE.A
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Date: 2020.03.10 10:40:56 -05'00'

BRUCE A. MCCAULEY, R.A.
Deputy Director, 55th Civil Engineer Squadron

3 Attachments:

1. Offutt Air Force Base Location
2. Aerial of March, 2019 Flooding
3. Proposed Action

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Ms. Donna Lynam
Sarpy County Planning Department
1210 Golden Gate Drive
Papillion, NE 68046

Dear Ms. Lynam,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

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Sincerely,

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BRUCE A. McCAULEY, R.A., LEED AP
Deputy Director, 55th Civil Engineer Squadron

3 Attachments:
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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Ms. Eliza Hines
U.S. Fish and Wildlife Service
9325 South Alda Road
Wood River, NE 68883

Dear Ms. Hines,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1).

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Based on our research through the USFWS IPac website, the federally listed species that may occur within the project area are provided in the table below.

Mammals	**Status**
Northern Long-Eared Bat (*Myotis septentrionalis*)	Threatened
Birds	
Interior Least Tern (*Sterna antillarum*)	Endangered
Piping Plover (*Charadrius melodus*)	Threatened
Fish	
Pallid Sturgeon (*Scaphirhnchus albus*)	Endangered
Plants	
Western Prairie Fringed Orchid (*Plantanthera praeclara)*	Threatened

We respectfully request your review to provide concurrence on these species and provide any addition information regarding listed species or habitats in the area. In addition to information on federally listed species we would appreciate receiving any information your agency has regarding potential impacts of the Proposed Action on the environmental aspects of the project area so it can be considered in the NEPA process.

If you have additional information regarding the Proposed Action and alternatives for inclusion and consideration during the NEPA compliance process, we would appreciate receiving such information. To ensure that the USAF has sufficient time to consider your input in the preparation of the draft EA, please forward written issues or concerns within 30 days of the receipt of this letter to: Ms. Krista Hoffart, 55 CES/CENPL; 106 Peacekeeper Drive, Suite 2N3, Offutt AFB, NE 68113-4019 or email at: krista.hoffart@us.af.mil.

Sincerely,

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BRUCE A. MCCAULEY, R.A., LEED AP
Deputy Director, 55th Civil Engineer Squadron

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
9325 S Alda Road
Wood River, Nebraska 68883

April 9, 2020

FWS-NE: 2020-300

Mr. Bruce McCauley
Deputy Director, 55^{th} CES, U.S. Air Force
Offutt Air Force Base
106 Peacekeeper Dr., Suite 2N3
Offutt AFB, Nebraska 68113-4019

RE: Offutt Air Force Base Flood Restoration Project, Sarpy County, Nebraska

Dear Mr. McCauley:

This responds to your March 10, 2020, email request for review and comments from the U.S. Fish and Wildlife Service (Service) regarding the proposed U.S. Air Force (USAF) Offutt Air Force Base (AFB) Flood Restoration Project (Project) that is located at Offutt AFB, in Sarpy County, Nebraska. The USAF is proposing to rehabilitate and re-establish critical facilities and infrastructure following damages sustained during flooding in March 2019. Approximately 22 new buildings would be constructed, 23 flood-damaged buildings rehabilitated, and 62 flood-damaged structures would be demolished. The activities would occur on a 600-acre, previously developed area in the southeast portion of the AFB. The USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt AFB.

The Service has responsibility for the conservation and management of fish and wildlife resources for the benefit of the American public under the following authorities: 1) Endangered Species Act (ESA); 2) Fish and Wildlife Coordination Act (FWCA); 3) Bald and Golden Eagle Protection Act (Eagle Act); and 4) Migratory Bird Treaty Act (MBTA). Compliance with all of these statutes and regulations is required to be in compliance with the National Environmental Policy Act.

ENDANGERED SPECIES ACT

Pursuant to section 7(a)(2) of the ESA, every federal agency, shall in consultation with the Service, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. If a proposed project may affect federally listed species or designated critical habitat, section 7 consultation is required.

In accordance with section 7 of ESA, we have determined that the following federally listed species may occur in the proposed Project area or be affected by the proposed action:

Listed Species	Expected Occurrence
Northern long-eared bat (*Myotis septentrionalis*)	Forested habitats, man-made structures, and mines
Interior least tern (*Sternula antillarum*)	Migration, nesting
Piping plover (*Charadrius melodus*)	Migration, nesting
Pallid sturgeon (*Scaphirhynchus albus*)	Missouri, Platte, Elkhorn, Niobrara, and Loup rivers
Western prairie fringed orchid (*Platanthera praeclara*)	Tall-grass prairie and wet meadows

Northern Long-Eared Bat

The northern long-eared bat (NLEB) was listed as threatened in May 2015 with a 4(d) rule that became effective in January 2016. No critical habitat has been designated for the NLEB. The state of Nebraska is within the known range of the NLEB. During the summer, NLEBs typically roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on presence of cavities, crevices, or peeling bark. It has also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable). They forage for insects in upland and lowland woodlots and tree-lined corridors along water features. During the winter, NLEBs predominately hibernate in caves and abandoned mine portals. Additional habitat types may be identified as new information is obtained. The greatest risk to populations of this species is from white nose syndrome (WNS), which poses a severe and immediate threat. WNS combined with other impacts such as loss and degradation of overwintering habitat and loss of habitat during the pup season can cause further declines of the NLEB.

The proposed Project would occur in Sarpy County, a county that is included within the WNS buffer zone. Based on the information provided in your submittal, it appears that tree removal could occur as a result of construction. As such, the Service recommends that tree clearing be avoided during the June 1 – July 31 pup season to avoid impacts to the NLEB during its reproductive time.

Least Tern and Piping Plover

The Interior least tern, federally listed as endangered, and the piping plover, federally listed as threatened, nest on unvegetated or sparsely vegetated sandbars in river channels. The nesting season for the least tern and piping plover is from April 15 through August 15. Least terns feed on small fish in the river and piping plovers forage for invertebrates on exposed beach substrates. The Project area does not contain suitable habitat and thus we do not expect the project to impact least terns or piping plovers.

Pallid Sturgeon

Pallid sturgeon are found in backwaters, chutes, sloughs, islands, sandbars, and main channel waters. The species is associated with the large-river ecosystems where diverse aquatic habitats are present. These habitats historically were dynamic and in a constant state of change due to influences from the natural hydrograph, and sediment and runoff inputs from an enormous watershed spanning portions of ten states. Navigation, channelization and bank stabilization, and hydropower generation projects have caused the widespread loss of this diverse array of dynamic habitats once provided to pallid sturgeon on the Missouri River, resulting in a precipitous decline in populations of the species. The proposed Project occurs outside of the channel of the Missouri River and thus we do not expect the project to impact pallid sturgeon.

Western Prairie Fringed Orchid

The western prairie fringed orchid, federally listed as threatened, inhabits tall-grass calcareous silt loam or sub-irrigated sand prairies. Declines in western prairie fringed orchid populations have been caused by the drainage and conversion of its habitats to agricultural production, channelization, siltation, road and bridge construction, grazing, haying, and the application of herbicides. Populations are known to occur in Boone, Cherry, Dodge, Garfield, Grant, Greeley, Hall, Holt, Lancaster, Loup, Madison, Otoe, Pierce, Rock, Saline, Sarpy, Seward, and Wheeler counties, and may occur at other sites in Nebraska. The Proposed project occurs on previously developed and disturbed land. It does not contain suitable habitat and is thus not expected to impact the western prairie fringed orchid.

All federally listed species under the ESA are also state-listed under the Nebraska Nongame and Endangered Species Conservation Act. However, there are also state-listed species that are not federally listed. To determine if the proposed project may affect state-listed species, please contact Melissa Marinovich (melissa.marinovich@nebraska.gov) at the Nebraska Game and Parks Commission (NGPC), 2200 North 33rd Street, Lincoln, Nebraska 68503-0370.

REVIEW, COMMENTS, AND RECOMMENDATIONS ON THE PROPOSED PROJECT ACTION UNDER OTHER FISH AND WILDLIFE STATUTES

Fish and Wildlife Coordination Act

The FWCA requires consultation with the Service and State fish and wildlife agency for the purpose of giving equal consideration to fish and wildlife resources in the planning, implementation, and operation of federal and federally funded, permitted, or licensed water resource development projects. The FWCA requires that federal agencies take into consideration the effect that water related projects may have on fish and wildlife resources, to take action to avoid impact to these resources, and to provide for the enhancement of these resources.

If wetlands or streams will be impacted by the proposed project, a Department of the Army permit from the U.S. Army Corps of Engineers may be needed. We will provide FWCA comments pursuant to a permit application. We recommend that impacts to wetlands, streams, and riparian areas be minimized and avoided.

To determine if the proposed project may affect fish and wildlife resources of the State of Nebraska under the FWCA, we recommend that the USAF contact Shannon Sjolie, NGPC, 2200 North 33rd Street, Lincoln, Nebraska 68503-0370.

Bald and Golden Eagle Protection Act

The Eagle Act provides for the protection of the bald eagle *(Haliaeetus leucocephalus)* and golden eagle (*Aquila chrysaetos*). The golden eagle is found in arid, open country with grassland for foraging in western Nebraska and usually near buttes or canyons which serve as nesting sites. Golden eagles are often a permanent resident in the Pine Ridge area of Nebraska. Bald eagles utilize mature, forested riparian areas near rivers, streams, lakes, and wetlands and occur along all the major river systems in Nebraska. The bald eagle southward migration begins as early as October and the wintering period extends from December-March. Additionally, many eagles nest in Nebraska from mid-February through mid-July. Disturbances within 0.5-mile of an active nest or within line-of-sight of the nest could cause adult eagles to discontinue nest building or to abandon eggs. Both bald and golden eagles frequent river systems in Nebraska during the winter where open water and forested corridors provide feeding, perching, and roosting habitats, respectively. The frequency and duration of eagle use of these habitats in the winter depends upon ice and weather conditions. Human disturbances and loss of wintering habitat can cause undue stress leading to cessation of feeding and failure to meet winter thermoregulatory requirements. These effects can reduce the carrying capacity of preferred wintering habitat and reproductive success for the species. To comply with the Eagle Act, it is recommended that the USAF determine whether the proposed Project would impact bald or golden eagles. If it is determined that either species could be affected by the proposed project, we recommend that the project proponent notify this office as well as the NGPC for recommendations to avoid adverse impacts to bald and golden eagles.

Migratory Bird Treaty Act

Under the MBTA (16 U.S.C. 703-712: Ch. 128 as amended) construction activities in grassland, roadsides, wetland, riparian (stream), shrubland and woodland habitats, and those that occur on bridges or culverts (e.g., which may affect swallow nests on bridge girders) that would otherwise result in the impacts to migratory birds, eggs, young, and/or active nests should be avoided. Although the provisions of MBTA are applicable year-round, most migratory bird nesting activity in Nebraska occurs during the period of April 1 to July 15. However, some migratory birds are known to nest outside of the aforementioned primary nesting season period. For example, raptors can be expected to nest in woodland habitats during February 1 through July 15, whereas sedge wrens, which occur in some wetland habitats, normally nest from July 15 to September 10.

We recommend that the USAF avoid removal or impacts to vegetation during the primary nesting season of breeding birds. In the event that construction work cannot be avoided during peak breeding season, we recommend that the project manager (or construction contractor) arrange to have a qualified biologist conduct an avian pre-construction risk assessment of the affected habitats (grassed drainages, streamside vegetation) to determine the absence or presence of breeding birds and their nests. Surveys should be conducted during the nesting season. Breeding bird and nesting surveys should use appropriate and defensible sampling designs and survey methods to assist the proponent in avoiding the unnecessary take of migratory birds. We further recommend that field surveys for nesting birds, along with information regarding the qualifications of the biologist(s) performing the surveys, be thoroughly documented and that such documentation be maintained on file by the project proponent (and/or construction contractor) until such time as construction on the proposed project has been completed.

We request that the following be provided to this office prior to the initiation of the proposed project if the above conditions occur.

a) A copy of any survey(s) for migratory birds done in conjunction with this proposed project, if any. The survey should provide detail in regard to survey methods, date and time of survey, species observed/heard, and location of species observed relative to the proposed project site.

b) Written description of specific work activity that will take place in all proposed project areas.

c) Written description of any avoidance measures that can be implemented at the proposed project site to avoid the take of migratory birds.

We appreciate the opportunity to review and comment on this proposed project. Should you have questions, please contact Mr. Matt Rabbe within our office at matt_rabbe@fws.gov or (308) 382-6468, extension 205.

Sincerely,

Eliza Hines
Nebraska Field Supervisor

cc: Melissa Marinovich, Assistant Division Administrator, Nebraska Game and Parks Commission
Shannon Sjolie, Environmental Analyst Supervisor, Nebraska Game and Parks Commission

10 March 2020

Mr. Bruce McCauley, R.A.
55 CES/DD
106 Peacekeeper Dr.
Suite 2N3
Offutt AFB NE 68113-4019

Mr. Coly Brown
Chairperson
Winnebago Tribe of Nebraska
P.O. Box 687
Winnebago, NE 68071-0687

Dear Chairman Brown,

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality NEPA regulations, and the United States Air Force (USAF) NEPA regulations, the USAF is preparing an Environmental Assessment (EA) to evaluate potential environmental impacts associated with flood recovery and rebuild activities at Offutt Air Force Base (AFB) located in Sarpy County, Nebraska (see attached Figure 1). The USAF is seeking your comments to ensure that any issues of concern to your Tribe are addressed within our NEPA and Section 106 processes.

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Date: 2020.03.10 10:56:43 -05'00'

BRUCE A. MCCAULEY, R.A.
Deputy Director, 55th Civil Engineer Squadron

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3. Proposed Action

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
1616 CAPITOL AVENUE
OMAHA NE 68102-4901

CENWO-EDH-B 28 April 2020

MEMORANDUM FOR CENWO-PM-AC (Quinn)

SUBJECT: Executive Order 11988 Compliance Memo for the Proposed Offutt Air Force Base (AFB) Flood Recovery Rebuild in Sarpy County, Nebraska

1. The Omaha District Flood Risk and Floodplain Management Section (FRFM) is responsible for coordinating the compliance with the requirements of Executive Order 11988 (Floodplain Management). FRFM reviewed the proposed project by United States Air Force submitted February 2020, and has found it to be in compliance with EO 11988 contingent for any construction within the 100-year floodplain – non-mission critical buildings will assume an elevation 2 feet above the flood elevation, and mission critical buildings will assume an elevation 3-feet above the flood elevation of 972 feet respectively.

2. Executive Order (EO) 11988 is applicable to all planning, design, and construction of civil works projects, and activities under the operation and maintenance program and the real estate program (ER 1165-2-26).

3. In March 2019, Offutt AFB was inundated with floodwaters as part of a record flood event that occurred in eastern Nebraska, western Iowa, and northern Missouri. These floodwaters overwhelmed the southeastern side of the base with floodwater from the Missouri River and Papillion Creek. Approximately 137 buildings and structures including the headquarters facilities of the 55 WG, 55th Security Forces Squadron, 97th Intelligence Squadron, 343rd Reconnaissance Squadron, the Bennie L. Davis maintenance facility, flight simulators facility, several aircraft hangars including the E-4 Hangar, 557th Weather Wing facilities, fuel tanks and other structures were damaged by the floodwaters. Approximately 44 were occupied buildings with office space totaling 1.2 million square feet.

Cleanup and evaluation efforts determined some of the facilities could be reclaimed and reutilized, and a significant portion of the structures were determined to be unsalvageable

The proposed project will re-establish critical facilities and infrastructure to support the full functioning of Offutt AFB. The project will consolidate related functions into eight different campuses, and involves the construction of new facilities and infrastructure in each of the functions that experienced flood damage.

4. The following is a list of the eight campus facilities and their activities:

a. NC3 Alert Campus – Construction of a two-story alert facility, a one-story aircraft maintenance/spares storage building, a one-story family visitor center, a one-story simulator building, backup power generators, parking areas, road realignment, site grading, security fencing, utilities and connections.

b. MILSTAR Satellite Communications – Construction of a consolidated MILSTAR Satellite Communications Station with adjacent antennae farm, special foundations, and redundant power generators, site development, utilities and connections.

c. Non-Kinetic Operations Campus – Construction of an approximately 420,000 SF Non-Kinetic Operations Facility, an approximately 4400 SF Courier Station building, and a family visitation facility at approximately 20,000 SF, backup power generators, associated utilities infrastructure, road realignment, parking, and security fencing. The buildings at this campus will be built on approximately 9 foot of fill to reduce the risk of flooding in the future.

d. Security Campus – Construction of a new approximately 45,000 SF facility for a Security Forces Operations Center. This facility would replace existing facilities that were flooded and damaged beyond repair, replacement of 6,000 linear feet (LF) of chain-link boundary fence, approximately 31,000 SF Indoor Small Arms range, Military Working Dog Kennel, and a one-story storage facility warehouse. The buildings at this campus will be built on approximately 9 foot of fill to reduce the risk of flooding in the future.

e. Flight Line Hangars Complex – Construction of consolidating various functions that were previously spread around the area. Building 585 (Petroleum Operations Facility) would be demolished and rebuilt in the LRS/POL campus; removing it from the flight line area. Liquid Oxygen storage facility (approximately 4,800 SF), a de-icing liquid storage facility (approximately 1,100 SF), and a supply and equipment storage facility (approximately 1,900 SF) will be constructed in the Flight line hangar campus.

f. Logistics Readiness SQ Campus – Construction of a consolidated LRS warehouse with loading docks (approximately 27,000 SF), and an Open Storage Area (approximately 64,000 SF). Supporting facilities include underground utilities (water, sewer, and gas) electric service, paving, sanitary sewer system, storm drainage, roadway and parking realignment, security fencing and gates.

g. Emergency Power Microgrid – Construction of replacing lost power generation capability and the associated distribution infrastructure.

h. Lake Campus – Construction of a new consolidated recreational facility (approximately 10200 SF) and includes a reception hall, equipment rental and check-out, restrooms, laundry, shower facilities, snack bar, kitchen, dining room, mechanical room and

supporting infrastructures. It also includes a MWR maintenance shed (approximately 3,000 SF). Construction will include all HVAC, electrical, communications, plumbing and ADA requirements, retaining walls, railings and sidewalks and pavements. The finished floor elevation of the Recreation Facility will be raised to an elevation of approximately 973 ft NAVD 88 which would place it above flood level.

5. Corps of Engineers Engineer Regulation (ER) 1165-2-26, Implementation of Executive Order 11988 on Floodplain Management provides guidance on compliance with EO 11988. The following comments are provided in reference to ER 1165-2-26 Section 8 General Procedures:

a. Determine if the proposed action is in the base floodplain: The proposed action is located on Offutt Air Force Base, Bellevue, Sarpy County, Nebraska (41.124272, -95.914557). The Installation comprises 4,041 acres and is located in the Missouri River and Papillion Creek watersheds. Sarpy County does participate in the National Flood Insurance Program. The project is within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panels 19129C0020D, and 19129C015D effective date 17 April 2020. The project is in a protected area of the Missouri River and Papillion Creek levee systems. Flood exposure in this area is related to the Missouri River and Papillion Creek with some flood risk management from the R-616 levee. This levee is currently being reconstructed and increased in height. NFIP mapping in the area shows the area as protected by the levee, flooding in 2019 and ongoing efforts would identify that this feature does not provide full protection. Current plans for the R-616 levee are for protection to the 100-yr event. Flood threats in the area are governed by the levee which, with adjacent L-611-614 act as a hydraulic control. The function of this hydraulic control is not represented on NFIP mapping. The low elevation of the R-616 levee system is at elevation 973 ft NAVD88. Above this elevation increased flood flows would result in small increases in water surface elevation as the entire Missouri River floodplain would be active.

b. Identify and evaluate practicable alternatives to the action or location of the action: Because Offutt AFB is home to the 55th Wing (55 WG), United States (US) Strategic Command (USSTRATCOM), and the 595th Command and Control Group (595 CACG); which support a constant state of readiness for the National Command Authority (NCA) under any contingency or declared national emergency, the project is functionally dependent on its location.

c. Advise the general public in the affected area and obtain their views and comments: It should be ensured that the proposed project is in compliance with floodplain management criteria of The United States Air Force, Offutt AFB. The project is being documented to the public through the NEPA process.

d. Identify beneficial and adverse impacts due to the action: The proposed action is landward of the existing levees and as such is not anticipated to cause a rise in water surface. Beneficial impacts include reconstruction and flood risk resiliency of previously affected structures.

e. Identify the potential for the project to induce development in the base floodplain: The proposed activities are military in nature and in an area of restricted development potential. While there are likely future activities associated with these facilities they would undergo similar EO11988 review.

f. Determine viable methods to minimize any adverse impacts: As mentioned, ensure guidance is adhered to maintain elevation 2-foot above the flood elevation for non-mission critical structures and 3-foot above the flood elevation for mission-critical structures. Ensure that any modifications within the floodplain will be able to sustain inundation, scouring, and erosion.

6. The comments herein pertain only to Flood Risk and Floodplain Management office concerns. If you have any questions, please contact Seth Kiely at (402) 995-2329, or the undersigned at (402) 995-2326.

KRAUSE.TONY.DEAN.1282509551 Digitally signed by KRAUSE.TONY.DEAN.1282509551 Date: 2020.05.01 14:12:56 -05'00'

TONY D. KRAUSE, P.E., CFM
Chief, Flood Risk and Floodplain Management Section
Hydrologic Engineering Branch
Engineering Division

05 FEB 1998

MEMORANDUM FOR US Army Corps of Engineers Omaha District
Mr. John Peterson
Nebraska Regulatory Office @ Wehrspann
8901 South 154th St., Suite 1
Omaha NE 68138-3621

FROM: 55 CES/CD
106 Peacekeeper Drive, Suite 2N3
Offutt AFB, NE 68113-4019

SUBJECT: Clarification of Jurisdictional Waterways and Drainage Areas at Offutt AFB

1. Enclosed are photographs from 1949, 1959, 1971, and 1997 which indicate the development of the current airfield runway, taxiways, and the general layout of Offutt AFB facilities over the past 50 years. These photos were used and are modified to delineate the limits of jurisdictional and non-jurisdictional waterways regulated under Section 404 of the Clean Water Act for Offutt AFB per a meeting at your office on 29 Jan 98 with our Mr. Raymond Woracek and Mr. Gene Svensen.

2. Please review the attached documents to verify the areas of jurisdictional waterways relating to Offutt. Your concurrence on the delineation for our on going and future construction projects is requested.

3. We appreciate your cooperation with establishment of these jurisdictional limits so that our efforts are clearly defined relating to wetland issues.

SIGNED

DAVID R. HOMAN
Deputy Civil Engineer

Attachments:
1. Map (1)
2. Photographs (4)

CEV —
Grane -
[illegible]
w/ CEOE/CEC

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

REPLY TO
ATTENTION OF

February 10, 1998

Nebraska Regulatory Office - Wehrspann
8901 South 154th Street, Suite 1
Omaha, Nebraska 68138-3621

David R. Homan
Deputy Civil Engineer
Department of the Air Force
55 CES/CD
106 Peacekeeper Drive, Suite 2N3
Offutt AFB, Nebraska 68113-4019

RE: **Jurisdictional/Non-Jurisdictional Waterways and Drainage Areas @ Offutt AFB, Nebraska**

Dear Mr. Homan:

The Corps of Engineers is responsible for administering Federal laws that regulate certain activities in waters of the United States. The authority applicable to this responsibility is Section 404 of the Clean Water Act (33 U.S.C. 1344), which prohibits the discharge of dredged or fill material and excavation in lakes, streams or wetlands without authorization in the form of a Department of the Army permit and Section 10 of the Rivers and Harbors Act of 1899 which regulates all work or structures in or affecting the course, condition, or capacity of navigable waters of the United States.

Reference your letter dated February 5, 1998 regarding the clarification of jurisdictional waterways and drainage areas at Offutt Air Force Base, Nebraska.

On January 28, 1998, John Peterson of my staff met with Messrs. Raymond Woracek and Gene Svensen of your staff at the Regulatory Office address shown above to determine the limits of waters of the United States located at Offutt Air Force Base and regulated by the U. S. Army Corps of Engineers under Section 404 of the Clean Water Act. This determination was made relative to the extreme grade modifications made to the upper limits of headwaters within the Offutt Air Force Base properties located in Sections 1, 2, 11, & 12, Township 13 North, Range 13 East, Sarpy County, Nebraska. These modifications were found to have been made prior to Corps of Engineers jurisdiction.

My review of the 1949, 1959, 1971, and 1997 aerial photography provided with your February 5th letter confirms that the dashed line markings are accurate in displaying the dividing line between waters that are jurisdictional under the Section 404 of the Clean Water Act and those non-jurisdictional.

* If you have any questions, please contact ~~John Peterson~~ at the Regulatory Office address shown above or telephone (402) 896-0896 ext. #2 and **reference file number NE 1998-10025.**

or 221-4140 Mike Wray

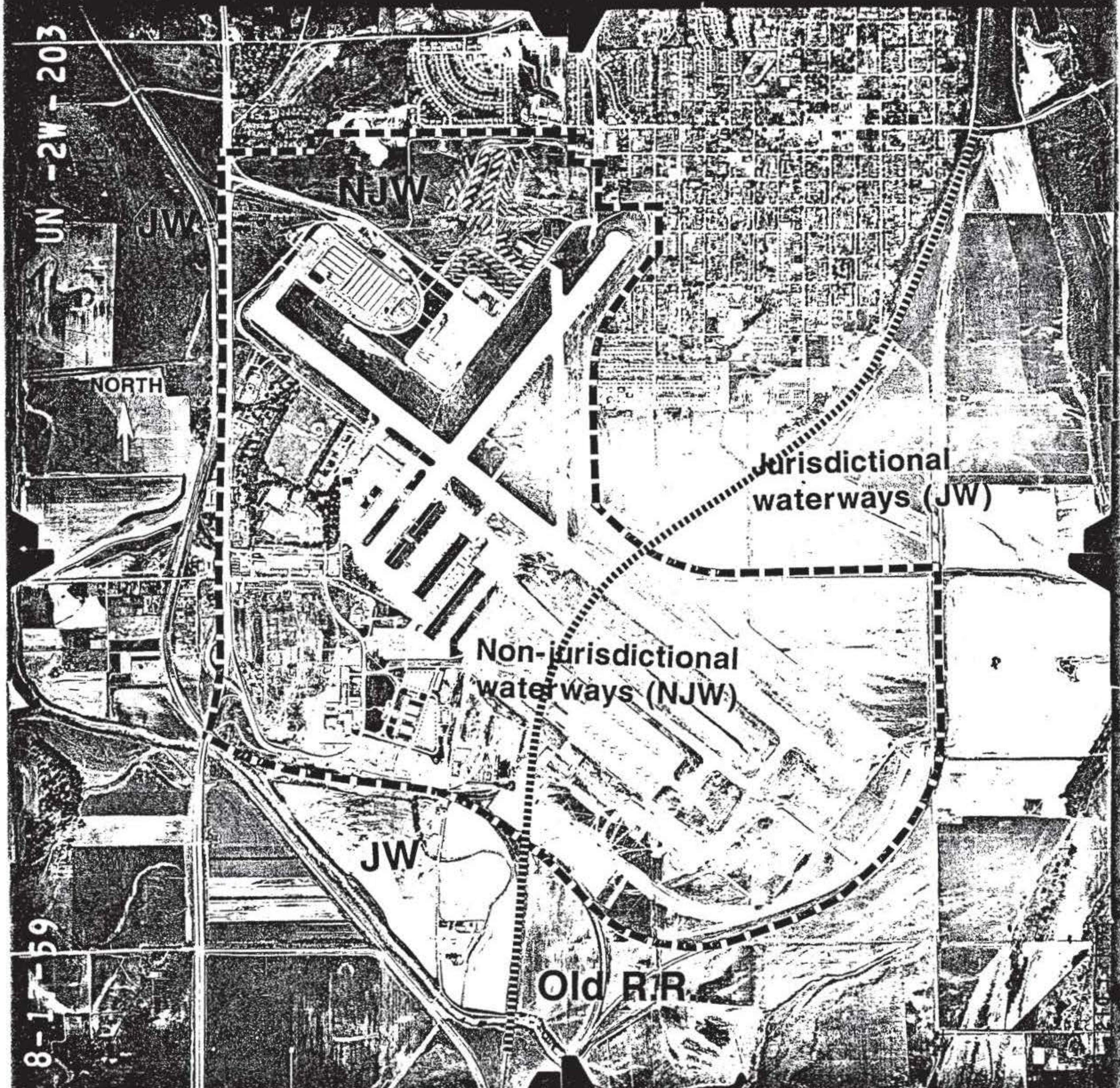
Sincerely,

Allan Steinle

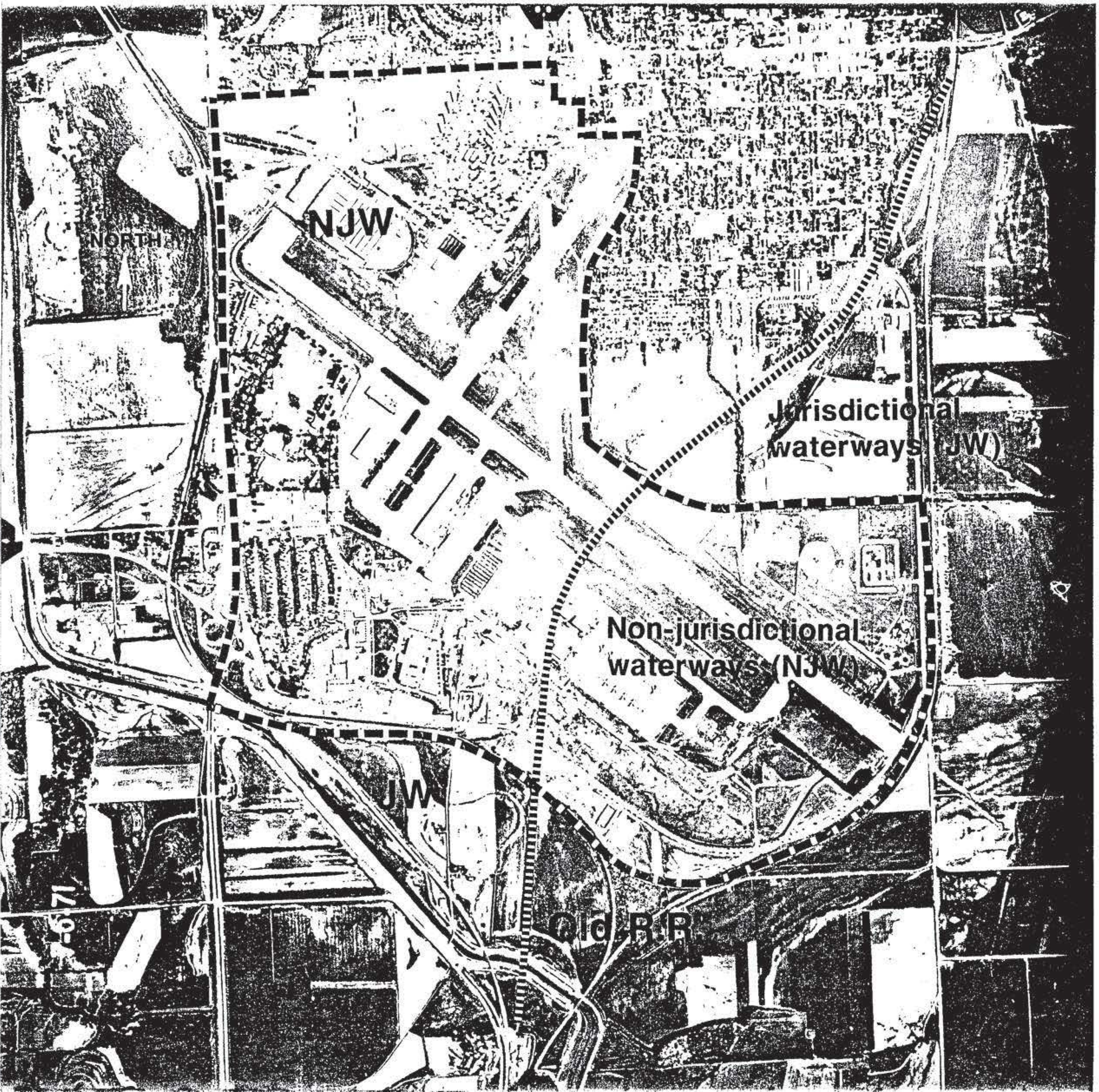
Allan Steinle
Nebraska State Program Manager

Dave Shifflet
at ACC
574-9332


KODAK AEROGRAPHIC SAFETY
NJW
NORTH
JW
Non-jurisdictional waterways (NJW)
Jurisdictional waterways (JW)



UN -2W - 203
8-17-59
NJW
JW
NORTH
Jurisdictional waterways (JW)
Non-jurisdictional waterways (NJW)
JW
Old R.R.



NJW
NORTH
Jurisdictional waterways (JW)
Non-jurisdictional waterways (NJW)
JW
Old R.R.


NORTH
JW
NJW
Jurisdictional
waterways (JW)
JW
Jurisdictional
waterways (JW)
MAY 1997

COORDINATION AND FILE COPY

OCT 27 2004

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 55TH WING (ACC)
OFFUTT AIR FORCE BASE, NEBRASKA

MEMORANDUM FOR U.S. ARMY CORPS OF ENGINEERS, OMAHA DISTRICT
Nebraska Regulatory Office
ATTN: Mr. John Moeschen
8901 South 154th Street, Suite 1
Omaha NE 68138-3621

FROM: 55 CES/CEV
106 Peacekeeper Dr Ste 2N3
Offutt AFB NE 68113-4019

SUBJECT: Clarification of Jurisdictional Waters of the U.S. at Offutt AFB

1. We are requesting your concurrence with our interpretation of the limits of Waters of the U.S. that are regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. In the summer of 2004, we updated our previous survey of wetlands and waterways on Offutt AFB.

2. The specific interpretation for which we are asking for concurrence is based on the aerial photography analysis submitted to Mr. John Peterson of your office via a 5 February 1998 memorandum from Mr. David R. Homan, the Deputy Civil Engineer at 55 CES/CD, Offutt AFB, and the subsequent approval of the designated areas via the 10 February 1998 letter from Mr. Allan Steinle of the Nebraska State Program, USACE, to Mr. Homan. The interpretation made is that all wetlands and waterways designated in the 2004 survey that are shown inside the designated 1998 boundary on the attached figure entitled "Non-Jurisdictional Wetlands and Waterways, Offutt AFB Main Station" are not jurisdictional Waters of the U.S. and therefore are not subject to the requirements of Section 404 of the Clean Water Act. Note that the 1998 boundary shown in the attached figure is slightly adjusted in a few areas to more closely conform to the actual property limit boundary of Offutt AFB. In all cases the adjustments made decreased the size of the non-jurisdictional area (versus increasing them).

3. In addition, we are requesting your concurrence with our interpretation that the 1998 boundary as shown on the attached figure permanently designates the non-jurisdictional area of Offutt AFB.

4. We appreciate your cooperation in the interpretation of the jurisdictional limits as this will simplify and expedite our base planning and construction projects. Please direct any questions and comments on this matter to Mr. Karl Morris of my staff at 294-4087. Thank you for your consideration on this request.

Signed

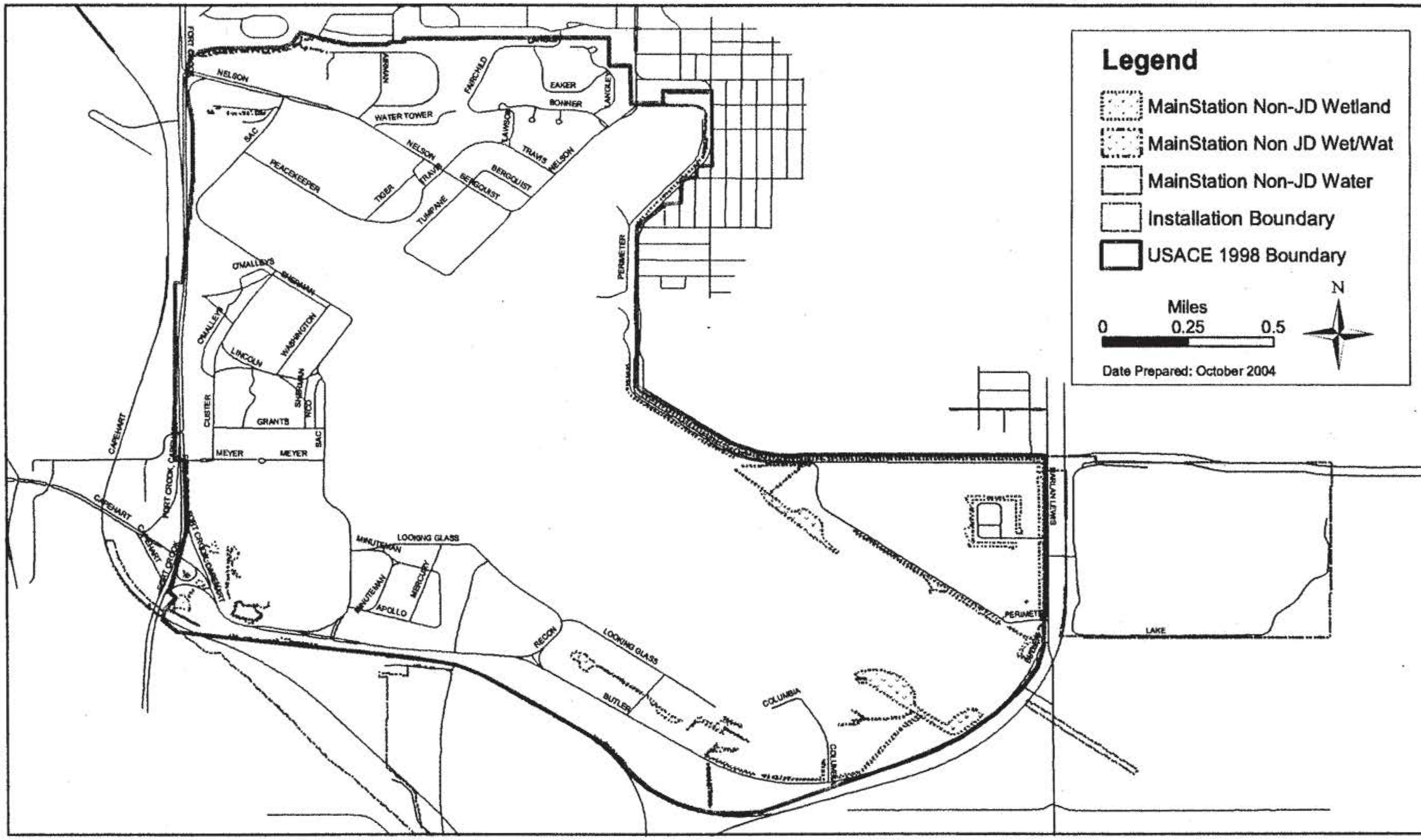
EDWARD W. LUENINGHOENER
Chief, Environmental Management Flight

Attachment:
Wetlands and Waterways Map

FUNC ADDRESS SYMBOL	LAST NAME AND DATE
WG/CC	
CV	
CCE	
WG/FM	
WG/JA	
WG/PA	
WG/SE	
SG/CC	
CD	
CCE	
CEV	
CD	
CEA	
CEB	
CED	
CEC	
CEF	
CEH	
CEO	
CER	
CEV	
CEVN	KAM
CEVI	
CEVC	
CEVN	
CEVR	
CCQ/CCF	

Global Power for America

RETURN TO:	FUNC ADDRESS SYM	ORIGINATOR'S NAME AND GRADE	PHONE	TYPIST'S INITIALS	DATE TYPED
	CEVN	KARL MORRIS	4-9619	JEC	27Oct04



Non-Jurisdictional Wetlands and Waterways, Offutt AFB Main Station

Karl

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NEBRASKA REGULATORY OFFICE-WEHRSPANN
8901 SOUTH 154TH STREET, SUITE 1
OMAHA, NEBRASKA 68138-3621

REPLY TO
ATTENTION OF:

December 17, 2004

Mr. Edward W. Lueninghoener EWL
Chief, Environmental Management Flight
55 CES / CEV
106 Peacekeeper Drive, Suite 2N3
Offutt AFB, Nebraska 68113-4019

Subject: Clarification of Jurisdictional Waters of the U. S. at the Main Base and Capehart Housing at Offutt AFB, the Elkhorn Communications Annex, and the Scribner Communications Annex.

Dear Mr. Lueninghoener,

In response to your letter dated October 27, 2004, regarding the subject matter, Messrs. John Peterson and Jerry Folkers of my staff met with Mr. Karl Morris of your office on December 8, 2004, to confirm the Survey of Waters document prepared by The Environmental Company, Inc.(TECI). Their site visits and review of aerial photography concur with TECI's interpretation of the limits of Waters of the U. S. that are regulated by the U. S. Army Corps of Engineers in the subject sites.

If you have any questions concerning this letter, please contact Jerry Folkers at 402 / 896-0896 and reference file number **NE 1998-10025.**

Sincerely,

John Moeschen

John Moeschen
Acting NE State Program Manager

APPENDIX B – CULTURAL RESOURCES REPORT

Offutt AFB Cultural Resource Report No.

A Section 106 Report for the Offutt Air Force Base Flood Recovery Rebuild, Offutt Air Force Base, Sarpy County, Nebraska.

Prepared by

Dr. Levi L. Keach, RPA
United States Army Corps of Engineers,
Omaha District Office

May 2020

Cover Photograph:

Abandoned parking lot, Backs of BLDGs (L-to-R): 497, 458, 541, 685, 160, 514, 578, and 494; Proposed Location of the Non-Kinetic Operations and NC3 Campuses.

View east from 255690E 4555136N (UTM Zone 15, NAD83), Keach 2020.

A Section 106 Report for the Offutt Air Force Base Flood Recovery Rebuild, Offutt Air Force Base, Sarpy County, Nebraska.

Prepared by

Dr. Levi L. Keach, RPA
United States Army Corps of Engineers,
Omaha District Office

Prepared for

United States Air Force,
Offutt Air Force Base

Contract No.
Not Applicable.

May 2020

Abstract:

In 2019, unprecedented flooding severely damaged buildings and infrastructure in the southwest portion of Offutt Air Force Base, Sarpy County, Nebraska. Offutt Air Force Base proposed to demolish the remains of most of the buildings, raise the ground height in some areas to avoid future flooding, and redevelop the area into several campus areas, reestablishing and modernizing capabilities compromised by flood damage.

To assist the Air Force with their Section 106 compliance, the United States Army Corps of Engineers (USACE) conducted a reconnaissance level survey of the flood effected area, outside the flightline, and an intensive recordation of Building 524 on 30 January 2020. No previously undocumented potential historic property was identified. Based on this survey, it is recommended that Building 524 no longer retains the historic integrity to communicate its significance and is no longer eligible for inclusion in the National Register of Historic Places (NRHP).

USACE recommends that the proposed MILSTAR Campus may result indirect effects to Building 500 by altering the setting aspect of integrity, but that the magnitude of these effects do not raise to the level of adverse.

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Acronyms

AFB	Air Force Base
APE	Area of Potential Effects
BMEWS	Ballistic Missile Early Warning System: One of a number of Cold War attack alert systems
CG	Commanding General
CV	*Curriculum Vitae*
DRMO	Defense Reutilization and Marketing Offices: Predecessor of Defense Logistics Agency Disposition Service
FEMA	Federal Emergency Management Agency
FLH	Flight-Line Hangers: One of the campus areas proposed by the project
GLO	General Land Office: Government agency responsible for land survey and distribution, merged with the Grazing Service in 1946 to form the Bureau of Land Management
HAER	Historic American Engineering Record: One of three subprograms within the Heritage Documentation Program or a report within the same
ICBM	Intercontinental Ballistic Missile: A ballistic missile capable of ranges greater than 3,400 miles, typically as a delivery vehicle for nuclear weapons.
ILS	Instrument Landing System: A radio-based system for landing aircraft in inclement weather
ka	kilo-annum, a unit of time equal to 1,000 years: within this document, used as a calendar date before present
LRS	Logistics Readiness Squadron: One of the campus areas proposed by the project
Ma	Mega-annum, a unit of time equal to 1,000,000 years: within this document, used as a calendar date before present
MAD	Mutual Assured Destruction: Nuclear warfare doctrine in which the belligerents maintain sufficient arms at the ready to ensure that no can take offensive action without initiating an inevitable chain of events leading to the destruction of all belligerents (see Jervis 2002; lodal 1980; Rowan 2004)
MWR	Morale, Welfare, and Recreation: Military support, leisure, and quality of life activities
NAOC	National Airborne Operations Center: Post-Cold War successor to NEACP

NC2 Nuclear Command and Control

NC3 Nuclear Command, Control, and Communications, also: One of the campus areas proposed by the project

NEACP National Emergency Airborne Command Post

NKO Non-Kinetic Operations: One of the campus areas proposed by the project

NRCS Natural Resources Conservation Service

NSC National Security Council

OEM Original Equipment Manufacturer

PACCS Post-Attack Command and Control System

POL Petroleum, Oil, and Lubricants

SAC Strategic Air Command

SATCOM Satellite Communications

STRATCOM (United States) Strategic Command: Post-Cold War successor to SAC

UK United Kingdoms

USGS United States Geological Survey

USSTRATCOM See STRATCOM

Introduction

The United States Air Force's Offutt Air Force Base (Offutt) is located in eastern Sarpy County, Nebraska, approximately 10 miles south of the City of Omaha and adjacent to the City of Bellevue. Offutt lies immediately east of US Highway (US-75), six miles south of its intersection with Interstate Highway 80. In the spring of 2019, Offutt was severely damaged by the record flooding that occurred in eastern Nebraska, western Iowa, and northern Missouri (Figure 1). A significant construction effort is needed to restore Offutt to full operational capacity. The purpose of this report is to meet the Air Force's requirements under Section 106 of the National Historic Preservation Act to account for the effects of this effort on historic properties (54 U.S.C. 306108).

Figure 1. Extent of Flooding at Offutt, 18 March 2019.

Designation of the APE

The Area of Potential Effects (APE) is comprised of two discontiguous areas (Figure 2). The first area consists of approximately 533 acres located south of the runway extending to the base boundary fence, and from the eastern base boundary fence to Building 500. It is located within the 6th meridian, Township 13N, Range 13E, sections 11 (E½) and 12. The second area consists of approximately 76 acres surrounding the base lake. It is located in Township 13N, Range 14E, section 7, NW¼ and W½ of NE¼. The APE accounts for all direct and persistent indirect effects of the undertaking. Both portions of the APE are located within the Plattsmouth 7.5' USGS map.

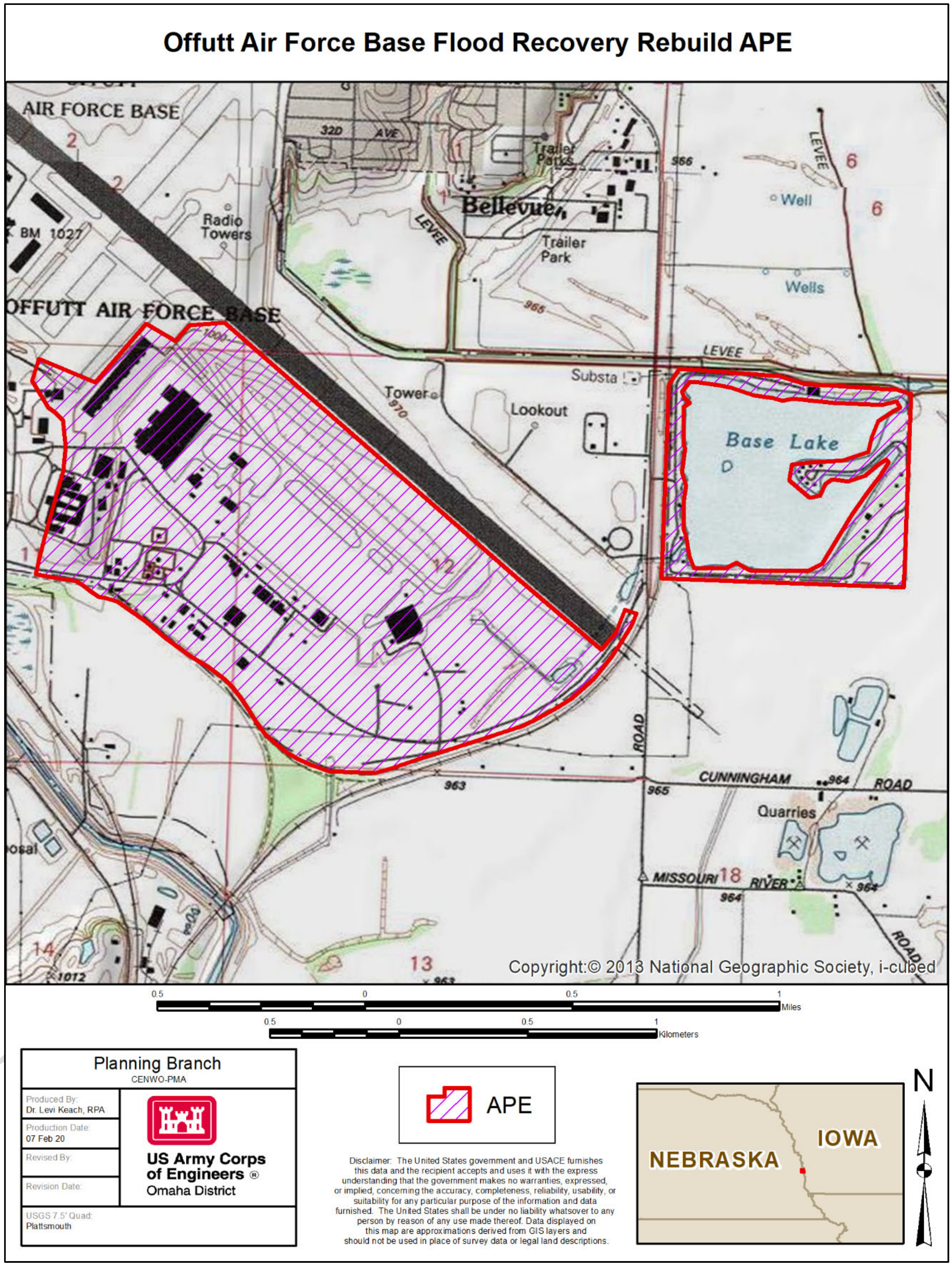

Figure 2. APE Map.

Description of the Undertaking

This undertaking include the demolition of 63 buildings (Table 1) within the APE, primarily clustering within seven proposed campus areas (Figure 3). The undertaking would involve the demolitions (Figure 4), the raising the elevation of new construction areas, and the construction of 21 new buildings across seven campus areas (Figure 5). Finally, the existing emergency power network would be transitioned to a microgrid allowing the distribution of power from a decentralized network of generators rather than a single power plant. Repair of approximately 17 buildings was limited and already complete. They are noted here to document the broader scope of flood recovery rather than to document activities associated with the proposed undertaking.

Table 1. Planned Building Demolition.

Building Number	Description	Location
160	SFS Operations Facility	NC3 Campus
273	Water Supply Building	NC3 Campus
389	Jet Engine Shop	FLH Campus
393	T9 Noise Suppressor Test Stand	FLH Campus
424	Supply & Equipment Warehouse	NKO Campus
428	Housing Supply and Storage	NC3 Campus
453	Airborne Weapon System Simulator Building	NKO Campus
455	Electrical Power Station Building	NKO Campus
458	55th Wing Headquarters	NKO Campus
464	Billy L. Skipworth Operations Center	NKO Campus
470	Electrical Power Station Building	NC3 Campus
475	Antenna Support Structure	Security Campus
476	Antenna Support Structure	Security Campus
482	Hazardous Waste Accumulation Point	LRS Campus
485	Electrical Power Station Building	256696E 4555533N
486	Fuel Pump Station	LRS Campus
494	Warehouse	NKO Campus
495	Sanitary Sewage Pump Station	LRS Campus
496	Warehouse	NC3 Campus
497	Squadron Operations Facility	NKO Campus
499	Readiness Crew Facility	NC3 Campus
514	Precision Measurement Equipment Laboratory	NC3 Campus
517	Aircraft Support Equipment Storage	FLH Campus
518	Generator Plant	255302E 4555540N
523	SATCOM Terminal	Security Campus
524	Readiness Crew Facility	NC3 Campus
532	ILS Equipment	256687E 4555526N
533	Entry Control Building	NC3 Campus
540	Security Forces Training Facility	Security Campus
541	Courier Station	NC3 Campus
542	SATCOM Terminal	Security Campus
543	Warehouse	LRS Campus
544	Admin Office-Recycling Center	NC3 Campus
545	Supply Shed	LRS Campus

Building Number	Description	Location
553	Warehouse	LRS Campus
557	Telephone Exchange and Classroom	NKO Campus
559	Drug Testing Office	Security Campus
560	Kennel	Security Campus
563	Small Arms Range	Security Campus
566	SATCOM Terminal	Security Campus
567	Storage	Security Campus
571	Liquid Oxygen Storage	FLH Campus
572	Warehouse	256367E 4555033N
573	Hazardous Storage	256376E 4555020N
576	Security Entry Control	NC3 Campus
578	Security Operations	NKO Campus
581	Rec Pavilion Press Box	Security Campus
582	Security Entry Control	NKO Campus
585	Petroleum Operation Building	FLH Campus
586	DRMO Warehouse	LRS Campus
588	Softball Pavilion	Lake Campus
593	Operations Building	NKO Campus
595	Liquid Oxygen Storage	NC3 Campus
598	SATCOM Terminal	NKO Campus
599	Depot Supply and Equipment Shed	NC3 Campus
655	SATCOM Terminal	NKO Campus
660	Fire Team Facility	256397E 4555052N
683	Supply Shed	NC3 Campus
685	Readiness Crew Family Facility	NC3 Campus
699	Supply shed	NKO Campus
803	Outdoor Recreation Pavilion	Lake Campus
809	Boathouse	Lake Campus
819	Maintenance Shed	Lake Campus

Emergency Power Microgrid: The Emergency Power Microgrid (Microgrid) is a dispersed network throughout the main base area. Present buildings on the Microgrid are 185, 301, 305, 485, 501, 515, 518, 519, 522, 565, and 597 with power generation concentrated at Building 518. Existing infrastructure—including generators, switchgear, and busses—are aging and have been damaged by the flood. Moreover, much of the equipment dates to the 1970s and 1980s; as such, it is neither energy-emissions efficient nor are OEM parts available for repairs. The replacement Microgrid would possess disbursed generation and distribution functions, meet current environmental regulations, and provide emergency power to the proposed campuses and 557th weather wing.

Flight Line Hangers Campus: The Flight Line Hangers (FLH) Campus is located immediately south of the Offutt runway. Activities in this area would consolidate various functions that were previously spread around the area in a manner unconducive to efficient operation and mission accomplishment as well as the repair of facilities that were damaged by the flood. Demolition planned in this area are Buildings 389, 393, 517, 571, 585, and several minor structures. Repairs have been completed for Buildings 491, 492, 493, and 584. Three of these buildings (491, 492, and 493) are identified historic properties; however, no activity at these properties are associated with this undertaking. Four buildings are planned for construction in this area, including a two-building liquid oxygen storage facility to replace Building 595, a de-icing liquid facility.

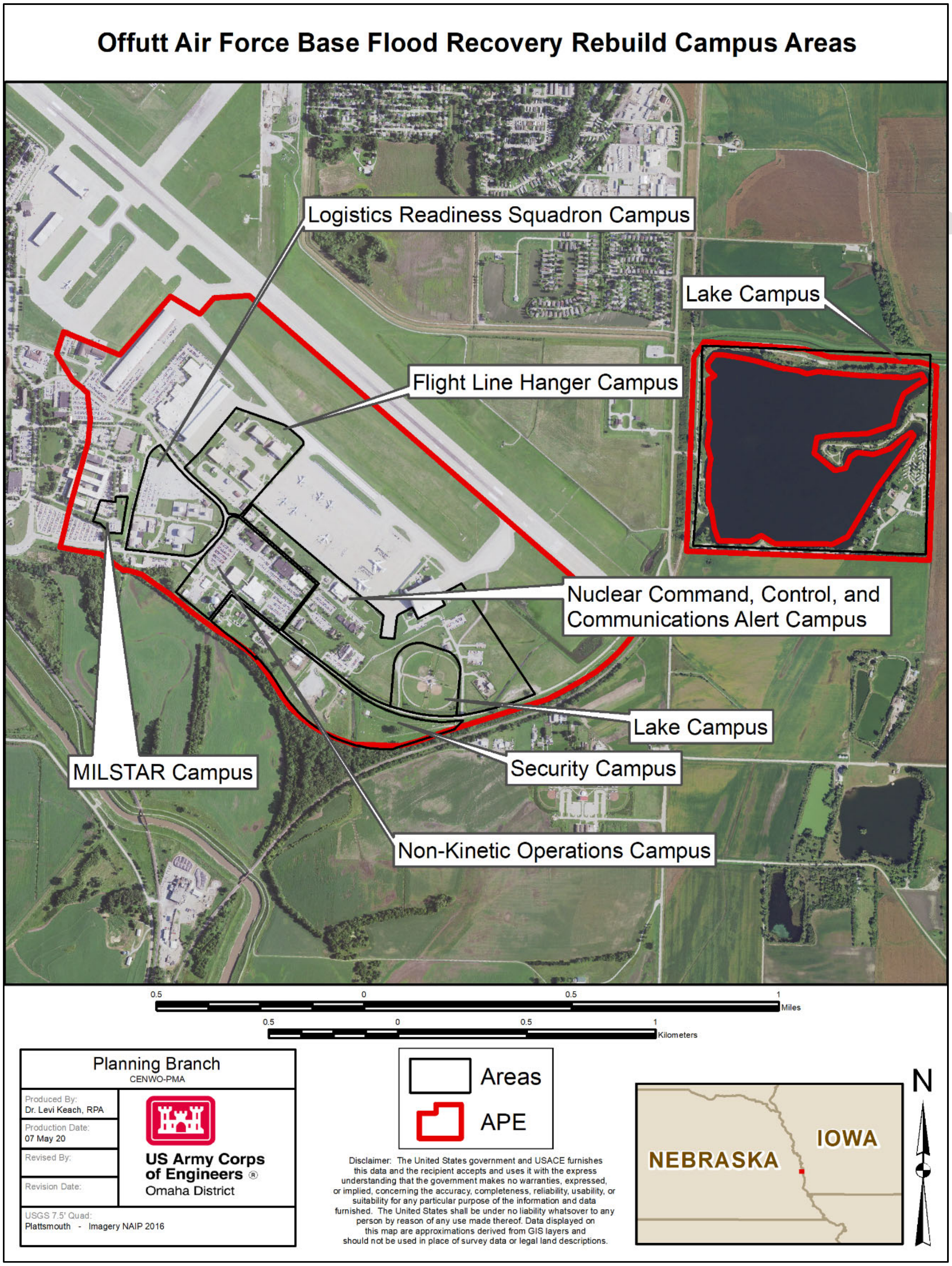

Figure 3. Campus Areas Map.

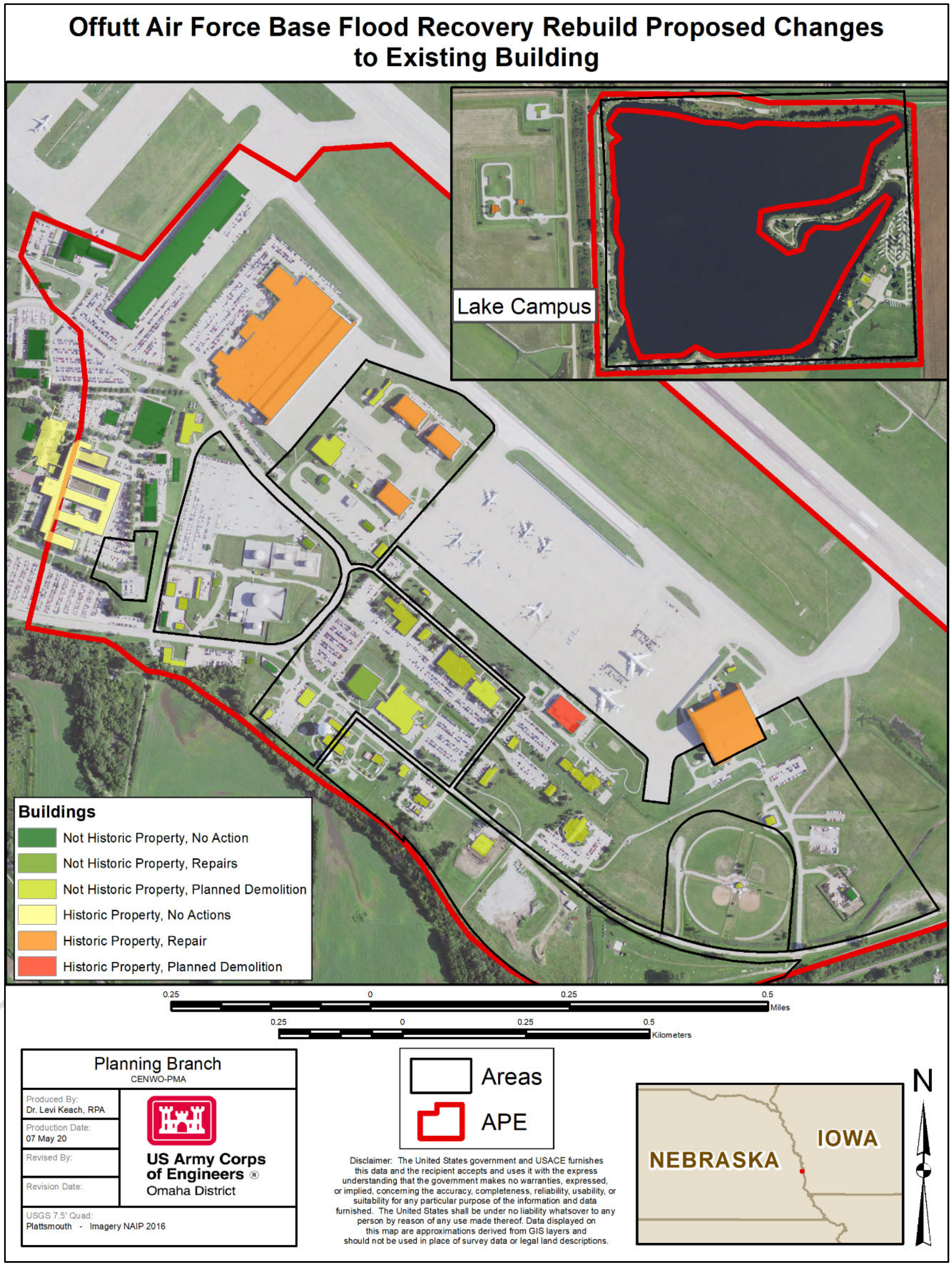

Figure 4. Proposed Changes to Existing Buildings.

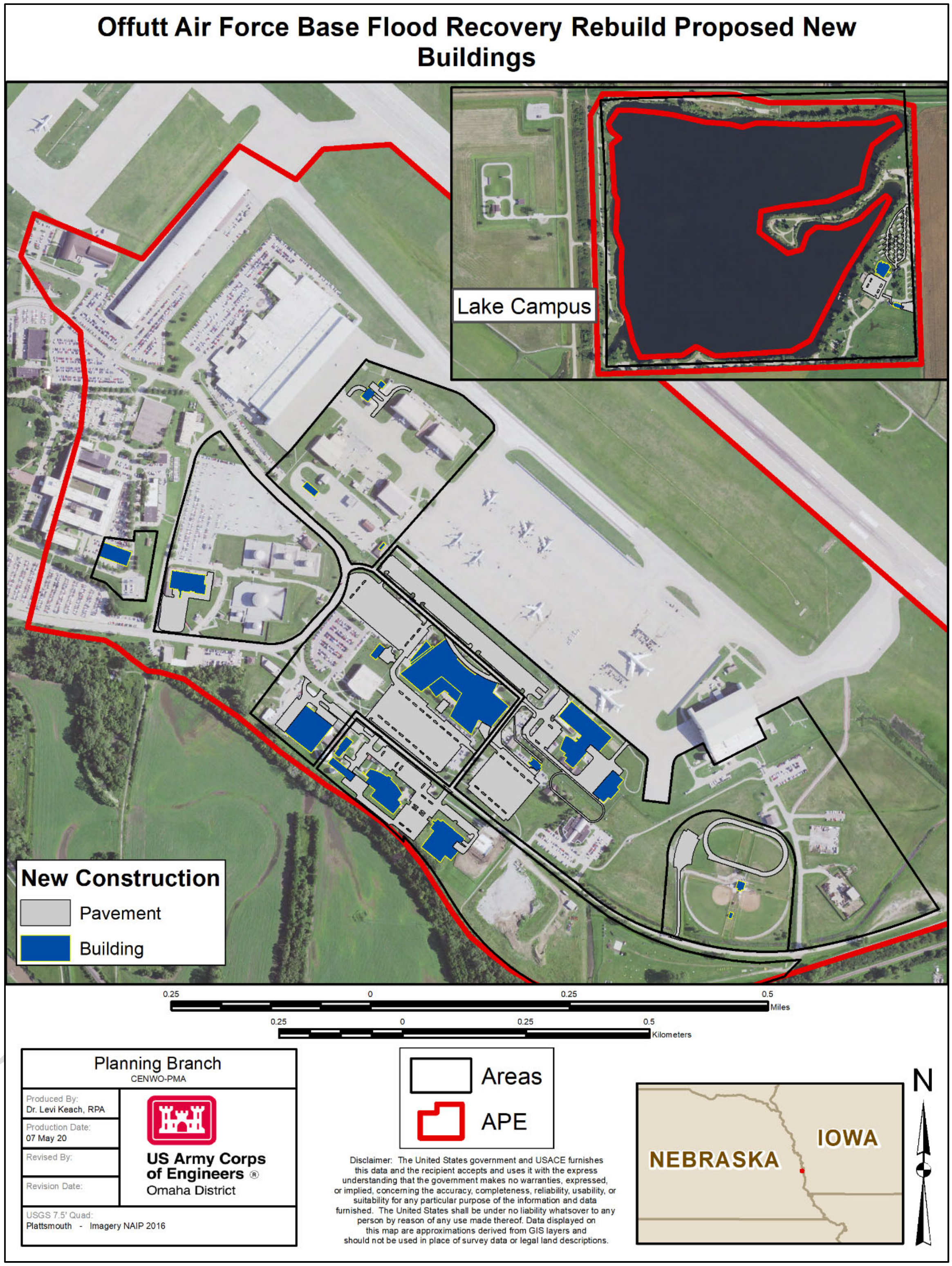

Figure 5. Proposed Building Construction.

Lake Campus Area: The Lake Campus is located east of the Offutt cantonment area, surrounding the base lake created by borrow activities during runway construction. Activities in this area would replace terminally damaged Morale, Welfare, and Recreation (MWR) facilities at the base lake. Demolition planned in this area are Buildings 803 and 809, as well as various structures including Structure 819 and several playgrounds and camping areas. Terrain in this area would be raised by about 10 feet in some areas. Replacement facilities would be constructed to include a new consolidated recreation facility, new RV camping facilities, and new infrastructure. Additionally the lake shore requires stabilization efforts, new riprap and the replacement of previous riprap may be installed, subject to invasive species considerations.

Outside of the Lake area but still considered part of the Lake Campus is the softball complex south of Building 565. As at the Lake Campus, this MWR facility was completely inundated and requires the demolition of the existing facility and reconstruction in place. Building 588 would be subject to demolition and replacement. No historic property is within the Lake Campus or the softball complex.

Logistics Readiness Squadron Campus: The Logistics Readiness Squadron (LRS) Campus would be located south of the Flight Line Hangers Campus and between Building 500 and the proposed Non-Kinetic Operations Campus. Activities in this area would consolidated logistic facilities currently dispersed across the southern portion of the base while replacing damaged facilities. Buildings 482, 486, 495, 543, 545, 553, and 586 would be demolished. Repairs have occurred at Buildings 431 and 558, both buildings relate to petroleum operations. The replacement Petroleum Operations Facility consisting of two buildings would be built within this area. Replacements to structures and infrastructure improvements would also occur. No historic property is located within the proposed LRS Campus.

MILSTAR Campus: Activities at the MILSTAR Campus would include constructing a consolidated MILSTAR Satellite Communications Station with adjacent antennae farm. Primary facilities would include a communications facility, special foundations, and redundant power generators. Supporting construction would include site development, utilities and connections including placement of utility infrastructure for water, underground electrical and site lighting, communications, sanitary sewer, and substantial retaining walls, parking realignment and additions, walkways, and other site improvements. No historic properties are within the proposed MILSTAR Campus; however, Building 500, a historic property of national significance within the theme of the Cold War is located just outside the proposed location.

Non-Kinetic Operations Campus: The Non-Kinetic Operations (NKO) Campus would be located south of Looking Glass Street. Activities in this area would consolidate support and training facilities currently scattered and damaged beyond reasonable repair across the flood impacted area. Buildings 424, 453, 455, 458, 464, 497, 557, 578, 582, 593, 598, 655, and 699 would be demolished, as well as several shed and gazebo structures. Two buildings would be constructed in this area, the NKO building and a replacement for the Courier building (541) that would be demolished within the neighboring campus. In the southern leg of the NKO, a third building would be constructed, although its mission is related to the Security Campus. Additionally, the surface elevation would be increased, and infrastructure improvements would be required in places. Repairs to Building 504 have already occurred. No historic property is located within the proposed NKO Campus.

Nuclear Command, Control and Communication Alert Campus: The Nuclear Command, Control and Communication Alert (NC3) Campus would replace facilities damaged beyond reasonable repair within the same general area. Buildings 160, 273, 428, 470, 496, 499, 514, 524, 533, 541, 544, 576, 595, 599, 683, and 685 would be demolished, as would several minor structures. Three new buildings would be constructed in the area. The primary facility would replace functions of buildings 499 and 524; another building would replace the functions of 685; and the final building would be serve as storage space. The elevation of the area would be increased in some places and various infrastructure improvements would be constructed. Repairs to Building 565, abutting the northeast edge of the NC3 Campus, have already taken place. Buildings 524 and 565 are the only historic properties located within the proposed NC3 Campus.

Security Campus: The Security Campus would replace and modernize facilities located in the southeast portion of the base that have been damaged beyond reasonable repair by the 2019 flooding event. Buildings in this area subject to demolition are 475, 476, 523, 540, 542, 559, 560, 563, 566, 567, and 581. Functionally, the majority of these buildings would be rebuilt within the Security Campus or relocated to the MILSTAR Campus. Environmental remediation of lead contamination would occur within the existing small arms range. The surface elevation of the Security Campus would be raised by up to nine feet in some places. New construction would include four buildings: a new kennel facility, an indoor small arms range, a security operations control center, and a warehouse. Finally infrastructure repair and replacement are necessary. No historic property is located within the proposed Security Campus.

Off-Campuses: Some flood repair actions were necessary outside the campus locations where new construction is planned. Proposed actions are the demolition of Buildings 485, 518, 532, 572, 573, and 660. Many of these demolitions relate to eliminating functions made obsolete by the proposed microgrid, the remainder relate to clean up of buildings damaged beyond reasonable repair by the 2019 flood. Repairs have been completed at Buildings 457, 490, 534, 535, 536, 537, 538, and 552. Two of these building are historic properties and emergency repairs were necessary to prevent the total loss of integrity.

Organization

The remainder of this volume is organized into three primary categories. The Background section discusses the preexisting conditions imposed on this study. Specifically, the extant environmental context, the state of existing cultural resources research at Offutt AFB, and the historic context of the resources within the study area. The Project Study section focuses on research design and the finding of this project. The short evaluation, recommendation, and references sections make up the final major division of this document. Two Appendices are attached. The first contains recordation forms for any potential historic property evaluated in this report, the second contains the P.I.'s C.V. As none of the resources evaluated are sensitive to public disclosure, no confidential map appendix is necessary and all relevant maps are embedded within the body of this report.

Background

This section discusses the environmental context, previous research, and historic context associated with the APE. The environmental context provides a brief overview of the climatic history of the Late Tertiary and Quaternary periods, as well as the geology, topography, soils, and biological communities in southeastern Nebraska. The previous research section discusses records reviewed relating to the APE and the existing evaluation of historic property associated with Offutt AFB. The historic context has been scaled to the scope of the undertaking and focusses on the Cold War and its relationship to potential historic property within the APE.

Environmental Context

The Late Tertiary and Quaternary climatic history of southeastern Nebraska consists of periods of glaciation spanning the late Pliocene and Pleistocene epochs and a Holocene epoch marked by periods of intermittent drought. Based on Boellstroff (1980), the APE was likely glaciated 2.4 Ma ago, stripping the landscape to its Pennsylvanian epoch bedrock. Several periods of glaciation occurred during the Pleistocene, though the last of these (c. 100-10 ka ago) did not cover the APE. These early periods of climatic history are of little interest to the archaeologist, save that they conditioned the geological landscape of the Holocene.

Baker (1999) and Baker et al. (2000) discuss the Holocene climatic history of southeast Nebraska using data collected from the Nemaha River. They divide the period into five temporal zones (uncalibrated radiocarbon years before present) based on climatic regime. Zone 1 spans 9–8.5 ka, Zone 2 spans 8.5–5.8 ka, Zone 3 spans 5.8–3.1 ky, Zone 4 spans 3.1–2.7 ka, and Zone 5 spans 2.7 ka to present. Multiple data sources suggest that following glaciation and prior to 9 ka, upland forests had developed on the loess terraces and valley walls. Zone 1 saw drier conditions transitioning the forests to prairies. Zone 2 was drier still. Zone 3 saw an amelioration leading to reforestation within riparian zones, though prairies remained the dominant biome throughout the uplands. Zone 4 saw a return to dry conditions with an associated reduction in riparian forests and evidence of wildfires being common suggesting the prairies were regularly being thinned by fire. Finally, Zone 5 lacked good data, but appears to have been fairly similar until shortly before contact, where wetter conditions allowed the return of riparian forests.

The geological setting within the APE is characterized as primarily Albaton-Haynie soils, with limited Marshall-Ponca in the far western portion of the APE, overlaying Kansas City Group bedrock (CSD and CALMIT 2020). The USGS defines the Kansas City Group as Late Pennsylvanian (c. 306-299 Ma) limestone and shale group with thin layers of chert with a maximum thickness of 200 ft. The soil characterization is described by Bartlett (1975). Albaton-Haynie association soils are formed of fine to medium-textured sediments deposited by water, associated with the Missouri river bottomland. They are deep soil associated with nearly level and poorly drained areas. Surface soils are dark grayish-brown (10YR 3-6/2) silty-clay overlaying dark grayish-brown to dark gray (10YR 4/1) silty-clay. Slightly higher on the landscape they transition to moderately drained silty-loam. Marshall-Ponca is deep well-drained silty moderate slopes dividing drainages. The soil division is associated with the topographic division of the APE wherein the majority of the APE is characterized as river valley until about Building 500, where it transitions into rolling hills (CSD and CALMIT 2020).

Today, the NRCS classifies the entire APE as urban developed land; however, prior to development the area was primarily Upland Tallgrass Prairie; though the Lake Campus splits the boundaries between Upland and Lowland Tallgrass Prairie biomes and Riparian Deciduous Forest, suggesting that the APE was likely an ecotone between the three (CSD CALMIT 2020). Johnsgard (2001) suggests a similar ecotonal situation, though without the division of Tallgrass Prairie into Upland and Lowland biomes. Further, he notes that the average annual precipitation within the APE is around 30-inches.

Johnsgard's (2007) characterization of the Tallgrass Prairie biome within Nebraska notes that while tall grasses, including Big Bluestem (*Agropyron gerardii*), Indiangrass (*Soghastrum nutans*), switchgrass (*Panicum virgatum*), and in wetter locations—like the APE—Prairie Cordgrass (*Spartina gracilis*) are characteristic of the biome, they are not actually the dominant grasses. Rather, the dominant grasses are medium statures bunchgrasses, including Little Bluestem (*Schizachyrium scoparium*), Needlegrass (*Nassella viridula*), Prairie drop-seed (*Sporobolus heterolepis*), Junegrass (*Koeleria pyramidata*), and side-oats grama (*Bouteloua curtipendula*). Important forbs include several species of sunflowers, including Jerusalem artichoke (*Helianthus tuberosus*) and milkweeds. Important birds include the Greater Prairie-Chicken (*Tympanuchus cupido*). Notable mammals include the Virginia Opossum (*Didelphis virginiana*), Eastern Cottontail (*Sylviangus floridanus*), Black-tailed Jackrabbit (*Lepus californicus*), Coyote (*Canis latrans*), Bobcat (*Felis rufus*), Raccoon (*Procylon lotor*), and White-tailed Deer (*Odocoileus virginianus*).

Previous Research

Though the entire project area has been inventoried for both archaeological and architectural resources, the National Register of Historic Places (NRHP), National Landmark Inventory, and GLO plats were consulted at the onset of this study. The NRHP lists the Fort Crook Historic District (McIntosh and Cherry 1975) and the Blacksmith's Shop (McIntosh and Cherry 1976) as listed properties associated with the Offutt AFB, however neither are within the APE. No National Landmarks are within Sarpy County. Except for the Papillion Creek, nothing is within the sections of the 1857 GLO plat for 13N 13E; while the 1857 GLO plat for 13N 14E demonstrates a road in the west half of Section 7 and the Missouri River in the east half.

The online collections of the Library of Congress were also examined, yielding portions of HAER NE-9-A, recording portions of the Looking Glass program within the proposed FLH and NC3 campuses (Roise and Curran 1998). The wording of these documents suggest that a Looking Glass Historic District was considered within the project APE. However, the district is not mentioned in the Offutt AFB Programmatic Agreement (PA 2017) or the Cold War-era Historic Property survey (Weitze et al. 2009). Further, no reference to the district was found within the Offutt Cultural Resources Geodatabase, nor was it mentioned by base environmental staff or the deputy SHPO during any discussions about this project. Therefore, it is assumed that no historic district was ultimately established. Further, this suggests that the quality of these resources and their integrity did not support the establishment of a district even prior to the 2019 flood. Likewise, online portions of HAER NE-9-M, which recorded Building 500, were also examined. Building 500 is the former SAC headquarters building and with Building 501, the underground portion of SAC Headquarters, was documented (Hoisington 2003).

The appendices of the Programmatic Agreement (PA 2017) and the Integrated Cultural Resource Management Plan (ICRMP) (Chesley 2019) are considered the definitive summaries of cultural resources within Offutt AFB. Both attest to a 1991 archaeological survey of the main base area conducted by the National Park Service (NPS). While the inventory was less than Class III in intensity, the report concluded that the base has been developed to the point that intact archaeological resources are extremely unlikely to be located on the base with the possible exception of the Base Lake area. A Class III inventory of three annexes near the base was conducted by NPS in 1997 that was also negative. Based on these inventories it was determined that further archaeological inventory was unnecessary baring future discovery. The Nebraska SHPO has concurred with this assessment, with the caveat that buried sites cannot be discounted (Chesley 2019:31–32).

Three studies of the Offutt built environment have been conducted (Chesley 2019; PA 2017). The first of these, in 1995, was a building inventory by U.S. West Research. It identified 245 buildings constructed between 1893 and 1958. The following year, Tellus Consultants evaluated 236 buildings and 111 landscape features constructed between 1959 and 1989. Finally, Geo-Marine, Inc. completed a survey of the Cold War build environment in 2009. It seems likely that the Tellus survey noted by Chesley is the same as the Mariah survey discussed in the Geo-Marine, Inc. survey.

The Geo-Marine Inc. survey (Weitze et al. 2009) maintained the eligibility of buildings associated with the Fort Crook Historic District (1–16, 19–22, 40–42, 44, 49, 60, & 88). Eligibility Criteria are not provided for these buildings. However, Weitze et al. notes that Building 16 is also eligible for its association with Curtis E. LeMay. Additionally, five buildings (301, 302, 305, 306, and 316) within the Martin Bomber Complex were assessed as eligible under Criteria A (World War II) and C (work of a master [Albert Kahn]). Building 302 is also significant under the Criterion A Cold War context as the office of Gen. Curtis E. LeMay during his command of the Strategic Air Command (SAC). Buildings 534–538 were assessed as eligible under Criterion A for their role in the Cold War and Criterion C for their design by a master, Leo A. Daly Sr.; additionally, they suggested that these five building may form an Atlas Missile Historic District.

Three buildings within the SAC headquarters compound (500, 501, and 522) were assessed as eligible under criteria A and C for their association with the Cold War and design by Leo A. Daly Sr. Building 500 was the SAC Headquarters building, while Buildings 501 and 522 were buildings within the SAC underground command center. In order to continue NC3 in the event of the destruction of the above and below ground SAC buildings, their function was duplicated with the Looking Glass program's airborne command. The final set of eligible buildings are associated with that program and its successor programs. These were Building 457, 463, 491, 492, 493, 524, and 565. All of these were assessed eligible for their association with the Cold War. Building 457 was assessed eligible under C for its embodiment of the distinctive style of late-Cold War hanger buildings. The remaining six buildings were assessed eligible under C as works of a master.

Historic Context

The following context is scaled to the scope of cultural resources within the project area. As no prehistoric or ethnohistoric resources are within the APE, no Prehistoric or Ethnohistoric Context is presented here; interested parties are referred to the ICRMP (Chesley 2019:27–29). Likewise, the development of the base from 1887 through World War II is adequately covered in the ICRMP and not directly relevant to the resources within the APE. Therefore, the following Historic Context focuses on the Cold War and Offutt AFB's role therein. The specific focus of Offutt AFB's role as discussed below is the development and operation of the airborne alert and airborne command post as a response to the ICBM age.

While the precise onset and causes of the Cold War are debated among experts, in a general sense the Cold War can be understood as a global ideological conflict between the United States and the Soviet Union, along with each country's allies (viz., the Western and Eastern Blocs), that developed in the immediate aftermath of World War II. Following that war, the United States and Soviet Union emerged as the only superpowers possessing relatively intact heavy industry, large populations, and low international debt loads; however, while allied in World War II, the two nations possessed radically different ideological visions for the post-war order (Fink 2014; Gaddis 2005 Sewell 2002).

Gaddis summarizes this ideological tension as no less a question than one of "how best to organize human society" (Gaddis 2005:84). While some researchers note the origins of the Cold War conflict as early as the mid-18th century (e.g., Barrass 2009), or more commonly the Bolshevik Revolution (e.g., Sewell 2002) the proximate cause was tensions brought to the surface by the conflicting visions of how to organize human society within the states jointly occupied by the United States and Soviet Union, most especially Germany and Korea.

One of the Defining patterns of the Cold War was the nuclear arms race between the superpowers. In this, the United States has an initial advantage, being the only nation to possess the technology to produce atomic arms at the close of World War II, the first to possess the technology to produce a thermonuclear device, and the first to develop the technology to miniaturize both (Barrass 2009; Craig and Radchenko 2007; Fehner and Gossling 2006; Moody et al. 1997). However, these advantages were quickly eroded by Soviet spies leading to an apparent state of approximate parity. Zaloga (2002) has demonstrated that this apparent state of parity was largely illusory, at least until the Carter administration. Throughout the late 1940's and until 1957, while these technological gains were being made, it was understood that the deployment of nuclear weapons would be executed through bombers (Fink 2014:104; Schlosser 2013:181–184). It was under this understanding that SAC came into being.

Strategic Air Command grew out of the Army Air Corps Continental Air Forces organized at the close of 1944 (Longacre 1990). However, it was not until March of 1946 when the organization gained its strategic missions. During the second half of the 1940s, SAC's mission and culture developed their focus on the long range planning for, and delivery of, very heavy, including atomic, bombs. At the time, it was assumed that if war came it would once again be fought over Western Europe (Deaile 2018:79). In 1948, SAC saw a dramatic increase in its bomber force, as well as its second headquarters move—from Andrews AFB to Offutt AFB—and the installation of Curtis LeMay as Commanding General (CG). Following the move to Offutt, SAC underwent a process of professionalization and moved to the wartime readiness posture of the Cold War.

LeMay's efforts to professionalize SAC were gravely needed, based on the assessment of Charles Lindbergh. Prior to LeMay's assumption of command, the SAC CG—George Kenney—organized the first SAC bombing competition, with Lindbergh in attendance. Lindbergh's reported that the SAC aviators were inadequate for a bombing fleet wielding nuclear weapons (Deaile 2018). A professional and competent atomic air force was necessary to maintain the standoff defending Western Europe, even more so following the first detonation of a Soviet atomic device in 1949.

In the early aftermath of the development of the Soviet atomic bomb, war planners still imagined that war would occur in Europe. This understanding was grounded not only in the two previous World Wars, but in the fact that neither power possessed a strategic bomber of intercontinental range capabilities (Deaile 2018; Moody et al. 1997). By the close of the Truman administration, the United States' plan for the coming war involved immediate intervention in Europe, rather than a retaking of the Western States. This shift was the result of one of the most consequential American documents of the Cold War, NSC 68 (see Nitze 1950). SAC responded by developing forward airbases along the periphery of Europe, including Thule in Greenland, and various locations in Morocco, Spain, and the UK. The 1950s, however, would see the development of both the hydrogen bomb and intercontinental bombers, as well as Eisenhower's *New Look,* which secured nuclear weapons as the backbone of United States' deterrent policy toward Soviet aggression. SAC, and the United States broadly, also witnessed institutional shakeups related to the Korean War during this period.

The balance of nuclear powers throughout the Cold War was maintained through a state of approximate perceived parity between the superpowers. This balance ensured that neither superpower believed that it could wage nuclear war upon the other without suffering unacceptably high losses themselves. Throughout the early 1950s, this stalemate was maintained through a combination of strategic bombers, deployable weapons systems, early warning radar, and interceptor aircraft. The early warning systems, speed limitations of bomber fleets, and inland location of many of the SAC bases ensured that American bombers would have adequate time to deploy prior to the arrival of the Soviet fleet. However, technological improvements in nuclear weapons and ballistic missiles began narrowing the window in which bombers and their refueling planes had to become airborne and the survivability of their command and control facilities.

It is worth noting that, in retrospect, it has been demonstrated that throughout the age of the bomber, the Soviet Union lagged far behind the United States in the fields of advanced metallurgy, electronics, and engine design (Zaloga 2002). For many of these years, the backbone of the Soviet bomber fleet was made up of Tu-4s, an inferior Soviet clone of the American B-29s that were produced at the Martin Bomber Building at Offutt, and other similar factories, during World War II. The poor range of these bombers meant that, even on a one-way trip, the Soviet strategic bomber fleet could penetrate no further than Washington State (Zaloga 2002:15–16). Throughout the 1950s, the Soviets attempted several advanced bomber designs. Given the persistent lag in technologies, the best that they could field was the Tu-95. The bomber was inferior in every way to the B-52s being fielded by SAC, but nominally provided true intercontinental range (Zaloga 2002:26–31).

By the close of 1956, General Thomas S. Power had succeed LeMay as SAC's commander and had recognized the threat posed to the credibility of the United States' threat of retaliatory strike (Narducci 1988). Operations Try Out, Watch Tower, and Fresh Approach established the feasibility of a new SAC posture, the one-third ground alert. This posture meant that one-third of SAC's retaliatory force would be armed and standing by to takeoff within 15-minutes of notification. Likewise, SAC Headquarters moved from the Martin Bomber complex (Building 301, etc.) to purpose built above and below ground headquarters buildings (Building 500 and 501). It was believed that the underground headquarters was hardened to the point that it would withstand all but a direct hit from the largest bomb (Hopkins and Sheldon 1976:58–59). As SAC was hardening its headquarters it was gradually built to the one-third stance, achieving it in 1960. The early 1960s, however, would see the full development and integration of ICBMs into the strategic arsenal of the superpowers, negating those efforts.

As ICBMs entered the arsenals, the window for launching bombers became effectively non-existent and the scope of command and control expanded to include the ICBM facilities. SAC's response was to develop the airborne alert for its bombers and airborne command post. On 1 July 1960, SAC began testing the concept of the airborne command post. Five KC-135 Stratotankers from the 311th Air Refueling Squadron at Offutt AFB were specially configured and put on 15-minute takeoff alert (Narducci 1988:8). When on alert, these planes were staffed a general officer and a team of controllers and communications experts to serve a backup for the above and below ground SAC command posts at Offutt (Hopkins and Goldenberg 1976).

Like the earlier strategic bomber threat, the limited opening of Soviet archives and the production of memoirs by former defense and defense industry leaders has demonstrated the illusory nature of the 1960s *missile gap.* Despite Khrushchev's boast that the Soviet Union was "turning out missiles like sausages," data presented by Zaloga (2002:77) demonstrates that the early 1960s, the Soviets missile stockpile never exceeded 32% of that of the United States. Moreover, despite their apparent early successes, the Soviet missiles were vastly inferior to those of the United States in terms of durability, alert readiness, reliability, and accuracy.

By February of 1961, the concept of the airborne command post was determined effective and continuous operations began. The airborne command post, later referred to as "Looking Glass" because it mirrored the underground command post at Offutt. It could communicate with the Joint Chiefs of Staff, any SAC base, and any other SAC aircraft (Hopkins and Goldenberg 1976). Each modified airborne command post operated for 8-hour shift before handing over the Looking Glass function to the next modified KC-135 in the air. The following year, the SAC airborne command post was augmented to include auxiliary airborne command posts flying modified B-47 Bombers (EB-47L) within the Post Attack Command Control System (PACCS).

By 1965, the EB-47L's role in PACCS had been made obsolete and the KC-135s had been replaced by newer EC-135s serving as Looking Glass and auxiliary command posts, as needed (Hopkins and Goldenberg 1976; Narducci 1988). In 1966, the 55th Strategic Reconnaissance Wing (SRW) relocated to Offutt AFB from Forbes AFB and assumed responsibility for the PACCS and Looking Glass missions (Clark and Martin 1988). The next major event occurred in 1975, when the 1st Airborne Command Control Squadron transferred to the 55th SRW, bringing with it their complement of E-4A aircraft and the National Emergency Airborne Command Post (NEACP) mission (Clark and Martin 1988).

While the Looking Glass mission mirrored the mission of the SAC command post, the NEACP mission was broader, providing an airborne command post from which the President, Secretary of Defense, or Joint Chiefs of Staff could coordinate the total military response of the United States (Air Force 2017). Nevertheless, the E-4 aircraft were equipped with the necessary electronics to operate as Looking Glass

(Lloyd 2000). Though the E-4 was capable of taking on the Looking Glass role, it remained in the purview of the EC-135 throughout the period of continuous operations (viz., 1961–July 1990) until it was replaced with the E-6Bs in 1998; the mission of providing airborne command and control over the United States' nuclear forces continues to this day (USSTRATCOM 2018). Following the close of the Cold War, the E-4 took on the National Airborne Operations Center (NAOC) role, adding natural disaster response for the Federal Emergency Management Agency (FEMA) to its previous NEACP roles. They continue this mission today (Air Force 2017).

Looking Glass and NEACP made vital contributions to keeping the Cold War from escalating into a global nuclear war. The perpetual active presence of the airborne command post, as well as the alert programs in general, were well publicized, in some cases even before they were actually operational (Narducci 1988). The purpose of this was explicitly signaling the Soviets. Writing of General Power's stance at the birth of the ground alert program, Narducci writes "he [Power] felt the best deterrent was to convey to the Soviets in clear and deadly terms the military readiness of his command" (1988:5). Airborne command posts ensured that the Soviets could not deliver a surprise decapitating blow to the United States and avoid retaliation, guaranteeing the stability of MAD.

The airborne command posts also reduced the danger of the United States prematurely initiating a nuclear exchange. The ICBM era presented a challenge in the balancing act between the time needed to evaluate a potential incoming attack and the time needed to launch a retaliatory strike. Once evidence of a potential launch was presented, ground controllers had a narrow window to evaluate the evidence and decide whether to initiate a retaliatory strike. An error in favor of an attack would lead to the unnecessary initiation of nuclear war. This almost happened on several occasions. An American example occurred on October 5, 1960, when the newly established BMEWS warning system mistook moon raise for an incoming Soviet ICBM attack, the fact that Khrushchev was at the United Nations in New York prevented the launch of a retaliatory strike (see Schlosser 2013:252–254). Similarly, the often cited actions of Stanislav Petrov during a Soviet false alarm in 1983 demonstrate a Soviet example (see Stien and Lotan 2019:61–64). However, an error against an attack would mean that the ground controllers would be destroyed before a decision could be made.

Beginning in the spring of 1967, the Airborne Launch Control System (ALCS) was operational on the airborne command post aircraft allowing SAC to launch its ICBMs even if the ground controllers were destroyed (Narducci 1988:17). As such, SAC commanders were less likely to make an error in favor of an attack fearing the loss of retaliatory strike capability.

Like their bomber and missile technology, Soviet NC3 lagged far behind the United States. As shown, the United States was developing redundant and dispersed nuclear command posts from the mid-1950s. The Soviets, in contrast, maintained centralized control within Moscow and communications by simple radio or telephone commands throughout the 1950s and 1960s. In fact, it was not until the late 1960s when two-way command signaling was operationalized, and even this did not allow direct control of the missiles themselves (Zaloga 2002:122–125). In the 1960, some dispersed command posts were operational during recognized crises, including a train-mobile command post and planes flying under the auspice of commercial carriers, including modified Tu-134s (Zaloga 2002:163). In the 1970s, two IL-82s—a purpose built variant of the Ilyushin Il-76 airlifter—entered the airborne command post, or *Vozdooshniy Komanndniy Poonkt* (VKP), role. By the mid-1980s, the Signal-A system finally allowed the Soviet command posts to directly launch their missiles, in the same manner that United States command staff could since the development of ALCS (Zaloga 2002:202). Though it would not enter service until after the collapse of the Soviet Union, the IL-86VKP was developed to fill, and currently fills, the same role as the E-4B for Russia (Zaloga 2002:226).

In summary, the conditions at close of World War II led to the development of both SAC and the Cold War. By the early 1950s, it was believed that if the Cold War were to become hot, it would be fought with atomic bombs delivered by strategic bombers. However, as the decade progressed, larger hydrogen weapons were developed and the ICBM was on the horizon. These technological developments minimized the lead time between the onset of nuclear war and the delivery of nuclear payloads, as well as the value of hardening stationary command posts. In response, SAC developed both ground and airborne alert postures, as well as airborne command posts that could coordinate a United States response to a Soviet initiated nuclear war. The need for airborne command posts was not limited to military leadership, leading to the development of both the Looking Glass and NEACP missions that were based out of Offutt AFB throughout the closing decades of the Cold War. These missions contributed to deterring nuclear war by signaling to the Soviets that they could not escape retaliatory strikes and by providing breathing room for America to evaluate potential attacks before launching its ICBMs.

Project Study

This section discusses the research design employed by this study. It is based on the historic context discussed above. The field methods used to assess the on-the-ground state of the APE are then briefly discussed. Finally, the study results are presented by proposed campus.

Research design

Based on the existing state of inventory and evaluation, the new identification of historic properties either archaeological or architectural was not anticipated. Rather, the goal of this study was threefold. First, within the main base portion of the APE, to determine if potentially affected historic properties retain sufficient integrity to communicate their significance following the 2019 flood. Second, within the Base Lake portion of the APE, to identify potentially buried cultural resources within areas disturbed by the flood. Finally, determine if larger blocks of the built environment are potential historic districts that may be destroyed or fragmented by the proposed undertaking.

National Register Framework

Historic Property is defined as any district, site, building, structure, or object included in, or eligible for the inclusion in the National Register of Historic Places (NRHP) (36 CFR 800.16(l)(1). Eligibility for inclusion requires significance in at least one of the four Significance Criteria presented within 36 CFR 60.4, and possession of sufficient historic integrity to communicate that significance.

National Register Bulletin 15 provides an order of operations for evaluating potential historic properties. This process begins with the categorization of a potential historic properties into one of five categories. The second step is determining what historic context or contexts a potential historic property represents. Step 3 determines whether the potential historic property is significant under one or more Significance Criteria. Step 4 determines if a property that is of a type generally excluded from the NRHP meets any of the seven Criteria Considerations. Finally, step 5 determines whether the potential historic property retains sufficient historic integrity to communicate its significance.

Step 1 of the evaluation process requires categorizing a potential historic property. They can be classified as a:

- Building: a construction principally to shelter human activity.
- Structure: a construction principally of a purpose that is not the sheltering of human activity.

- Object: a relatively small scale construction principally of artistic or communicatory design.
- Site: the location of significant human activity, including buildings and structures in ruins, primarily of archaeological rather than architectural value.
- District: a concentration, linkage, or continuity of the preceding property classifications united historically or aesthetically. Districts are especially valuable as a management tool for considering related properties.

Step 2 of the process involves determining the appropriate *historic context.* Historic contexts are patterns and trends within our shared history in which specific events and properties can be understood and given meaning. National Register Bulletin 15 states that significance is embedded within historic context. For a property to be historic, it must significantly represent a significant aspect of history. Neither marginal association with a significant pattern of history nor significant association with a marginal pattern of history is sufficient for achieving historic property status. To determine the significance of a property one must:

1. Determine how the theme of the context is significant in the history of the local area, the state, or the nation. The National Register has a defined list of *Areas of Significance* in which historic contexts fall.
2. Determine what the property type is (e.g., building, structure, site) and whether it is important in illustrating the historic context.
3. Determine how the property represents the historic context through the four Significance Criteria (A, B, C, and D).
4. Determine what physical features are necessary to reflect significance through the seven aspects of historic integrity.
5. Compare with related properties listed on the NRHP.

Step 3 evaluates the potential historic property against the four Significance Criteria. These are:

A. Event: Properties associated with events that have made a significant contribution to the broad patterns of our history.
B. Person: Properties associated with the lives of persons significant in our past. Generally, restricted to properties that illustrate the productive lives of these people, rather than commemorative properties such as birthplaces and graves.
C. Design/Construction: embody the distinctive characteristic of type, period, or method of construction, or represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
D. Information Potential: Properties that have yielded, or may be likely to yield, information important in prehistory or history.

Step 4 applies the properties significant under one or more of the four criteria discussed above, but of a type generally not eligible for listing on the NRHP. In these cases, there or seven exceptions to the rules, called the Criteria Considerations. These are:

A. A religious property deriving primary from architectural or artistic distinction or historical importance.
B. A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event.
C. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with their productive life.
D. A cemetery which derives its primary significance from graves of persons of transcendent importance, from distinctive design features, or from association with historic events.

E. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other buildings or structures with the same association has survived.
F. A Property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance.
G. A property achieving significance within the past 50 years if it is of exceptional importance.

Step 5 of the evaluation process assesses the seven aspects of integrity. The NRHP is fundamentally a register of physical property, the mere entanglement with the notion of a historic event is not sufficient for this reason a historic property must communicate its significance through the aspects of integrity. These are:

- Location: the place where the historic property was constructed or the historic event/s took place.
- Design: the combination of elements that create the form, plan, space, structure, and style of a property.
- Setting: the physical environment of a historic property.
- Materials: the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to for a historic property.
- Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory
- Feeling: the property's expression of aesthetic or historic sense of a particular period of time.
- Association: the direct link between an important historic event or person and a historic property.

National Register Bulletin 15 provides basic rules of thumb for assessing the ability of a resource to communicate its significance. For resources significant under Criteria A or B, it should be recognizable to its hypothetical contemporaries. For Criterion C, retention of historical materials, design, and workmanship are generally necessary to communicate its significance. Rules of thumb are less valuable for Criterion D because the important aspects of integrity are heavily conditioned by the data requirements of the research questions.

Research Questions within the Historic Context and Nation Register Framework

The only historic context relevant to the resources within the APE is the Cold War. Salmon's (2011) historic context for Cold War defensive sites provides examples of eligible property types by Significance Criteria based on a review of listed Cold War property. Regarding properties significant under Criterion A, he notes that these tend to be places associated with production and testing, places and resources associated with controlling and executing national defense activities, and—while none were listed—places associated with politics and government, including dwellings and office buildings (Salmon 2011: 93–94). Regarding Criterion B, properties significant under this criterion must be meaningfully associated with individuals who played significant roles in the Cold War. Regarding Criterion C, places must be exemplars of the architecture, landscape architecture, engineering, planning, or construction techniques of Cold War themes. Regarding Criterion D, the property must demonstrate physical remains that have answered or are likely to answer research questions about topics identified in the historic context. Further, he notes that all Cold War related sites within his corpus have met Criterion Consideration G.

Within the study area, historic properties significant under Criterion A may be associated with controlling or executing the nuclear defense and deterrent functions of the national defense mission, as well as offices and dwellings in support of the same. A historic properties significant under Criterion A should be able to communicate its Cold War significance through its relationship to specific themes or events associated with the Cold War and through intact aspects of integrity. For example, a Cold War-era dorm would not necessarily be eligible under Criterion A, despite being a dwelling related to the national defense mission during the Cold War; however, if documentary records and/or design demonstrate a key role within the ICBM or Alert programs and the necessary aspects of historic integrity are retained it may be eligible under Criterion A.

Within the study area, historic properties significant under Criterion B may be associated with the working lives of historic personages including General Curtis LeMay, General Thomas S. Power, Presidents of the United States (9 individuals), Chairmen of the Joint Chiefs of Staff (12 individuals), and Secretaries of Defense (16 individuals) throughout the Cold War. Such association would require documentary evidence supporting an association with important events of the person's life. For example, a building that General LeMay walked through during a routine inspection would not necessarily be eligible under Criterion B, despite having an association with an important Cold War person's working life; however, a building General LeMay routinely debriefed personnel after accidents may be eligible under Criterion B.

Within the study area, historic properties significant under Criterion C may be architecture, engineering, planning, or construction techniques of Cold War themes that demonstrate innovative approaches to construction that address problems such as:

- Hardening against direct or indirect effects of nuclear weapons
- Physical security related to the storage, assembly, or operational readiness of nuclear weapons
- Rapid deployment of alert personnel
- NC3 issues
- Operational security and counter-intelligence.

Historic property within the project area may also be significant under Criterion C as examples of the work of significant architects Albert Kahn and Leo A. Daly Sr., provided that they demonstrate intact features associated with their particular architect's cannon.

Within the study area, historic properties significant under Criterion D would possess data or information relevant to historic questions pertaining to the Cold War. Some examples include:

1. How did the mission of the facility contribute to deterrence during the Cold War?
2. How did the conditions of personnel assigned to the military airborne command post (Looking Glass) differ from those assigned to the civilian airborne command post (NEACP)?
3. How does the facility demonstrate unique or undocumented features associated with their Cold War mission?
4. Does the facility demonstrate significant information about the military during the Cold War that is either undocumented or contradictory to written histories?

Field methods

As the full APE has been adequately inventoried, field survey was limited to a reconnaissance survey of 610 acres (246.5 Hectares), with a more detailed recordation of the historic properties previously identified within the APE and potentially subject to effects. The survey units were primarily architectural based on lots surrounding major buildings. The exception to the architectural focus is the Base Lake portion of the APE where open ground was examined with specific focus on post-flood erosional features for evidence of subsurface cultural resources. Ground visibility was poor with snow cover approaching 90%. While not ideal, it is unlikely that surface scatters are present in this are because it has been previously inventoried without identification of cultural resource and was an active recreation area.

All coordinates were recorded in UTM Zone 15, WGS 1984 and are reported in UTM Zone 15, NAD 1983. Photographs relating to Building 524 were taken with a Canon PowerShot S100 by Offutt Air Force

Base Environmental Scientist Marisa Gibb. All other photographs were taken with an Olympus Stylus TG-3 by USACE Archaeologist Levi Keach.

Study Results

No new potential historic property was identified within the APE. Existing historic properties are summarized on Table 2. Only Building 524 is subject to the direct effects of the proposed undertaking. Building 500 may be subject to indirect effects associated with the proposed MILSTAR. The remaining historic properties have been effected by the flood and repairs have already been conducted.

Table 2. Existing Historic Property within the APE.

Building Number	Description	Construction Date	Eligibility	Flood Rehabilitation Plan
457	Bennie L. Davis Maintenance Facility	1986	A and C	Post-flood repair
491	Large Aircraft Maintenance Dock	1959	A and C	Post-flood repair
492	Large Aircraft Maintenance Dock	1959	A and C	Post-flood repair
493	Large Aircraft Maintenance Dock	1959	A and C	Post-flood repair
500	SAC Headquarters	1955	A and C	No activity
524	NEACP alert crew quarters	1977	A and C	Demolition
565	E-4 Maintenance Hanger	1977	A and C	Post-flood repair

FLH Campus: For security purposes, this location was only examined from outside the flightline security area (Figure 6). Repair work at identified historic property Buildings 491, 492, 493, as well as one non-historic property (584), was necessary within this area to prevent the buildings from rotting and has already been completed.

Previous cultural resources studies have sufficiently identified all prehistoric and historic-era historic properties within this area. Additional ground survey would not reasonably be expected to identify any unknown potential historic property and the integrity of existing historic property is assumed to remain intact following the flood.

Buildings not identified as historic properties within this area are 322, 389, 393, 408, 409, 460, 517, 552, 571,584, 585 and 600. Nine of these are listed in Appendix D of the Offutt PA as determined not eligible for the NRHP and exempt from further Section 106 review (Table 3). The remaining three buildings (408, 409, and 600) post-date the base's period of significant, dating between 1993 and 1996. They do not meet the requirements of Criterion Consideration G and are not considered potential historic property.

Figure 6. FLH Overview, Building 565 in center. View north from: 257332E 4555099N (Keach 2020)

Table 3. Buildings within the Proposed FLH Campus listed in Appendix D of the Offutt PA

Facility Number	Year Built	Original Use/ Current Use	Integrity Summary
322	1971	Vehicle Fuel Station	Not evaluated; pump island for Building 517.
389	1989	Jet Engine Inspection and Maintenance Shop	Intact
393	1989	T-9 Sound Suppressor/Test Stand	Intact
460	1970	Warehouse	Intact
517	1964	Ground Support Equipment Shop/Aircraft Support Equipment Shop and Storage	Modified – Large addition in 1979.
552	1961	Heavy Equipment Shop/Refueling Vehicle Shop	Intact
571	1986	Liquid Oxygen Storage	Intact
584	1986	Petroleum Operations Refueling Garage/Vehicle Operations Heated Parking	Intact
585	1986	Petroleum Operations Building	Intact

Work associated with the undertaking in this area is the demolition of damaged non-historic buildings and the construction of several structures and small buildings associated with aviation maintenance. These actions do not present a risk of direct adverse effects to the historic property within this location. Additionally, the proposed demolition and construction activities would not result in a change to the setting or association of the historic property and, therefore, would not result in any indirect effects to historic property.

Lake Campus Area: The Lake Campus consists of two discontiguous recreation areas. The first is a baseball field located within the cantonment area (Figure 7), the second is located east of the cantonment area and surrounds an artificial lake created by past Offutt AFB activities (Figure 8). The entire location was subject to reconnaissance level survey. The lake area was further examined for evidence of archaeological sites, especially within cuts made by the flooding. No previously identified historic property is within this location. Likewise, no previously unidentified potential historic property was observed within either location.

Three buildings (588, 803, and 809) and 11 structures are locate within the Lake Campus. Of these, only Building 588 is located within the cantonment area.

No potential historic property was identified in this area. This is unsurprising given the history and land use at this locations, especially within the lake area. GLO plats demonstrate that much of the area was within a meander of the Missouri River during the late 1800s. The river would have limited human use and scoured near surface sites from the landscape during that period. The extensive borrow activities that produced the base lake likely resulted in a fair amount of mechanical turbation during the mid-20th century. Subsequent recreational activities would have had further deleterious effects on near-surface archaeological deposits that may have been present. Given this history the potential for intact deposits within the first three feet is negligible.

Figure 7. Lake Campus baseball area within Offutt Cantonment. Building 588 in midground. View north from 256533E 4554595N (Keach 2020)

Figure 8. Campground at the Lake Campus. View southeast from 258171E 4555221N (Keach 2020)

Proposed activities include the demolition of non-historic buildings (Figure 9) and structures, as well as landscape repairs. Building 588 was constructed in 1989 and is not significantly associated with the important themes relevant to Consideration Criterion G. Building 803 has been evaluated and is listed in Appendix D of the Offutt PA (Table 4). Building 809 is of relatively recent construction and does not meet the criteria to be considered as potential historic property. Structure 819 is a non-descript maintenance shed. Because no historic property is present, these activities would not result in effects to historic property.

Table 4. Buildings within the Proposed Lake Campus listed in Appendix D of the Offutt PA

Facility Number	Year Built	Original Use/ Current Use	Integrity Summary
803	1958	Base Lake Pavilion/Outdoor Recreation Pavilion	Modified (minor) - Non-historic entrance; small shed roof addition.

Figure 9. Buildings Planned for Demolition at the Lake Campus, View Southwest from 258267E 4555347N (Keach 2020)

LRS Campus: The entire proposed LRS campus was subject to reconnaissance level survey. Previous cultural resources surveyed have not identified any historic property in this area and nothing was observed during this reconnaissance to suggest any previously undocumented historic property is present. The area is currently a warehouse and POL storage area. Proposed activities would demolish existing storage facilities and construct more efficient facilities serving the same general function. Most of the buildings within this area that are listed for demolition are also listed in Appendix D of the Offutt PA (Table 5). The remaining two buildings, 486 and 586 are not potentially historic property because Building 586 was constructed in 2000 and Building 486 was evaluated and determined non-eligible in 2007 (Weitze et al. 2009). Because no historic property is present, the proposed activities in this area would not result in effects to historic property. Figure 10 provides an overview demonstrating the warehouses and POL storage facilities.

Table 5. Buildings within the Proposed LRS Campus listed in Appendix D of the Offutt PA

Facility Number	Year Built	Original Use/ Current Use	Integrity Summary
482	1961	Chemical Storage/Liquid Fuel Pump Station	Modified- windows and roof replaced; altered 1977.
495	1958	Sanitary Sewage Pump Station/Electric Power Station	Intact
543	1962	Disposal and Salvage Warehouse/Hazardous Storage	Modified – Non-historic doors.
553	1961	Disposal and Salvage Warehouse/Warehouse	Modified – Non-historic doors and windows.
556	1968	Disposal and Salvage Warehouse/Warehouse	Modified – Non-historic overhead door and window on main façade.

Figure 10. LRS Location, FLH location in background. View east from 255197E 4555215N. (Keach 2020).

MILSTAR Campus: The proposed MILSTAR Campus would be constructed behind Building 500. The facility would consist of a single story building and an antenna farm. Current design considerations are to locate the antenna farm either on top of the hill or within a parking area on the side of the hill. Due to security consideration and planning uncertainty, this location was not visited during the initial survey. On April 08, 2020 the location was visited. Photographs were taken of the proposed MILSTAR locations in this area and from various vantage points to allow for the preparation of visual simulations. Figure 11 demonstrates an area where the MILSTAR building would be developed. It is immediately adjacent to the Building 500 district boundary proposed in the 2003 HAER (Figure 12).

As a building eligible under A and C, it is possible that the construction may negatively affect the setting of Building 500, causing indirect effects to this historic building. Such effects are not likely to change the overall eligibility of the property but are still likely to result in an adverse effect. An appendix (Appendix B) analyzing the indirect effects associated with the proposed MILSTAR Campus siting is attached to this report.

Figure 11. Area behind Building 500 where MILSTAR would be located. View south from 255034E, 4555530N (Keach 2020).

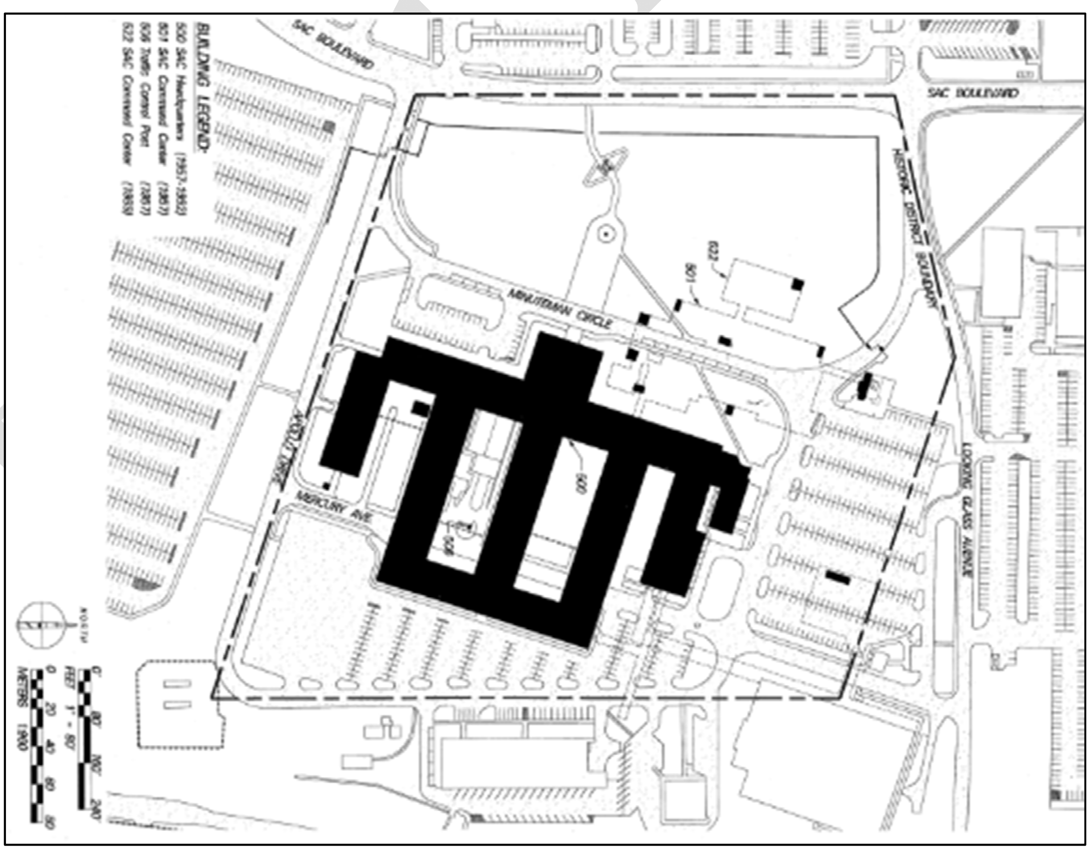

Figure 12. Building 500 and Associated Space from HAER NE-9-M (Hoisington 2003)

NKO Campus: The NKO is planned to occupy the area previously occupied primarily by buildings associated with the Looking Glass program. Buildings 424, 453, 455, 458, 464, 497, 557, 578, 582, 593, 598, 655, and 699 would be demolished. Several of these buildings have been subjected to HAER documentation associated with the recordation of the Looking Glass program and consideration of a potential historic district (Roise and Curran 1998). No district was established and all of the buildings have since lost their integrity. The current Appendix D of the Offutt PA (26 April 2018 update) list most of the buildings in this area as determined non-eligible and exempt from further Section 106 review (Table 6).

Buildings 453 and 582 are not discussed in the appendix because they are not related to the Cold War and do not otherwise meet the criteria for consideration as potential historic property. Buildings 453 is an airborne weapon system simulator building that had been recommended eligible in the late 1990s (Rhodes et al. 1997), but was later found to lack sufficient integrity due to substantial modification (Weitze et al. 2009). Buildings 582 is a security building that post-dates the period of significance by four-years and does not otherwise meet any of the criteria for potential historic property.

The area was subject to reconnaissance survey, no previously unidentified potential historic property was found. The area has been intensively developed and no potential for shallow archaeological deposits is present. Many of the buildings previously associated with the Looking Glass program have been substantially destroyed by flooding (Figure 13). Their doors stood open and obvious mold and water damage could be observed (Figure 14). Proposed activities in this area would not result in effects to historic property because no potential historic property remains at this location.

Table 6. Buildings within the Proposed NKO listed in Appendix D of the Offutt PA

Facility Number	Year Built	Original Use/ Current Use	Integrity Summary
424	1991	Supply and Equipment Shed/Warehouse	Intact
453	1976	Flight Simulator*	Modified – 50% addition in 1986.
458	1985	Group Headquarters	Intact
464	1973	Readiness Crew/Group Headquarters	Lost - Major facelift 1988-1992, including brick veneer; connected to Building 458, 1988.
497	1958	Squadron Operations	Lost – Complete facelift; 50% addition 1968; replaced windows and installed exterior insulation 1991; covered walkways at entrances 1993.
557	1962	Telephone Exchange/Flying Training Classroom	Modified – Vertical window panels on west façade are infilled top to bottom; brick infill on east façade.
578	1975	Security Operations	Modified – Wing added 1981; garage added west side 1991; northwest façade remodeled, including removal of upper band of small windows, door pattern, and overhang.
593	1986	AFSS Operations/Security Operations	Intact

* More precisely, airborne weapon system simulator building

Figure 13. Flood Damaged Gazebo behind Building 497. View Northeast from 255677E 4555155N (Keach 2020).


Figure 14. Flood Damage to Building 497, One of Several Open Doors, View North from 255697E 4555134N (Keach 2020).

NC3 Alert Campus: The NC3 campus would be constructed in approximately the same location as the buildings where the same functions had occurred prior to the flood Buildings 160, 273, 428, 470, 496, 499, 514, 524, 533, 541, 544, 576, 595, 599, 683, and 685 would be demolished. Like the proposed NKO and Security Campus, buildings in this area were among the hardest hit by the flood. Many are currently uninhabitable and all would be demolished. The majority of these buildings have been determined non-eligible and exempt from further Section 106 review (Table 7). Buildings 160, 470, 499, and 685 were constructed after the period of significance and do not otherwise meet the criteria for consideration as historic property. Building 524 is listed in Appendix C of the Offutt PA as individually eligible the NRHP. Building 595 is a liquid oxygen facility consisting of tanks and a canopy structure that was constructed in 1988. It was not evaluated by Weitze et al. (2009) because it was considered a minor facility of such little potential as to be not worth evaluating. It is currently in poor condition as a result of the flood (Figure 15).

Table 7. Buildings within the Proposed NC3 Campus listed in Appendix D of the Offutt PA

Facility Number	Year Built	Original Use/ Current Use	Integrity Summary
273	1965	Water Supply Building	Intact
428	1976	Base Supply and Equipment Shed/Housing Supply and Storage	Intact
496	1957	Demineralized Water Storage/Base Supplies and Equipment Warehouse	Intact
514	1984	Precision Measurement Equipment Laboratory	Intact
533	1977	Security Entry Control	Lost - Reclad in veneer and non-historic roof treatment, 1987.
541	1985	Courier Station/Air Force Headquarters	Intact
544	1960	Jet Engine Test Stand/Admin Office	Modified - Lacks the multiple related elements at the original complex.
576	1977	Security Entry Control	Lost – Reclad in veneer and non-historic roof treatment, 1987
599	1975	Depot Supply and Equipment Shed	Modified – Non-historic roof treatment.
683	1986	Supply and Equipment Shed/Warehouse	Intact

Figure 15. Building 595, View West from 257332E 4555099N (Keach 20200.

The area was subjected to a reconnaissance survey, with an intensive recordation effort at Building 524. The area has been completely developed and there is no potential for shallow buried archaeological deposits. The interior and exterior of Building 524 was examined for integrity, engineering drawings of the building were acquired from the base's spatial data repository, and an architect familiar with the building was briefly interviewed. Based on these data, it is recommended that the building no longer retains the integrity to communicate its significance and in no longer eligible for the NRHP. A detailed evaluation is presented in Appendix A of this document and abstracted in the Evaluation section of this document. Because no historic property is present, activities associated with the NC3 Campus would not affect historic properties.

Security Campus: The Security campus would be constructed in the most intensively damaged portion of the base. On the ground survey associated with this report demonstrated extensive flood damage and buildings inhabited by wildlife. Given that the area has been completely developed and is either paved or artificially contoured to suit mission needs, the probability of encountering previously unrecorded shallowly buried or surface sites approaches non-existent in this area.

This area was host to many of the facilities that need to be replaced due to the flood. This includes the previous MILSTAR-equivalent facility (Figure 16) and multiple facilities that will be replaced within the Security Campus. Buildings slated for demolition in this area are 475, 476, 523, 540, 542, 559, 560, 563, 566, 567, and 581. Six of these buildings have been determined non-eligible and exempt from further Section 106 review (Table 8). Buildings 475 and 476 are accessory structures to the non-eligible Satellite Communications buildings. Building 523 and 567 were constructed in 1994, Building 581 was constructed in 2000, and none meet any criteria for consideration as a historic property.

Building 563 (Figure 17) is a small arms range, the original building dating to 1970 that was previously found to be unrelated to the important historic themes of Offutt AFB (Weitze et al. 2009). The building was not evaluated at that time. The original building was demolished in 2017 and the current Building 563 was built in its place. As a 2017 building with no Criterion Consideration G potential it does not have the potential to be historic property.

Figure 16. Satellite Communications Center to be Replaced by MILSTAR Campus, View West-southwest from 255540E 4554973N (Keach 2020)

Table 8. Buildings within the Proposed Security Campus listed in Appendix D of the Offutt PA

Facility Number	Year Built	Original Use/ Current Use	Integrity Summary
540	1959	Liquid Oxygen Plant/Maintenance Building	Modified – Overhead door non-historic; some upper window panes changed out (others intact).
542	1976	Satellite Communications Ground Terminal	Intact
559	1972	Warehouse	Lost – Original prefabricated metal building (40' by 100') augmented with addition early 1990s.
560	1976	Canine Kennel	Lost – Original metal building, reclad in insulated panels; windows replaced.
566	1978	Satellite Communications Ground Terminal	Lost - Radome and base added 1991; as built, 40' dish antenna.

Given that no historic property has been identified in this location, that the conditions preclude shallowly buried archaeological sites, and the extent of the damage in this area, no historic property is present. Therefore, activities associated with the proposed Security Campus are not expected to cause effects to historic property.

Figure 17. Building 563, View Southwest from 255925E 4554734N (Keach 2020)

Off-Campuses: Some flood repair actions were necessary outside the campus locations where new construction is planned. Proposed actions are the demolition of Buildings 485, 518, 532, 572, 573, and 660. Many of these demolitions affect properties already determined to be not eligible (Table 9). Building 485 dates to 2004, well after the period of significance. Building 532 is not a building, rather it is a structure associated with the ILS for the Offutt runway. It is a minor structure measuring less than 100 square feet in area. It was originally constructed in 1960 and has undergone continuous modification.

Table 9. Buildings outside the proposed campuses subject to effects listed in Appendix D of the Offutt PA

Facility Number	Year Built	Original Use/ Current Use	Integrity Summary
518	1973	Electric Power Station	Modified – Large addition 1978-1982; small addition 1995; paired with Building 519.
572	1960	Support Facility, Jet Engine Test Stand/Warehouse	Intact
573	1960	Jet Engine Test Cell/Hazardous Storage	Intact
660	1988	Reserve Fire Team Facility	Modified – Brick veneer added.

Evaluation

Buildings 500 and 524 are the only historic properties that may be effected by the proposed undertaking. Five other properties were damaged by the flooding and were subjected to emergency repairs under a separate undertaking. Potential effects to Building 500 would be indirect only.

Building 500
Area of Significance: Historic-Period (Cold War)
Type: Administrative Building
Date: 1955–1991
Significance: Significant under A and C, Eligible (National Level)

Description: This building is the former headquarters for SAC and USSTRATCOM headquarters. Recently, USSTRATCOM moved to a new building and 55th Wing headquarters now occupies the building. It was built in 1955 to serve as the headquarters of the Strategic Air Command. The building complex measures approximately 650-x-500 feet along its largest extents. No attempt was made to record this building during this survey. The building was the subject of HAER NE-9-M.

Eligibility Summary: The eligibility determination dates to the 1997 baseline inventory (Rhodes et Al. 1997) and was confirmed by Weitze et al. (2009) and the PA's Appendix C. It is eligible under Criterion A for its association with the Cold War. It is eligible under Criterion C for its design by a significant architect, Leo A. Daly. No direct discussion of its supporting integrity is document, except that it is intact despite modifications throughout the 1960s and a change in windows and supported by its association with Building 501 and a security building within its courtyard (Weitze et al. 2009). As flooding has not impacted this building, there is no cause to reevaluate this building and it is assumed to be eligible under A and C and communicated through all aspects of integrity. This research recommends, however, that Criterion B for association with the productive life of General Thomas S. Power be considered during its next formal evaluation.

Building 524
Area of Significance: Historic-Period (Cold War)
Type: Mixed Use (administrative and temporary residential) Building
Date: 1979–1991
Significance: Significant under A and C, Not-eligible

Description: This building consists of two stories, following an irregular plan that masses primarily along an east-west axis. The first floor serves as office and readiness space, while the second serves as dormitory space. The first floor is larger, originally enclosing 28,816 ft^2 now enclosing 32,565 ft^2, the second enclosing only 17,270 ft^2. Three stairwells connect the two stories. Each contains a mural dating to the late 1990s. The asymmetry of floors weights the building to the west.

The building had been designed in the Brutalist architectural style, as demonstrated by strong geometric lines, exposed structural concrete, and generally uninviting entrances. As was common among American Cold War defensive structures of this style, windows were minimal to non-existent. It was designed by a staff architect at Burns & McDonnell and built by contractors to the US Army Corps of Engineers.

An addition was added to the east elevation in 2000 of unknown designer and a major remodel occurred in 2018 following designs by John T. Deacy of Carson West Povondra. Both of these events deviate from the architectural style of the building during its period of significance. The concrete massing of the building was defined by strong vertical lines in the original design. The 2000 addition conflicts with this in that it consists of metal horizontal lines and adds windows and glass doors to the building. Likewise, the 2018 remodel conflicts with original style through the addition of more windows and a glass vestibule around what had been a recessed main entrance. As it stands today, the Brutalist style of the building is difficult to perceive through the subsequent modifications (Figure 18).

Figure 18. Building 524, East Elevation, Note Conflicting 2000 Addition (Gibb 2020).

Turning to interior space, on the ground floor, nearly the entire use of space was changed in the 2018 remodeling (cf. Burns & McDonnell 1984 and OAFB 2020a; 2020b). The only more-or-less intact space is the briefing theater and stairwells. Most of the first floor space was redivided to create smaller spaces at the expense of larger communal spaces. A significant reassignment of space within the interior northeast portion of the building has been converted to an industrial kitchen. This space also resulted in changes to the main hallway throughout the building. Much of the interior divisions on the ground floor made during the remodel have been destroyed by the 2019 flood.

The second floor has also undergone an extensive redivision of space, even if it was unaffected by the flood event. In the original design, the hallway formed a figure-8 with rooms along the outside walls and within three interior clusters. Each of the 34 sleeping rooms contained a latrine, either individually or more commonly shared as a suite. The remodel has completely changed design of the second floor. Today, 67 smaller rooms are arranged in three and one-half east-west running files, with north-south hallways along the external walls. With the exception of the three stairwells and a closet between the main stairwell and the south exterior wall, no division of space remains unaltered between the original design and the 2018 remodel. No photos were taken of second floor rooms to respect the privacy of the airmen billeted there.

Water marks on the exterior walls demonstrate that flood waters reached approximately 33-inches high, just beneath the door handles (Figure 19). Floodwaters heavily damaged the flooring and all lower drywall panels within the building. Emergency stabilization has involved the complete removal of flooring, most interior doors, and drywall. In order to facilitate minimal mission readiness drywall was being rehung in mission critical portions of the building, but all areas west of the main hallway have been left bare and abandoned in place.

Figure 19. High Water Line on Building 524, North Elevation (Gibb 2020).

Five murals dating to the late-1990s created by two or three artists, likely airmen attached to the NEACP are located within the building. One is located in the briefing theater, while the remaining murals are within the stairwells. Two are E-4 aircraft and the remaining three are unit insignia.

A more complete description of the building is located in Appendix I.

Eligibility Summary: Since 2007, when Weitze and associates surveyed the building, Building 524 has undergone two significant events impacting its integrity, a major remodeling in 2018 and a flood in 2019. The following recommendation considers all four Significance Criteria anew and the current state of integrity.

- **Criterion A:** This building was significantly associated with the NEACP program during the late Cold War, a period typified by Reagan-era escalation of hostilities and the ultimate collapse of the Soviet Union. The program was important to the theme of Cold War Defense within the sub-theme of nuclear deterrence. The program reduced the possibility of a decapitating strike against the civilian leadership of the United States and, with the complementary Looking Glass program, enhanced the credibility of MAD, and preventing a hot war between the Super Powers. Therefore, the building is significant under Criterion A.

- **Criterion B:** No information related to specific persons of historic importance could be identified. Therefore, the building is not significant under Criterion B.

- **Criterion C:** The building—as designed—was exemplar of Brutalist architecture, especially as it related to American Cold War defensive buildings. Hard geometric lines, massing of visible concrete, and uninviting entrances communicated the values of the architectural style. It is not, however, the work of a master, or any representative of any other factor leading to significance under Criterion C. On 30 January, the building was discussed with a licensed Nebraska architect and project manager for the remodeling effort. He opined that building was standard in configuration with no significant or unique design or construction elements (Kotlik 2020). It is, therefore, significant under Criterion C for its architectural style.

- **Criterion D:** The building does not possess and has not yielded information important to our shared history. It does not possess data significant to the Cold War questions defined above. Building 524, especially following the remodel and with the loss of comparative Looking Glass buildings cannot address these questions. Therefore, the building is not significant under Criterion D.

The building is less than 50-years old and meets Consideration Criterion G. The building is significantly associated with the later phase of the Cold War, this phase is marked by the collapse of détente and a final period of intensive proliferation preceding the collapse of the Soviet Union. This period is of noted significance to Cold War historians and there is sufficient written history to demonstrate the exceptional historic importance of this period.

While the building is significant under Criteria A and C, and meets the requirements of Consideration Criterion G, it lacks the integrity to communicate that significance.

- **Integrity of Location:** Building 524 remains in its original location. This aspect of integrity is completely intact.

- **Integrity of Design:** Organization of space, technology, and ornamentation has been destroyed in the remodel and subsequent flood. Spatial organization has been completely revised such that nearly no correlation exists between the original design and the current layout. The architectural style of the building has been severely compromised through the construction of an addition that incorporates windows and geometric lines running perpendicular to those of the original design. This aspect of integrity has been lost.

- **Integrity of Setting:** Landscape level changes have been wrought by the flood, and the loss integrity of most of the buildings associated with the related Looking Glass program diminish the setting. However, the persistent relationship with the flightline, E-4, and Building 525, as well as the persistence of the NEACP mission and Air Force base are enough to maintain integrity of Setting. This aspect of integrity has been compromised but is minimally intact.

- **Integrity of Material:** While the exterior walls remain mainly their original pre-cast concrete, the integration of new material, including glass, Thermoplastic Polyolefin, and aluminum, has significantly degraded the integrity of exterior material. The situation is much worse within the building where a remodel and flood have resulted in the loss of all flooring and walls, with the exception of the walls within the stairwells. This aspect of integrity has been lost.

- **Integrity of workmanship:** Due to the factors effecting the materials and design of the building this aspect of integrity has been lost.

- **Integrity of Feeling:** Changes made in the remodel and the effects of the flood have drastically changed the feeling of the building. The only elements supporting the feeling of a Cold War Air Force alert facility are the palimpsest of klaxons and loudspeakers still affixed to the exterior walls and the murals within the stairwell, neither of which are necessarily associated with the building's period of significance. This aspect of integrity has been lost.

- **Integrity of Association:** This aspect is supported and compromised in much the same manner as Setting. Therefore, this aspect of integrity is intact but compromised.

Following the guidance of National Register Bulletin 15, the essential aspects of integrity for a property significant under Criterion A are those that make up its appearance during its period of significance. Building 524 lacks those aspects. Likewise, a property significance under Criterion C can lose some of its materials or details but must retain the majority of those features that illustrate "massing, spatial relationships, proportion, pattern of windows and doors, texture of materials, and ornamentation." These aspects are strikingly absent from the building.

Therefore, while Building 524 is significant under Criteria A and C, it lacks the historic integrity to communicate its significance under either Criteria and is not eligible for inclusion in the National Register of Historic Places. Additionally, it does not contribute to a historic district, either listed or potential. No listed district is present. The only potential historic district in this location would be related to the airborne alert program. Such a district was previously considered and resulted in a HAER level recording of some property associated with the Looking Glass program (Roise and Curran 1998). No historic district was established and most of the properties associated with the program have lost their integrity and passed from individual eligibility.

Recommendations

FLH Campus: The proposed undertaking is not anticipated to cause effects to historic properties within this area and it is recommended that the proposed project proceed as planned.

Lake Campus Area: The proposed undertaking is not anticipated to cause effects to historic properties within this area because none are present. While it is unlikely, this location may contain deeply buried sites. It is recommended that the proposed project proceed; however, if deep earth disturbing activity occurs it is recommended that staff be trained to identify cultural material and an inadvertent discovery plan be in place prior to those activities.

LRS Campus: The proposed undertaking is not anticipated to cause effects to historic properties within this area because none are present. It is recommended that the proposed project proceed as planned.

MILSTAR Campus: The proposed MILSTAR Campus would be located immediately southeast of Building 500, a historic property of national significance. This action has the potential to cause effects to the setting aspect of integrity. An analysis of these effects was conducted and documented in Appendix B of this report. Based on this analysis, it is recommended that, provided the size of the structures are approximately the same as the structures they are replacing and that the building is of a similar style to the existing buildings in the area, these effects would not raise to the level of adverse effects and the proposed project should proceed as planned.

Miscellaneous Non-Campus action: No historic property is present in the miscellaneous locations outside of the campus foot prints where building demolitions are proposed. The proposed undertaking is not anticipated to cause effects to historic properties within this area because none are present. It is recommended that the proposed project proceed as planned.

NKO Campus: The proposed undertaking is not anticipated to cause effects to historic properties within this area because none are present. It is recommended that the proposed project proceed as planned.

NC3 Alert Campus: The proposed undertaking is not anticipated to cause effects to historic properties within this area because none are present. It is recommended that the proposed project proceed as planned. While Building 524 lacks the integrity to convey its significance, it is recommended that the buildings name be retained with its replacement along with some artifact of the building purely for continuity of military tradition rather than Section 106 purposes.

Security Campus: The proposed undertaking is not anticipated to cause effects to historic properties within this area because none are present. It is recommended that the proposed project proceed as planned.

Recommended Finding of effect

This report recommends a finding of no adverse effect. It is recommended that indirect effects to Building 500 do not raise to the level of adverse effects. It is recommended that Building 524 is no longer eligible for the NRHP because it lacks integrity. Therefore, it is recommended that the overall finding be *No Adverse Effect* as defined in 36 CFR 800.5(b).

Potential Mitigation

If the Offutt Cultural Resource Manager or Nebraska SHPO do not concur with this recommendation and find these effects to be adverse, the following mitigation actions are recommended:

- For effects to Building 500, a HAER documentation would be inappropriate as such documentation already exists. Rather, it is recommended that this be supplemented by the commissioning of an investigation into the assignment of parking during Building 500's period of significance and an associated phenomenological study of the perception of space for public publication.
- For effects to Building 524, it is recommended that a HABS/HAER-level documentation focusing on the evolution of the building overtime be commissioned.

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Appendix A

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Resource Forms

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SHPO Resource #:
Other Resource #: BLDG 524

Architectural Recording Form

SHPO Concurrence?:			Date:		
Eligible Under:	Criterion A ☐	Criterion B ☐	Criterion C ☐	Criterion D ☐	Not Eligible ☒
	Unevaluated ☐		Contributes to historic district ☐		

1. Property Type

Building ☒	Structure ☐	Object ☐	Landscape (Designed or Rural) ☐

2. Property Overview and Location

Street Address	102 Looking Glass Ave.				
City, Zip	Offutt Air Force Base, 68113				
County, State	Sarpy, Nebraska				
Assessor's Parcel #	N/A	Subdivision Name	N/A		
UTM Location (NAD 83, UTM Zone 15)	Easting: 256063	Northing: 4554961			
Township:	Range:	Section:	P.M.:	USGS Quad: Plattsmouth 7.5'	
Ownership:	Private ☐	Public-Local ☐	Public-State ☐	Public-Federal ☒	Multiple ☐
Should the property's location be kept confidential?	Yes ☐	No ☒			

Description: Airstrip-facing façade from northeast corner, 256115E 4554964N	
Elevation: North	
Date: 30 January 2020	

3. Architectural Information

Architectural Style:	Brutalist		Architectural Type:	Mixed use		
Roof Form:	Flat	Roof Material:	Thermoplastic Polyolefin (originally aluminum)			
Window Form:	Fixed		Window Material:	Aluminum		
Exterior Wall Material:	Concrete, aluminum façade		Foundation Material:	Concrete		
Number of Stories:	2	Special Features:	None			
General Condition:	Exceptional ☐	Good ☐	Fair ☒	Poor ☐		
Explanation:	Significant flood damage to first story.					

4. Architectural History

Construction Date:	1979
Historic Name:	Advance Airborne Command Post Facility
Current/Common Name:	Colonel Robert R. Dailey Operations Center
Historic/Original Owner:	United States Air Force
Current Owner:	United States Air Force
Historic Building Use:	NAOC crew readiness facility
Current Building Use:	NEACP crew readiness facility
Architect/Engineer:	Burns & McDonnell staff (JKZ)-1977–1984; Daren Konda, Carlson West Povondra-2015–2018
Builder/Contractor:	Unknown.
History of Construction and Modification:	Building was designed by Burns & McDonnell staff architects in the late 1970s. In 2000 an addition was grafted to the south east corner. In 2018, renovations designed by Daren Konda of Carlson West Povondra were completed. In 2019, flooding damaged the entire 1st story, the story has been gutted and unfinished drywall hung in essential areas.

5. Individual NRHP Eligibility

Significant Under:	Criterion A ☒	Criterion B ☐	Criterion C ☐	Criterion D ☐		
	Not Significant ☐	Unevaluated ☐				
Significant at what level?	National ☒	State ☐	Local ☐			
Applicable Consideration Criteria?	G					
Area(s) of Significance:	Cold War Defense					
Period(s) of Significance:	1979–1991					
Intact Aspect(s) of Integrity						
Location ☒	Design ☐	Materials ☐	Workmanship ☐	Setting ☒	Feeling ☐	Association ☒
General Integrity:	Intact ☐	Altered ☐	Not Retained ☒	Moved ☐	Date(s):	
Threats to Resource:	Planned demolition					
If work of a master, list:	N/A					
representative of particular phase of work:						
Is the property listed in the National Register?	Yes ☐	No ☒	If yes, provide:	Date Listed:		
				NRIS #:		

6. Existing and Potential District NRHP Eligibility

Contributing to a listed historic district?	Yes ☐	No ☒	If yes, provide:	Name:	
				NRIS #:	
Contributing to an eligible, unlisted, historic district?	Yes ☐	No ☒	If yes, provide:	SHPO #:	
				District Name:	
If no, is there a potential district?	Yes ☐	No ☒	If so, is the potential district eligible for the NRHP?	Yes ☐	No ☐
			If so, is this resource contributing?	Yes ☐	No ☐

Potential District Description:

7. Administrative Data

Survey Date:	30JAN20	Recorded By:	Dr. Levi L. Keach	Agency Report #	
Survey Organization:	U.S. Army Corps of Engineers			Org. Report #	
Address:	Omaha District Office, 1919 Capitol Ave. Omaha, NE				

8. Narrative Architectural Description:

This building consists of two stories following an irregular plan that masses primarily along an east-west axis. The first story was designed as office and readiness space, while the second served as dormitory space. The first floor is larger, originally enclosing 28,816 ft^2 now enclosing 32,565 ft^2, the second enclosing only 17,270 ft^2. Three stairwells connect the two stories. Each contains a mural discussed below. The asymmetry of floors weights the building to the north and west.

The building has ten exterior doors, the majority of which are unornamented steel along the north elevation, facilitating rapid access to the alert aircraft. The main entrance is located on the south elevation. Prior to the 2018 remodel, this entrance was recessed within the main massing of the building (Burns & McDonnell 1984a). Unfortunately, due to security concerns no photos are available at an angle that demonstrates this feature. Today, the recessed entrance is encased in a small glass vestibule (Figure 22). There are also two doors that exit the briefing theater at this elevation. Three exterior doors are located on the building's eastern elevation. These are primarily tinted glass, with the exception of a steel door accessing the mechanical room. Previously, there was a single steel door on the west elevation.

Windows are rare and located exclusively within the 2000 addition and the western half of the north elevation. It is worth noting that these windows are associated with the remodel and are not original to the design. They are all fixed, tinted glass framed in metal, presumed to be aluminum, but may be steel. All exterior walls are precast concrete, as is the base of the flat-form roof. The upper story's façade is the beige dyed face of the precast concrete panels. The ground story is slightly ornamented in that the precast concrete panels have regularly spaced vertical fins every three feet. Along the original façade, the vertical lines are interrupted by horizontally louvered vents on the east elevation. The 2000 addition breaks up the vertical patterning further with horizontally oriented steel siding. Utilitarian fixtures, consisting of alert klaxons, loud speakers, floodlights, electrical boxes, surveillance cameras, and radio antennas are fixed along the façade in a seemingly ad hoc manner.

Overall, the exterior of the building appears to have been designed in a utilitarian Brutalist style, common to American Cold War defensive building. Concrete massing, uninviting entrances, and strong geometric lines being highly characteristic of the architectural style, and a paucity of windows being common as it was expressed in Cold War defensive buildings. However, subsequent modifications to the building have compromised the stylistic integrity of the building to the extent that the recorder did not recognize the buildings style until the original designs were consulted. The 2000 addition is fairly detrimental to the buildings stylistic integrity, presenting a contrasting material, pattern, and the presence of many windows that are not stylistically in keeping with Brutalist architecture. Even more so, the 2018 remodel is apparently unaware of the building's architectural style. The addition of more windows, and the glass vestibule create a more inviting atmosphere inconsistent with the style.

Turning to interior space, on the ground floor, nearly the entire use of space was changed in the 2018 remodeling. The only more-or-less intact space is the briefing theater and stairwells. Previously, the south entrance opened into a security office that served as an antechamber before accessing the main hallway (Burns & McDonnell 1984b). Following the remodel, the entrance opens directly into the main hallway

(OAFB 2020a). The space that had been office has been reoccupied by a redesigned latrine. The previous latrine had been oriented east-west and consisted of six water closets, three urinals, and six hand basins. It also enclosed a 66.6 ft^2 janitor's closet. Post remodel, the latrine area runs along a north-south axis and consists of a two water closet, one hand basin women's room to the north and a two water closet, three urinal, two hand basin men's room enclosing a much smaller mop closet located to the south.

Most of the first floor space was redivided to create smaller spaces at the expense larger communal spaces. Exceptions are present in three places. Three rooms in the center of the north exterior facing wall were redesigned to form two larger rooms that are linked internally. Similarly, part of the latrine and two adjacent rooms west of the briefing theater were joined to form two internally linked rooms. Finally, a significant reassignment of space within the interior northeast portion of the building has been converted to an industrial kitchen. This space also resulted in changes to the main hallway throughout the building. Much of the interior divisions made during the remodel have been destroyed by the 2019 flood.

Physical survey of the building occurred on 30 Jan 2020. Water marks on the exterior walls demonstrate that flood waters reached approximately 33-inches high, just beneath the door handles (Figure 26). Floodwaters destroyed the flooring and all lower drywall panels within the building. Emergency stabilization has involved the complete removal of flooring, most interior doors, and drywall. In order to facilitate minimal mission readiness drywall was being rehung in mission critical portions of the building, but all areas west of the main hallway have been left bare and abandoned in place (Figure 28).

As mentioned, the briefing theater was relatively unaffected by the remodel, changes being largely limited to the removal of doors to rooms that were removed or reassigned. Unfortunately, flooding destroyed the stage and lower course of drywall in this area. This has resulted in damage to one of five murals within the building.

The mural located in the briefing theater is a large paining of an E-4 aircraft, tail number 50125, flying against a black field (Figure 29). The removal of destroyed drywall has compromised this mural. The remaining four murals are located within the three stairwells. Within the north stairwell, at the mid-flight landing, there is a large unit insignia for the 1st ACCS, dated to 1996 (Figure 30). Within the northwest stairwell, at the mid-flight landing, there is a large unit insignia for the National Airborne Operations Center, dated to 1997 (Figure 31). Two murals are located within the main stairwell, near the south entrance. The first is located at the mid-flight landing, it is a large unit insignia for 55th Wing, dated to 1996 and by the same artist at the 1st ACCS mural (Figure 32). The second is located between the mid-flight landing and the second floor landing. It is another E-4 aircraft, tail number 31676. It is also dated 1996, and signed by the same artist as the National Airborne Operations Center mural (Figure 33).

The second floor has also undergone an extensive redivision of space, even if it was unaffected by the flood event. In the original design, the hallway formed a figure-8 with rooms along the outside walls and within three interior clusters. Each of the 34 sleeping rooms contained a latrine, either individually or more commonly shared as a suite. Five more sleeping rooms were also listed in the floor plan (Burns & McDonnell 1984a). The remodel has completely changed design of the second floor. Today, 67 smaller rooms are arranged in three and one-half east-west running files, with north-south hallways along the external walls (OAFB 2020b). With the exception of the three stairwells and a closet between the main stairwell and the south exterior wall, no division of space remains unaltered between the original design and the 2018 remodel. No photos were taken of second floor rooms to respect the privacy of the airmen billeted there.

9. Accessory Resource(s) Description:
No extant accessory resources are associated with Building 524.

10. Eligibility Justification:

Preexisting eligibility recommendations:
Building 524 was first recorded in 1994 by Hoisington. This recordation appears to have been fairly cursory, as evidenced by the fact that the building is identified as a single-story construction. At the time, the building was recommended as Non-contributing. Based on Weirze et al. (2009), the building was reevaluated as eligible by Rhodes et al. in 1997. Weitze et al. (2009) provided a refined historic context and recommended the building as eligible under Criteria A and C. Eligibility under Criterion A was based on association with the NEACP alert program. Eligibility under Criterion C was based on representativeness of "middle Cold War Design" and design by a distinguished architectural-engineering firm (Burns & McDonnell). Historic integrity was modified by the 2000 addition, but the intact flightline façade was understood as being representative enough to communicate the significance of the building.

The existing justification for eligibility under Criterion C is problematic. While the building certainly had been representative of Cold War architecture (Brutalism was common from the 1950s through the 1980s in American Cold War defensive buildings), association with an unnamed staff architect at a large architectural-engineering firm seems a flimsy claim to being the work of a master.

Considering National Register Bulletin 15, Significance under C as it relates to the work of a Master needs to be expressive of a distinct phase in the career of a master, and the example is noted that not every building designed by Frank Lloyd Wright is eligible as the work of a master (NRB15:20). It stretches credulity to assign master status to an entire multinational firm, more so to identify this building as representative of a distinct phase of the firm's career. As Justice Stevens wrote "corporations have no consciences, no beliefs, no feelings, no thoughts, no desires. Corporations help structure and facilitate the activities of human beings, to be sure, and their "personhood" often serves as a useful legal fiction. But they are not themselves [people]" (Citizens United v. FEC 2010:76). Without consciences, beliefs, and feeling there can be no art or *Arete.* Because the recognition of a master is a recognition of one who has perfected their *arete* in some aspect, and as a corporation cannot possess the faculties necessary for *arete*; therefore, a corporate architectural-engineering firm cannot be a master. Therefore, design by the Burns & McDonnell firm, or any firms generally, is not sufficient, *ipso facto*, to support significance under Criterion C, and—therefore, Building 524's significance under Criterion C is only for its representativeness of the Brutalist architectural style.

Revised Eligibility recommendation:
Since 2007, when Weitze and associates surveyed the building it has undergone two significant events impacting its integrity, a major remodeling in 2018 and a flood in 2019. The following recommendation considers all four Significance Criteria anew and the current state of integrity. The building is evaluated within the context of Cold War Defense, documented in Keach (2020).

Considering Criterion A, this building was significantly associated with the NEACP program from during the late Cold War, a period typified by Reagan-era escalation of hostilities and the ultimate collapse of the Soviet Union. The program was important to the theme of Cold War Defense within the sub-theme of nuclear deterrence. The program reduced the possibility of a decapitating strike against the civilian leadership of the United States and, with the complementary Looking Glass program, enhanced the credibility of Mutually Assured Destruction, and preventing a hot war between the Superpowers. Therefore, the building is significant under Criterion A.

Considering Criterion B, no information related to specific persons of historic importance could be identified. Therefore, the building is not significant under Criterion B.

Considering Criterion C, the building—as designed—was exemplar of Brutalist architecture, especially as it related to American Cold War defensive buildings. Hard geometric lines, massing of visible concrete, and uninviting entrances communicated the values of the architectural style. It is not, however, the work of a master, or representative of any other factor leading to significance under Criterion C. On 30 January 2020, the building was discussed with a licensed Nebraska architect and project manager for the remodeling effort. He opined that building was standard in configuration with no significant or unique design or construction elements (Kotlik 2020). It is, therefore, significant under Criterion C as representative of the Brutalist style.

Considering Criterion D, the building does not possess and has not yielded information important to our shared history. Keach (2000) identified four significant questions related to the Cold War that buildings in this area may possess data relevant to. Building 524, especially following the remodel and with the loss of comparative Looking Glass buildings and internal spatial integrity cannot address these questions. Therefore, the building is not significant under Criterion D.

The building is less than 50-years old and meets Consideration Criterion G. The building is significantly associated with the later phase of the Cold War, this phase is marked by the collapse of détente and a final period of intensive proliferation preceding the collapse of the Soviet Union. This period is of noted significance to Cold War historians and there is sufficient written history to demonstrate the exceptional historic importance of this period.

While the building is significant under Criteria A and C, and meets the requirements of Consideration Criterion G, it lacks the integrity to communicate that significance.

- Integrity of Location is completely intact. Building 524 remains in its original location.
- Integrity of Design has been lost. Organization of space, technology, and ornamentation has been destroyed in the remodel and subsequent flood. Spatial organization has been completely revised such that nearly no correlation exists between the original design and the current layout. The architectural style of the building has been severely compromised through the construction of an addition that incorporates windows and geometric lines running perpendicular to those of the original design.
- Integrity of Setting has been compromised but is minimally intact. Landscape level changes have been wrought by the flood, and the loss integrity of most of the buildings associated with the related Looking Glass program diminish the setting. However, the persistent relationship with the flightline, E-4s, and Building 525, as well as the persistence of the NEACP mission and Air Force base are enough to maintain integrity of Setting.
- Integrity of Material has been lost. While the exterior walls remain mainly their original pre-cast concrete, the integration of new material, including glass, Thermoplastic Polyolefin, and aluminum, has significantly degraded the integrity of exterior material. The situation is much worse within the building where a remodel and flood have resulted in the loss of all flooring and walls, with the exception of the walls within the stairwells.
- Integrity of workmanship has been lost due to the factors effecting the materials and design of the building.
- Integrity of Feeling has been lost. Changes made in the remodel and the effects of the flood have drastically changed the feeling of the building. The only elements supporting the feeling of a Cold War Air Force alert facility are the palimpsest of klaxons and loudspeakers affixed to the exterior walls and the murals within the stairwell, neither of which are necessarily associated with the building’s period of significance.
- Integrity of Association is intact but compromised. This aspect is supported and compromised in much the same manner as Setting.

Following the guidance of National Register Bulletin 15, the essential aspects of integrity for a property of significance under Criterion A are those that make up its appearance during its period of significance. Building 524 lacks those aspects. Likewise, a property significance under Criterion C can lose some of its materials or details but must retain the majority of those features that illustrate “massing, spatial relationships, proportion, pattern of windows and doors, texture of materials, and ornamentation.” These aspects are strikingly absent from the building.

Therefore, while Building 524 is significant under Criteria A and C, it lacks the historic integrity to communicate its significance under either Criteria and is not eligible for inclusion in the National Register of Historic Places. Additionally, it does not contribute to an historic district, either listed or potential.

No listed or otherwise established historic district is present. The only potential historic district in this location would be related to the airborne alert programs. Such a district was previously considered and resulted in a HAER-level recording of some property associated with the Looking Glass program. No historic district was established and most of the properties associated with the program have lost their integrity and passed from individual eligibility.

11. References:

Burns & McDonnell

1984a “Adv Airborne Command Post Fac Reference Floor Plan” As-Built revision. Drawing No. AW 30-07-06, sheet A-1. On file at Offutt Air Force Base. Sarpy Co., Nebraska.

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Kotlik, Jerry

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Offutt Air Force Base (OAFB)

2020a “Record Floor Plan: First Floor” *Facility 524.* On file at Offutt Air Force Base. Sarpy Co., Nebraska.

2020b “Record Floor Plan: Second Floor” *Facility 524.* On file at Offutt Air Force Base. Sarpy Co., Nebraska.

Rhodes, Lori E, Patience Elizabeth Patterson, and Katherine J. Roxlau

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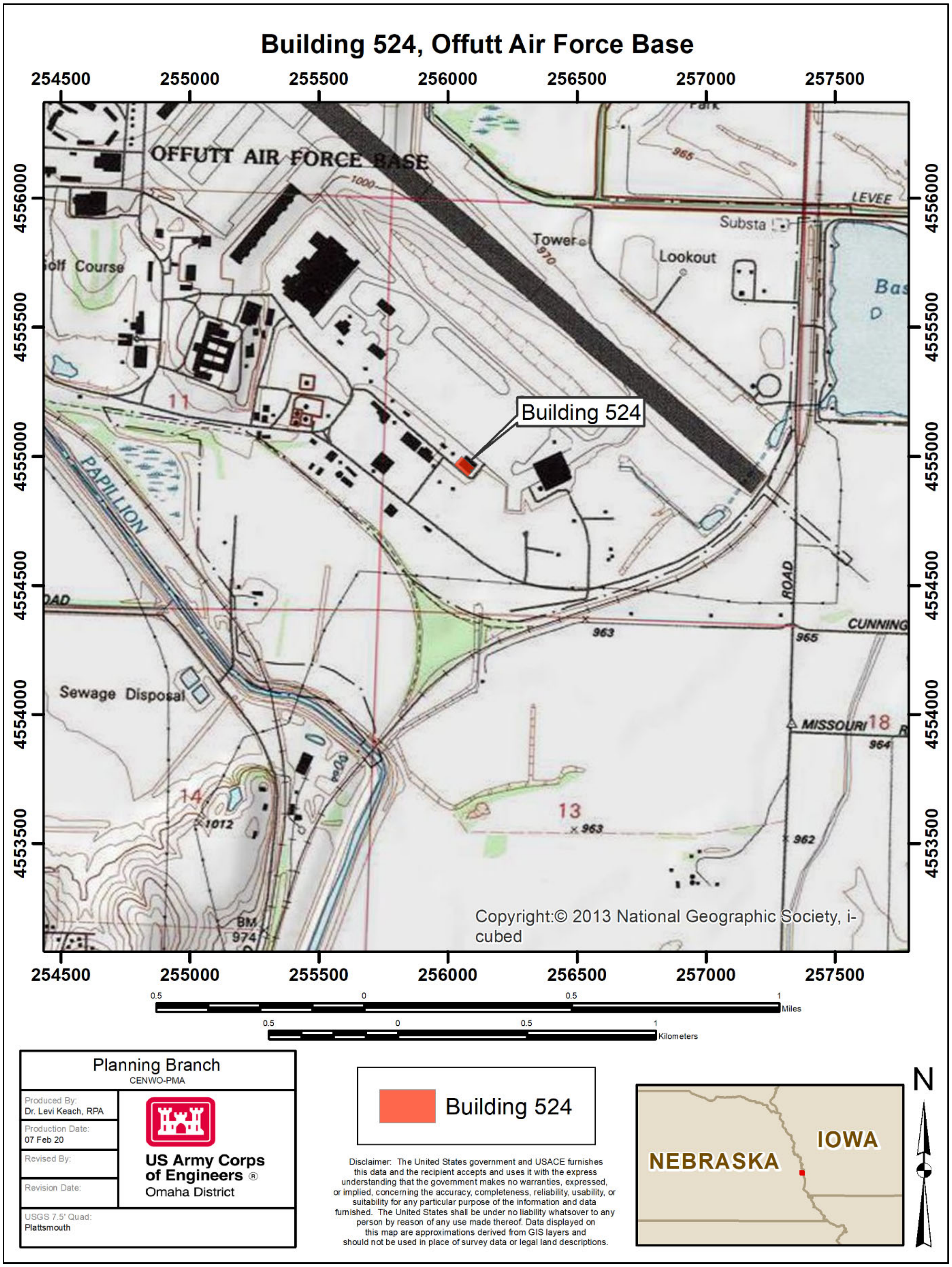
Weitze, Karen J., Marsha Prior, and Michelle D. Wurtz

2009 *Offutt Air Force Base Cold War-Era Historic Property Survey.* Geo-Marine, Inc. Plano, Texas. On file at Offutt Air Force Base. Sarpy Co., Nebraska.

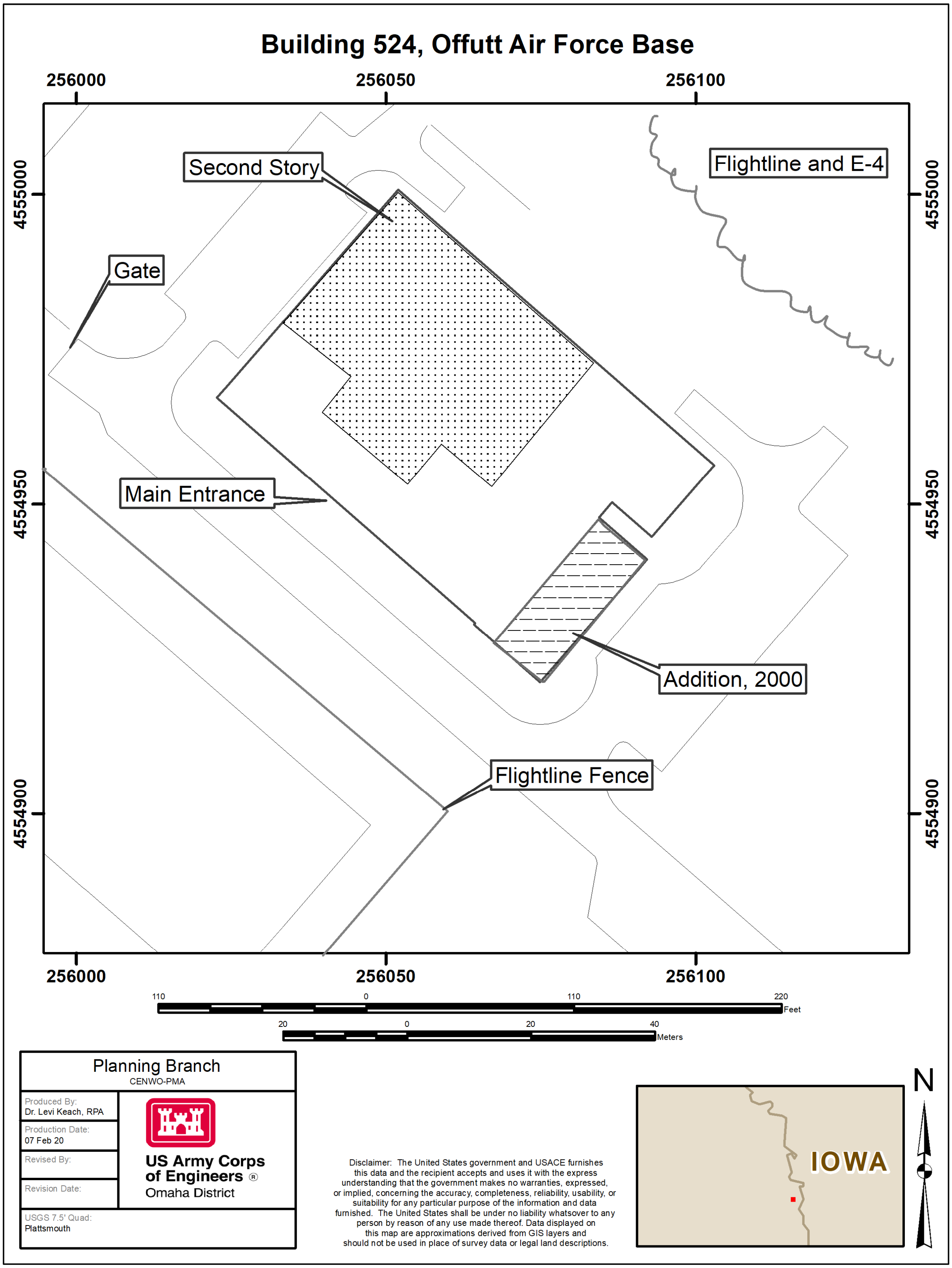
SHPO Resource #:
Other Resource #: BLDG 524

(Attach Location Map, Sketch map, additional photos, and representative architectural/engineering drawing—if available)



Resource Location Map, 1:24k scale, UTM Zone 15 (NAD 83).

SHPO Resource #:
Other Resource #: BLDG 524



Sketch Map, 1:1K, UTM Zone 15 (NAD 83).

Figure 20. Pre-flood photo, North and West Elevations, Offutt Environmental Staff, 17 July 2007

Figure 21. Pre-flood photo, East and South Elevations, Offutt Environmental Staff, 17 July 2007

Figure 22. South Elevation, Main Entrance, Offutt Environmental Staff, 30 January 2020

Figure 23. South Elevation, Offutt Environmental Staff, 30 January 2020

Figure 24. East Elevation, note contrasting geometric patterns of addition and main building,
Offutt Environmental Staff, 30 January 2020

Figure 25. North Elevation, note post-design windows and palimpsest of building attachments,
Offutt Environmental Staff, 30 January 2020

Figure 26. High Water Marks on East Elevation, Offutt Environmental Staff, 30 January 2020

Figure 27. First Floor Salvaged Room, characteristic of salvaged areas, Offutt Environmental Staff, 30 January 2020

Figure 28. First Floor Abandoned Hallway, characteristic of abandoned areas,
Offutt Environmental Staff, 30 January 2020

Figure 29. Mural on Briefing Theater Wall, Offutt Environmental Staff, 30 January 2020

Figure 30. 1st ACCS Mural, Offutt Environmental Staff, 30 January 2020

Figure 31. NAOC Mural, Offutt Environmental Staff, 30 January 2020

SHPO Resource #:
Other Resource #: BLDG 524

Figure 32. 55th Wing Mural, Offutt Environmental Staff, 30 January 2020

Figure 33. E-4 Mural, Offutt Environmental Staff, 30 January 2020

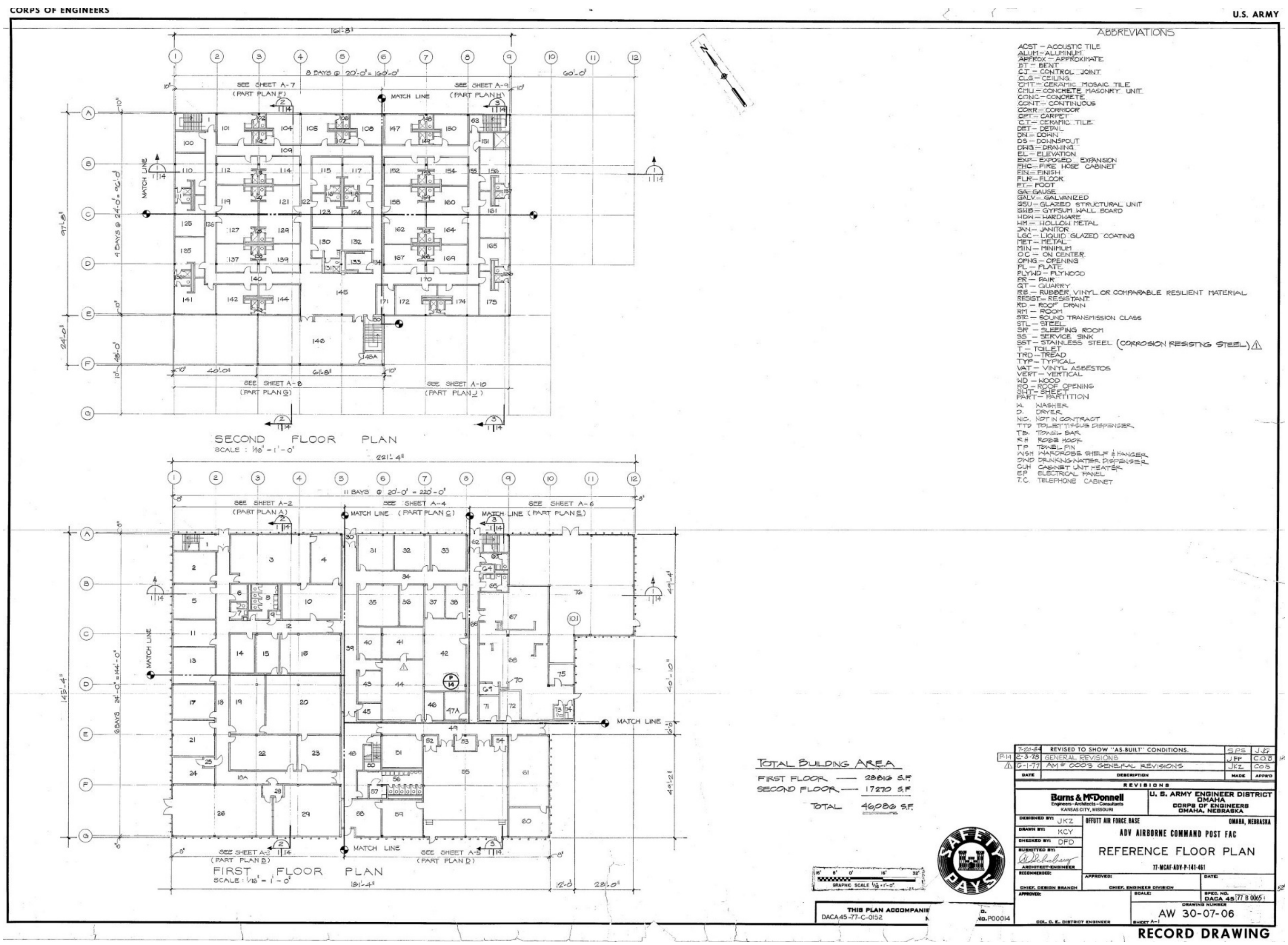


Figure 34. Original Building Layout

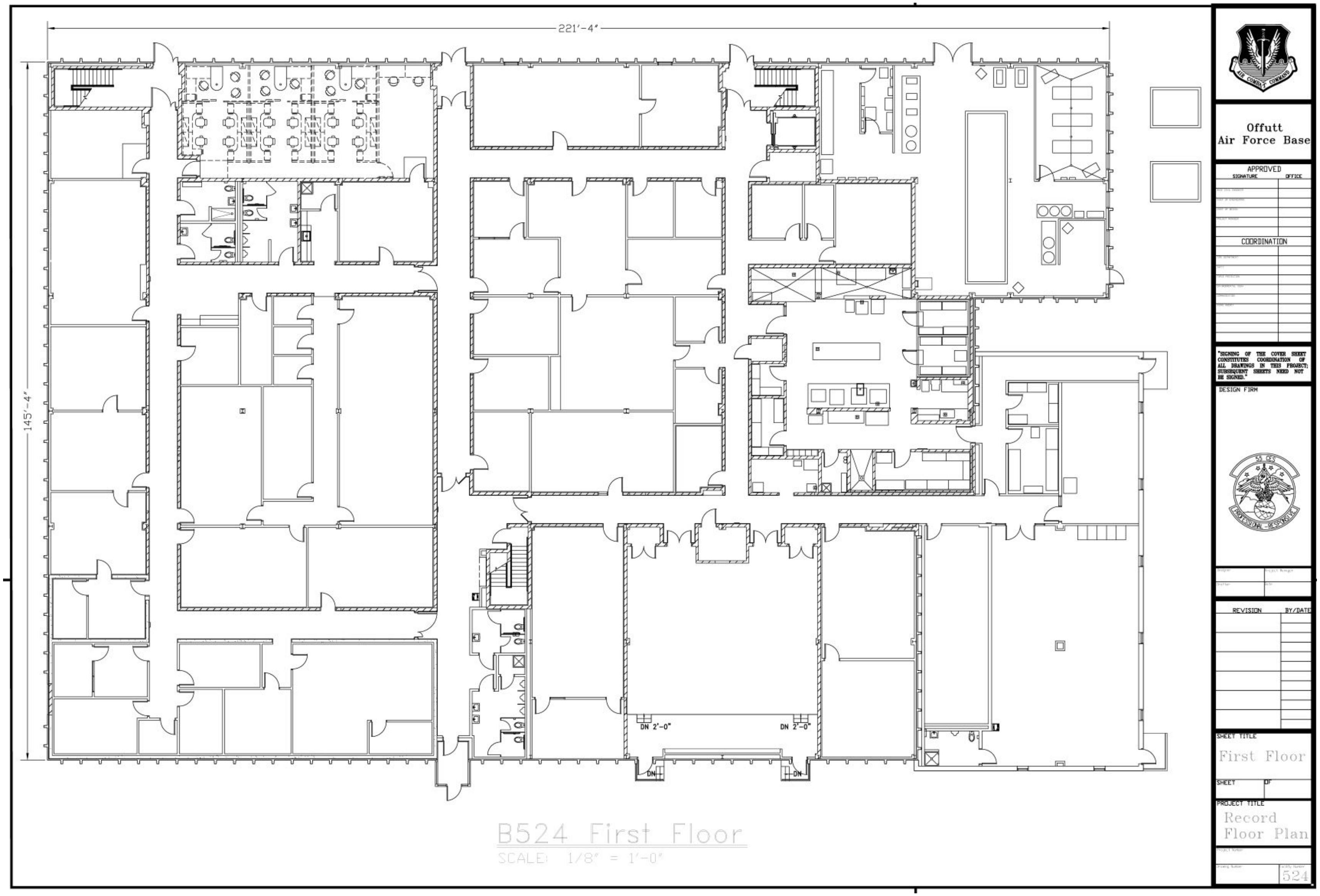


Figure 35. Post-Remodel First Floor Layout

SHPO Resource #:
Other Resource #: BLDG 524

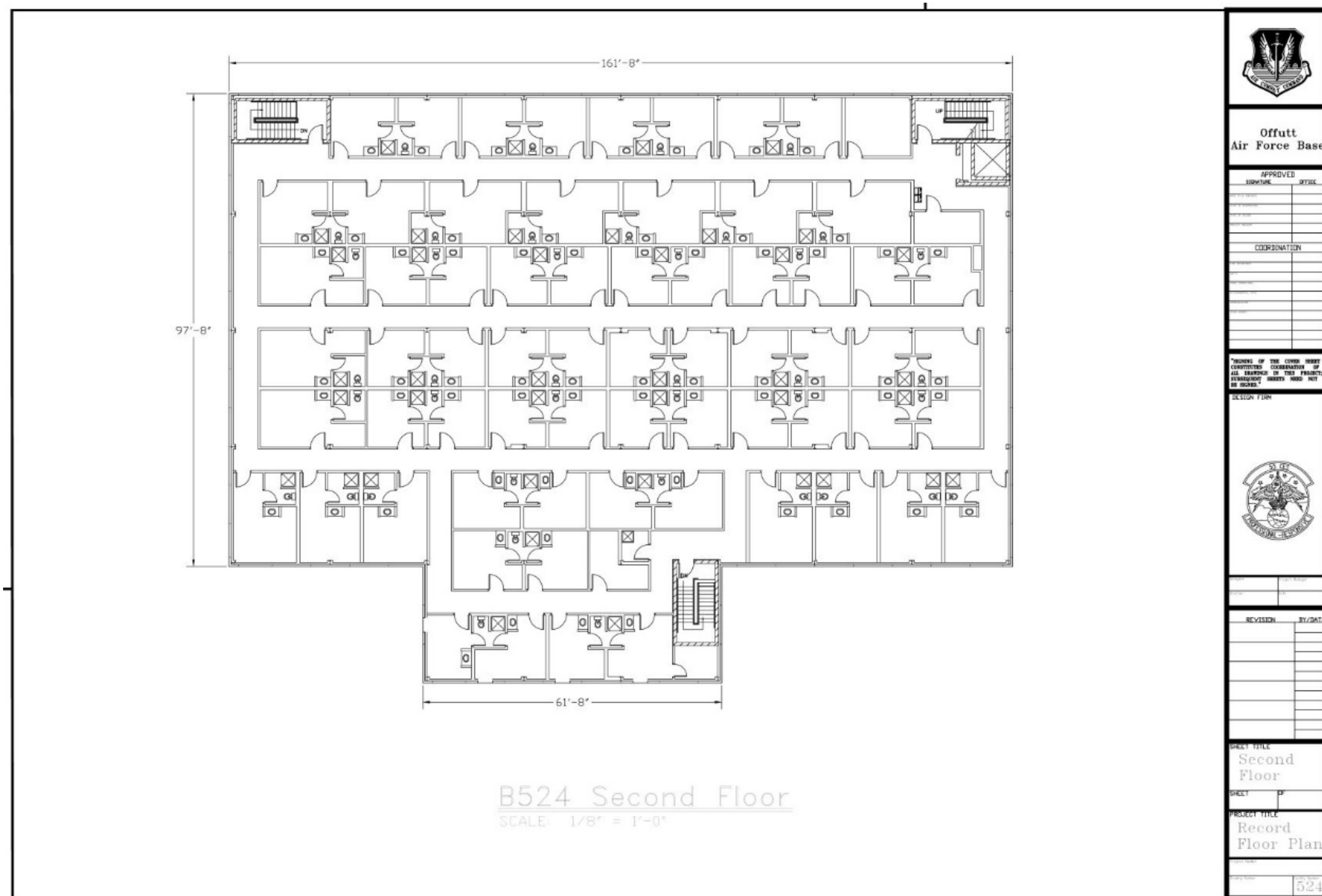


Figure 36. Post-Remodel Second Floor Layout

<u>Appendix B</u>

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Indirect Effects Analysis of the Proposed MILSTAR Siting.

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Overview

The proposed MILSTAR Siting would locate facilities southwest of Building 500. The primary building would be a single story 23,000 square foot building with its major axis slightly off of an east-west orientation. The building would be located over the picnic area seen in Figure 11 of the main report. Additionally, two radomes, several antennae structures, and a fence would be built within the area identified in Figure 3 of the main report. The proposed action presents the potential to affect the aspect of setting in two ways. First, the campus itself will result in the loss of parking spaces and the redefinition of space with the immediate area of Building 500. Second, the intrusion of the new building and radomes may detract from Building 500's visual setting.

Assumptions

1. Radomes will be similar in size, shape, and color to the existing radomes located in the propose Security Campus.
2. The final building and structures will follow current working designs.
3. The proposed building will be about 20-feet high and of similar design to the existing buildings on base.
4. Antennae and similar minor structures represent a minor component of the effects causing agents compared to the building, radomes, and enclosure fence.

Background Data

Over the course of the project, three potential locations have been examined for the MILSTAR Campus siting. The other two locations were rejected because of concerns related to the requirements for radio wave propagation. Presently, there are two ideas being considered for the location of the building and structures of the MILSTAR campus near Building 500. The first and most likely plan involves siting the radomes on top of the hill (Figure 37). This alternative is desirable because it causes less impact to parking. The second alternative would situate the radomes on the hill (Figure 38). This alternative is also less desirable from a radio wave propagation stand point. As the alternate layout is unlikely to be selected and would result in similar, but slightly diminished effects, it is not modelled within this appendix.

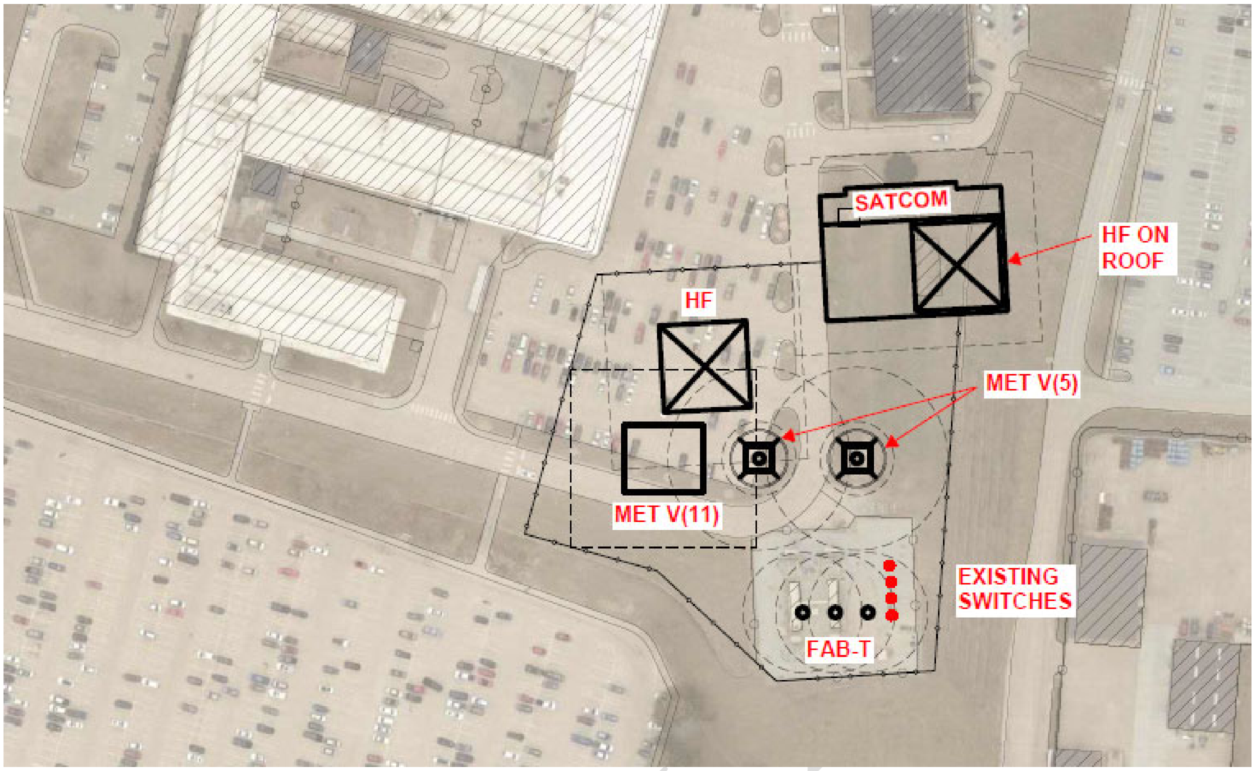

Figure 37. Working plan layout for the proposed MILSTAR Campus, as of November 11, 2019.

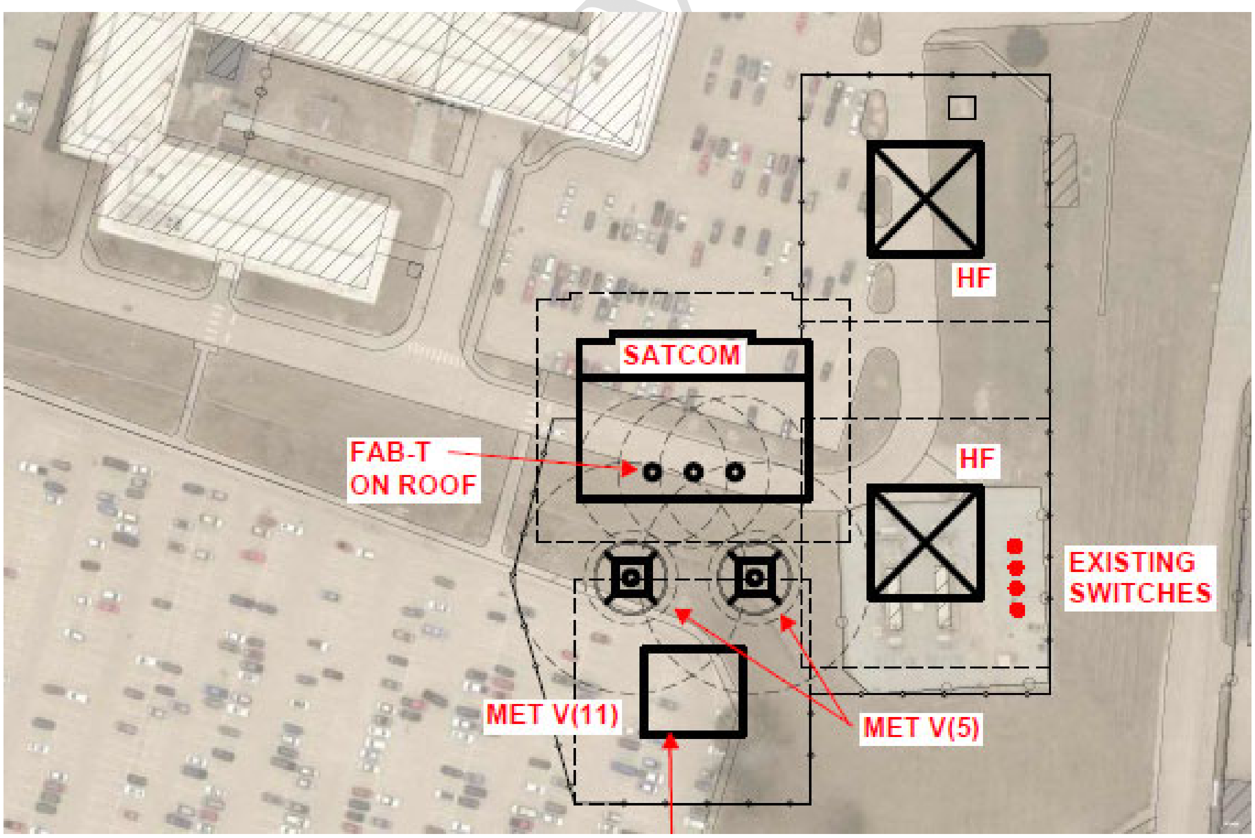

Figure 38. Alternate Working plan layout for the proposed MILSTAR Campus, as of November 11, 2019.

Analyses

To determine the magnitude of potential effects to spatial configuration, parking spots and movement corridors are quantified and reasonably foreseeable changes in behavior identified.

To determine the magnitude of potential effects to visual setting, the proposed new building and radomes were plotted in ArcGIS and viewshed analyses were conducted within a sub-foot LiDAR derived terrain model. Additionally, simulation images demonstrating the effects of the proposed construction from several key vantage points were created to provide a qualitative description of the potential effects.

Spatial Use Analysis

The proposed MILSTAR campus would cause effects to the setting by altering the use of space for some personnel assigned to the building. Particularly those who park in the approximately 190 parking spaces that may be eliminated by the facility and 340 parking spaces below the hill that may walk by the proposed facility on the way into Building 500.

A reasonably foreseeable impact to the spatial use in this area would be the conversion of many of the remaining parking spaces to parking for MILSTAR personnel. The combined impact of these actions would be a reduced use of the west entrance of Building 500.

As the building is no longer staffed by USSTRATCOM, the impact of this reduced use would not alter the perception of space for personnel within the historic continuum of SAC-USSTRATCOM, but may present a minor impact to future biographers or other researchers in recreating the daily perception of space for potentially significant people or groups of people who parked in these locations during Building 500's period of significance.

Without knowledge of how parking was assigned during Building 500's period of significance, the potential effect described above is speculative at best. The change in assignment of personnel using southeastern parking areas would be imperceptible to the casual viewer and has been made irrelevant by the reassignment of the Building 500 from USSTRATCOM to 55th Wing Headquarters.

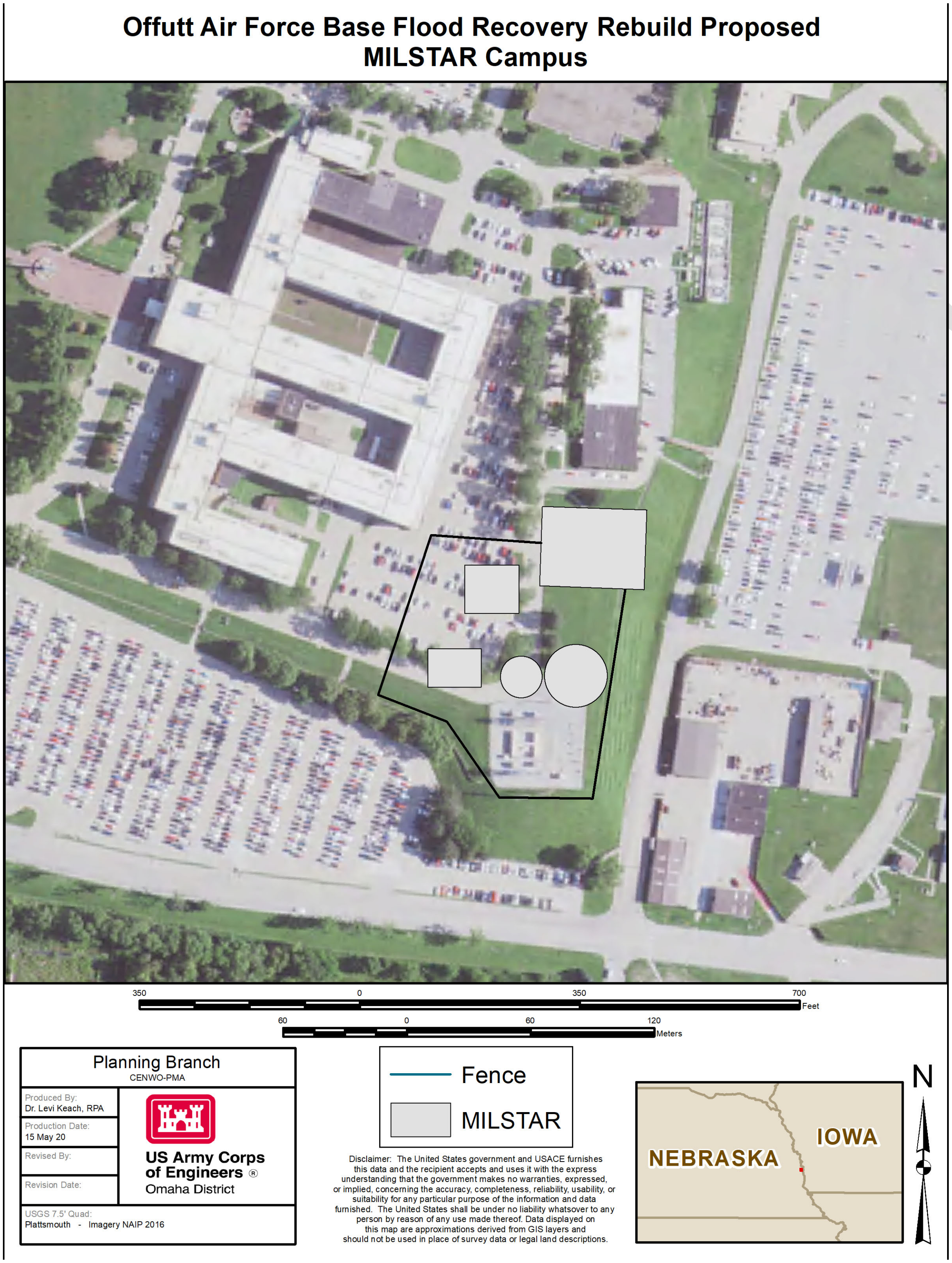

Figure 39. Map of the proposed MILSTAR Campus Location.

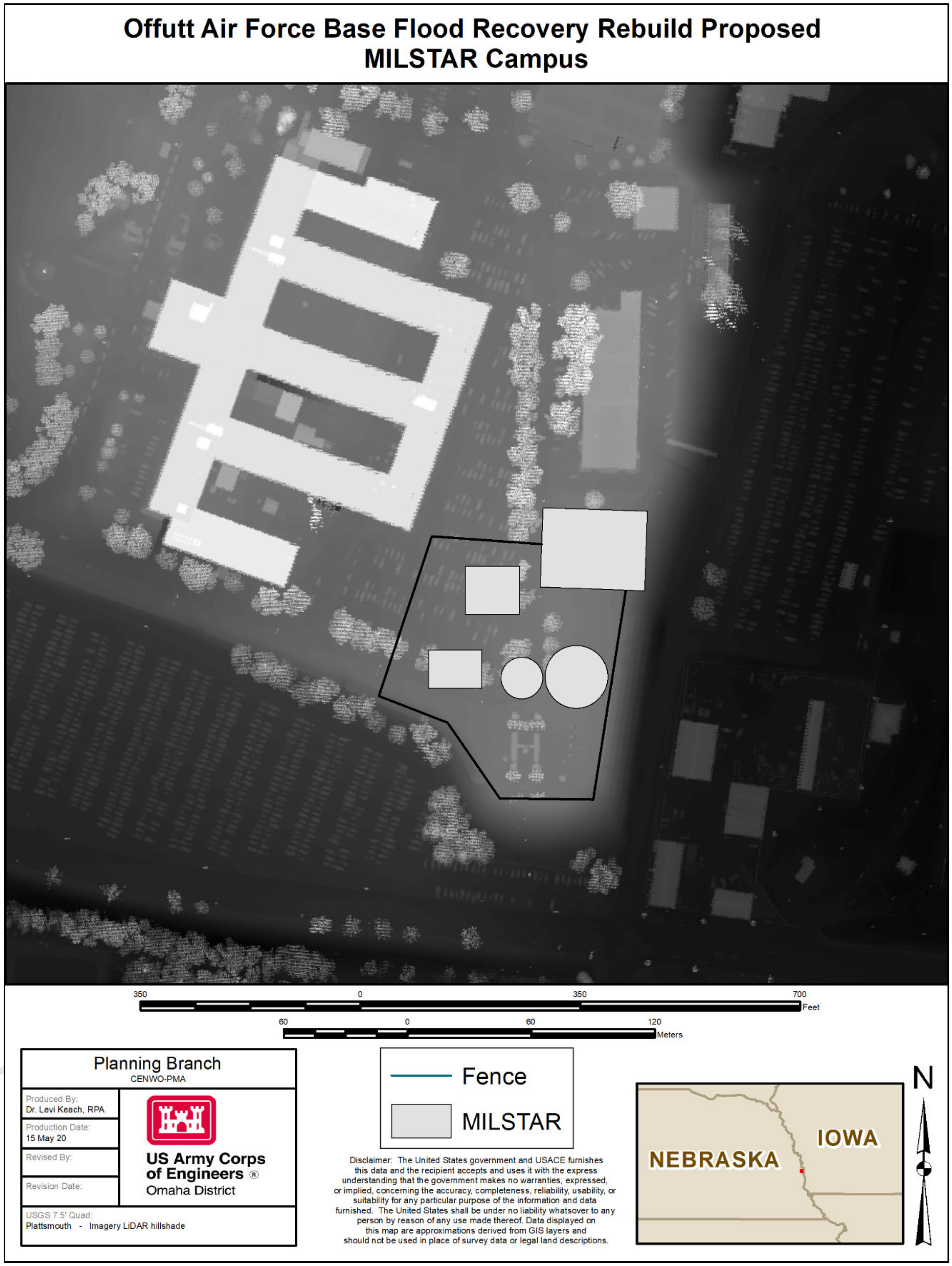

Figure 40. Map of the proposed MILSTAR location against LiDAR hillshade.

Viewshed Analysis

GIS-based viewshed analysis provides a rudimentary answer to the question “how far is that visible.” This analysis is a composite four three smaller analysis, one for each of the major components of the proposed MILSTAR Campus. The base terrain data was a LiDAR derived DEM. The DEM accounts for the visual obstruction of existing building. Visibility was modeled of off a point at the assumed center of each radome and the three corners of the building closest to Building 500. The Viewshed 2 tool was used. The observer offset option was set to 95-feet for the larger radome, 32-feet for the smaller radome, and 25-feet for the building. As expected the larger radome is the most significant contribution to the viewshed (Figure 41). The other affecting agents are relatively minor and do not cause effects to views not otherwise effected by the larger radome.

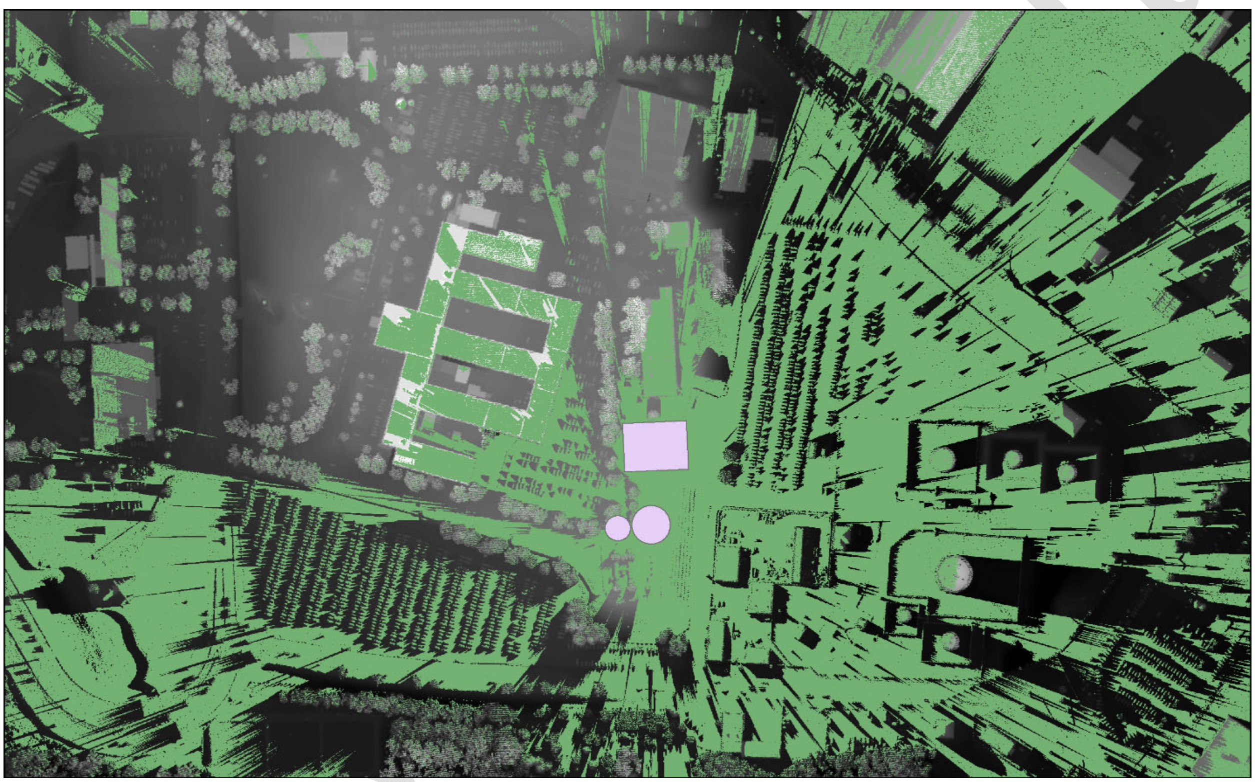

Figure 41. Viewshed model for the larger radome, visibility illustrated in green, 1:6000 scale.

Because of the raised design of the Building 500 complex, the front (western) viewshed is relatively unaffected by even the largest radome. The north side viewshed is slightly impacted by the largest radome only, until one is well inside the compound, having rounded the northeast corner when the full facility would come into view. Again due to topography, Building 500 is not visible from east of the hill it is located on so there is no viewshed to be impacted.

All of the major viewings of Building 500 would remain either unchanged or minimally altered. The intersection of SAC and STRATCOM streets provides an excellent location to view the front of the building (Figure 42). The model demonstrates that the viewshed would remain unchanged at until one on is approximately 15-feet above ground.

Focused more narrowly, the main entrance has a small designed landscape that post-dates the building’s period of significance but commemorates that significance. It is characterized by the display of a demilitarized SLBM and ICBM, as well as a circle of flags and various plaques commemorating the mission of SAC and it successor command (Figure 43). Again, the model demonstrates that this view would remain unchanged.

The rear (east) facing of Building 500 would be most affected by the proposed MILSTAR campus. However, even here the impact is surprisingly light. From the northeast corner, if one was looking at the building the only potential impact would be a fencing that would blend in with the existing lighting infrastructure (Figure 44).

Minor visual impacts would exist the southwest viewshed of Building 500. This is the first viewing that a member of the public would have upon entering the base from the STRATCOM Gate (Figure 45). From this vantage, the existing MILSTAR equivalent facility is visible today. The change in visual setting is one of degree rather than type; that is, the bringing of the radomes into proximity with Building 500, rather than the introduction of the radomes (Figure 46).

Serious impacts are confined to the southeast corner, where the facility would be built (Figure 47 and Figure 48). From within Building 500, some outgoing views would be dominated by the MILSTAR campus, whereas today's equivalent is a background feature. Views of Building 500 from parking within the lot to be replaced by the campus and the picnic area would be eliminated by the MILSTAR campus.

Overall, the visual effects associated with the location of the MILSTAR campus at this location are surprisingly mild. The local topography and the size of Building 500 reduce the intrusion of the proposed MILSTAR campus into the viewshed associated with Building 500 to only locations in which the current MILSTAR equivalent features already exist. When combined with the fact that the proposed facility is associated with the historical mission of Building 500, adverse visual effects are limited to a very small are behind Building 500.

Figure 42. Current view from the corner of SAC and STRATCOM streets (Keach 2020).

Figure 43. Current front entrance view, towards proposed MILSTAR Campus (Keach 2020).

Figure 44. Current view of Northeast corner of Building 500 (Keach 2020).

Figure 45. Building 500 affected view, current MILSTAR equivalent visible in middle right of frame (Keach 2020).

Figure 46. Simulated post-construction view (Keach 2020).

Figure 47. Building 500, East (back) elevation. From proposed MILSTAR building entrance (Keach 2020).


Figure 48. Building 500, South and East elevations. View from proposed radome location (Keach 2020).

Conclusion

The proposed MILSTAR Campus would result in only mild changes to the use of space and visual setting of Building 500, a historic property eligible under Criteria A and C. The extent of significant impacts are restricted to the immediate area of the MILSTAR campus, located near the southeast corner of Building 500. Given the restricted location and minimal impact of both potential effects, it is suggested that the impacts to setting do not raise to the level of an adverse effect to setting or any other aspect of integrity.

If the agency or SHPO disagree with the recommended finding of no effect, the commissioning of an investigation into the assignment of parking during Building 500's period of significance and an associated phenomenological study of the perception of space for public publication is the recommended mitigation.

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Appendix C

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C.V.

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Curriculum Vitae

Levi Keach

U.S Army Corp of Engineers
Omaha District Office
1616 Capitol Ave, Ste 9000
Omaha, Nebraska 68102-9000
Phone: 402-995-9022 Email: Levi.L.Keach@usace.army.mil

EDUCATION

Ph.D. (Anthropology emphasis in archaeology) University of Nevada, Las Vegas, 2018
Dissertation: *Investigating the Role of Liminality in the Cultural Transition of the Late Eighth Millennium BC on Cyprus.*
M.A. (Anthropology, emphasis in archaeology) University of Nevada, Las Vegas, 2014
Thesis: *Spatial Analysis of Chipped Stone at the Cypro-PPNB Site of Krittou Marottou Ais Giorkis: A GIS-Assisted Study*
B.A. (Honors, Anthropology) University of Kansas, 2012
Thesis: *Justifying Belief within the Christian Identity Movement.*

SPECIALIZED TRAINING

ACHP Section 106 Essentials Course (February 2016).
ACHP Advanced Section 106 Seminar (February 2016).
FLETC Archeological Resources Protection Training Program (August 2018).

PROFESSIONAL EXPERIENCE

Archaeologist. U.S. Army Corp of Engineers (November 2019–Present)
This position is responsible for meeting the Cultural Resource Management responsibilities of USACE's Omaha District Office. Duties include review and evaluation of internal and external proposed projects using applicable laws, regulations, policies, and agreements and determining agency responsibility for cultural resources; coordination with Native American, state, industry, and other stakeholders related to cultural resource interests; contributing to NEPA analysis; contract management; inventory and evaluation of cultural resources; authorization, review, and oversight of cultural resource work conducted by outside parties; representation of cultural resources perspectives on planning teams; and providing cultural resource advise as needed. My level of responsibility in this position is primarily at the agency oversight and principal investigator level.

Archaeologist, Bureau of Land Management (July 2018–November 2019)
This position was responsible for meeting the Cultural Resource Management responsibilities of the Bureau of Land Management's Humboldt River Field Office. Duties included review and evaluation of internal and external proposed projects using applicable laws, regulations, policies,

and agreements and determining agency responsibility for cultural resources; coordination with Native American, state, industry, and other stakeholders related to cultural resource interests; developing proposals for proactive investigations and outreach activities; providing training for junior archaeological staff as well as non-archaeological staff; inventory and evaluation of cultural resources; authorization, review, and oversight of cultural resource work conducted by contract and academic parties; representation of cultural resources perspectives on interdisciplinary NEPA teams; managing cultural resources records; and advising Field and District Management on cultural resources responsibilities. The majority of the resources located within this position's area of responsibility were small prehistoric sites ranging from Paleo-Indian through contact and 19th and 20th century mining sites. My level of responsibility in this position was primarily at the agency oversight and principal investigator level.

ACHIEVEMENTS

- Managed Culture, Lands, and Recreation program for four months
- Supported district objectives through teaching both field and classroom components of the District Archaeology Technician (DAT) program course, as well as provided mentorship and supervision for four DAT recordations.
- Spearheaded the effort to modify the geodatabase to accommodate the BLM's new National Data Standard.
- Ported the cultural geodatabase to ArcGIS Online to allow for field recording and monitoring of cultural resources using esri Collector.
- Provided advice and guidance related to cultural and other resource values to Incident Commanders during emergency operations as Fire-Line qualified resource advisor on five wildfires.
- Led NEPA team and constructed nine-hole disc golf course at the Water Canyon Recreation Area.

Archaeology Technician and GIS Manager
Temporary Research Faculty - Desert Research Institute (2018-2019)
Graduate Research Assistant (2015-2017)
This position provided Cultural Resources Management support for the Department of Energy/National Nuclear Security Administration's Nevada Field Office operations, within the Great Basin and Mojave deserts. Primarily within the Nevada National Security Site, a facility having a special period of national significance between 1951 and 1992. Duties included: evaluating proposed projects using applicable laws, including Section 106 of the National Historic Preservation Act. Conducting record searches as part of both pre-inventory planning and in the construction of research designs. Planning and conduction pedestrian inventories as part of a team, both in supervisory and subordinate roles. Recoding and monitoring cultural resources using applicable forms and evaluating them using the research design. Producing and reviewing contract driven technical reports, and maintenance and design of the cultural resource geodatabase. The primary resources within this position's area of responsibility were engineering resources associated with Cold War nuclear testing, with geographic concentrations of small prehistoric sites and early 20th century mining sites. My level of responsibility in this position was primarily at the crew chief and field crew level.

ACHIEVEMENTS

- Authored internal GIS tasks manual.
- Revised Health and Safety plan.
- Planned and generated four new GIS layers resulting in improved quality and efficiency of cultural resources surveys.
- Executed over 400 hours of archaeological fieldwork.
- Produced over 400 maps using a combination of ArcGIS and Adobe Illustrator.

Instructor, Department of Anthropology, University of Nevada, Las Vegas (2016)
Anthropology 101 "Introduction to Cultural Anthropology" Provide overview of the history, theory, and methods of Cultural Anthropology.

Collections Manager (Graduate Assistant), Department of Anthropology, University of Nevada, Las Vegas (2012-2014)
Responsible for the curation of the department archaeological collections consisting primarily of Prehistoric and historic sites located within Southern Nevada. creating and updating databases using Microsoft Excel and Access, sorting and classify lithic and ceramic artifacts, recording and cataloging prehistoric and historic artifacts, filling forms and maintaining paper records, organizing and curating collections, and facilitating researcher access to collections. Managerial duties included: supervising two employees and one volunteer, ordering supplies and equipment, accessioning and deaccessioning collections, maintaining time and effort logs, liaising with outside facilities and government agencies, and reporting on the status of the collections to the department chair.

ACHIEVEMENTS
- Accessioned thirty collections.
- Developed a digital catalog of collections curated.
- Organized the collections by area and period.
- Standardized the labeling and shelving of collections.
- Transferred two collections to more appropriate facilities.

Instructor, Department of Anthropology, University of Nevada, Las Vegas (2014)
Anthropology 110L "Introduction to Physical Anthropology Lab" Provide practical experience in aspects of physical anthropology: the mechanisms of inheritance, osteology and forensic science, comparative anatomy and human evolution, the processes of human growth and aging, and aspects of modern human variability.

ADDITIONAL ARCHAEOLOGICAL EXPERIENCE

Geospatial Analyst/Lithic Analyst/Database Manager. The Ais Giorkis Project, Laboratory, University of Nevada Las Vegas. (2013 – Present)
Responsible for the creation and management of the artifact and spatial databases used by the Ais Giorkis Project, generation of maps and descriptive graphics, etc.; coding, measuring, and recording lithic artifacts using the appropriate typology; analyzing patterns within the spatial distribution of artifacts within anthropological paradigms. Principal Investigator: Alan H. Simmons.

Crew Chief. The Ais Giorkis Project, *'Ais Giorkis*, Paphos, Cyprus. (May-June 2013 and 2015).
Direct physical survey, provide leadership and training to volunteer excavators ranging in experience level from novices to Ph.D. students, ensure accurate completion of forms and logs, conduct and oversee laboratory analysis, supervise excavation, etc. Principal Investigator: Alan H. Simmons.

Student Crew Member. Excavations at Kincaid Mounds State Historic Site, Southern Illinois University, Carbondale Field School (May-June 2011).
Gain practical experience in North American field archaeology including excavation and physical survey, conduct basic analysis of primarily Mississippian period ceramic and lithic artifacts. Principal Investigators: Corin C.O. Pursell and Brian M. Butler

SELECTED PROJECT EXPERIENCE

Quinn River CCC Camp Section 110 Recordation (BLM)
I was the Principal Investigator for this project. I identified this resource as potentially significant, sought funding and approval for its recordation and evaluation, conducted archival research, defined its historic context and significant research questions, lead the field recordation and inventory of surrounding 350 acres, and completed site forms for all identified resources. Field recordation involved a crew of five persons ranging in experience from none to moderate. The surrounding area was inventories to Class III standards using GPS equipment. The camp itself was recorded using a total survey station.

Spring Valley Project (BLM)
I was the agency archaeologist overseeing this project. My involvement began with evaluating the compliance requirements and continued through acceptance of the preliminary report. This was a complex project involving aspects of both gold exploration and mine development within an historic gold mining area. Initial agency literature identified the potential for an historic district centered on the Fitting boomtown site. I worked with the project proponent and their cultural resources contractor to ensure that the potential district was evaluated prior to the commitment of resources to the exploration of the area. Following SHPO concurrence on the potential district I determined the project APE and ensured the contractor was authorized to complete the inventory and understood the scope. During the course of the inventory I worked closely with the contractor and proponent to ensure questions were resolved in a timely manner and potential historic property was not disturbed by the ongoing exploration activity.

Kings River Allotment (H3) Pipeline project (BLM)
I was the Principal Investigator for this project. This project was an agency internal project brought forward through the Range Program on behalf of allottees within the Kings River Cooperative. I reviewed the proposed undertaking, conducted an initial literature search and, in consultation with the Nevada SHPO, established the APE and scope of effort. This project was inventoried over three reports, on primary report written by the P.I. and two reports documenting smaller legs of the APE written by DATs under the supervision of the P.I. Limited subsurface testing by manual bucket auger was employed. Nine prehistoric sites were recorded and

evaluated within the context of a nearby lithic acquisition district, one historic period road was recorded and evaluated within the context of the settlement of the Kings River Valley.

Grable Section 110 Recordation (DRI)
I was the lead researcher and crew chief for this project. I identified these resources locations and their potentially significance. I proposed a budget and sought approval from the program's P.I. for historical and field research related to five sites associated with the Grable atmospheric nuclear test. Historical research was conducted at the Nuclear Testing Archive, the Clark County Nevada Library, and the Eisenhower Presidential Library. Field research focused on the archaeological remains of the gun emplacement site, one of the artillery observation sites, the troop trenches, and two locations of associated testing instrumentation. A preliminary report, site forms, and architectural forms were drafted.

UNESE Tunnel Testbed Project (DRI)
The UNESE Tunnel Testbed Project involved inventorying a 30-acre area atop a mesa in the southern Great Basin. For this project, I evaluated the project proposal and conducted background research. Field inventory was necessary, therefore I prepared GPS units with the project coordinates, as well as previously identified resources within the APE. I served as a crew member for eight days of fieldwork. Based on field finding, I produced shapefiles for six archaeological sites within the APE and began IMACS site forms for three prehistoric and one historic site. Finally, I produced three components of the project report.

Area 11 Dense Plasma Focus Facility Research and Development Project (DRI)
This project involved inventorying a 68-acre area in the southern portion of Yucca Flat, a transitional environment between the Great Basin and Mojave deserts. My participation on this project occurred from initial project evaluation through report authoring. I was the crew chief during the single day of field reconnaissance. A complex fence was identified and recorded as a structure using Nevada SHPOs ARA form.

The Frey II Project (DRI)
The Frey II Project involved inventorying a 97-acre area. My involvement in this project included conducting background research, preparing GPS units with APE coordinates, three days of fieldwork, preparing historic context, searching records libraries, generating shapefiles based on field recording, and recording one nuclear testing resource using the IMACS site form.

TECHNICAL REPORTS

2020 Levi Keach
A Phase I Investigation of 120 Acres for the Proposed Ditch 6 Hamburg Borrow Location, Fremont County, Iowa. United States Army Corps of Engineers, Omaha District Office. Omaha, Nevada.

An ASSR of the Phase I investigation of 14.5 Acres for the Proposed Civil Bend Potential Borrow Location #1, Fremont County, Iowa. United States Army Corps of Engineers, Omaha District Office. Omaha, Nevada.

An ASSR of the Phase I investigation of 12.4 Acres for the Proposed Civil Bend Potential Borrow Location #2, Fremont County, Iowa. United States Army Corps of Engineers, Omaha District Office. Omaha, Nevada.

An ASSR of the Phase I investigation of 5.8 Acres for the Civil Bend Potential Borrow Location #3, Fremont County, Iowa. United States Army Corps of Engineers, Omaha District Office. Omaha, Nevada.

2019 Levi Keach
A Class III Cultural Resources Inventory of 59.3 Acres for a Proposed Water Pipeline and Troughs in the Kings River Allotment. BLM Report No. CR2-3466(P). Bureau of Land Management, Winnemucca, Nevada.

A Class III Cultural Resources Inventory of 35.4 Acres for the City of Winnemucca Railroad Springs Pipeline Extension Project, Humboldt County, Nevada. BLM Report No. CR2-3457(P). Bureau of Land Management, Winnemucca, Nevada.

A Class II Inventory of 505 Acres for the West Mentaberry Allotment Temporary Water Troughs, Humboldt County, Nevada. BLM Report No. CR2-3442(N). Bureau of Land Management, Winnemucca, Nevada.

A Class III Cultural Resources Inventory of 139.5 Acres of the Proposed Sand Dunes Recreation Area Improvement Project's Indirect Area of Potential Effects, Humboldt County, Nevada. BLM Report No. CR2-3433(P). Bureau of Land Management, Winnemucca, Nevada.

Resource Advisor's Report of the Rebel Creek Fire (MG1K). Bureau of Land Management, Winnemucca, Nevada.

Resource Advisor's Report of the Union Fire (MB4Z). Bureau of Land Management, Winnemucca, Nevada.

2019 Levi Keach and Michael McCampbell
Resource Advisor's Report of the Crutcher Fire (MGQ8). Bureau of Land Management, Winnemucca, Nevada.

2018 Levi Keach
A Section 106 Cultural Resources Inventory for the Log Cabin Pipeline Range Improvement Project. Nevada. Bureau of Land Management, Winnemucca, Nevada.

A Cultural Resources Survey of the NNSS 138kV Transmission Line, Yucca Flat, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR081710-1. Desert Research Institute, Las Vegas, Nevada.

A Cultural Resources Inventory for the Proposed RWMC Berm, Area 5, Nevada Nation Security Site, Nye County, Nevada. Cultural Resources Report No. SR021718-1. Desert Research Institute, Las Vegas, Nevada.

A Cultural Resources Inventory for the Proposed Test Bed South Project, Areas 5, 25, and 26, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR022718-1. Desert Research Institute, Las Vegas, Nevada.

A Section 110 Recordation of the Teapot Project 8.3 Instrument Stations, Area 3, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR112817-1. Desert Research Institute, Las Vegas, Nevada.

2017 Levi Keach
A Cultural Resources Inventory for the Proposed Performance Optimized Data Center Project (Updated), Area 6, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR082217-1. Desert Research Institute, Las Vegas, Nevada.

A Cultural Resources Inventory of the Proposed Area 11 Technical Facilities Perimeter Fencing Project, Area 11, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR112916-1. Desert Research Institute, Las Vegas, Nevada.

2017 Tatianna Menocal, Cheryl Collins, Levi Keach, and Harold Drollinger
A Cultural Resources Inventory of the Proposed Frey 2 Project, Areas 3 and 7, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR122816-1. Desert Research Institute, Las Vegas, Nevada.

2017 Levi Keach and Maureen King
A Section 106 Evaluation of the Kennebec Rad-Chem Assembly, Area 2, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR091917-1. Desert Research Institute, Las Vegas, Nevada.

A Cultural Resources Assessment of the Unstemmed Tests in Corrective Action Unit 568, Area 3, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR120616-1. Desert Research Institute, Las Vegas, Nevada.

Impact of Proposed Clean Closure Actions at CAU 576 CAS 02-99-12, U-2af (Kennebec) Radiological Chemical Sampling Apparatus, Area 2, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. LR041717-1. Desert Research Institute, Las Vegas, Nevada.

2017 Tatianna Menocal, Harold Drollinger, Maureen King, and Levi Keach
A Cultural Resources Inventory of the Proposed UNESE Tunnel Testbed Project, Area 12, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR092616-1. Desert Research Institute, Las Vegas, Nevada.

2016 Levi Keach
A Cultural Resources Inventory of the Proposed Fiber Optic Line Between Mercury Highway and Camp Desert Rock, Area 22, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR081011-1. Desert Research Institute, Las Vegas, Nevada.

A Cultural Resources Inventory of the Proposed Performance Optimized Data Center, Area 6, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR102016-1. Desert Research Institute, Las Vegas, Nevada.

A Cultural Resources Inventory of the Proposed LLNL Field Experiment Location, Area 2, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR041116-1. Desert Research Institute, Las Vegas, Nevada.

A Cultural Resources Inventory of the Proposed Soil Staging Area for the Radioactive Waste Management Complex, Area 5, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR090215-1. Desert Research Institute, Las Vegas, Nevada.

2016 Tatianna Menocal and Levi Keach
Fiscal Year 2016 Cultural Resources Monitoring, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. MR080816-1, Desert Research Institute, Las Vegas, Nevada.

2016 Maureen L. King and Levi Keach
Cultural Resources Preliminary Assessment of Corrective Action Unit 576, Miscellaneous Radiological Sites and Debris, Area 5, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. PA051216-1. Desert Research Institute, Las Vegas, Nevada.

2016 Tatianna Menocal, Maureen King, and Levi Keach
A Cultural Resources Inventory of the Proposed Thor II Seismic Hammer East-West Line, Areas 2, 4, 7, and 9, Nevada National Security Site, Nye County, Nevada. Cultural Resources Report No. SR070815-1. Desert Research Institute, Las Vegas, Nevada.

PUBLICATIONS

2018a Alan H. Simmons, Katelyn DiBenedetto, and Levi Keach
*Kritou Marottou Ais Giorkis: Preliminary Results of Renewed Investigations: 2013-2015***.** Reports of the Department of Antiquities, Cyprus.

2018b Alan H. Simmons, Katelyn DiBenedetto, and Levi Keach
Neolithic Kritou Marottou Ais Giorkis, Cyprus—Living in the Uplands. Bulletin of the American Schools of Oriental Research.

PROFESSIONAL PRESENTATIONS

Landscape and Super-Regional Scale Interaction within the Aceramic Neolithic of Cyprus.
Podium jointly presented with Katelyn DiBenedetto before the "Pushing the Envelope, Chasing Stone Age Sailors and Early Agriculture: Papers in Honor of the Career of Alan H. Simmons" Session of the 84th Annual Meeting (2019) of the Society for American Archaeology, Albuquerque, New Mexico.

A Prospectus on BLM Research at the Quinn River CCC Camp.
Podium presentation before the 2019 Nevada Anthropological Association, Elko, Nevada.

Flying the Fly Canyon Bypass with Satellites, LiDAR and Drones.
Poster Presented Jointly with Kathryn Ataman, Mark Hall, Peggy McGuckian, Tanner Whetstone, and Megan Holleran before the 36th Great Basin Anthropological Conference, 2018, Salt Lake City, Utah.

Howdy Podner: The Strange Story of Soda Bottles on a Cold War Battlefield.
Presented before the Conflict in the Historic Era North America Session of the 82nd Annual Meeting of the Society for American Archaeology and the 2016 University of Nevada, Las Vegas Graduate and Professional Students Association Research Forum.

Refining the Spatial Accuracy of the Ais Giorkis Geodatabase using a Low-Cost UAV: Results of the 2015 Aerial Survey Project.
Presented before the GIS and Remote Sensing in Archaeology II Session at the 2015 meeting of the American Schools of Oriental Research.

Geospatial Analysis of Areal (Polygonal) Units: Applications at the Site Level in Neolithic Cyprus.
Poster presented before the GIS Modeling and Geospatial Analysis Session of the 80th Annual Meeting (2015) of the Society for American Archaeology.

Playing with Fire at *'Ais Giorkis*: A Geospatial Analysis of Prehistoric Fire Residue.
Poster jointly presented with Katelyn DiBenedetto before the GIS Modeling and Geospatial Analysis Session of the 80th Annual Meeting of the Society for American Archaeology.

A GIS-Based Analysis of the Lithic Core Find Locations at Krittou *Marottou Ais Giorkis.*
Poster presented before the 2015 University of Nevada, Las Vegas Graduate and Professional Students Association Research Forum.

Intra-site Applications of Geographic Information Systems: Lessons from Krittou Marottou *Ais Giorkis*, Cyprus.
Presented before the GIS and Remote Sensing in Archaeology II Session at the 2014 meeting of the American Schools of Oriental Research.

Ecological Variables at one of Cyprus's Earliest Villages.

Poster jointly presented with Katelyn DiBenedetto, Forrest Jarvi, Trent Skinner, and Alan H. Simmons before the Projects on Parade Session at the 2014 meeting of the American Schools of Oriental Research.

Stone Blades and Social Space: Describing and Interpreting Two Stone Blade Caches at Neolithic *'Ais Giorkis*, Cyprus.
Presented before the Mediterranean Session at the 79th Annual Meeting (2014) of the Society for American Archaeology.

Reconstructing Water Availability and Potential Cropland at the Dawn of Agriculture Using Remote Sensing and GIS.
Poster presented before the University of Nevada, Las Vegas 9th Annual (2014) GeoSymposium.

Tale of Two Blade Caches.
Presented before the 2014 University of Nevada, Las Vegas Graduate and Professional Students Association Research Forum

Assessing U.S. Military impact on Iraqi Cultural Heritage Sites during Operation Iraqi Freedom Using Freedom of Information Act Requests.
Presented before the Cultural Heritage Management: Methods, Practice, and Case Studies section at the 2013 meeting of the American Schools of Oriental Research.

Employing Freedom of Information Act (5 U.S.C. § 552) Data in Archaeological Research.
Presented before the 2013 University of Nevada, Las Vegas Graduate and Professional Students Association Research Forum.

SERVICE

INSTITUTION

Department of the Army Intern Hiring Committee Member, USACE (2020)
Wildlife Biologist Hiring Committee Member, Bureau of Land Management (2019)
ES&R Archaeologist Hiring Committee Member, Bureau of Land Management (2019)
Archaeology Intern Hiring Committee Chair, Bureau of Land Management (2019)
Wildlife Biologist Hiring Committee Member, Bureau of Land Management (2018)
Presented Desert Research Institute research to the Board of Regents (2018)
DEES Vice President/Secretary Desert Research Institute GRAD Org. (2015-2016)
University Daily Kansan Advisory Board member, University of Kansas. (2011-2012)
KJHK Advisory Board member, University of Kansas. (2011-2012)
Senator, Student Senate, University of Kansas (2011-2012)

OTHER

Join Organizer and Session Chair with Katelyn DiBenedetto, Pushing the Envelope, Chasing Stone Age Sailors and Early Agriculture: Papers in Honor of the Career of Alan H.

Simmons Session of the 84th Annual Meeting of the Society for American Archaeology.

Session Chair, Conflict in the Historic Era North America Session of the 82^{nd} Annual Meeting of the Society for American Archaeology.

2005-2009 Motor Transport Operator (88M), United States Army
Combat service, discharged under honorable conditions

MEMBERSHIPS

Register of Professional Archaeologists
American Association for the Advancement of Science
Society for Historical Archaeology
Society for American Archaeology
Nevada Archaeological Association
Plains Anthropology Society

APPENDIX C – ENVIRONMENTAL SITE ASSESSMENT

FINAL
PHASE I ENVIRONMENTAL SITE ASSESSMENT

MISSOURI RIVER FLOOD DAMAGE AND DEMOLITION/CONSTRUCTION PROJECTS

OFFUTT AFB, NEBRASKA

July 2020

Prepared by

U.S. Army Corps of Engineers
Omaha District

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FINAL ENVIRONMENTAL SITE ASSESSMENT
Offutt Air Force Base, Nebraska
July 2020

1. Summary
The Missouri River flood of the spring and summer of 2019 inundated the lower areas of Offutt Air Force Base (OAFB) with flood water for months. This southeast section of the base includes: flying and intelligence squadrons, aircraft maintenance facilities, alert facilities, security police facilities, small arms firing range, logistics and fuels activities, hazardous waste storage, recreational areas, working canine kennel, and veterinary services.

Many of the structures in this area are considered unacceptable working accommodations and the decision was made to replace the facilities as necessary. This Environmental Site Assessment (ESA) is in support of the upcoming projects to replace damaged facilities by making determinations of possible contamination by hazardous substances and/or petroleum products of the property undergoing the demolition/construction.

1.1. Background
A Phase I ESA was conducted in support of the proposed project intended to demolish and construct facilities that were damaged beyond repair during the 2019 flood event. This ESA was conducted in accordance with ASTM International (ASTM) E1527-13, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." The purpose of this practice is to define good commercial and customary practice in the United States of America for conducting an ESA with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. §9601) and petroleum products (ASTM 2013).

1.2. Findings
There are six recognized environmental conditions (RECs) on the property for this Phase I ESA. A REC is the presence of any hazardous substances or petroleum products in, on, or at the property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment (ASTM 2013).

There are several Solid Waste Management Units (SWMUs) in the project area that include groundwater plumes and landfills. Each REC is identified in Section 1.4.

1.3. Opinions
The groundwater in the project area is very shallow at certain times of the year and contamination is possible in the soil that will be excavated during the demolition and construction phases. Contaminants of concern in the groundwater are trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC). Any contact with groundwater in these plume areas can be considered contaminated material. Additionally, contaminants in groundwater may pose a risk to future receptors via vapor

intrusion. Vapor intrusion mitigation measures will likely be necessary for any buildings planned for construction over the contaminant plume/s.

1.4. Conclusions

I have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527 of the flooded area in the spring of 2019 of Offutt AFB, Nebraska (NE), the property. Any exceptions to, or deletions from, this practice are described in Section 2 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property except for the following:

1. The land use controls (LUC) associated with SD041 and the VC plume in the NC3 Campus constitute a REC.
2. The area identified as SS040, southern plume in the Security Campus, is considered a REC for LUCs.
3. The area identified as LF012 in the Security Campus is considered a REC for the groundwater contamination and LUCs.
4. Area LF042 in the Security Campus, though not identified for construction, is a REC for the restricted area over the landfill.
5. The VC contaminated plume in the Flightline Hangars Campus is a REC considering the demolition and construction in the Flightline Hangars Campus are directly above the plume.
6. The existence of the groundwater plume and designation as SWMU SS040, the entire Logistics Readiness Squadron Campus is considered a REC.

2. Introduction

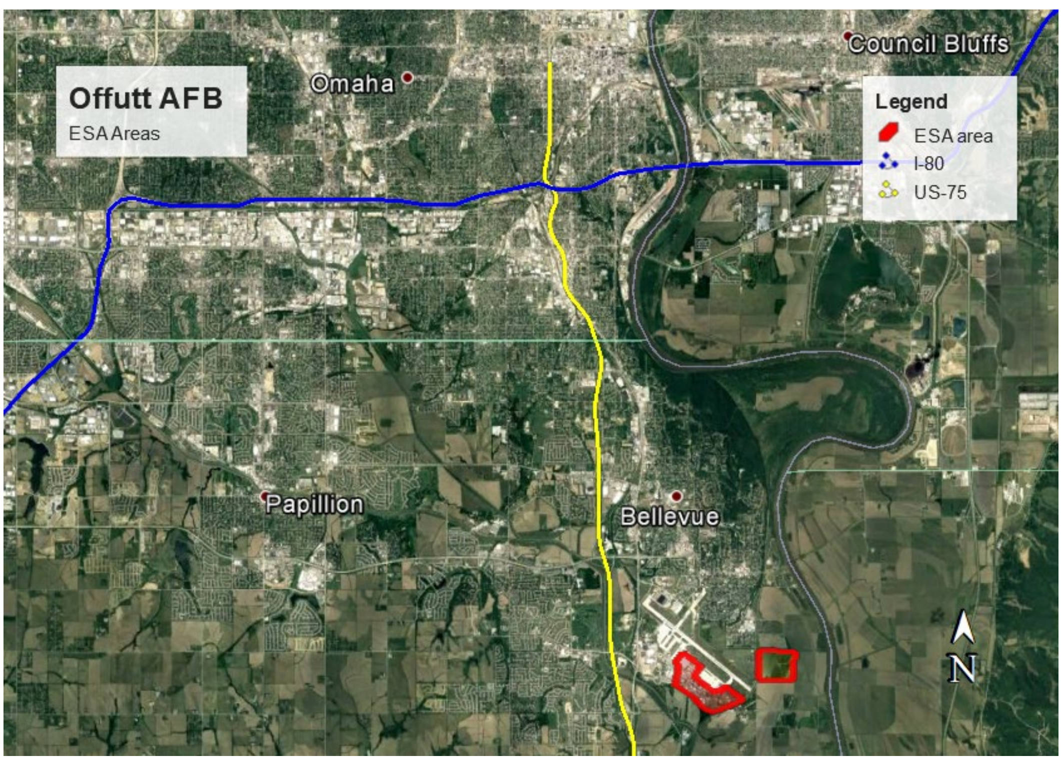

Figure 1. Offutt AFB Location

2.1. Property Identification

Offutt AFB is adjacent to the city of Bellevue in Sarpy County, Nebraska (NE) which is just south of Omaha along the Missouri River. OAFB is located on the Iowa and Missouri Deep Loess Hills Resource Area, generally characterized by rolling hills and bluffs along the Missouri River. The Loess Hills are a distinctive topographic region found along the alluvial plain of the Missouri River, which comprises small valleys with narrow floodplains and larger valleys with broad bottomlands.

Uplands are occupied by narrow ridges separated by narrow valleys. Two alluvial valleys are present at OAFB, each is occupied by perennial streams, the Papillion Creek and the Missouri River. Valley surfaces are nearly level and total relief for alluvial valleys at OAFB is approximately 25 feet. Papillion Creek flows west of OAFB into the Missouri River southeast of the base. The Missouri River is located east of OAFB and the Missouri River valley is characterized by several small lakes (base lake) formed by dredging to remove sand and gravel.

A dissected terrace is located near the center of OAFB and has a surface elevation between 1,030 and 1,040 feet above mean sea level (msl). This terrace slopes gently down to the southeast to the project area at approximately 950 msl.

The OAFB base lake has approximately 113 surface acres and an average depth of 15 feet. Variations in the elevation of the Missouri River directly affect the lake's surface elevation. The lake was formed from dredging that supplied material for construction on base (OAFB 2015).

Figure 2. Flood Affected Areas of Offutt AFB

2.2. Purpose

The purpose of this ESA Phase I is to inspect and determine the environmental condition of the properties that may contain contamination from hazardous substances or petroleum products for several construction and demolition projects resulting from the permanent damage due to the Missouri River flooding of spring of 2019.

The satellite imagery of OAFB in Figure 3 shows the flooding extent of March 2019. The ESA Phase I area is outlined in blue and still shows the frozen surface of the base lake. Flood waters reached the northwestern boundary of the survey area as the ground elevation rises substantially at that point.

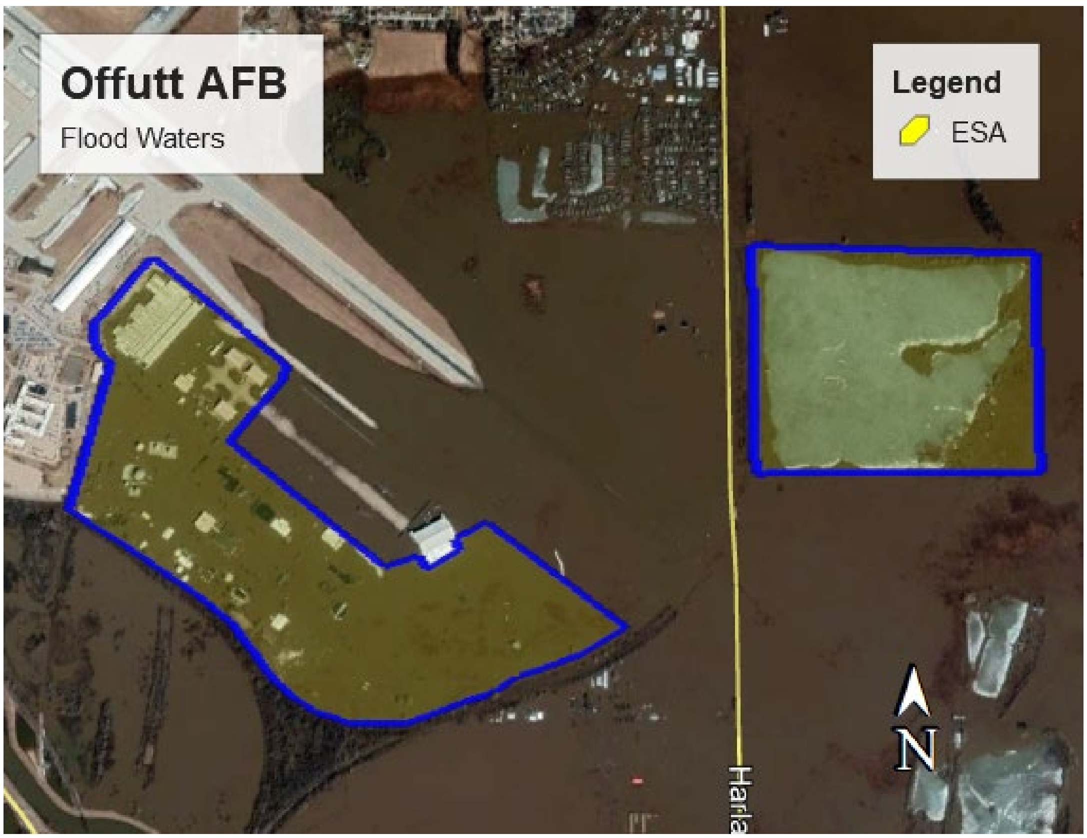

Figure 3. Flood Waters Extent

2.3. Contractual Details (Scope of Work)

The United States Army Corps of Engineers (USACE) Scope of Work required the following:

- A review of federal and state regulatory agency databases for the site and the minimum search distance from the site
- Interviews of certain regulatory agencies about environmental conditions at the site and in the vicinity of the site
- A review of the site history through available historical sources (topographic maps, aerial photographs, interviews…)
- Site visits to observe current site conditions for evidence of RECs

- A review of nearby properties to identify the use of hazardous substances or petroleum products
- Interviews with key personnel regarding current and past operation at the facility
- The preparation of the ESA Phase I Report.

2.4. Limiting Conditions

Not knowing what substances were introduced to the property by the flood waters is a limiting condition that only complete project area soil sampling could answer.

2.5. Deviations

There are no cognitive deviations from the Phase I ESA as described in ASTM E1527-13.

2.6. Exceptions

No data, observations, or information collected on the project property were purposely omitted from inclusion into this ESA Phase I report.

2.7. Significant Assumptions

It is assumed that any contamination brought to the property with the flood waters will be confined to the upper twelve inches of the soils of the project area.

The campus borders and locations depicted in the figures are estimated and may not reflect the actual or precise locations.

2.8. Special Terms and Conditions

There are no special terms and conditions for this Phase I ESA.

2.9. Definitions

Controlled REC (CREC): A CREC applies to a site that has reached regulatory closure with the implementation of an engineering control, such as an impermeable cap, and/or an institutional control, such as a deed restriction or property use restriction.

Historic REC (HREC): An HREC is a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity use limitations, institutional controls, or engineering controls). An HREC is not typically a REC. If regulatory standards have changed since the HREC achieved closure, and the data used to close the case indicate the occurrence of chemical constituents that are above their respective regulatory standards, then the HREC will be identified as a REC in the conclusion section of the Phase I ESA Report.

De Minimis Condition, as defined by ASTM E1527-13: A de minimis condition is a condition that generally does not present a threat to human health of the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. ASTM E1527-13 does not consider de minimis conditions RECs.

Data Gap: A data gap is a lack of or inability to obtain information required by this practice despite good faith efforts by the environmental professional to gather such information. Data gaps may result from incompleteness in any of the activities required by this practice. A data gap is only significant if other information and/or professional experience raises reasonable concerns involving the data gap.

3. User Provided Information

3.1. Environmental Liens/Activity and Use limitations

Activity and use limitations (AULs) are one indication of a past or present release of a hazardous substance or petroleum products. AULs are an explicit recognition by a federal, tribal, state, or local regulatory agency that residual levels of hazardous substances or petroleum products may be present on the property, and that unrestricted use of the property may not be acceptable (ASTM 2013).

For the purpose of this report, the Department of Defense (DoD) uses the term “LUCs” in lieu of AULs for legal (administrative) and physical (engineering) controls on a property.

3.2. Specialized Knowledge or Experience

No specialized knowledge or experience was provided by the user.

3.3. Commonly Known Information

No commonly known information was provided by the user.

3.4. Degree of Obviousness

The degree of obviousness is high considering SWMUs are established in the area, groundwater contamination has been encountered and remediation for chlorinated aliphatic hydrocarbons is in progress.

4. Records Review

USACE personnel reviewed federal, state, and local environmental records pertaining to the Phase I ESA study areas at OAFB, NE. In performing this review, USACE used the services of Environmental Data Resources (EDR), a vendor specializing in the search and retrieval of governmental environmental databases. These federal, state, and local databases include information regarding reported hazardous materials use and storage, facilities that treat, store, dispose, or generate hazardous waste, solid waste landfills, transfer stations, and incinerators, leaking underground storage tanks (USTs), discharges of petroleum and other hazardous substances and reported incidents of contamination. The databases conform to the standard record sources identified in ASTM Standard Practice E1527-13.

4.1. Physical Setting Sources

Topographical maps and aerial photograph are provided in Appendices B and C.

4.2. Standard and Additional Environmental Records Sources

The EDR report provides federal and state research data on hazardous materials and petroleum products within one mile of the boundaries of the ESA area. These reports provide; radius map report, recovered government archives, historical reports, certified Sanborn maps, historical aerials, historical city directories, and historical topographic maps.

The Air Force Administrative Record was consulted for information on areas of contamination that could affect the project. This web site stores documents for remediation projects and documents from regulatory agencies.

These records provided the data that is compiled in Section 7.

4.3. Historical Use Information on the Property and Surrounding Area

According to the aerial photographs in Appendix C, the project property was mainly farmland before the extension of the runway from the conditions of World War II and Martin Bomber manufacturing.
The section of OAFB that was affected by the flood of March 2019 was mainly developed in the late 1950's and early 1960's to accommodate the mission of the newly formed Strategic Air Command and the mission of the EC-135 Looking Glass aircraft. During this time the runway was extended to its current length and some building construction occurred in the currently named non-kinetic operations campus.

5. Site Reconnaissance

5.1. General Site Setting

The majority of the buildings in the flood damaged areas are abandoned and deemed unfit for workplace environments due to water damage and possible mold infestation. Buildings required for aircraft operations (aircraft hangars and petroleum. oil, and lubricants [POL] tanks/pumphouses) were determined to be structurally sound and cleaned for use by personnel.

5.2. Interior and Exterior Observations

The scope of this ESA is for external observations only as many of the existing buildings in the flood damaged area will require demolition. Observations were focused on petroleum storage tanks and hazardous material storage.

5.3. Uses and Conditions of the Property and Adjoining Properties

The property is used as a military airfield support facility with office buildings, aircraft maintenance hangars, fuel storage and transfer facilities, recreation areas and support facilities. Many of the buildings in this area are high priority assets that have external diesel fuel powered generators for electrical supply in emergency conditions. A groundwater contamination plume of TCE is located under the hangar and bulk fuel storage areas.

Adjoining properties include; flightline, taxiways and runway for aircraft operations, more office and support buildings associated with a military installation, a railroad right-of-way, Papillion Creek, and agricultural land.

6. Interviews

6.1. Past and Present Owners and Occupants

Name	Office	Comment
Marvin Riedel	55 CES/CEIE	Environmental Compliance Office, 34 years at OAFB. -There is lead contamination in the berm to the south of the Small Arms Firing Range and a likely landfill underneath the range. -The Hazardous Waste Storage Facility started out as a Resource Conservation and Recovery Act (RCRA) Part B Treatment, Storage and Disposal Facility and was

		converted to a 90 day Conforming Storage Facility in the mid 1990's. Now the building is considered the Central Accumulation Point for hazardous materials.
Doug Chase	55 CES/CEIE	Environmental Compliance Office, one year at OAFB. Provided locations of aboveground storage tanks (ASTs) and USTs in the project area. None of the fuel tanks in the flood damage area leaked any fuel, however, one tank at building number 322 had water in the tank. The UST on the south side of building 496 is an emergency tank for the 10,000 gallons of de-icing fluid (non-hazardous substance) stored inside the building should a spill occur. The UST at building 479 that is on the Spill Prevention Control and Countermeasures Plan has been closed and removed.
MSgt Garcia	55 LRS/LGRF	POL Supervisor with 18 months at OAFB. There are four 50,000 gallon and one 2,000 gallon emergency USTs that supply fuel to R-11 fuel truck fillstand inside the restricted area. All tanks were tested for water after the flood and all passed. MSgt Garcia is not aware of any fuel spills in the vicinity of building 531.
Jason Teem	55 CES/CEOUI	Water and Fuels Management Supervisor, 16 years at OAFB. - Tank #466 in the Logistics Readiness Squadron (LRS) campus is the only bulk storage of gasoline at OAFB. This tank is scheduled for replacement in the near future. - The two USTs at the LRS campus are actually catch tanks connected to the secondary containment for the tanker truck offload stations and refueling truck fillstands. - The Base Lake campus has a sanitary sewer lift station and a pressurized 2 inch sewer line to the main base.

6.2. State and Local Government Officials

Name	Office	Comment
Yvonne Smith	U.S. Environmental Protection Agency (EPA) Region 7	January 15, 2020 telephone conversation. EPA Region 7 personnel were at OAFB after the flood for an inspection of the Facility Response Plan. The inspectors noted some tanks took on water from the flood and were overall very impressed with the way base personnel handled the adverse conditions experienced.

7. Evaluation

The flood damaged areas of OAFB covered in this ESA totals 434 acres and is divided into seven campuses to further distinguish the demolition/construction activities. These campuses and their approximate area, shown in Figure 4, include:

- Flightline and Hangars (FLH) Campus, 55 acres,
- Logistics Readiness Squadron (LRS) Campus, 25 acres,
- Military Strategic and Tactical Relay (MILSTAR) Campus, 3 acres,
- Lake Campus, 176 acres,
- National Command, Control and Communication (NC3) Campus, 82 acres,
- Non-Kinetic Operations (NKO) Campus, 24 acres, and
- Security (SEC) Campus, 54 acres.

The investigation into the hazardous material and petroleum product conditions of these campuses is documented in the remainder of this section and reflects the site walks and interviews with key personnel about the conditions before and after the flood event.

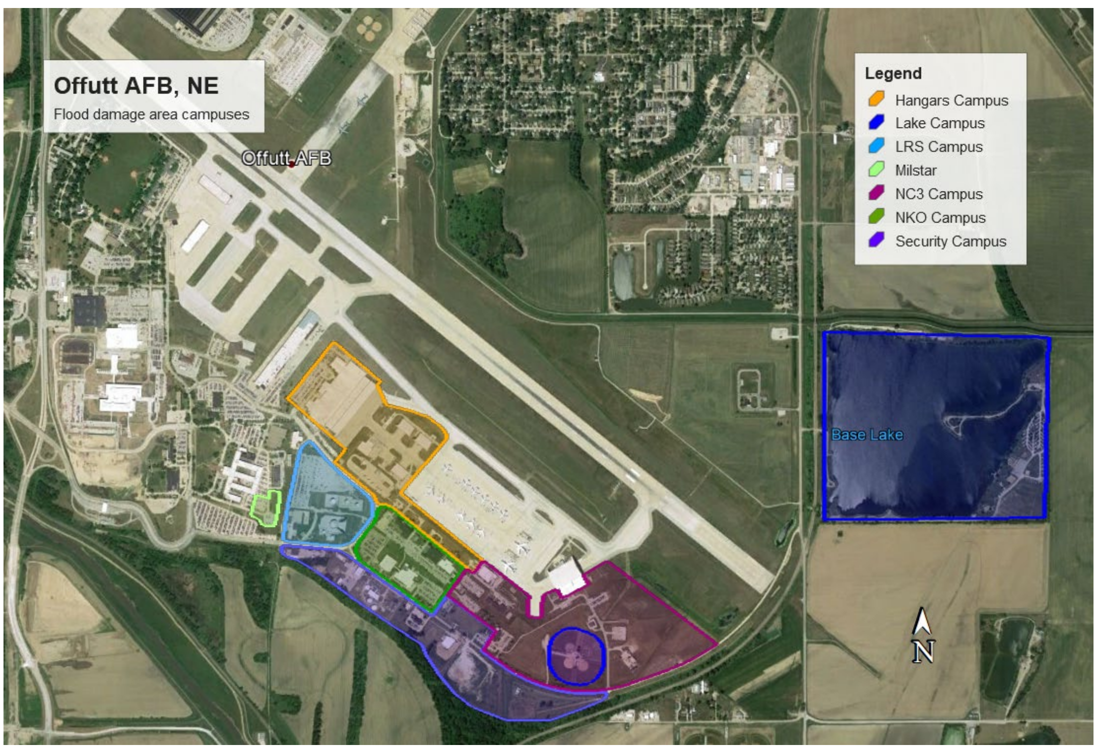

Figure 4. Division of Flooded Areas

The evaluations conducted on the property include:

- Several site walks, both solo and escorted,
- Interviews with key base personnel and appropriate off-base personnel, and
- Records reviews.

Site walks were conducted in December 2019 and January 2020 at times when there was no snow on the ground. Photographs taken during the site walks are presented in Appendix D. Interviews are recorded in Section 6 of this report. Records reviews include EDR reports, Air Force Administrative records, Real Property records, and spill/release logs.

As stated in Section 3, since this ESA is conducted on DoD property, LUCs are used in lieu of AULs in this report (ASTM 2013).

7.1. NC3 Alert Campus

The NC3 Alert Campus consists of one two-story building used as office space and alert facility with aircrew quarters and several single story buildings used as alert crew quarters with family visitation center, courier station, and recycling center. A circular area containing the four ball fields is considered part of the Lake Campus because of the morale, wellness and recreation (MWR) connections.

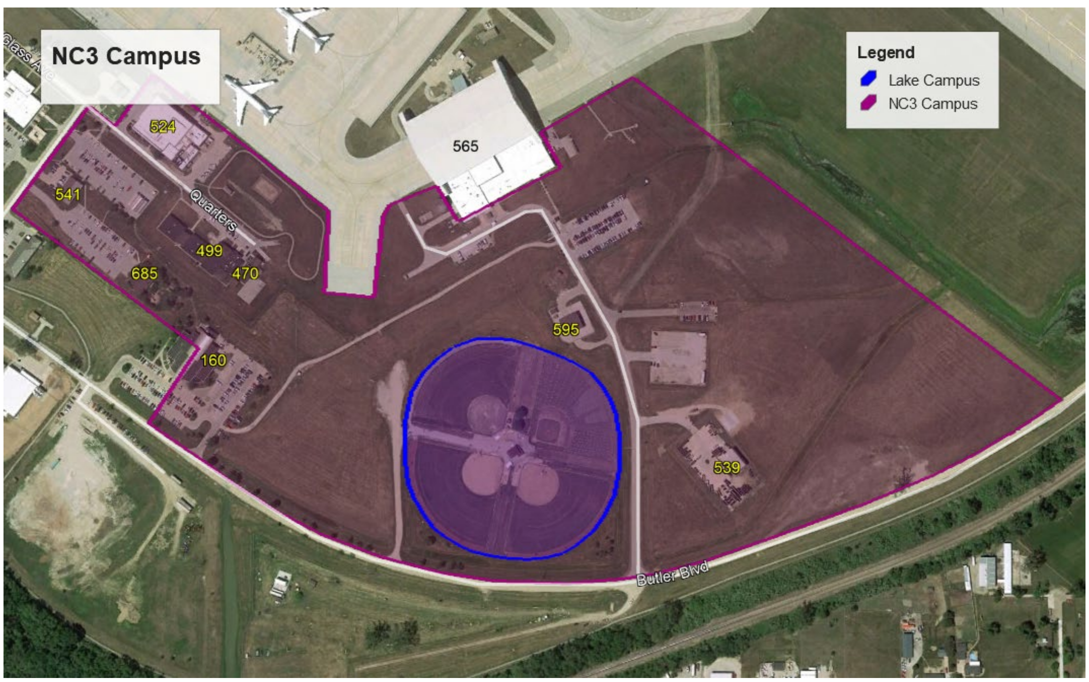

Figure 5. NC3 Alert Campus

7.1.1. Findings

Building 470 is a generator building to power building 499. There are two diesel double-walled ASTs attached to this generator and the volumes are 75 gallons for the day tank and 4,000 gallons for extended operations. Building 524 also has an emergency generator with a diesel double-walled AST of 500 gallons. Building 539 is the recycling center and has a used oil double-walled AST of 660 gallons. The Courier Facility in building 541 also has an emergency generator and a 217 gallon diesel double-walled AST.

The property surrounding building 565 (E-4 hangar) will experience one small building demolition and replacement north of the north corner of the hangar. South of the south corner there are two 50,000 gallon and one 4,000 gallon USTs with diesel fuel for boilers, emergency generators, and fire suppression pumps. These single-walled USTs are equipped with auto tank gauging systems for leak detection. This hangar is also equipped with an aqueous film forming foam (AFFF) fire suppression system and per- and polyfluoroalkyl substances (PFAS) contamination was detected in the surface soil, subsurface soil and groundwater in this area south of the hangar (AERO 2019).

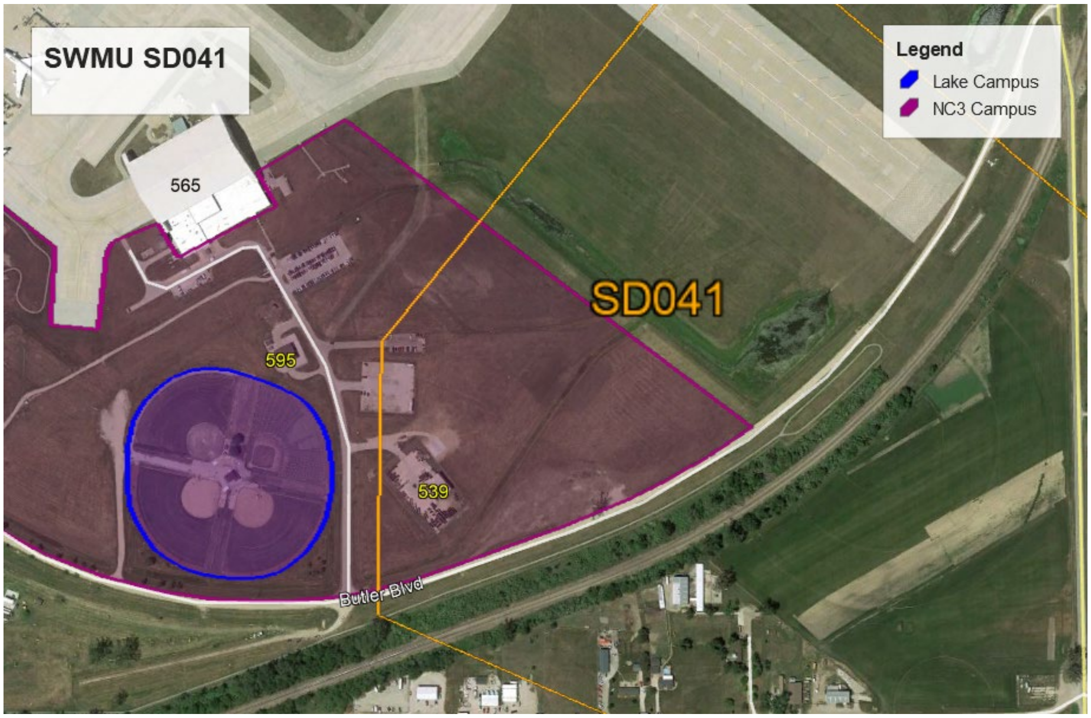

Figure 5a. SD041 in the NC3 Campus

SD041 is the identifier for the SWMU in the NC3 Campus and has a TCE hotspot immediately to the north of building 539 with the higher contamination readings in the shallow groundwater that is between 4 and 13 ft bgs. The preliminary plan for this area indicates building 539 will be demolished and another building constructed at the same location. This location is above a plume of VC and the entire SWMU is subject to the following LUCs as defined in OAFB's part II RCRA permit:

- Use of the digging permit process to prohibit installation of domestic-type wells. A prohibition on the installation of domestic water wells intended to provide groundwater for human needs related to health, fire control, or sanitation or for domestic livestock.
- A Base Civil Engineering Work Clearance Request required for any land disturbance greater than 6 inches deep.
- Annual visual inspections and pertinent records review are required to track and verify physical use for the LUC.

LUCs will remain in place until the concentrations of the hazardous constituents in groundwater are at levels that will allow for unlimited use/unrestricted exposure (UU/UE) (ARGO 2019).

7.1.2. Opinions

The PFAS contamination in the groundwater will not affect the demolition/construction activities in this campus. The VC plume in the groundwater could pose a vapor intrusion hazard to the new construction.

7.1.3. Conclusions

The LUCs associated with SD041 and the VC plume constitute a REC.

7.2. MILSTAR Satellite Communication Station

The MILSTAR Satellite Communication Station Campus is located to the southeast of building 500, the former Strategic Command Headquarters. This campus was not affected by floodwaters.

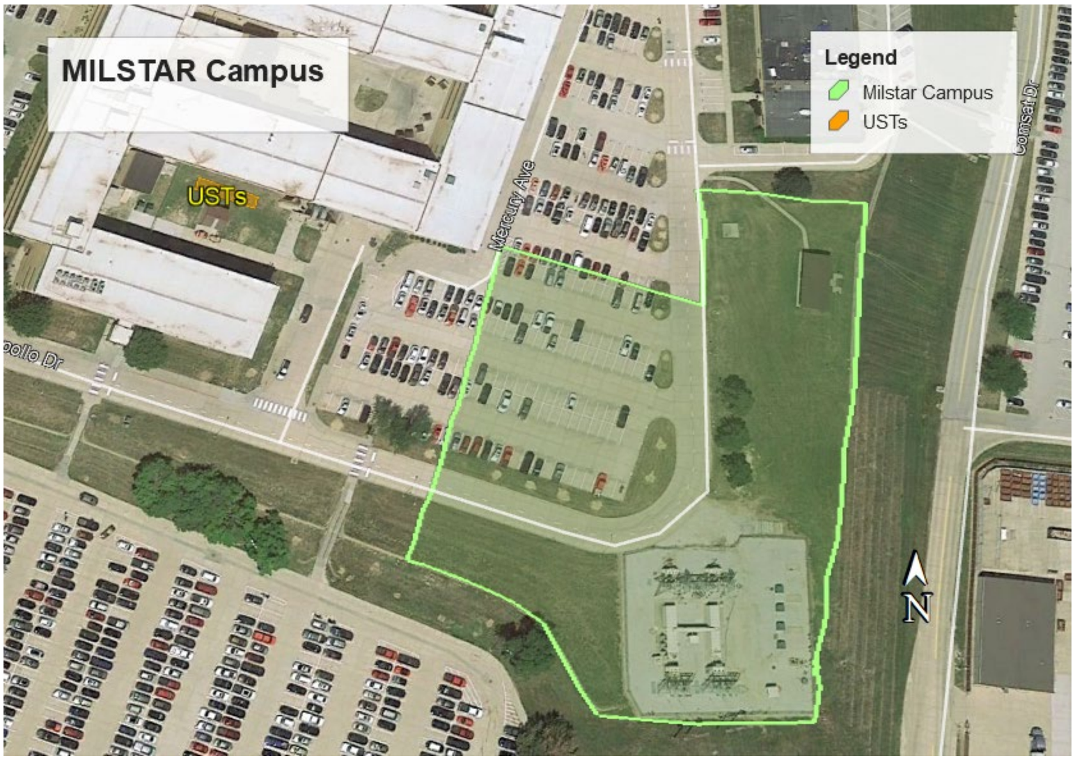

Figure 6. MILSTAR Campus

7.2.1. Findings

There are two 25,000 gallon USTs to the west of the campus that are used to feed the boilers for building 500 (Figure 6a). There is a small rectangular structure in the northern section of the campus that is not identified for demolition at this time.

The northeastern portion of the MILSTAR Campus is within the administrative boundaries of SWMU SS040. The source area of a groundwater plume containing TCE, cis-1,2-DCE, and VC is located approximately 100 feet beyond the northeast corner of the MILSTAR Campus. This plume extends around the eastern side of the MILSTAR Campus and ends approximately 2,000 feet to the southeast. No portion of the plume overlaps with the proposed construction area (see Figure 6b).

Figure 6a. Building 500 UST Location

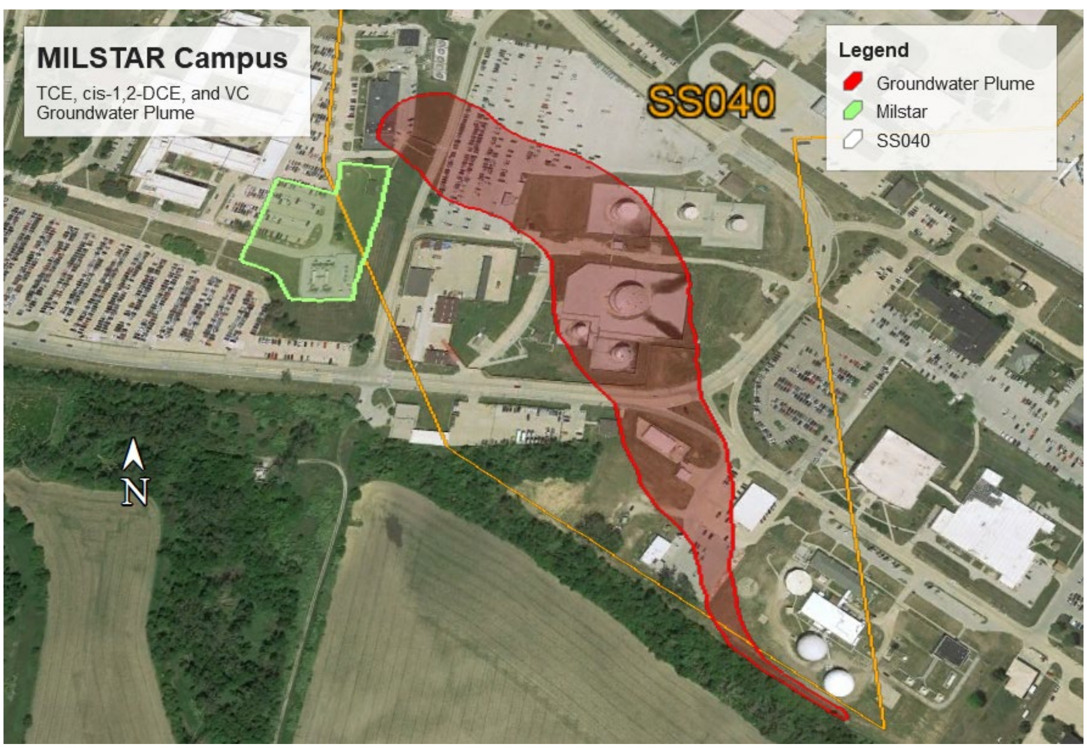

Figure 6b. Groundwater Plume

7.2.2. Opinions

There are no identified soil contamination issues with this area. There is a known groundwater plume to the northeast and east that will not affect construction or demolition operations at this campus.

7.2.3. Conclusions

No RECs are identified in the MILSTAR Campus.

7.3. Non-Kinetic Operations Campus

All existing structures in the NKO Campus, except for building 504, will be demolished at the onset of this project. The buildings are mainly single storied office spaces and replacing was determined to be more economical than repairing.

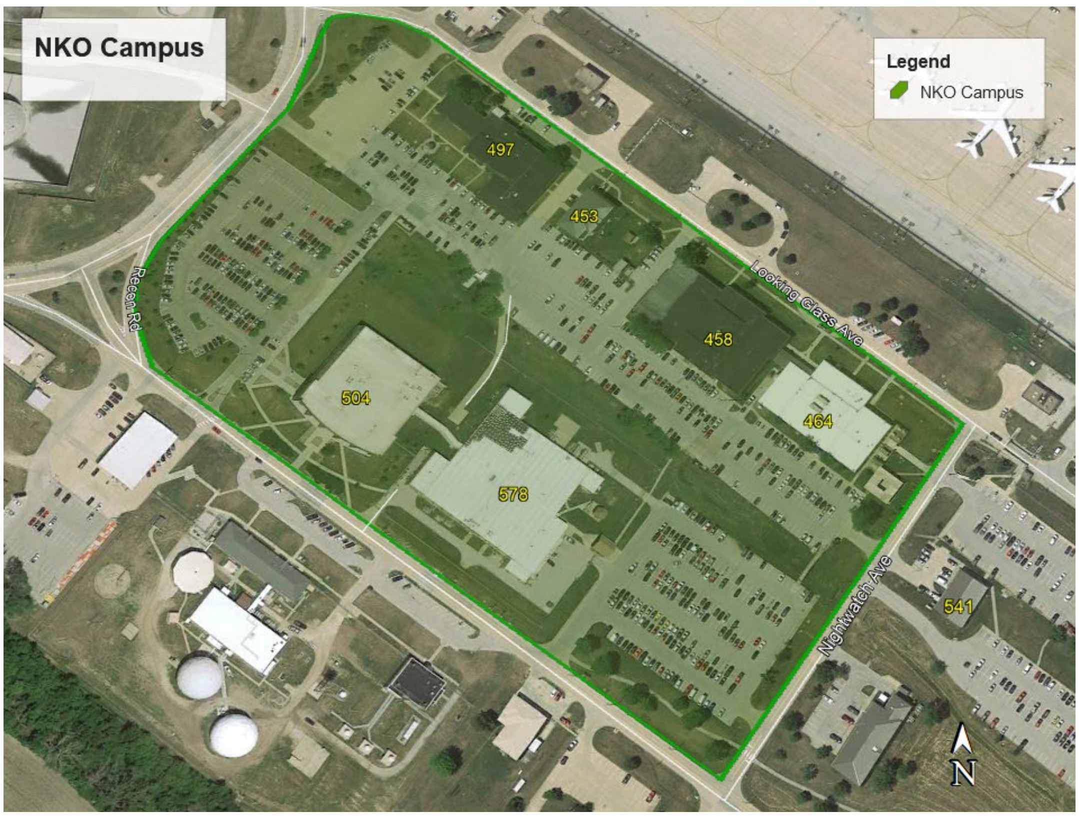

Figure 7. NKO Campus

7.3.1. Findings

Four storage tanks were identified on the site walk. Of the four tanks, three are diesel ASTs (one of which in building 578 was inaccessible) and one is a diesel UST. No evidence of fuel spills or leaks were noted at the ASTs and managers of the tanks indicated no leaks have been reported from the UST which is also doubled walled for leak protection.

7.3.2. Opinions

There are no known soil and groundwater contamination issues with this area.

7.3.3. Conclusions

No RECs are identified in the NKO Campus.

7.4. Security Campus

The Security Campus is the area between Butler Boulevard and the south fence of the base with an additional space that incorporates buildings 160, 514, and 592 that are on the north side of Butler Boulevard. All existing buildings with the possible exception of building 592, lift station, will be demolished as the result of the flooding that occurred in March 2019.

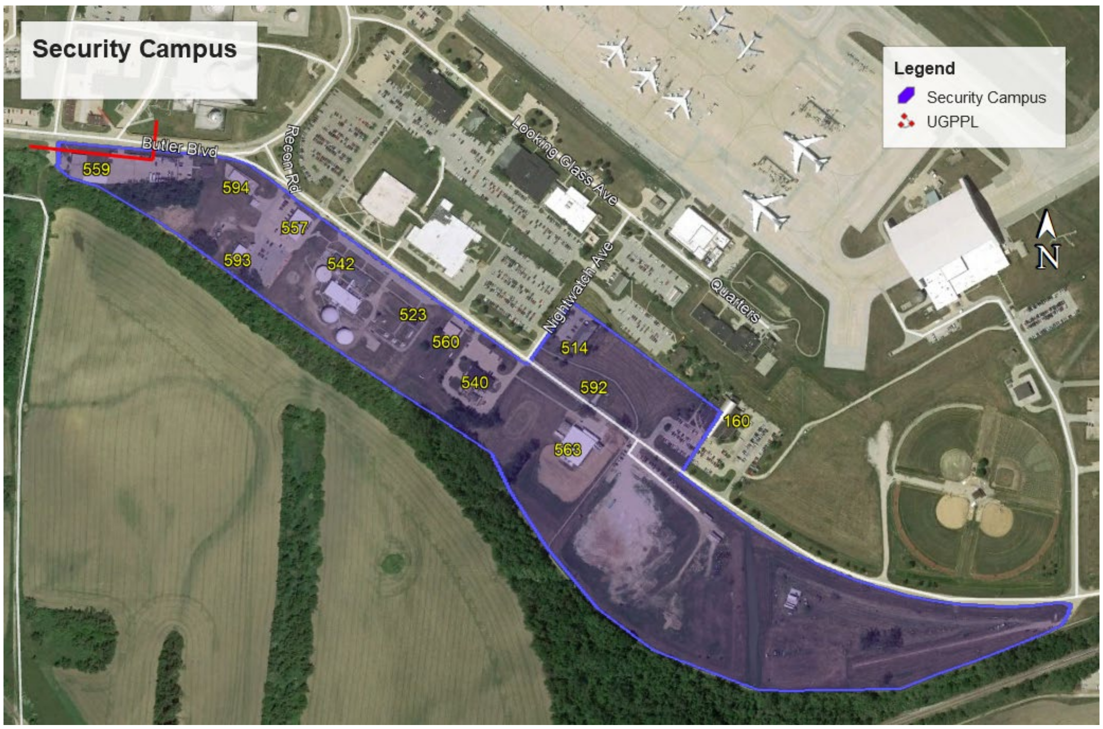

Figure 8. Security Campus

7.4.1. Findings

The far west end of this campus there is an underground petroleum pipeline (UGPPL) (red line on Figure 8) that parallels Butler Boulevard on the south and turns to the north east of building 559 to the LRS Campus. Farther to the east are buildings 594 and 564, the central accumulation point for hazardous materials/waste at OAFB. South of the central accumulation point and west of building 593 is a contractors temporary collection point for 55 gallon drums with what appears to be soil from the bore cuttings of an environmental or geotechnical investigation project.

There are several storage tanks in this campus. The satellite communication area, consisting of buildings 542, 598, and 523, has four ASTs and four USTs. There is one AST at building 592 and two ASTs at building 160.

Groundwater contamination occurs at the west end of the campus under buildings 594 and 564. This contamination consists of cis-1,2- DCE and VC and seems to end at the ditch that borders the south edge of the base. The SWMU site identified as SS040 southern plume has a solvent source on the east side of building 407 which is located just to the west of the LRS Campus. The contaminants in the southern plume under the SEC Campus are cis-1,2-DCE and VC and will affect the demolition of buildings in the SS040 area (Figure 8a) with the following LUCs:

- A prohibition on digging or excavating below 6 inches within the LUC area without approval from the OAFB Environmental Restoration Program (ERP). A Base Civil Engineering Work Request is required for any land disturbance greater than 6 inches deep.
- A prohibition on installing domestic water wells intended to provide groundwater for human needs related to health, fire control, and sanitation, or for domestic livestock.

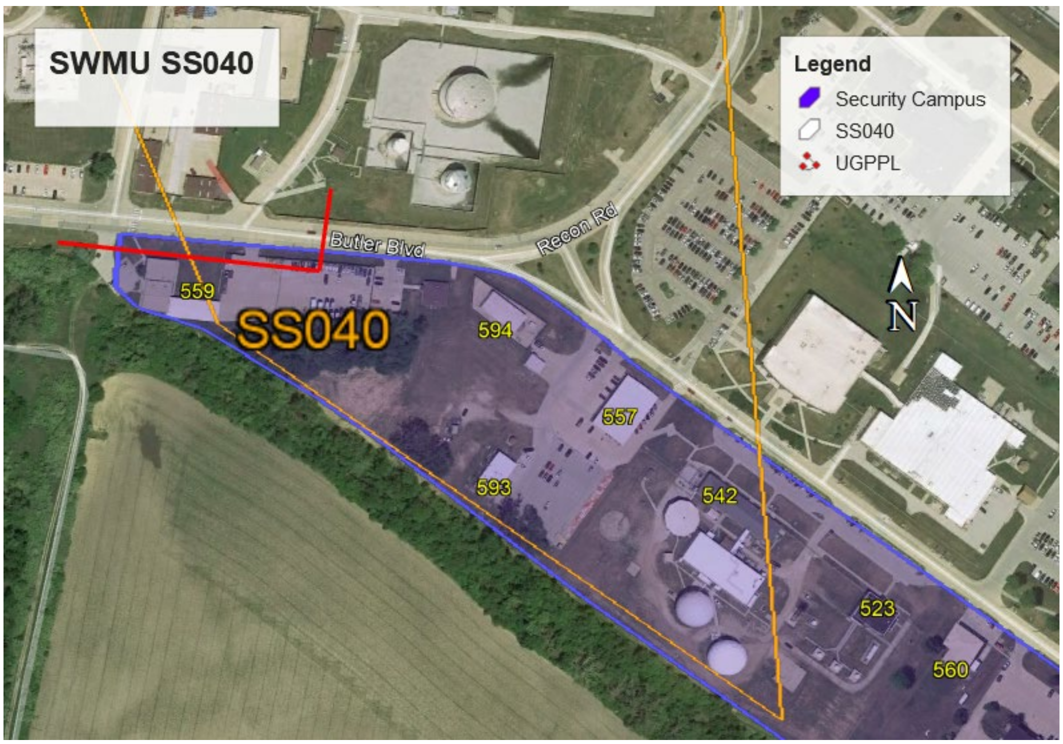

Figure 8a. SS040 in SEC Campus

LF012 is located in the central portion of the Security Campus (Figure 8b) and is identified as one of the SWMUs requiring further action under the OAFB Part II RCRA permit. LF012 was originally identified as a refuse and debris landfill and was later determined the landfill was further east: however, solvent contamination was found in both soil and groundwater. In the early 1960s, a liquid oxygen (LOX) facility operated at building 540. Although there are no records that confirm the use of solvents at the LOX facility, it is likely that solvents were used to clean LOX manufacturing equipment and the hose fittings to LOX carts that were used to service the aircraft (ARGO 2019).

As defined in the OAFB Part II RCRA permit, LUCs were implemented at LF012 to prevent exposure to TCE, cis-1,2-DCE, and VC in the soil and groundwater. The primary LUCs for LF012 concerning this ESA include:

- A prohibition on digging or excavating below 6 inches within the LUC area without approval from the OAFB ERP. A Base Civil Engineering Work Request is required for any land disturbance greater than 6 inches deep within the LF012 site boundary.
- A prohibition on installing domestic water wells intended to provide groundwater for human needs related to health, fire control, and sanitation, or for domestic livestock.
- Partial control of access to the site by OAFB fencing.
- Continuation of groundwater monitoring at LF012 to monitor contaminant concentrations. The sampling frequency and analyte list will be determined in an annual EPA-approved ERP work plan.

LUCs will remain in place until the concentration of hazardous constituents in the soil and groundwater are at levels that allow UU/UE (ARGO 2019).

LF042 (Figure 8b) is identified as one of the SWMUs listed in the OAFB Part II RCRA permit requiring further action. The mounded area of LF042 (Red shaded area of Figure 8b.) reportedly operated as a trench and fill landfill around 1968. Material reportedly disposed in the trenches included municipal wastes from the OAFB housing areas, sludge from the wastewater treatment plant, waste solvents, POL materials, contaminated meat, waste paint and thinners, and six mustard gas containers. This area is restricted access only.

LUCs for this area to prevent exposure to TCE, cis-1,2-DCE, and VC in the soil and groundwater include:

- A prohibition on digging or excavation within the fenced landfill, and below 6 inches within the non-fenced portion of the LUC area without approval from the OAFB ERP.
- A Base Civil Engineering Work Clearance Request is required for any land disturbance greater than 6 inches in the non-fenced LUCs area. A prohibition on installing domestic water wells intended to provide groundwater for human needs related to health, fire control, and sanitation, or wells for domestic livestock.
- Maintenance of a restricted-access area surrounded by a 7-foot chain link fence with padlocked gates.
- Permanent signs posted and maintained at the perimeter of LF042 identifying restricted use. LUCs will be maintained in the designated area outside the fenced landfill until the concentrations of hazardous constituents in the soil and groundwater are at levels that allow UU/UE (ARGO 2019).

7.4.2. Opinions

Because of its higher elevation, new construction is planned for the property that building 504 now occupies which happens to be in LF012 and on top of a groundwater plume contaminated with TCE, cis-1,2-DCE, and VC. If the construction occurs, vapor intrusion countermeasures must be utilized as the groundwater is as shallow as 3 feet bgs.

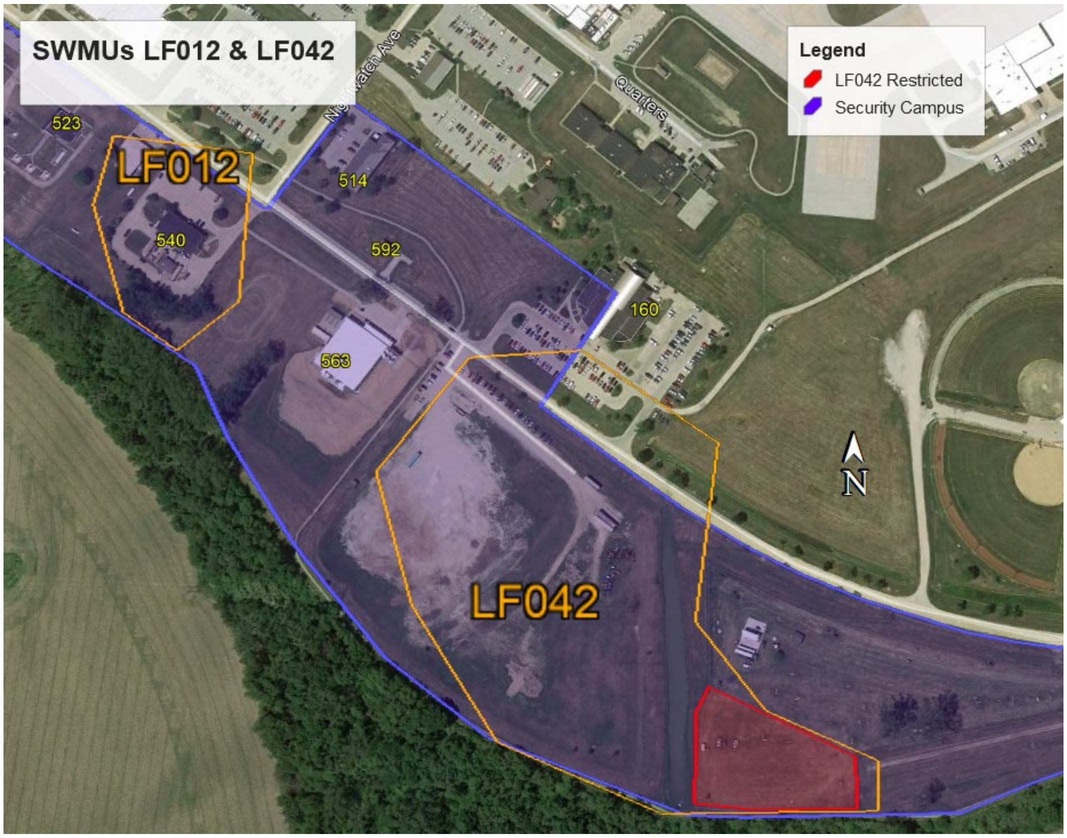

Figure 8b. LF012 and LF042 Locations

7.4.3. Conclusions

The area identified as SS040, southern plume, is considered a REC for LUCs. The area identified as LF012 is considered a REC for the groundwater contamination and LUCs. Area LF042, though not identified for construction, is a REC for the restricted area over the landfill.

7.5. Flightline Hangars Campus

The FLH Campus contains buildings associated mainly with aircraft maintenance and POL. The aircraft maintenance buildings include the massive Bennie L. Davis Maintenance Facility, building 457, and nose docks 1, 2, and 3, buildings 491, 492, and 493 to support the maintenance functions on the RC-135 mission aircraft. Building 517 is used by the U.S. Navy for aircraft maintenance support of the E-6B Mercury. POL buildings include operations in 584 and 585 and a POL pumphouse in building 531.

7.5.1. Findings

On 29 November 2011 an equipment failure caused approximately 12 gallons of hydraulic fluid to spill north of building 517. Of the 12 gallons, 4 gallons were picked up with absorbents and 8 gallons travelled into a trench drain and into the storm sewer. The hydraulic fluid made it to the waters of the base lake and deemed not a threat to the surface waters. This incident is found in the Emergency Response Notification System Database, incident number 2011996763.

There are many fuel tanks in the FLH campus. These ASTs and USTs include:

- Building 531 is a POL pumphouse that will remain operational and has four 50,000 gallon USTs containing jet fuel and a 2,000 gallon diesel UST that is empty and used for spill containment.
- Building 488 houses an emergency generator and has two diesel tanks, one is an attached 366 gallon day tank and a separate 1,000 gallon diesel reserve tank for extended operation.
- Building 496 stores de-icing fluid for use on the aircraft during when the weather dictates. There is a 10,000 gallon emergency catch basin to the south of the building to contain any fluid that might spill.
- Building 584 contains a 20,000 gallon UST emergency catch basin for jet fuel.
- Building 493 (nose dock 3) has two 500 gallon emergency catch basins for hydraulic fluid.
- Building 492 (nose dock 2) has three 360 gallon ASTs for fire suppression pumps.
- Building 517 has a 70 gallon capacity AST for motor oil.
- Building 332 has four 2,000 gallon USTs (jet fuel [2], diesel, and gasoline).
- Building 457 (Bennie Davis Maintenance Facility) contains five ASTs, three are for diesel fuel for emergency generators and boilers, one is a diesel tank for a fire suppression pump, and one is a used oil tank. Three diesel USTs support emergency generators and boilers, two are 20,000 gallons and one is 2,000 gallons.

Figure 9. Flightline Hangars Campus

There is a groundwater contamination plume that originates to the northwest of building 457 and stretches to the southeast to building 492. The contaminant of concern in this plume under the FLH Campus is vinyl chloride and is identified as area SS040 northern plume. The remediation efforts for this plume is monitored natural attenuation.

LUCs were implemented at SS040 to prevent exposure of construction workers to high concentrations of contaminants that persist in shallow groundwater source areas, and to prohibit the installation of on-base drinking water wells. The primary LUCs for SS040 include:

- A prohibition on digging or excavating below 6 inches within the remaining LUC areas without approval from the OAFB ERP, and a requirement to obtain a Base Civil Engineering Work Clearance Request for any land disturbed greater than 6 inches.
- A prohibition on installing domestic water wells intended to provide groundwater for human needs related to consumption, fire control, and sanitation, or for domestic livestock.

Building 492 is also equipped with an AFFF system and testing for PFAS occurred in the surface soil, subsurface soil, and groundwater. PFAS was detected in the surface and subsurface soil, but was less than the screening level. PFAS in the groundwater exceeded the screening level with perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) (AERO 2019).

7.5.2. Opinions

The preliminary demolition/construction plan indicates the demolition of building 393 (west of building 491) and the construction of three small buildings. There are LUCs for SS040 and they reflect those of LF012 and LF042 in that the OAFB ERP must be notified of any excavations deeper than 6 inches and obtain a Base Civil Engineering Work Clearance Request. Vapor intrusion controls should be employed for new construction that will be occupied by personnel. Depth to groundwater in this site varies from 5 to 15 ft bgs (ARGO 2019).

7.5.3. Conclusions

The vinyl chloride contaminated plume is a REC considering the demolition and construction in the FLH Campus are directly above the plume.

7.6. Logistics Readiness Squadron Campus

The main feature of the LRS Campus are the ASTs that contain the jet and diesel fuels for ground and flight operations at OAFB that also includes a type III pumphouse. Other buildings in this campus include storage facilities for Defense Logistics Agency materials handling and associated support buildings. On the eastern border of this campus is a sanitary sewer lift station and emergency generator building.

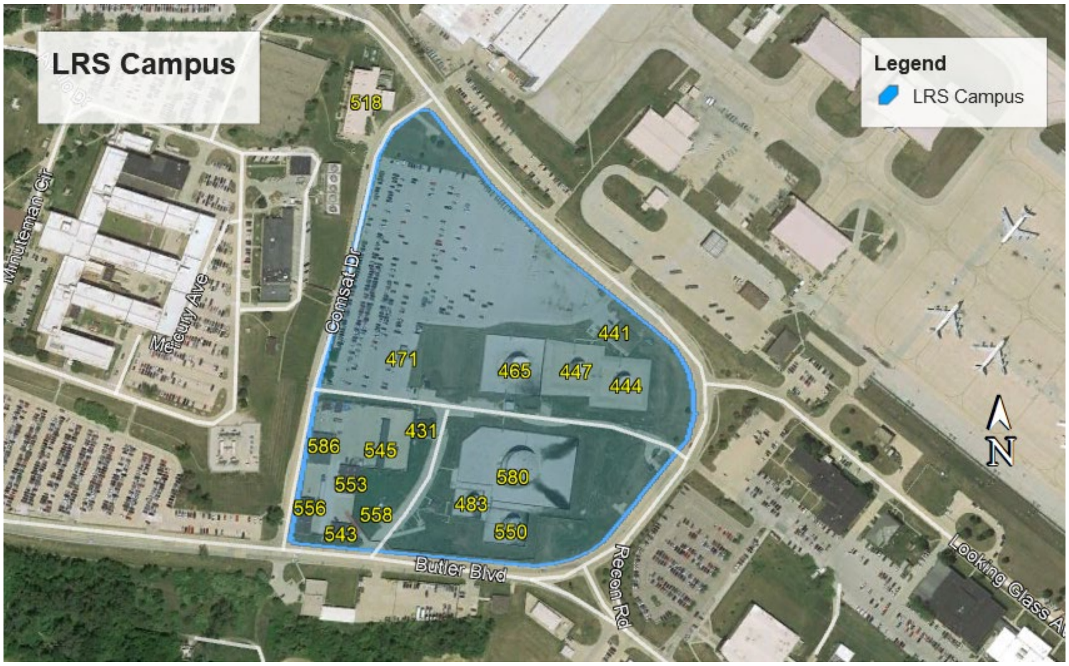

Figure 10. LRS Campus

7.6.1. Findings

There are two catch basins in the LRS campus, one is near building 558 (U0558) and catches spills/releases at the fuel truck offload station. The other catch basin is east of building 431 (U0584) and catches spills/releases from the fuel truck fill stand.

Fuel tank number 483 was scheduled for demolition and was drained and disconnected to fuel lines before the flood event. The flood water lifted the tank and left it laying on its side while still in the secondary containment dike. OAFB environmental office personnel said there is water trapped inside the tank which must be removed before demolition. Other fuel tanks in this campus include:

- A0441 – 300 gallon diesel fuel AST for and emergency generator for the pumphouse (building 441).
- A0444 – 420,000 gallon AST for jet fuel in the POL area.
- A0447 – 420,000 gallon AST for jet fuel in the POL area.
- A0465 – 1,050,000 gallon diesel AST in the POL area.
- A0466 – 20,000 gallon gasoline AST in the POL area.
- A0550 – 420,000 gallon AST for jet fuel in the POL area.
- A0580 – 2,310,000 gallon AST for jet fuel in the POL area.
- U0441 – 4,000 gallon UST for product recovery at building 441.

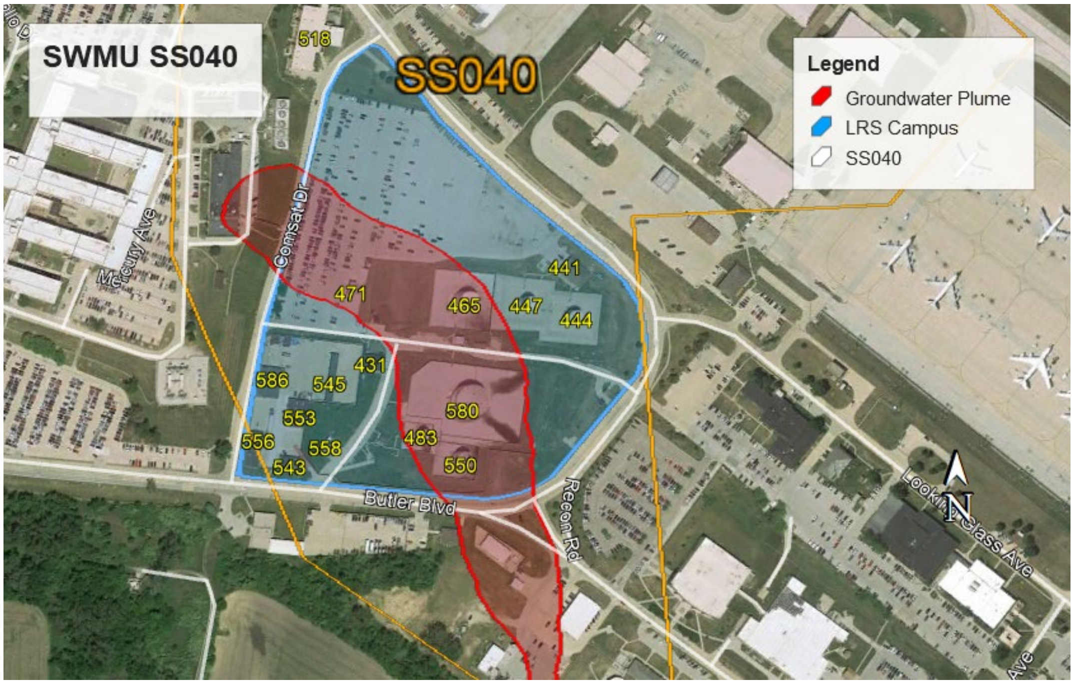

Figure 10a. SS040 in LRS Campus

SS040 southern plume is an area of groundwater contamination with readings above screening levels of TCE, cis-1,2-DCE, and VC. The contamination plume has its origins east of building 407 just to the west of the western boundary of the LRS Campus and encompasses the entire campus. The shallow groundwater flow is to the east and the plume lies under building 471 and tank 465, turns south under tank 580 and exits the campus under tank 550.

As defined in OAFB's Part II RCRA permit, LUCs were implemented at SS040 to prevent exposure of construction workers to high concentrations of contaminants that persist in shallow groundwater source areas, and to prohibit the installation of on-base drinking water wells. The primary LUCs for SS040 include:

- A prohibition on digging or excavation within the fenced landfill, and below 6 inches within the non-fenced portion of the LUC area without approval from the OAFB ERP.
- A Base Civil Engineering Work Clearance Request is required for any land disturbance greater than 6 inches in the non-fenced LUCs area. A prohibition on installing domestic water wells intended to provide groundwater for human needs related to health, fire control, and sanitation, or wells for domestic livestock.

LUCs will remain in place until the concentration of hazardous constituents in soil and groundwater are at levels that allow UU/UE (ARGO 2019).

7.6.2. Opinions

Except for building 471, the groundwater plume does not affect any other planned demolition in this campus; however, the buildings identified for demolition are in the SWMU and subject to the LUCs placed on the property.

7.6.3. Conclusions

The existence of the groundwater plume and designation as SWMU SS040, the entire LRS Campus is considered a REC.

7.7. Lake Campus

The Lake campus in the only campus split up into two different areas. One area is obviously the base lake and the other area is the four ball fields which is in the middle of NC3. The ball field area is attached to the Lake campus because of the MWR connection. According to the OAFB Spill Prevention, Control, and Countermeasures Plan there are no USTs or ASTs in this campus (OAFB 2016).

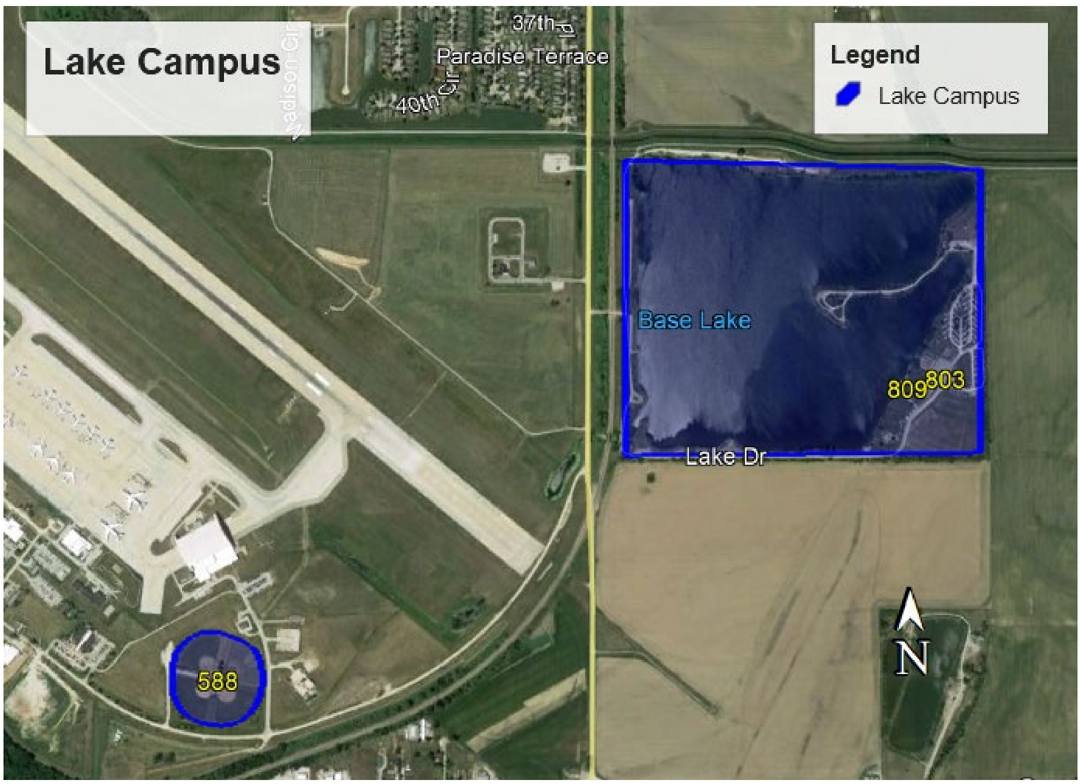

Figure 11. Lake Campus

7.7.1. Findings

All structures within the Lake Campus will be demolished and no areas of contamination were identified.

7.7.2. Opinions

There are no known soil and groundwater contamination issues with this area.

7.7.3. Conclusions

No RECs were found in this campus.

7.8. Additional Investigations, Data Gaps and Deletions

The EPA Vapor Intrusion Screening Level (VISL) Calculator was used to determine the possibility new construction over contamination plumes could cause hazardous conditions for personnel occupying positions in the new buildings. Standard commercial exposure scenarios were used with the default assumptions provided by the calculator program to determine the screening levels. When construction is to occur over a plume of TCE and/or VC, the contamination concentration from the *Offutt Air Force Base, Nebraska Annual Monitoring Report 2018,* by ARGO/LRS joint venture, was used in the calculator to estimate screening level risks and hazards to building occupants.

Three future buildings were found to be planned above groundwater contamination plumes in three different SWMU sites. Contamination concentrations were taken from a well that was close to the footprint of the new building. When more than one well was close to the footprint, the highest concentration of contamination was used.

Appendix E contains the data sheets extracted from the VISL calculator. The cover sheet for each data set provides the well number, contaminant, campus, and building number closest to the well that provided the sample. In general, cancer risks are greater than one in ten thousand and hazard quotients are greater than one. Vapor intrusion mitigation measures for these three buildings is warranted due to the elevated carcinogenic and non-carcinogenic VISLs.

7.9. Environmental Condition of Property

The term “standard environmental condition of property (ECP) area type” refers to one of seven area types defined in ASTM D5746-98 (Reapproved 2010). An Identification of an area type on an ECP map means that a DoD component has conducted sufficient studies to make a determination of the RECs of installation real property (ASTM 2010).

The determination of the environmental condition of property area is Type 5. A Type 5 property is an area or parcel of real property where release, disposal, or migration, or some combination thereof, of hazardous substance has occurred and removal or remedial actions, or both, are under way, but all required actions have not yet been taken (ASTM 2010).

7.10. Statement and Signature

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional (EP) as defined in §312.10 of 40 CFR §312 and I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Thomas A, Weirauch, EP, CESCO
USACE-NWO-ED-GS

7.11. References

AERO 2019	Aerostar SES LLC. *Final Site Inspection Report of Aqueous Film Forming Foam Areas at Offutt Air Force Base Sarpy County, Nebraska.* September 2019.
ARGO 2019	ARGO/LRS JV. *Offutt Air Force Base, Nebraska Annual Monitoring Report 2018.* May 2019.
ASTM 2010	ASTM International. *D5746-98 (Reapproved 2010), Standard Classification of Environmental Condition of Property Area Types for Defense Base Closure and Realignment Facilities.* April 2010.
ASTM 2013	ASTM International. *E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* November 2013.
EDR 2020	Environmental Data Resources, Inc. *EDR Lightbox Standard Report*. January 2020.
OAFB 2015	*Offutt AFB Integrated Natural Resources Management Plan.* April 2015.
OAFB 2016	*Offutt AFB Spill Prevention, Control and Countermeasures Plan.* April 2016 (Revised 2017).

8. Non-Scope Services

8.1. Additional Services

There are wetlands on the property, but there are no U.S. Jurisdictional Wetlands on the ESA Phase I property except for the base lake. All buildings to be demolished during this project require asbestos containing material and lead based paint surveys.

9. Appendices

A – Abbreviations and Acronyms

B – Topographical Maps

C – Aerial Photographs

D – Site Photographs

E – Vapor Intrusion Screening Levels

F – EDR Report (sent separately on request)

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APPENDIX A

ABBREVIATIONS AND ACRONYMS

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ABBREVIATIONS & ACRONYMS

AFB	Air Force Base
AFFF	Aqueous Film Forming Foam
AFCEC	Air Force Civil Engineer Center
AST	Aboveground Storage Tank
ASTM	ASTM International
AUL	Activity and Use Limitation
CESCO	Certified Environmental and Safety Compliance Officer
cis-1,2-DCE	cis-1,2-Dichloroethylene
CFR	Code of Federal Regulations
CREC	Controlled Recognized Environmental Condition
DoD	Department of Defense
ECP	Environmental Condition of Property
EDR	Environmental Data Resources
EP	Environmental Professional
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
ESA	Environmental Site Assessment
FLH	Flightline and Hangars
HREC	Historic Recognized Environmental Condition
LOX	Liquid Oxygen
LRS	Logistics Readiness Squadron
LUC	Land Use Control
MILSTAR	Military Strategic and Tactical Relay
msl	Mean Sea Level
MWR	Morale, Wellness, and Recreation
NC3	National Command, Control and Communication
NKO	Non-Kinetic Operations
OAFB	Offutt Air Force Base
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
POL	Petroleum, Oil and Lubricants
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
SEC	Security
§	Subsection
SWMU	Solid Waste Management Unit

TCE	Trichloroethylene
UGPPL	Underground Petroleum Pipeline
U.S.	United States
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
UST	Underground Storage Tank
UU/UE	Unlimited Use/Unrestricted Exposure
VC	Vinyl Chloride
VISL	Vapor Intrusion Screening Level

APPENDIX B

TOPOGRAPHICAL MAPS

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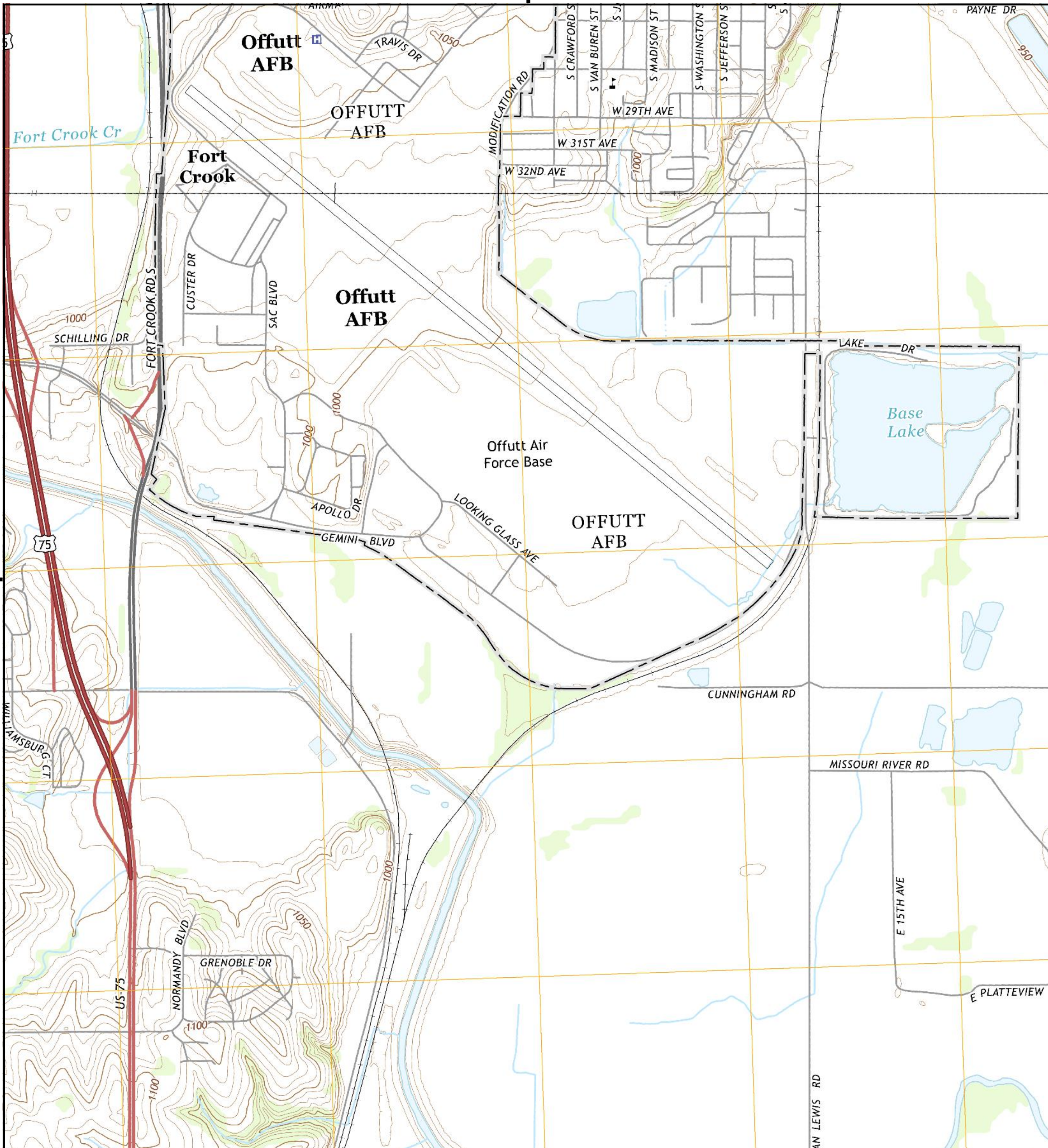
EDR

Historical Topo Map

2014



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SW S SE

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N, Omaha South, 2014, 7.5-minute

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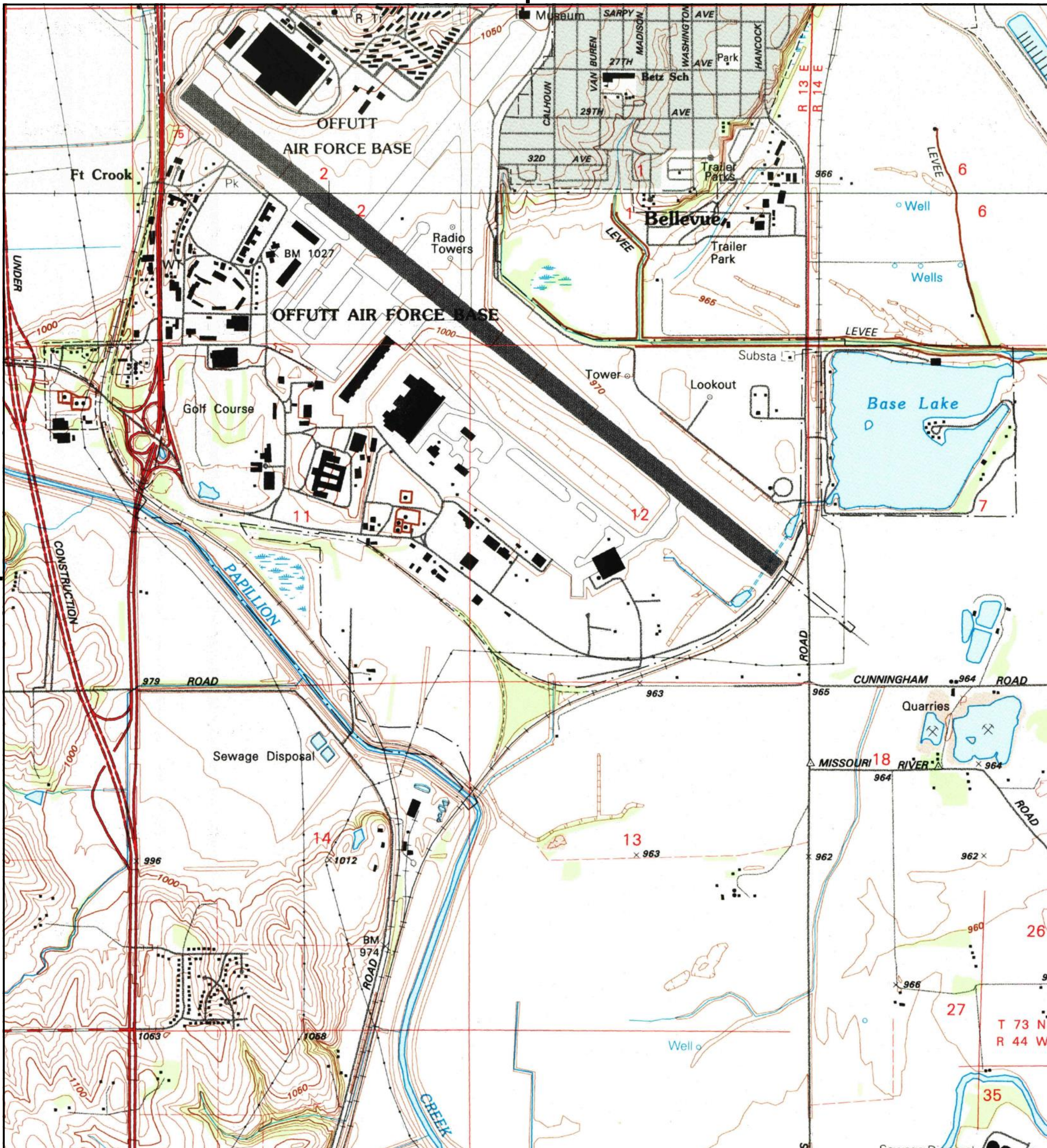
ADDRESS: Offutt Air Force Base
Offutt AFB, NE 68113
CLIENT: U.S. Army Corps of Engineers

N

Historical Topo Map

1994



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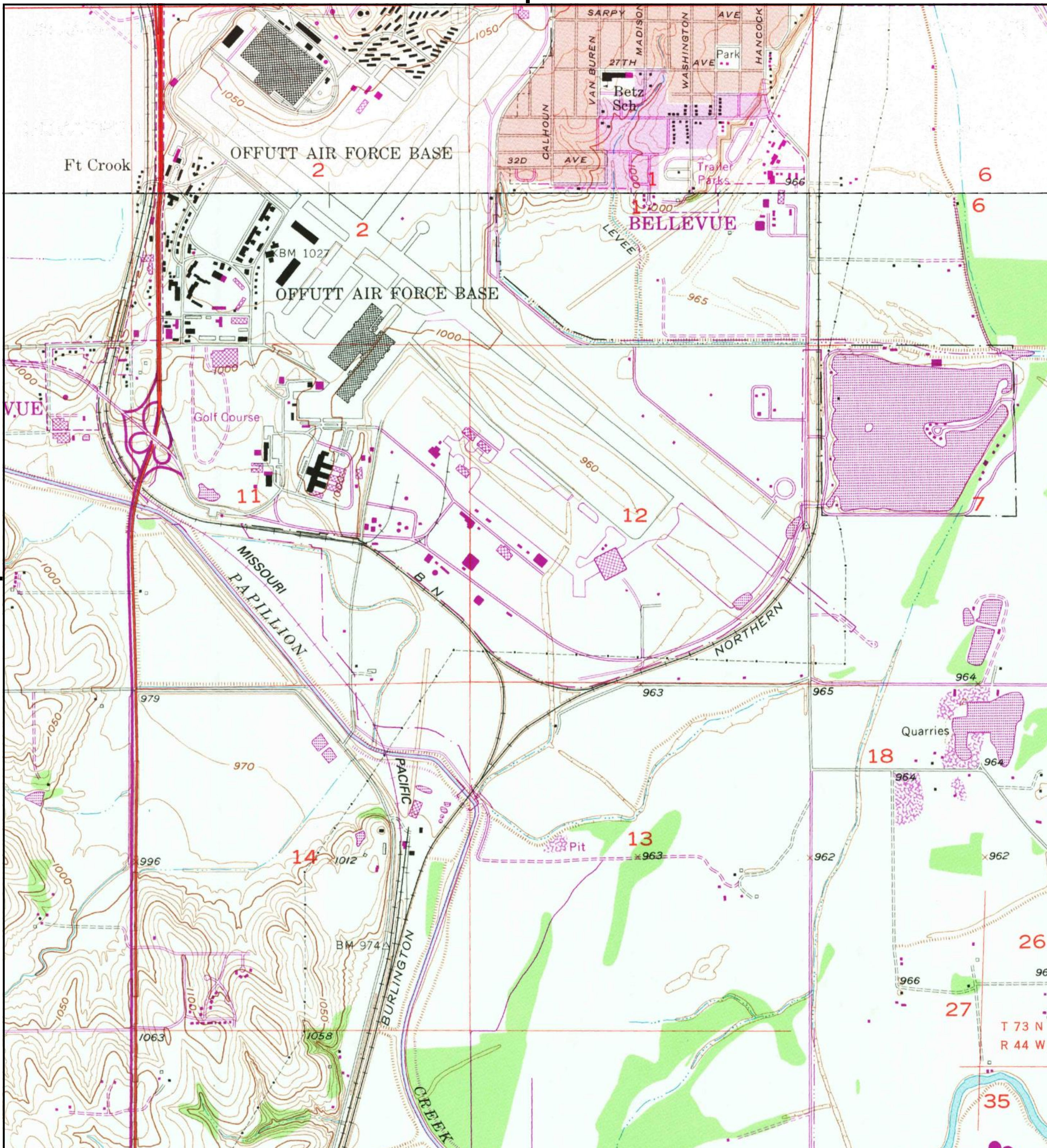
Offutt AFB, NE 68113
CLIENT: U.S. Army Corps of Engineers

N

Historical Topo Map

1984



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N, Omaha South, 1984, 7.5-minute

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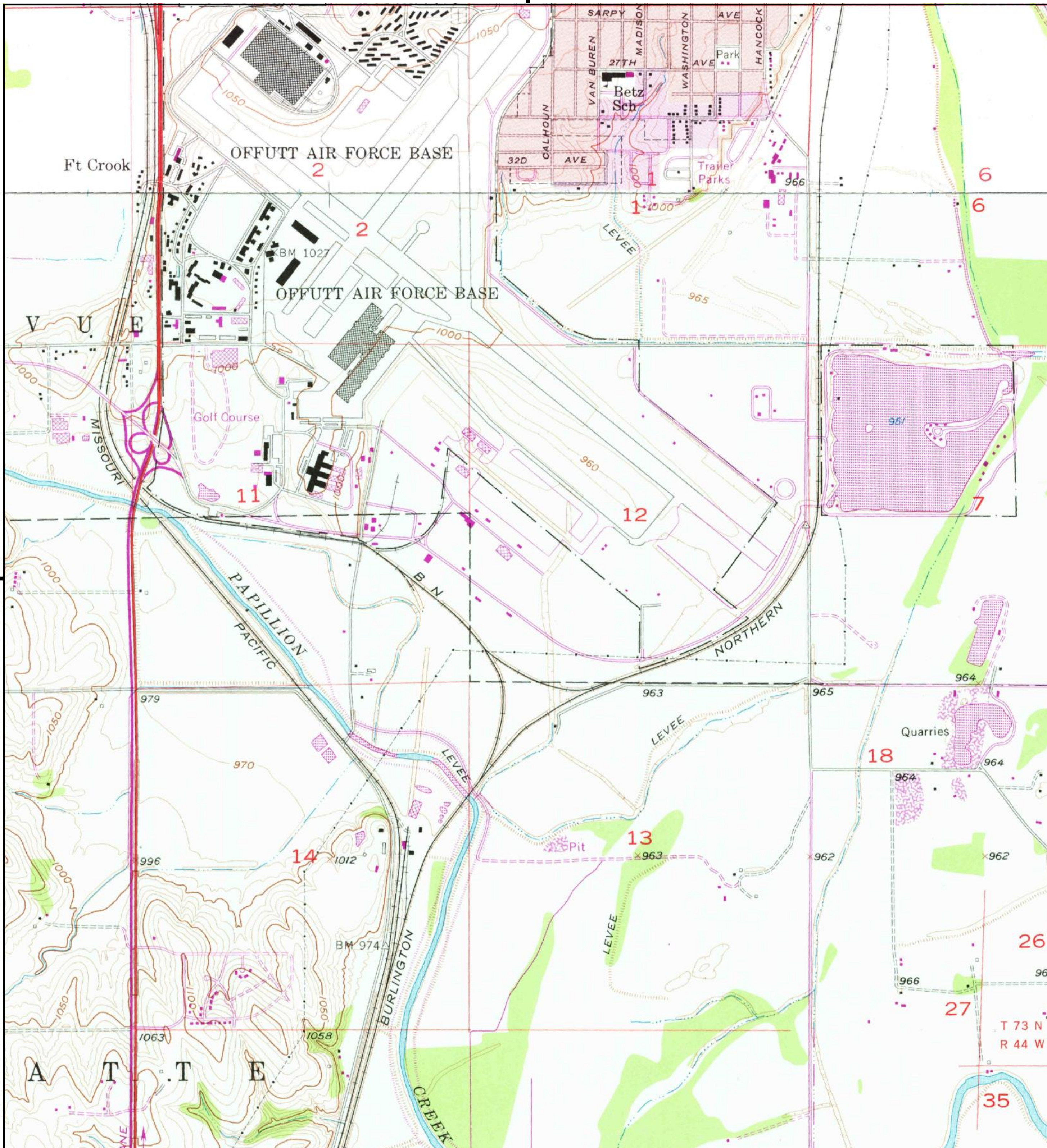
ADDRESS: Offutt Air Force Base
Offutt AFB, NE 68113
CLIENT: U.S. Army Corps of Engineers

Historical Topo Map

1975



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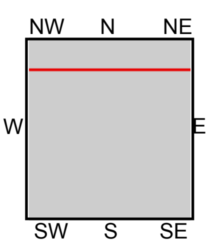

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Offutt AFB, NE 68113
CLIENT: U.S. Army Corps of Engineers

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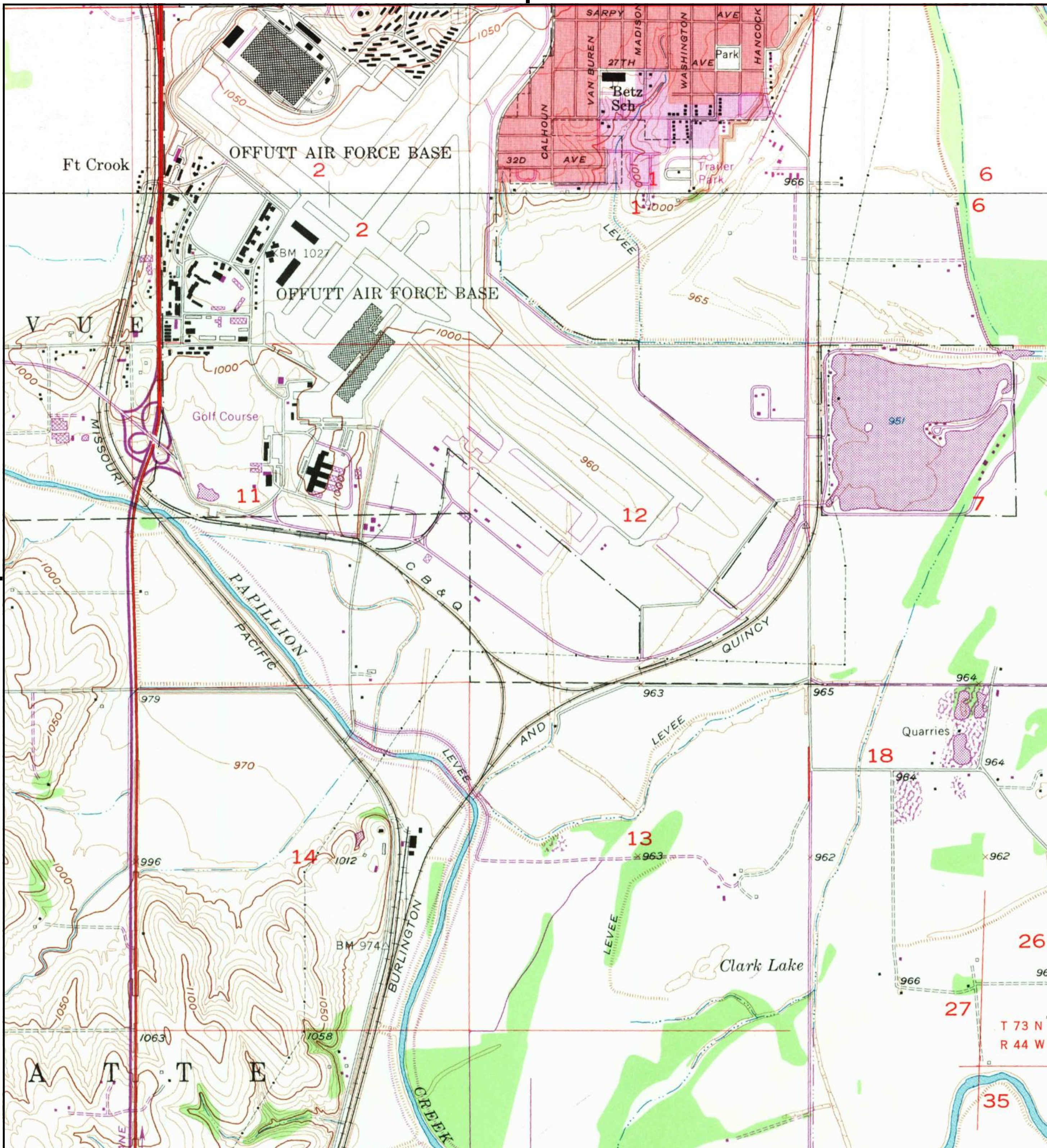
Historical Topo Map

1969



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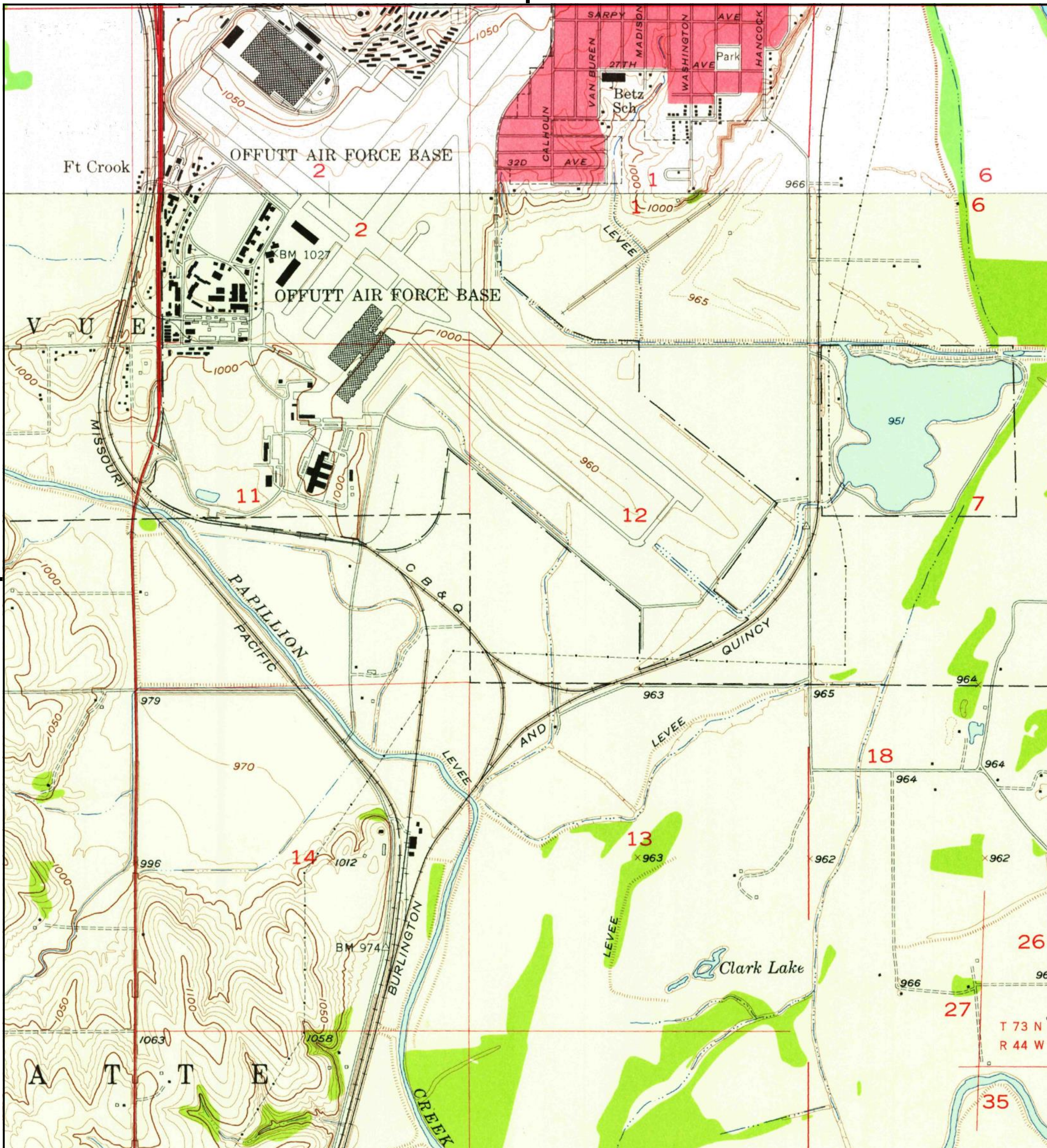
ADDRESS: Offutt Air Force Base
Offutt AFB, NE 68113
CLIENT: U.S. Army Corps of Engineers

N

Historical Topo Map

1956



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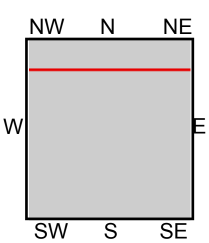

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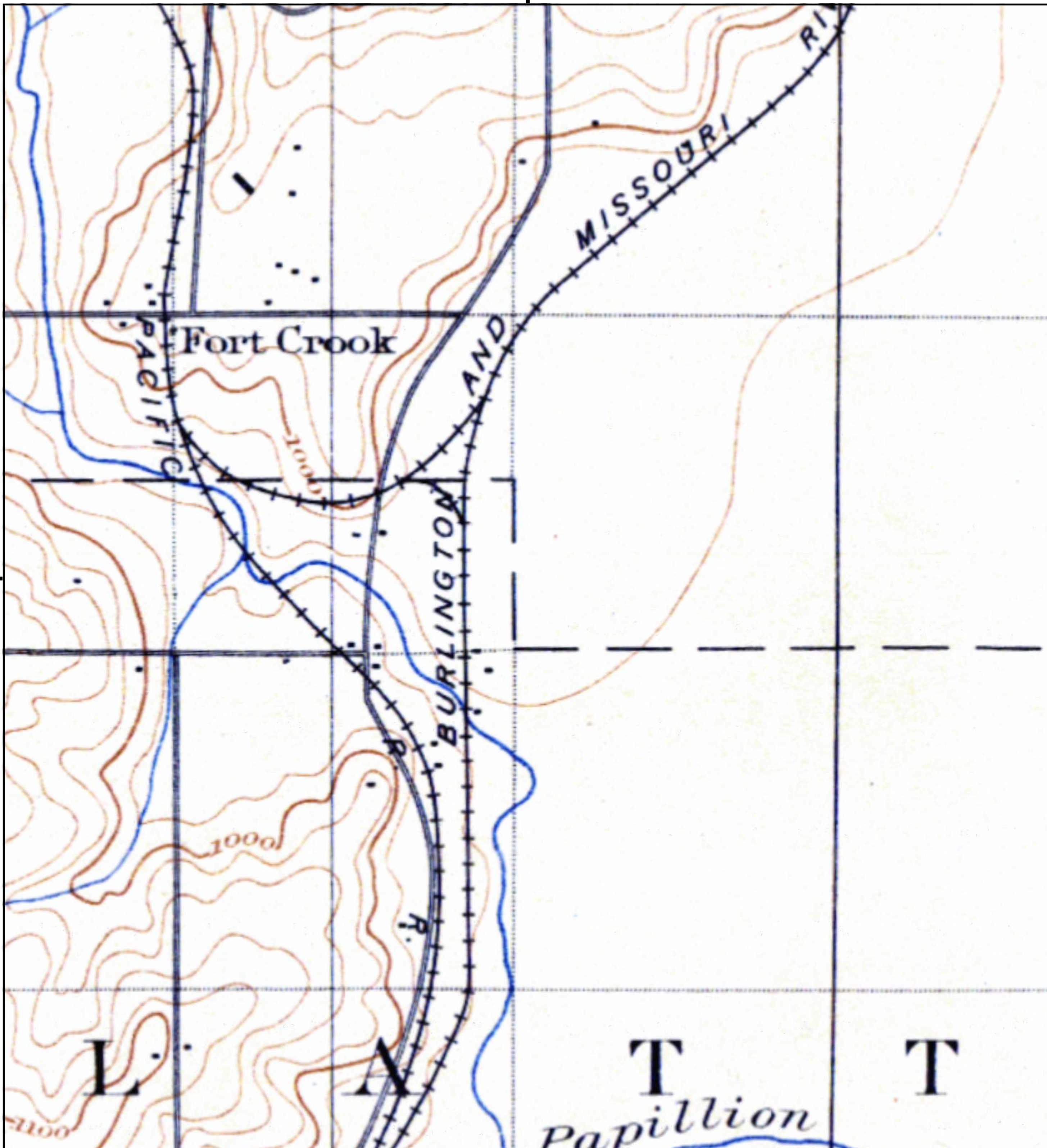
Offutt AFB, NE 68113
CLIENT: U.S. Army Corps of Engineers

Historical Topo Map

1898



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ADDRESS:	Offutt Air Force Base Offutt AFB, NE 68113
CLIENT:	U.S. Army Corps of Engineers

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APPENDIX C

AERIAL PHOTOGRAPHS

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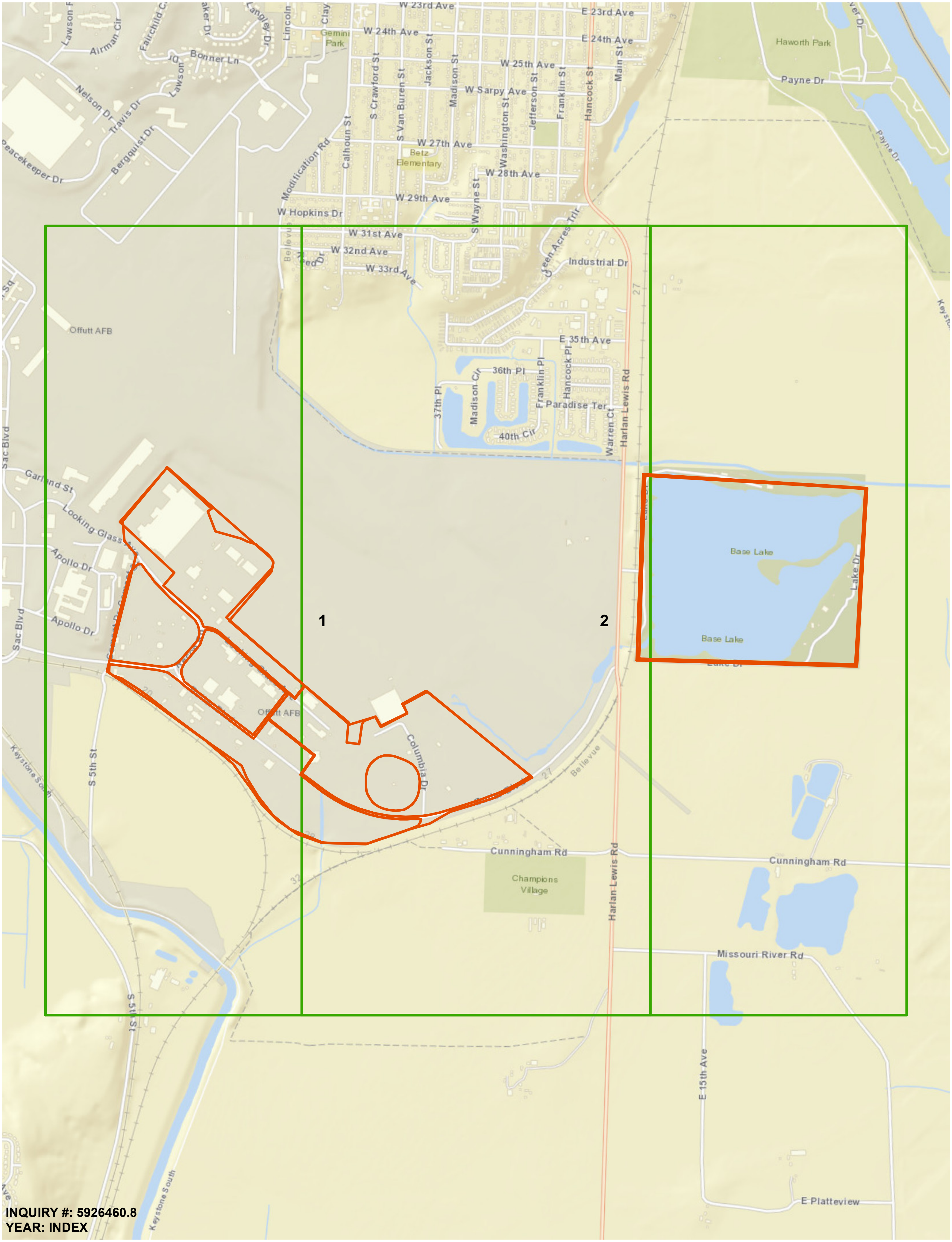

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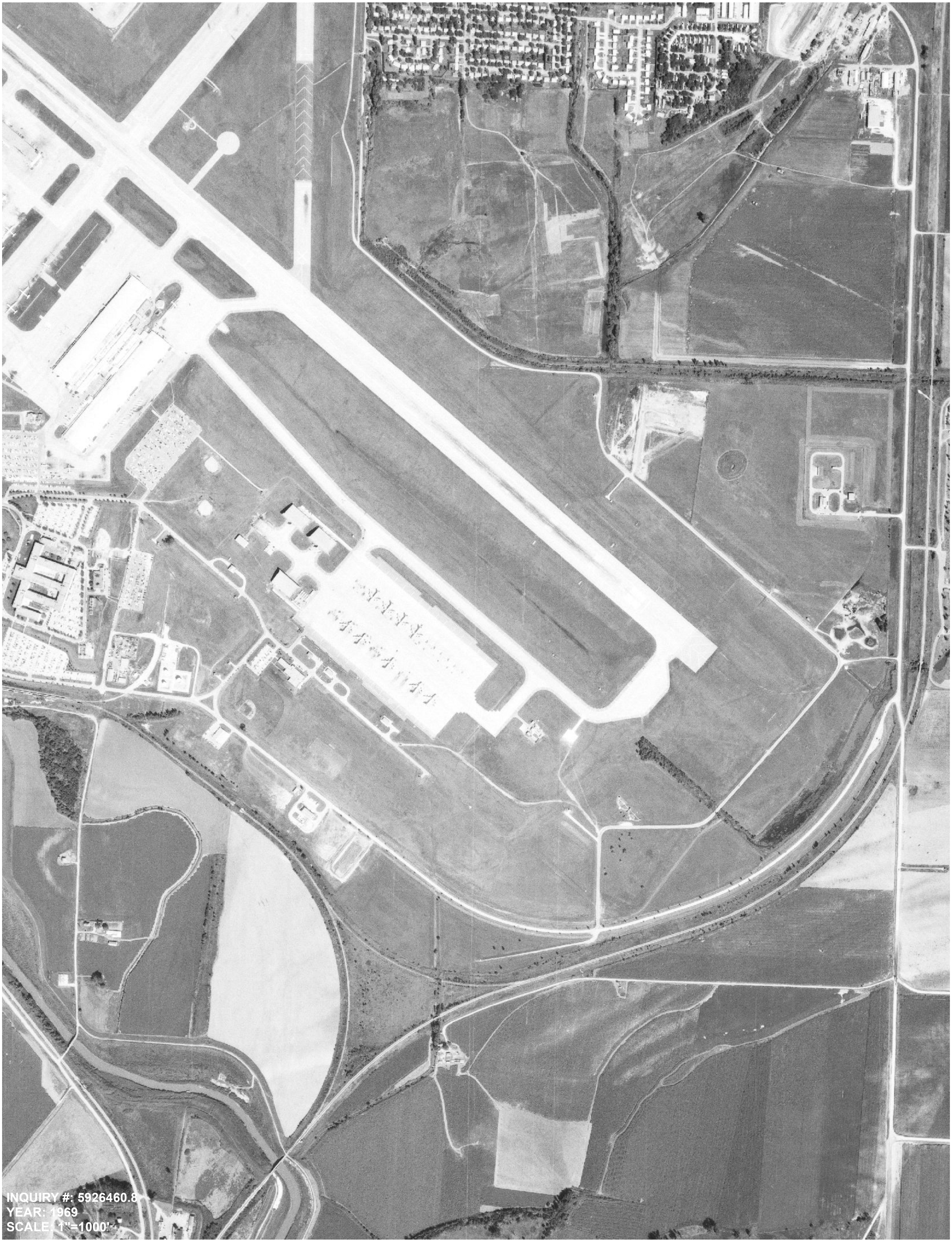
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APPENDIX D

SITE PHOTOGRAPHS

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Project Name: Offutt AFB Flood Damage ESA Phase I.	**Direction of View:** Southwest
Location: East of building 496 (de-icing) and north of building 497 (Raven Haven).	**Date/Time:** 20 Dec 2019/0906
Photograph No.: FLH_001_488	**Description of View:** Building 488 - Diesel AST for Emergency Generator.

Pictured is the 1,000 gallon tank and a 336 gallon day tank is part of the generator unit.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** Northwest
Location: North of building 497 (Raven Haven)	**Date/Time:** 20 Dec 2019/0908
Photograph No.: FLH_002_496	**Description of View:** Concrete cap over catch tank that is secondary containment for the de-icing fluid in building 496.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** West
Location: Building 531, pumphouse near the restricted area gate west of building 524.	**Date/Time:** 20 Dec 2019/0938
Photograph No.: FLH_003_531	**Description of View:** Pumps of 2 of the 50K USTs on the south side of the building.

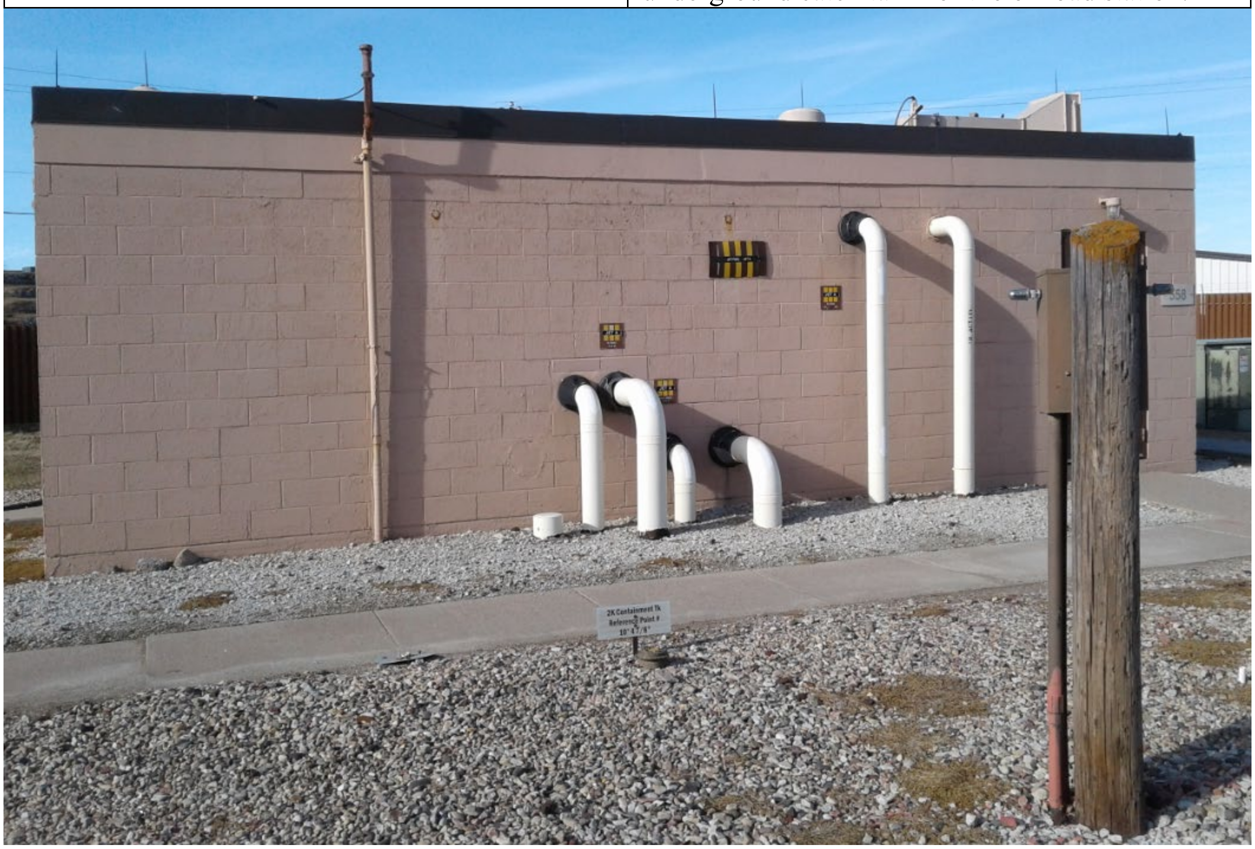
There are 5 USTs around building 531 containing Jet Fuel. Four 50,000 gallon tanks for aircraft servicing and one 2,000 gallon emergency tank.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** Southeast
Location: Across Looking Glass Ave. from building 458 (Wing and Operations Group HQs).	**Date/Time:** 20 Dec 2019/0946
Photograph No.: FLH_004_458	**Description of View:** Valve pit for the underground Jet Fuel line from bulk storage to building 531.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** South
Location: North of the government vehicle retail station, building 517.	**Date/Time:** 08 Jan 2020/1334
Photograph No.: FLH_005_517	**Description of View:** The foreground shows three USTs (gasoline, diesel, and jet fuel).

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** Southeast
Location: East of building 431 in the LRS campus.	**Date/Time:** 08 Jan 2020/1353
Photograph No.: LRS_001_580	**Description of View:** The foreground shows the access to the underground catch tank for fillstand secondary containment.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** Northwest
Location: East of building 558 in the LRS campus.	**Date/Time:** 08 Jan 2020/1355
Photograph No.: LRS_002_558	**Description of View:** This building is a POL pumphouse and this is also the location of an underground catch tank for the offload station.



Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** East
Location: East of building 558 in the LRS campus.	**Date/Time:** 08 Jan 2020/1355
Photograph No.: LRS_003_558	**Description of View:** The foreground shows an offload station and the background shows tank #483 that was left on its side by the flood.

According to base personnel, tank #483 was disconnected and scheduled for demolition before the flood event.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** North
Location: Building 541.	**Date/Time:** 27 Dec 2019/1103
Photograph No.: NC3_001_541a	**Description of View:** Courier Building with emergency generator.

A 217 gallon day tank is part of this unit.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** North
Location: Building 541	**Date/Time:** 27 Dec 2019/1103
Photograph No.: NC3_002_541b	**Description of View:** Oil leaking from the emergency generator.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** South
Location: NE corner of building 578.	**Date/Time:** 20 Dec 2019/0851
Photograph No.: NKO_001_578	**Description of View:** Diesel UST for emergency generator.

This is the location of a 2,000 gallon UST for an emergency generator and there is a 250 gallon tank that is part of the generator unit.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** West
Location: Building 393 west of building 458.	**Date/Time:** 29 Dec 2019/0900
Photograph No.: NKO_002_458	**Description of View:** Diesel AST for emergency generator

Pictured is the 2,500 gallon AST for the emergency generator, there is a 500 gallon day tank that is part of the unit.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** East
Location: East of building 559 in the SEC campus.	**Date/Time:** 23 Dec 2019/1136
Photograph No.: SEC_001_559	**Description of View:** Sign showing the location of an underground petroleum pipeline.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** West
Location: West of building 559.	**Date/Time:** 23 Dec 2019/1140
Photograph No.: SEC_002_559	**Description of View:** Marker identifying the location of the underground petroleum pipeline.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** North
Location: North of building 559	**Date/Time:** 23 Dec 2019/1145
Photograph No.: SEC_003_559	**Description of View:** The cut lines in Butler Blvd. indicate the location of the underground petroleum pipeline as it terminates in the LRS campus.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** South
Location: West of building 593.	**Date/Time:** 23 Dec 2019/1150
Photograph No.: SEC_004_593	**Description of View:** Drums containing soil marked "Non-Regulated Waste" May '18.

Approximately 12 drums are stored in this area.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** South
Location: West of building 593.	**Date/Time:** 23 Dec 2019/1151
Photograph No.: SEC_005_593	**Description of View:** Drums containing soil marked "Non-Regulated Waste" May '18.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** Southwest
Location: South building 593.	**Date/Time:** 23 Dec 2019/1156
Photograph No.: SEC_006_593	**Description of View:** Groundwater monitoring wells along southern fence line.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** West
Location: South of building 540.	**Date/Time:** 23 Dec 2019/1207
Photograph No.: SEC_007_523	**Description of View:** AST behind building 523 is in the background. Foreground is the working dog exercise area.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** West
Location: Buildings 564 and 594.	**Date/Time:** 27 Dec 2019/1053
Photograph No.: SEC_008_594	**Description of View:** Hazardous waste Central Accumulation Point (CAP) for the base.

Project Name: Offutt AFB Flood Damage ESA Phase I	**Direction of View:** Northwest
Location: Building 592 across Butler Blvd from the small arms range.	**Date/Time:** 27 Dec 2019/1058
Photograph No.: SEC_009_592	**Description of View:** Sanitary sewer lift station with internal emergency generator.

Two diesel tanks are reported in this building, one 300 gallon and one 120 gallon tank.

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APPENDIX E

VAPOR INTRUSION SCREENING LEVELS

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Well #: HF4-MW9D

Plume Contaminant: Vinyl Chloride

Campus: Flightline Hangars

Building #: 393

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Site-specific VISL Results
Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 23JAN2020:11:20:43

Variable	Commercial Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_{w} (averaging time - composite worker)	365	365
ED_{w} (exposure duration - composite worker) yr	25	25
EF_{w} (exposure frequency - composite worker) day/yr	250	250
ET_{w} (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (μg/m³)	Toxicity Basis	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) C_{sg},Target (μg/m³)
Vinyl Chloride	75-01-4	Yes	Yes	Yes	Yes	2.79E+00	CA	9.29E+01

Chemical	Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) C_{gw},Target (μg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 ℃)\ (μg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (μg/m³)	Temperature for Maximum Groundwater Vapor Concentration (℃)	Lower Explosive Limit LEL (% by volume)	LEL Ref	IUR (ug/m³)⁻¹
Vinyl Chloride	2.45E+00	No (2)	1.00E+10	1.00E+10	25	3.60	CRC89	4.40E-06

Chemical	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (μg/m³)	Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (μg/m³)
Vinyl Chloride	I	1.00E-01	I	Mut	2.79E+00	4.38E+01

Commercial Vapor Intrusion Risk
Output generated 23JAN2020:11:20:43

Chemical	CAS Number	Site Groundwater Concentration C_{gw}\ (μg/L)	Site Indoor Air Concentration $C_{i,a}$\ (μg/m³)	VI Carcinogenic Risk CDI (μg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ	IUR (ug/m³)$^{-1}$
Vinyl Chloride	75-01-4	23.7	2.69E+01	2.20E+00	9.66E-06	6.15E-03	6.15E-02	4.40E-06
**Sum*					*9.66E-06*		*6.15E-02*	

Chemical	IUR Ref	Chronic RfC (mg/m³)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Vinyl Chloride	I	1.00E-01	IRIS	25	Mut
**Sum*					

Chemical Properties
Output generated 23JAN2020:11:20:43

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m^3/mole)
Vinyl Chloride	75-01-4	Yes	Yes	62.50	PHYSPROP	2.98E+03	EPI	8.80E+03	PHYSPROP	2	2.78E-02

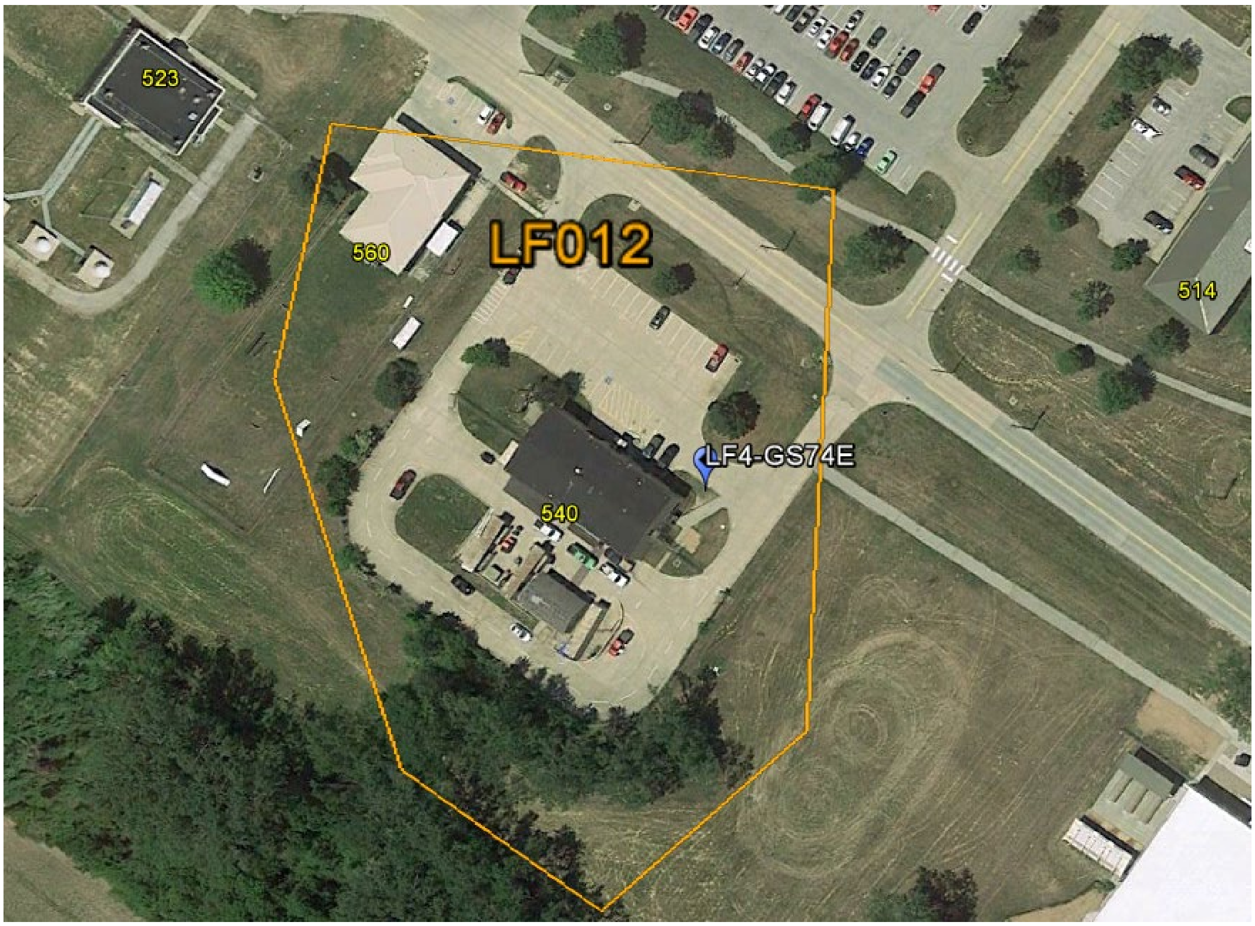
Chemical	Henry's Law Constant (unitless)	H\` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Vinyl Chloride	1.14E+00	PHYSPROP	1.14E+00	259.85	PHYSPROP	4.25E+02	CRC89	4971.32	CRC89	3.60	CRC89

Well #: LF4-GS74E

Plume Contaminant: Trichloroethylene

Campus: Security

Building #: 540



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Site-specific VISL Results
Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 23JAN2020:11:43:39

Variable	Commercial Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_{w} (averaging time - composite worker)	365	365
ED_{w} (exposure duration - composite worker) yr	25	25
EF_{w} (exposure frequency - composite worker) day/yr	250	250
ET_{w} (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³)	Toxicity Basis
Trichloroethylene	79-01-6	Yes	Yes	Yes	Yes	8.76E-01	NC

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) C_{sg},Target (µg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) C_{gw},Target (µg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 ℃)\ (µg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (µg/m³)	Temperature for Maximum Groundwater Vapor Concentration (℃)	Lower Explosive Limit LEL (% by volume)
Trichloroethylene	2.92E+01	2.18E+00	Yes (5)	4.88E+08	5.15E+08	25	8.00

Chemical	LEL Ref	IUR (ug/m³)⁻¹	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³)	Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (µg/m³)
Trichloroethylene	CRC89	4.10E-06	I	2.00E-03	I	Mut	2.99E+00	8.76E-01

Commercial Vapor Intrusion Risk
Output generated 23JAN2020:11:43:39

Chemical	CAS Number	Site Groundwater Concentration C_{gw}\ (μg/L)	Site Indoor Air Concentration $C_{i,a}$\ (μg/m³)	VI Carcinogenic Risk CDI (μg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ
Trichloroethylene	79-01-6	32.2	1.30E+01	1.06E+00	4.33E-06	2.96E-03	1.48E+00
**Sum*					*4.33E-06*		*1.48E+00*

Chemical	IUR $(ug/m^3)^{-1}$	IUR Ref	Chronic RfC (mg/m³)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Trichloroethylene	4.10E-06	I	2.00E-03	IRIS	25	Mut
**Sum*						

Chemical Properties
Output generated 23JAN2020:11:43:39

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref
Trichloroethylene	79-01-6	Yes	Yes	131.39	PHYSPROP	6.90E+01	PHYSPROP	1.28E+03	PHYSPROP

Chemical	MCL (ug/L)	HLC (atm-m³/mole)	Henry's Law Constant (unitless)	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref
Trichloroethylene	5	9.85E-03	4.03E-01	PHYSPROP	4.03E-01	360.35	PHYSPROP	5.71E+02	YAWS

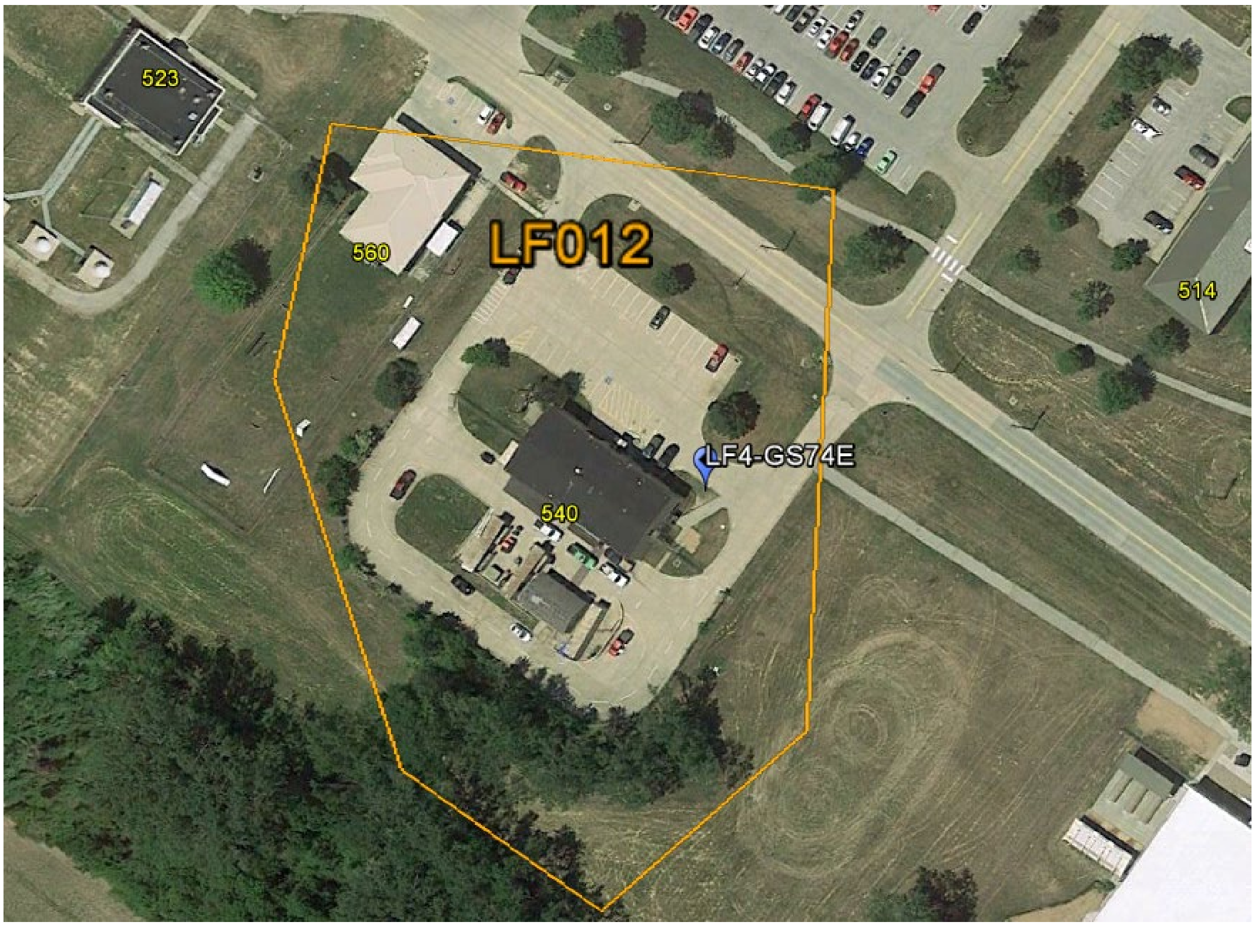
Chemical	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Trichloroethylene	7505.00	Weast	8.00	CRC89

Well #: LF4-GS74E

Plume Contaminant: Vinyl Chloride

Campus: Security

Building #: 540



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Site-specific VISL Results
Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 23JAN2020:11:39:50

Variable	Commercial Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_w (averaging time - composite worker)	365	365
ED_w (exposure duration - composite worker) yr	25	25
EF_w (exposure frequency - composite worker) day/yr	250	250
ET_w (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (μg/m³)	Toxicity Basis	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) C_{sg},Target (μg/m³)
Vinyl Chloride	75-01-4	Yes	Yes	Yes	Yes	2.79E+00	CA	9.29E+01

Chemical	Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) C_{gw},Target (μg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 ℃)\ (μg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (μg/m³)	Temperature for Maximum Groundwater Vapor Concentration (℃)	Lower Explosive Limit LEL (% by volume)	LEL Ref	IUR (ug/m³)⁻¹
Vinyl Chloride	2.45E+00	No (2)	1.00E+10	1.00E+10	25	3.60	CRC89	4.40E-06

Chemical	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (μg/m³)	Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (μg/m³)
Vinyl Chloride	I	1.00E-01	I	Mut	2.79E+00	4.38E+01

Chemical	CAS Number	Site Groundwater Concentration C_{gw}\ (μg/L)	Site Indoor Air Concentration $C_{i,a}$\ (μg/m³)	VI Carcinogenic Risk CDI (μg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ	IUR (ug/m³)⁻¹
Vinyl Chloride	75-01-4	386	4.39E+02	3.58E+01	1.57E-04	1.00E-01	1.00E+00	4.40E-06
**Sum*					*1.57E-04*		*1.00E+00*	

Chemical	IUR Ref	Chronic RfC (mg/m³)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Vinyl Chloride	I	1.00E-01	IRIS	25	Mut
**Sum*					

Chemical Properties
Output generated 23JAN2020:11:39:50

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m³/mole)
Vinyl Chloride	75-01-4	Yes	Yes	62.50	PHYSPROP	2.98E+03	EPI	8.80E+03	PHYSPROP	2	2.78E-02

Chemical	Henry's Law Constant (unitless)	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Vinyl Chloride	1.14E+00	PHYSPROP	1.14E+00	259.85	PHYSPROP	4.25E+02	CRC89	4971.32	CRC89	3.60	CRC89

Well #: OJET-MW2S

Plume Contaminant: Trichloroethylene

Campus: NC3

Building #: 539

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Site-specific VISL Results
Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 24JAN2020:10:39:09

Variable	Commercial Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_w (averaging time - composite worker)	365	365
ED_w (exposure duration - composite worker) yr	25	25
EF_w (exposure frequency - composite worker) day/yr	250	250
ET_w (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (μg/m³)	Toxicity Basis
Trichloroethylene	79-01-6	Yes	Yes	Yes	Yes	8.76E-01	NC

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) C_{sg},Target (μg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) C_{gw},Target (μg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 ℃)\ (μg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (μg/m³)	Temperature for Maximum Groundwater Vapor Concentration (℃)	Lower Explosive Limit LEL (% by volume)
Trichloroethylene	2.92E+01	2.18E+00	Yes (5)	4.88E+08	5.15E+08	25	8.00

Chemical	LEL Ref	IUR (ug/m³)⁻¹	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (μg/m³)	Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (μg/m³)
Trichloroethylene	CRC89	4.10E-06	I	2.00E-03	I	Mut	2.99E+00	8.76E-01

Commercial Vapor Intrusion Risk
Output generated 24JAN2020:10:39:09

Chemical	CAS Number	Site Groundwater Concentration C_{gw}\ (μg/L)	Site Indoor Air Concentration $C_{i,a}$\ (μg/m³)	VI Carcinogenic Risk CDI (μg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ
Trichloroethylene	79-01-6	99.4	4.00E+01	3.26E+00	1.34E-05	9.14E-03	4.57E+00
**Sum*					*1.34E-05*		*4.57E+00*

Chemical	IUR (ug/m³)⁻¹	IUR Ref	Chronic RfC (mg/m³)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Trichloroethylene	4.10E-06	I	2.00E-03	IRIS	25	Mut
**Sum*						

Chemical Properties
Output generated 24JAN2020:10:39:09

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref
Trichloroethylene	79-01-6	Yes	Yes	131.39	PHYSPROP	6.90E+01	PHYSPROP	1.28E+03	PHYSPROP

Chemical	MCL (ug/L)	HLC (atm-m³/mole)	Henry's Law Constant (unitless)	H\` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref
Trichloroethylene	5	9.85E-03	4.03E-01	PHYSPROP	4.03E-01	360.35	PHYSPROP	5.71E+02	YAWS

Chemical	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Trichloroethylene	7505.00	Weast	8.00	CRC89

Well #: OJET-MW2S

Plume Contaminant: Vinyl Chloride

Campus: NC3

Building #: 539

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Site-specific VISL Results
Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
Output generated 24JAN2020:10:45:07

Variable	Commercial Air Default Value	Form-input Value
AF_{gw} (Attenuation Factor Groundwater) unitless	0.001	0.001
AF_{ss} (Attenuation Factor Sub-Slab) unitless	0.03	0.03
AT_{w} (averaging time - composite worker)	365	365
ED_{w} (exposure duration - composite worker) yr	25	25
EF_{w} (exposure frequency - composite worker) day/yr	250	250
ET_{w} (exposure time - composite worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	0.1
LT (lifetime) yr	70	70
TR (target risk) unitless	1.0E-06	1.0E-06

Commercial Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? (C_{vp} > $C_{i,a}$,Target?)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? (C_{hc} > $C_{i,a}$,Target?)	Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (μg/m³)	Toxicity Basis
Vinyl Chloride	75-01-4	Yes	Yes	Yes	Yes	2.79E+00	CA

Chemical	Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) C_{sg},Target (μg/m³)	Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) C_{gw},Target (μg/L)	Is Target Groundwater Concentration < MCL? (C_{gw} < MCL?)	Pure Phase Vapor Concentration C_{vp}\ (25 ℃)\ (μg/m³)	Maximum Groundwater Vapor Concentration C_{hc}\ (μg/m³)	Temperature for Maximum Groundwater Vapor Concentration (℃)	Lower Explosive Limit LEL (% by volume)	LEL Ref
Vinyl Chloride	9.29E+01	2.45E+00	No (2)	1.00E+10	1.00E+10	25	3.60	U

Chemical	IUR (ug/m³)⁻¹	IUR Ref	RfC (mg/m³)	RfC Ref	Mutagenic Indicator	Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (μg/m³)	Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (μg/m³)
Vinyl Chloride	4.40E-06	U	1.00E-01	U	Mut	2.79E+00	4.38E+01

Commercial Vapor Intrusion Risk
Output generated 24JAN2020:10:45:07

Chemical	CAS Number	Site Groundwater Concentration C_{gw}\ (μg/L)	Site Indoor Air Concentration $C_{i,a}$\ (μg/m³)	VI Carcinogenic Risk CDI (μg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ	IUR $(ug/m^3)^{-1}$
Vinyl Chloride	75-01-4	43.1	4.90E+01	3.99E+00	1.76E-05	1.12E-02	1.12E-01	4.40E-06
**Sum*					*1.76E-05*		*1.12E-01*	

Chemical	IUR Ref	Chronic RfC (mg/m³)	RfC Ref	Temperature (℃)\ for Groundwater Vapor Concentration	Mutagen?
Vinyl Chloride	U	1.00E-01	U	25	Mut
**Sum*					

Chemical Properties
Output generated 24JAN2020:10:45:07

Chemical	CAS Number	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does the chemical have inhalation toxicity data? (IUR and/or RfC)	MW	MW Ref	Vapor Pressure VP (mm Hg)	VP Ref	S (mg/L)	S Ref	MCL (ug/L)	HLC (atm-m³/mole)
Vinyl Chloride	75-01-4	Yes	Yes	62.50	U	2.98E+03	U	8.80E+03	U	2	2.78E-02

Chemical	Henry's Law Constant (unitless)	H` and HLC Ref	Henry's Law Constant Used in Calcs (unitless)	Normal Boiling Point BP (K)	BP Ref	Critical Temperature TC (K)	TC Ref	Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$\ (cal/mol)	$\Delta H_{v,b}$\ Ref	Lower Explosive Limit LEL (% by volume)	LEL Ref
Vinyl Chloride	1.14E+00	U	1.14E+00	259.85	U	4.25E+02	U	4970.00	U	3.60	U

APPENDIX F

ENVIRONMENTAL DATA RESOURCES REPORT

(Sent separately on request)

APPENDIX D – AIR QUALITY MODEL

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: OFFUTT AFB
State: Nebraska
County(s): Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Offutt Air Force Base Flood Recovery Rebuild

c. Project Number/s (if applicable): NA

d. Projected Action Start Date: 5 / 2021

e. Action Description:

The Proposed Action would re-establish critical facilities and infrastructure to support the full functioning of Offutt AFB. The Proposed Action would involve demolishing damaged structures and constructing new facilities and infrastructure in each of the functions that experienced flood damage. Overall, there would be approximately 61 buildings demolished and 21 new buildings constructed.

f. Point of Contact:

Name:	Aaron Quinn
Title:	Environmental Resources Specialist
Organization:	U.S. Army Corps of Engineers
Email:	aaron.t.quinn@usace.army.mil
Phone Number:	402-995-2669

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.231	100	No
NOx	7.726	100	No
CO	8.114	100	No
SOx	0.017	100	No
PM 10	1.308	100	No
PM 2.5	0.364	100	No
Pb	0.000	25	No
NH3	0.008	100	No
CO2e	1695.5		

2022

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	8.595	100	No
NOx	30.536	100	No
CO	28.256	100	No
SOx	0.075	100	No
PM 10	44.023	100	No
PM 2.5	1.246	100	No
Pb	0.000	25	No
NH3	0.032	100	No
CO2e	7525.9		

2023

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	3.626	100	No
NOx	11.363	100	No
CO	11.936	100	No
SOx	0.029	100	No
PM 10	8.424	100	No
PM 2.5	0.481	100	No
Pb	0.000	25	No
NH3	0.012	100	No
CO2e	2850.7		

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	1.827	100	No
NOx	2.221	100	No
CO	2.576	100	No
SOx	0.006	100	No

PM 10	0.086	100	No
PM 2.5	0.084	100	No
Pb	0.000	25	No
NH3	0.004	100	No
CO2e	597.0		

2025

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.309	100	No
NOx	1.945	100	No
CO	2.225	100	No
SOx	0.005	100	No
PM 10	0.072	100	No
PM 2.5	0.071	100	No
Pb	0.000	25	No
NH3	0.003	100	No
CO2e	527.2		

2026

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.026	100	No
NOx	0.162	100	No
CO	0.185	100	No
SOx	0.000	100	No
PM 10	0.006	100	No
PM 2.5	0.006	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	43.9		

2027 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000	100	No
SOx	0.000	100	No
PM 10	0.000	100	No
PM 2.5	0.000	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	0.0		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Aaron Quinn, Environmental Resources Specialist

DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: OFFUTT AFB
State: Nebraska
County(s): Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Offutt Air Force Base Flood Recovery Rebuild

- Project Number/s (if applicable): NA

- Projected Action Start Date: 5 / 2021

- Action Purpose and Need:
The purpose of the Proposed Action would be to recover areas of Offutt AFB damaged by a record flood that occurred in the spring of 2019. The Proposed Action is needed because, under current conditions, the mission of Offutt AFB is being negatively impacted by the loss of critical mission and support facilities.

- Action Description:
The Proposed Action would re-establish critical facilities and infrastructure to support the full functioning of Offutt AFB. The Proposed Action would involve demolishing damaged structures and constructing new facilities and infrastructure in each of the functions that experienced flood damage. Overall, there would be approximately 61 buildings demolished and 21 new buildings constructed.

- Point of Contact
Name: Aaron Quinn
Title: Environmental Resources Specialist
Organization: U.S. Army Corps of Engineers
Email: aaron.t.quinn@usace.army.mil
Phone Number: 402-995-2669

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	MILSTAR Campus
3.	Construction / Demolition	Lake Campus Activities
4.	Construction / Demolition	Logistics and Readiness Campus Activities
5.	Construction / Demolition	Flight line Campus activities
6.	Construction / Demolition	Non Kinetic Operations Campus Activities
7.	Construction / Demolition	Security Campus Activities
8.	Construction / Demolition	NC3 Campus

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: MILSTAR Campus

- Activity Description:
Activities on the MILSTAR Campus would include site grading and constructing a consolidated MILSTAR Sattellite Communications Station.

- Activity Start Date
Start Month: 1
Start Month: 2022

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.690707
SO_x	0.008051
NO_x	2.942212
CO	2.841374
PM 10	1.703776

Pollutant	Total Emissions (TONs)
PM 2.5	0.107666
Pb	0.000000
NH_3	0.004948
CO_2e	815.9

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 8
Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 20034
Amount of Material to be Hauled On-Site (yd^3): 100000
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Building Construction Phase

2.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 11
Start Quarter: 1
Start Year: 2022

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Duration
Number of Month: 16
Number of Days: 0

2.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 20034
Height of Building (ft): 26
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Tractors/Loaders/Backhoes Composite								

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

2.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.3 Architectural Coatings Phase

2.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2023

- Phase Duration
Number of Month: 6
Number of Days: 0

2.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 20034
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

2.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

VMT_{WT} = (1 * WT * PA) / 800

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location
County: Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Lake Campus Activities

- Activity Description:

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Activities on the Lake Campus would involve demolishing flood damaged building and constructing a new consolidated recreational facility.

- Activity Start Date
Start Month: 7
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 3
End Month: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.253865
SO_x	0.008109
NO_x	3.351878
CO	4.137089
PM 10	0.191359

Pollutant	Total Emissions (TONs)
PM 2.5	0.153728
Pb	0.000000
NH_3	0.003061
CO_2e	785.5

3.1 Demolition Phase

3.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 6
Number of Days: 0

3.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 8891
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

3.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.2 Building Construction Phase

3.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 14
Number of Days: 0

3.2.2 Building Construction Phase Assumptions

- General Building Construction Information

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Building Category: Office or Industrial
Area of Building (ft^2): 23200
Height of Building (ft): 24
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

3.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0340	0.0006	0.2783	0.2694	0.0116	0.0116	0.0030	61.069
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

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Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0260	0.0003	0.1557	0.1772	0.0077	0.0077	0.0023	25.661

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

3.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.3 Architectural Coatings Phase

3.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 6
Number of Days: 0

3.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 59039
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

3.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

3.4 Paving Phase

3.4.1 Paving Phase Timeline Assumptions

- Phase Start Date

Start Month: 7
Start Quarter: 1
Start Year: 2022

- Phase Duration

Number of Month: 6
Number of Days: 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.4.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 82898

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.4.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

3.4.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Location
County: Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Logistics and Readiness Campus Activities

- Activity Description:
Activities in this area would included constructing a consolidated LRS warehouse and storage. Activities would also include demolishing flood damaged buildings.

- Activity Start Date
Start Month: 7
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 8
End Month: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.777593
SO_x	0.016882
NO_x	6.878656
CO	6.708317
PM 10	3.890125

Pollutant	Total Emissions (TONs)
PM 2.5	0.284075
Pb	0.000000
NH_3	0.007655
CO_2e	1689.8

4.1 Demolition Phase

4.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 6
Number of Days: 0

4.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 19038
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1

Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

4.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4.2 Site Grading Phase

4.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2022

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- Phase Duration
Number of Month: 6
Number of Days: 0

4.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 59039
Amount of Material to be Hauled On-Site (yd^3): 100000
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**

Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

4.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4.3 Building Construction Phase

4.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 14
Number of Days: 0

4.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 59039
Height of Building (ft): 30
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

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- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

4.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0340	0.0006	0.2783	0.2694	0.0116	0.0116	0.0030	61.069
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0260	0.0003	0.1557	0.1772	0.0077	0.0077	0.0023	25.661

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

4.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4.4 Architectural Coatings Phase

4.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 9
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 6
Number of Days: 0

4.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 59039
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

4.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

4.5 Paving Phase

4.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 6
Number of Days: 0

4.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 55567

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	1	8
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

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- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

4.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

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- Activity Location
County: Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Flight line Campus activities

- Activity Description:
Activities in this area would consolidate various functions that were previously spread around the base. The Proposed Action would involve demolishing flood damaged buildings and constructing replacement facilities.

- Activity Start Date
Start Month: 5
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 6
End Month: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.031142
SO_x	0.013886
NO_x	5.684164
CO	5.234252
PM 10	1.094576

Pollutant	Total Emissions (TONs)
PM 2.5	0.227622
Pb	0.000000
NH_3	0.006028
CO_2e	1396.1

5.1 Demolition Phase

5.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 6
Number of Days: 0

5.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 30593
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8

Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

5.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5.2 Site Grading Phase

5.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 11
Start Quarter: 1
Start Year: 2021

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- Phase Duration

Number of Month: 6
Number of Days: 0

5.2.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 12342
Amount of Material to be Hauled On-Site (yd^3): 100000
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0687	0.0013	0.3576	0.5112	0.0158	0.0158	0.0062	119.73
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1814	0.0026	1.2262	0.7745	0.0491	0.0491	0.0163	262.89
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

5.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5.3 Building Construction Phase

5.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 4
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 14
Number of Days: 0

5.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 12342
Height of Building (ft): 20
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

5.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0797	0.0013	0.5505	0.3821	0.0203	0.0203	0.0071	128.81
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0274	0.0006	0.1265	0.2146	0.0043	0.0043	0.0024	54.457
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

5.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

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- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.4 Architectural Coatings Phase

5.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 6
Number of Days: 0

5.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 12342
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

5.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

5.5 Paving Phase

5.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2023

- Phase Duration
Number of Month: 6
Number of Days: 0

5.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 18278

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0687	0.0013	0.3576	0.5112	0.0158	0.0158	0.0062	119.73
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1814	0.0026	1.2262	0.7745	0.0491	0.0491	0.0163	262.89
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

5.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location
County: Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Non Kinetic Operations Campus Activities

- Activity Description:

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Activities on this campus would include demolishing flood damaged buildings and constructing new facilities.

- Activity Start Date
Start Month: 2
Start Month: 2022

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	4.787711
SO_x	0.038625
NO_x	15.220024
CO	15.977711
PM 10	25.404782

Pollutant	Total Emissions (TONs)
PM 2.5	0.623413
Pb	0.000000
NH_3	0.018052
CO_2e	3859.0

6.1 Demolition Phase

6.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 12
Number of Days: 0

6.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 145321
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0410	0.0006	0.2961	0.3743	0.0148	0.0148	0.0037	58.556
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

6.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6.2 Site Grading Phase

6.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 12
Number of Days: 0

6.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 202434

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Amount of Material to be Hauled On-Site (yd^3): 100000
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rollers Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	2	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rollers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0499	0.0007	0.3198	0.3798	0.0180	0.0180	0.0045	67.149
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87

Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

6.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6.3 Building Construction Phase

6.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2023

- Phase Duration
Number of Month: 36
Number of Days: 0

6.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 202434
Height of Building (ft): 60
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

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	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

6.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0754	0.0013	0.5027	0.3786	0.0181	0.0181	0.0068	128.79
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0258	0.0006	0.1108	0.2145	0.0034	0.0034	0.0023	54.454
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0320	0.0006	0.2612	0.2683	0.0103	0.0103	0.0028	61.065
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0242	0.0003	0.1487	0.1761	0.0067	0.0067	0.0021	25.657

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

6.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6.4 Architectural Coatings Phase

6.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2023

- Phase Duration
Number of Month: 8
Number of Days: 0

6.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 202434
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

6.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)

PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

6.5 Paving Phase

6.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2023

- Phase Duration
Number of Month: 12
Number of Days: 0

6.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 548530

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	8
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

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POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rollers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0499	0.0007	0.3198	0.3798	0.0180	0.0180	0.0045	67.149
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

6.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location
County: Sarpy

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Security Campus Activities

- Activity Description:
Security Campus activities would include demolishing flood damaged buildings and constructing new facilities.

- Activity Start Date
Start Month: 7
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	3.308314
SO_x	0.022500
NO_x	9.564119
CO	8.930918
PM 10	12.968635

Pollutant	Total Emissions (TONs)
PM 2.5	0.412154
Pb	0.000000
NH_3	0.009491
CO_2e	2256.7

7.1 Demolition Phase

7.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 8
Number of Days: 0

7.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 51592
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

7.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.2 Site Grading Phase

7.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 8
Number of Days: 0

7.2.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 155019
Amount of Material to be Hauled On-Site (yd^3): 100000
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	8
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	8
Scrapers Composite	3	8
Tractors/Loaders/Backhoes Composite	2	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

7.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.3 Building Construction Phase

7.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 16
Number of Days: 0

7.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 155019
Height of Building (ft): 24
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

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- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

7.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0845	0.0013	0.6033	0.3865	0.0228	0.0228	0.0076	128.82
Forklifts Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0293	0.0006	0.1458	0.2148	0.0056	0.0056	0.0026	54.462
Generator Sets Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0362	0.0006	0.2977	0.2707	0.0130	0.0130	0.0032	61.074
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890
Welders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0280	0.0003	0.1634	0.1787	0.0088	0.0088	0.0025	25.665

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

7.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = BA * BH * (0.42 / 1000) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
VMT_{VT} = BA * BH * (0.38 / 1000) * HT

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

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EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.4 Architectural Coatings Phase

7.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 6
Number of Days: 0

7.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 155019
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

7.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)

WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

7.5 Paving Phase

7.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 8
Number of Days: 0

7.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 233725

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

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	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

7.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

8. Construction / Demolition

8.1 General Information & Timeline Assumptions

- Activity Location
County: Sarpy
Regulatory Area(s): NOT IN A REGULATORY AREA

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- Activity Title: NC3 Campus

- Activity Description:
Activities on this campus would include demolishing flood damaged buildings and constructing new facilities.

- Activity Start Date
Start Month: 7
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 6
End Month: 2023

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	2.765485
SO_x	0.024235
NO_x	10.312534
CO	9.463361
PM 10	8.664591

Pollutant	Total Emissions (TONs)
PM 2.5	0.444053
Pb	0.000000
NH_3	0.010242
CO_2e	2437.2

8.1 Demolition Phase

8.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 8
Number of Days: 0

8.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 91430
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

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- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

8.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

8.2 Site Grading Phase

8.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 11
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 8
Number of Days: 0

8.2.2 Site Grading Phase Assumptions

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- General Site Grading Information

Area of Site to be Graded (ft^2): 98430
Amount of Material to be Hauled On-Site (yd^3): 100000
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	1	8
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rollers Composite	1	8
Rubber Tired Dozers Composite	1	6
Scrapers Composite	4	8
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rollers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0499	0.0007	0.3198	0.3798	0.0180	0.0180	0.0045	67.149
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51

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Scrapers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

8.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

8.3 Building Construction Phase

8.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 16
Number of Days: 0

8.3.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 98430
Height of Building (ft): 45
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

8.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite							
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0845	0.0013	0.6033	0.3865	0.0228	0.0228	0.0076	128.82
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0293	0.0006	0.1458	0.2148	0.0056	0.0056	0.0026	54.462
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0362	0.0006	0.2977	0.2707	0.0130	0.0130	0.0032	61.074
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0280	0.0003	0.1634	0.1787	0.0088	0.0088	0.0025	25.665

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

8.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

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CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

8.4 Architectural Coatings Phase

8.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 6
Number of Days: 0

8.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category: Non-Residential
Total Square Footage (ft^2): 98430
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

8.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

8.5 Paving Phase

8.5.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 8
Number of Days: 0

8.5.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 280088

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

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- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Excavators Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0648	0.0013	0.3170	0.5103	0.0136	0.0136	0.0058	119.72
Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rollers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0499	0.0007	0.3198	0.3798	0.0180	0.0180	0.0045	67.149
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Scrapers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1723	0.0026	1.1176	0.7579	0.0447	0.0447	0.0155	262.87
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.328	000.002	000.246	003.739	000.009	000.008		000.023	00318.926
LDGT	000.398	000.003	000.424	005.053	000.011	000.010		000.024	00411.323
HDGV	000.683	000.005	001.041	015.203	000.026	000.023		000.044	00758.061
LDDV	000.128	000.003	000.136	002.479	000.004	000.004		000.008	00307.655
LDDT	000.264	000.004	000.386	004.220	000.007	000.006		000.008	00437.142
HDDV	000.601	000.013	005.662	001.971	000.171	000.157		000.030	01508.259
MC	002.373	000.003	000.804	013.503	000.027	000.024		000.055	00399.090

8.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)