Appendix D
U.S. Department of Agriculture Natural Resources Conservation Services Soil Resource Reports

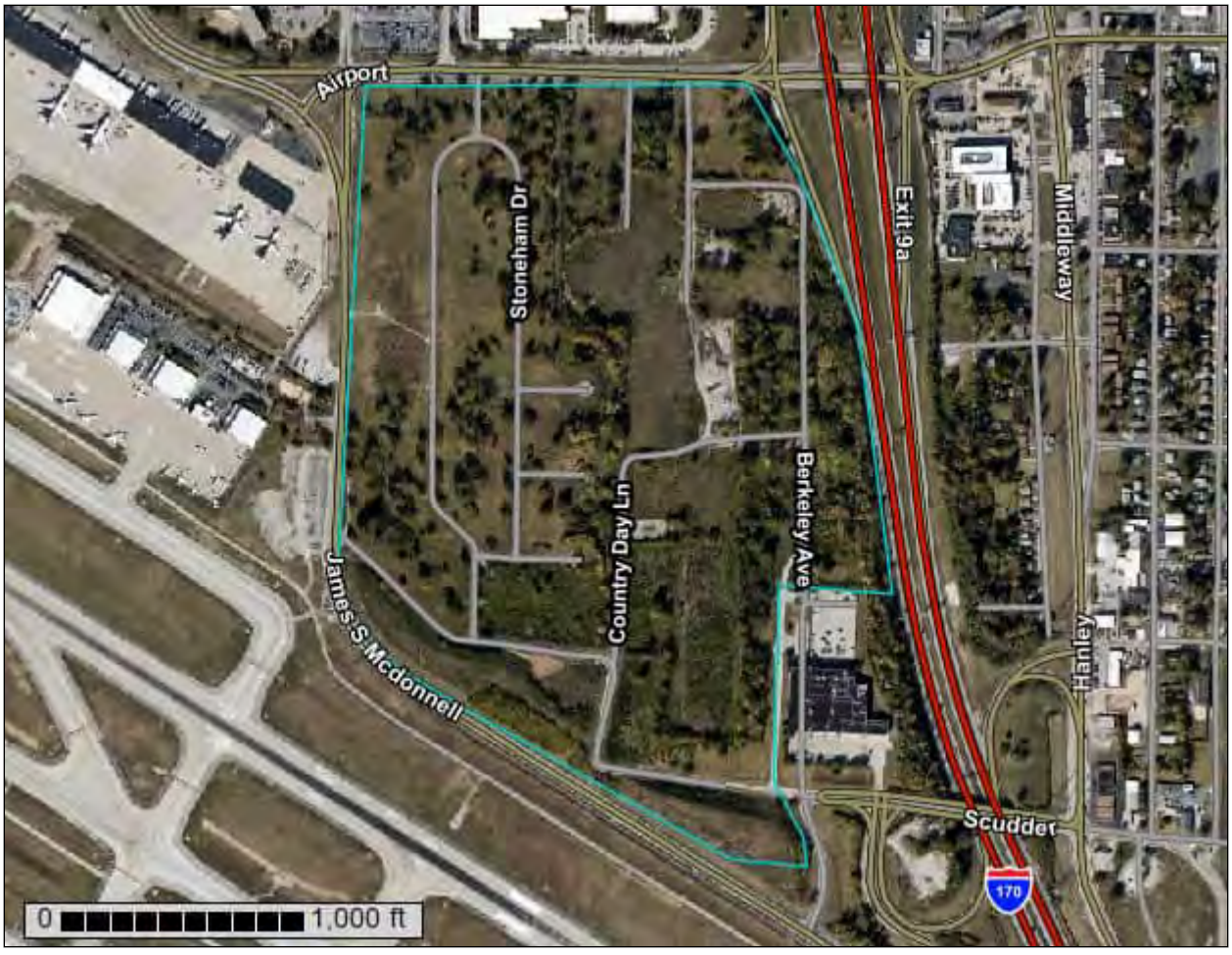
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for St. Louis County and St. Louis City, Missouri



March 14, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

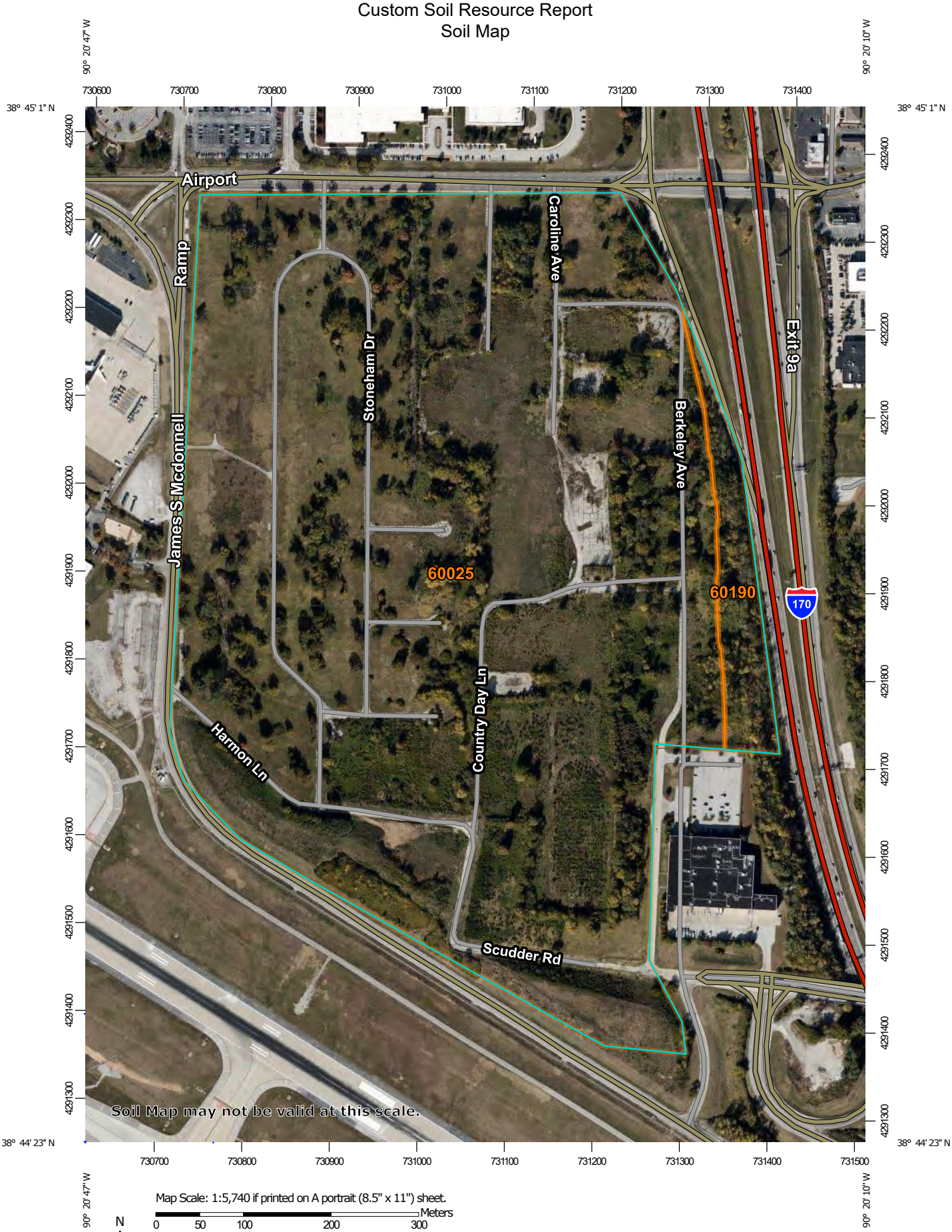
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:5,740 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: St. Louis County and St. Louis City, Missouri
Survey Area Data: Version 23, Sep 7, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 17, 2018—Oct 24, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
60025	Urban land-Harvester complex, 2 to 9 percent slopes	121.3	96.3%
60190	Menfro-Urban land complex, 5 to 9 percent slopes	4.7	3.7%
Totals for Area of Interest		**126.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Louis County and St. Louis City, Missouri

60025—Urban land-Harvester complex, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2qp0t
Elevation: 310 to 1,020 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 55 percent
Harvester and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Harvester

Setting

Landform: Hillslopes, interfluves
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loess

Typical profile

C1 - 0 to 7 inches: silt loam
C2 - 7 to 31 inches: silty clay loam
C3 - 31 to 80 inches: clay loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C
Ecological site: F115XB061MO - Anthropic Deep Loess Upland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Winfield
Percent of map unit: 5 percent
Landform: Hillslopes, ridges
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F115XB003MO - Deep Loess Protected Backslope Forest, F115XB043MO - Deep Loess Exposed Backslope Woodland
Hydric soil rating: No

60190—Menfro-Urban land complex, 5 to 9 percent slopes

Map Unit Setting
National map unit symbol: 128rk
Elevation: 400 to 980 feet
Mean annual precipitation: 31 to 43 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 160 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Menfro and similar soils: 55 percent
Urban land: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Menfro

Setting
Landform: Hillslopes, ridges
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile
Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 11 inches: silt loam
Bt2 - 11 to 34 inches: silty clay loam
Bt3 - 34 to 60 inches: silt loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F115XB001MO - Deep Loess Upland Woodland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Harvester

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F115XB061MO - Anthropic Deep Loess Upland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

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Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

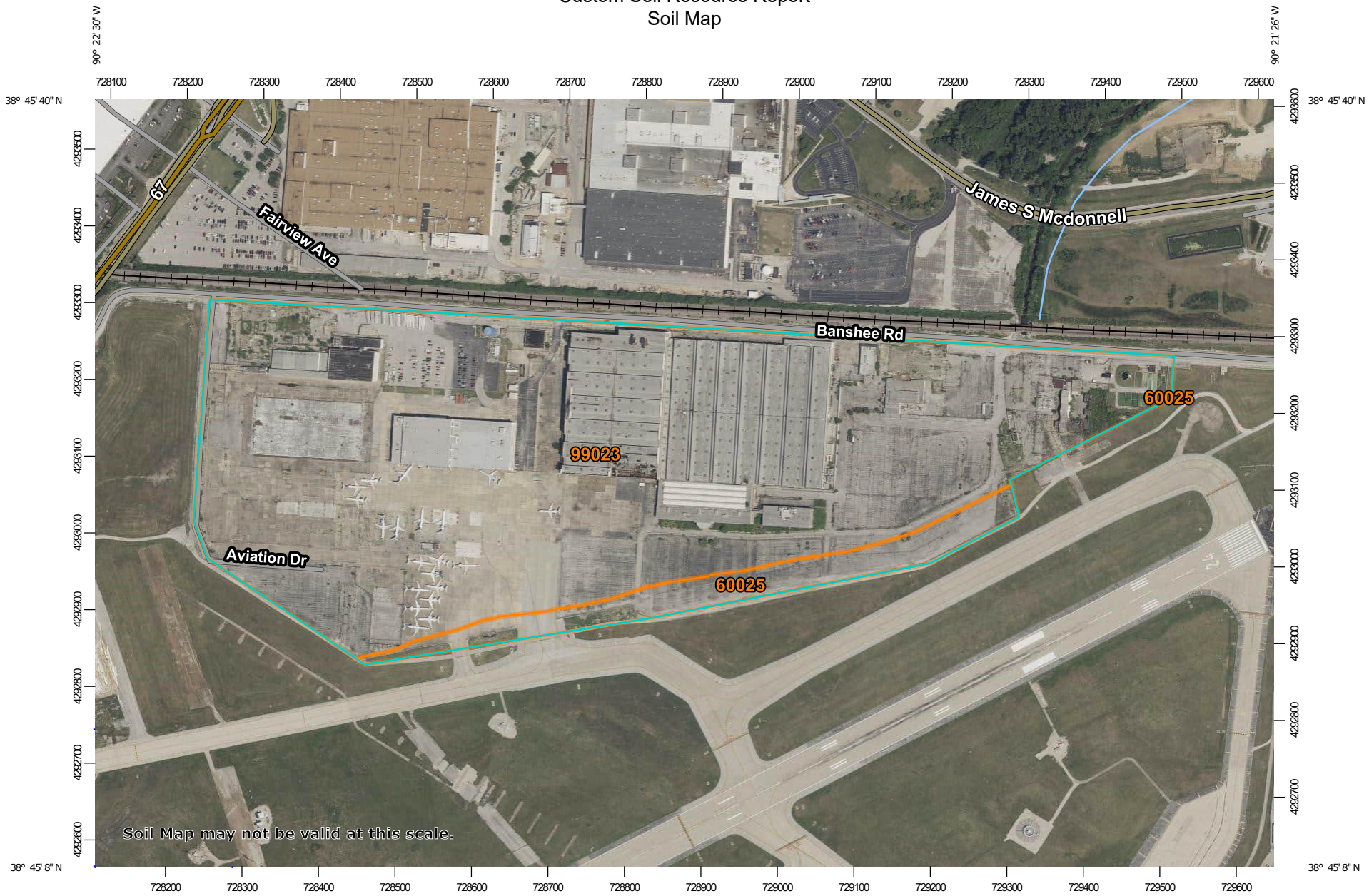
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:7,050 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: St. Louis County and St. Louis City, Missouri
Survey Area Data: Version 23, Sep 7, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 22, 2022—Aug 25, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
60025	Urban land-Harvester complex, 2 to 9 percent slopes	7.6	7.3%
99023	Urban land, upland, 0 to 5 percent slopes	95.9	92.7%
Totals for Area of Interest		**103.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Louis County and St. Louis City, Missouri

60025—Urban land-Harvester complex, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2qp0t
Elevation: 310 to 1,020 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 55 percent
Harvester and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Harvester

Setting

Landform: Hillslopes, interfluves
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loess

Typical profile

C1 - 0 to 7 inches: silt loam
C2 - 7 to 31 inches: silty clay loam
C3 - 31 to 80 inches: clay loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C
Ecological site: F115XB061MO - Anthropic Deep Loess Upland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Winfield
Percent of map unit: 5 percent
Landform: Hillslopes, ridges
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F115XB003MO - Deep Loess Protected Backslope Forest, F115XB043MO - Deep Loess Exposed Backslope Woodland
Hydric soil rating: No

99023—Urban land, upland, 0 to 5 percent slopes

Map Unit Setting
National map unit symbol: 128qs
Mean annual precipitation: 36 to 43 inches
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting
Landform: Hills

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

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Appendix D
Section 4(f) Statement

Final Section 4(f) Statement St. Louis Lambert International Airport Site Development for Aircraft Assembly and Flight Testing

Document no: 230616121601_4310afda
Revision no: Final

Boeing

St. Louis Lambert International Airport
December 2023

Contents

Tables

Figures

Acronyms and Abbreviations

§	Sections
ACHP	Advisory Council on Historic Preservation
the airport	St. Louis Lambert International Airport
ALP	Airport Layout Plan
ATS	Airport Terminal Services
Boeing	The Boeing Company
CFR	*Code of Federal Regulations*
CUP	Central Utility Plan
DOI	U.S. Department of Interior
DOT	Department of Transportation
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
ft^2	square feet
FTA	Federal Transit Administration
HABS	Historic American Buildings Survey
HUD	Housing and Urban Development
LWCF	Land and Water Conservation Fund
MOA	Memorandum of Agreement
MRO	maintenance, repair, overhaul
NHPA	*National Historic Preservation Act*
NRHP	National Register of Historic Places
RCS	Radar Cross Section
SCIF	Sensitive Compartmented Information Facilities
SHPO	State Historic Preservation Office
STL	St. Louis Lambert International Airport
STLAA	St. Louis Airport Authority
U.S.C.	U.S. Code
USDA	U.S. Department of Agriculture

If using a screen reader, you may need to adjust your default settings.

1. Introduction

Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites that are listed or eligible for listing on the National Register of Historic Places. Although it is now codified as 49 U.S. Code (U.S.C.) Section 303, the regulation is still referred to as Section 4(f). Section 4(f) provides that the Secretary of Transportation may approve a transportation program or project requiring the use of publicly owned land from a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance, only if there is no feasible and prudent alternative to using that land and the program or project includes all possible planning to minimize harm resulting from the use.

The Federal Aviation Administration (FAA) refers to a stand-alone Section 4(f) evaluation as a Section 4(f) Statement. This Section 4(f) Statement addresses the proposed project to allow St. Louis Lambert International Airport's (the airport's or STL's) partner, the Boeing Company (Boeing), develop airport property in support of defense-related aircraft assembly and testing operations (Proposed Action) at the airport in St. Louis County, St. Louis, Missouri. The airport is a commercial service airport owned by the City of St. Louis and daily operations at the airport are managed by the St. Louis Airport Authority. Implementation of the Proposed Action would result in the physical use of Section 4(f) properties.

This Section 4(f) Statement provides the required documentation to demonstrate that there is no feasible and prudent alternative that would avoid the use of Section 4(f) properties, and that the project includes all possible planning to minimize harm resulting from its use.

2. Description of the Proposed Action

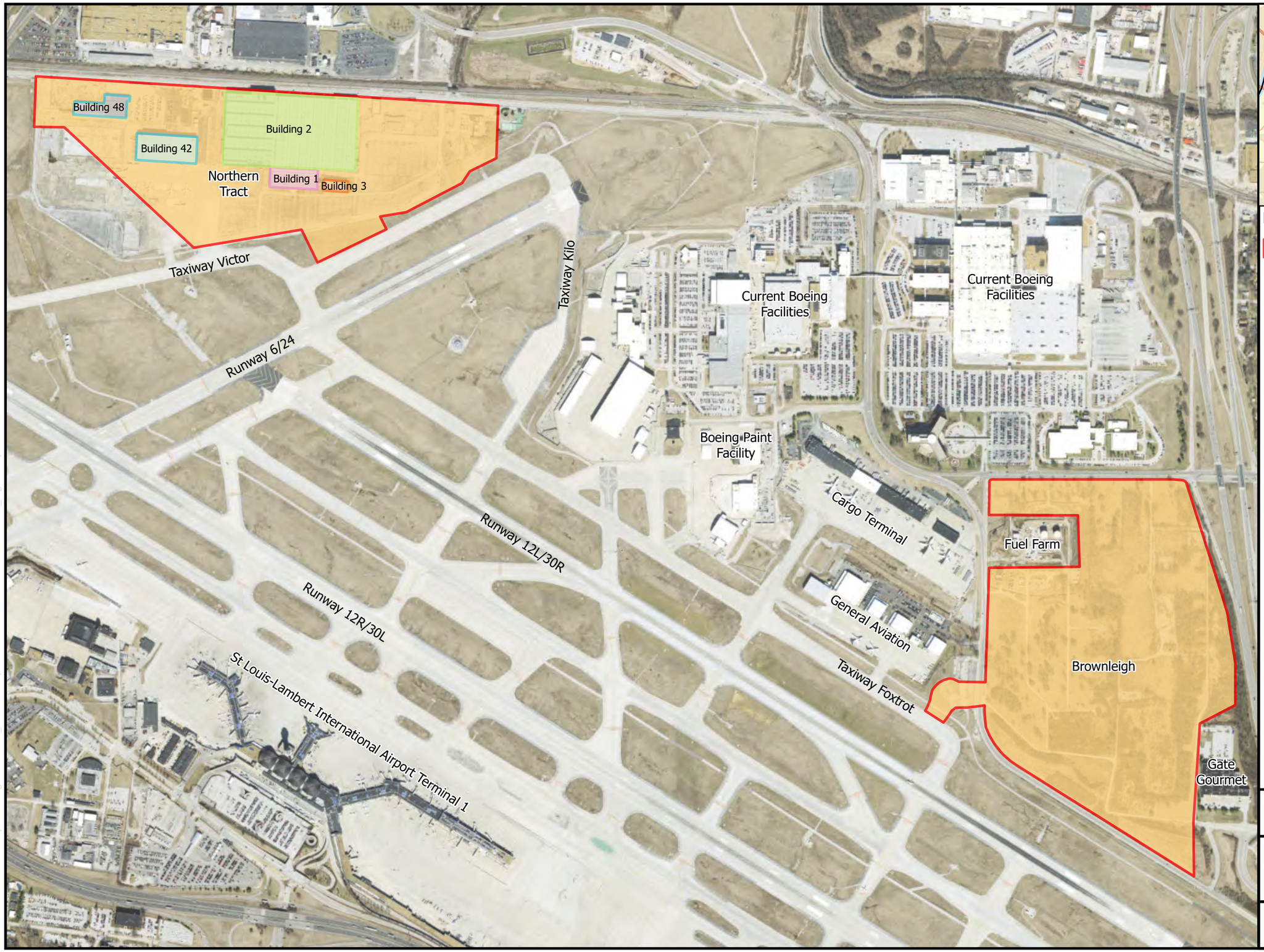
The airport's partner, Boeing, proposes to lease land from the airport to support construction and operation for U.S. defense-related aircraft production and testing.

Figure 2-1 depicts tracts of land at the airport evaluated for development (Berry Hill/Golf Course parcels, Northern Tract parcel, Air Cargo Facility, and Brownleigh parcel). Aircraft flight testing, evaluation, and product delivery require a parcel with direct access between the proposed hangar and associated facilities to the existing taxiways and runways at the airport. Flight testing is proposed to take place in similar airspace away from the airport that is used by legacy programs originating from the airport.

Figure 2-1. Tracts of Land Evaluated for Development at St. Louis Lambert International Airport

Source: Boeing 2023.

Under the Proposed Action Alternative, the airport's partner, Boeing, would lease two parcels, the 75-acre Northern Tract and 110-acre Brownleigh, from the airport to support construction and operation of Boeing's Assembly and Testing Campus (Figure 2-2).



LEGEND:

Detailed Study Area

N

BASE MAP SOURCE:
USGS USA Topo Map

0 1,000
FEET

Site Map
Boeing STL Expansion

Figure 2-2
Proposed Action Alternative

DATE: 8/23/2023

Jacobs

\\dc1vs01\GISProj\B\Boeing\D3688301_StLouis\MapFiles\Natural\Resources+EA\Pro\EA_Figures.aprx

Phases 1 and 2, as designed on Brownleigh and Northern Tract, include a total of 2,612,000 square feet (ft^2) of building construction, would have approximately 2,096 occupants, and would result in 165 to 185 acres of land development. The target occupancy is January 2026 for Phase 1 on Brownleigh parcel, January 2027 for Phase 1 on Northern Tract parcel, and January 2029 for Phase 2 on both parcels.

The Phase 1 planned construction on Brownleigh are as follows:

- Approximately 979,000-ft^2 Assembly Building
- Approximately 82,000-ft^2 Central Utility Plant (CUP)
- Taxiway to connect Taxiway Foxtrot to the Brownleigh parcel

The Phase 1 planned construction on Northern Tract is as follows:

- Approximately 191,500-ft^2 Hangar
- Approximately 94,550-ft^2 Radar Cross Section (RCS) Range Building
- Approximately 58,000- ft^2 CUP
- Approximately 25,000-ft^2, Open-air Aircraft Shelters (Launch and Recovery Structures)
- Approximately 14,500-ft^2 Hush House
- Approximately 15,600-ft^2 Maintenance Building
- Approximately 15,200-ft^2 Fuel Calibration Building
- Approximately 11,800-ft^2 Fire Department Satellite Building
- Several small support or storage structures (each under 10,000 ft^2)
- Taxiways to connect Taxiway Victor to the Northern Tract parcel

The Phase 2 planned construction on Brownleigh is as follows:

- Approximately 720,000-ft^2 Assembly Building

The Phase 2 planned construction on Northern Tract is as follows:

- Approximately 75,700-ft^2 Hangar addition
- Approximately 205,000-ft^2 Paint Building
- Approximately 12,500-ft^2 additional Open-air Aircraft Shelters (Launch and Recovery Structures)
- Approximately 13,300-ft^2 additional Hush House
- Approximately 12,000-ft^2 additional Fuel Calibration Building

A test fit assessment evaluated a layout based on initial design requirements. That potential layout passed the test fit and would have sufficient functionality, would strengthen compatibility with adjacent facilities, would increase operations efficiency, and would increase future flexibility. Additional capabilities and design requirements were added after charettes and design reviews resulting in a larger Assembly Building and RCS as well as adding a Fire Department Satellite Building and CUP. This concurrent approach on these parcels meets the current design requirements and would still have sufficient functionality, would strengthen compatibility with adjacent facilities, would increase operations efficiency, and would increase future flexibility.

Both parcels would be connected to the airfield taxiways via taxiway connectors. One taxiway connector would link the Brownleigh parcel to Taxiway Foxtrot. Another two taxiway connectors would link the Northern Tract parcel to Taxiway Victor. The western and southern edges of the Northern Tract lie within the Runway 12L runway protection zone and underneath the Runway 12L approach and departure surfaces. Runway 6-24 is southeast of the Northern Tract parcel. The proposed towpath avoids the Runway 6-24 high-energy zones.

To construct the Phase 1 facilities, Boeing would demolish functionally obsolete buildings and structures on the parcels, clear vegetation, and level the ground as needed to create a pad-ready environment for the campus. Northern Tract facilities that would need to be demolished include the McDonnell Douglas complex (Building 1, Building 2, Building 3, Building 48, and associated structures) and asphalt surface parking.

The McDonnell Douglas complex buildings have been unoccupied and disconnected from utilities for more than 20 years and have been damaged by storms in recent years. Additionally, the security level of the Boeing programs requires a structure to meet Intelligence Community Directive Number 705 standards, and the existing structures do not meet these standards. The buildings were purpose built for hands-on assembly line construction methods for the small planes that the Curtiss-Wright Aeroplane Factory produced during World War II. The buildings do not meet the needs of a modern aeronautical manufacturing tenant for internal configuration because of numerous internal columns, 20-foot-tall ceiling trusses, and a limited floor load (basements under majority of footprints).

Boeing would demolish Building 42 and asphalt surface parking as part of the implementation of Phase 2. Existing tenants of Building 42 (Airport Terminal Services [ATS] Jet Center and GoJet Airlines) would need to be relocated to new or existing facilities on airport property.

The Brownleigh parcel is currently vacant with the exception of a bulk fuel storage facility and Gate Gourmet facility, which would both remain in the Brownleigh area for future use.

Roads, parking areas, and other infrastructure would be created within the parcels during both phases. Parcels would be secured with new perimeter fencing, guardhouses, and badge access, similar to other Boeing facilities in the area.

Aircraft would be assembled on Brownleigh and then be towed across James S. McDonnell Boulevard into a secure holding area (“sally-port”) with gated access to the Air Operations Area. Security measures would be put into place to control vehicular traffic during the towing operations; once the towing operations are complete, the road would re-open to vehicular traffic. From there, the airport’s Air Traffic Control tower would approve access to the Air Operations Area, and the towed aircraft would proceed to the Northern Tract, avoiding the Runway 6-24 high-energy zones. Under Phase 1, these towing operations are anticipated to occur between two and four times per month. Under Phase 2, towing would increase to four to six times per month. Efforts would be made to avoid towing operations during high-traffic periods.

The Northern Tract parcel would contain the flight ramp structures, and the aircraft would move between the Hangar, Fuel Calibration Building, RCS, Hush House, and open-air shelters, as needed.

Aircraft operations are primarily the production acceptance of new-build aircraft and the U.S. Government acceptance of those aircraft at the factory. Boeing operates the aircraft built here in accordance with contractual requirements levied by their government customers to verify the aircraft meets the specifications and requirements set by these customers. For these contracts, the aircraft would be operated under Public Use rules with military airworthiness oversight. These activities, which would be supported by the Proposed Action continue the long-established, industry-standard processes for the acceptance of aircraft delivered to government customers. Flight testing would generally occur at the same rate and locations where current Boeing test flights are occurring today. There are currently 44 Boeing test flights per month (2 per day for 22 days a month) for all programs from the airport.

If Phase 2 is implemented, the parcels would generally have the same function and operations as Phase 1. Frequency of the movement from Brownleigh would increase as a result of the second Assembly Building coming online. Boeing anticipates towing operations between four and six times a month.

The precise design, footprint, and location of all projects are in the early planning stages. Figures 2-3 and 2-4 provide a conceptual layout for each parcel; however, this may change during the design process.

CONCEPTUAL - SUBJECT TO CHANGE

Lindbergh Boulevard

Norfolk Southern Railroad Tracks

Banshee Road

Building Restriction Line

Runway Protection Zone (Arrival)

Taxiway Victor

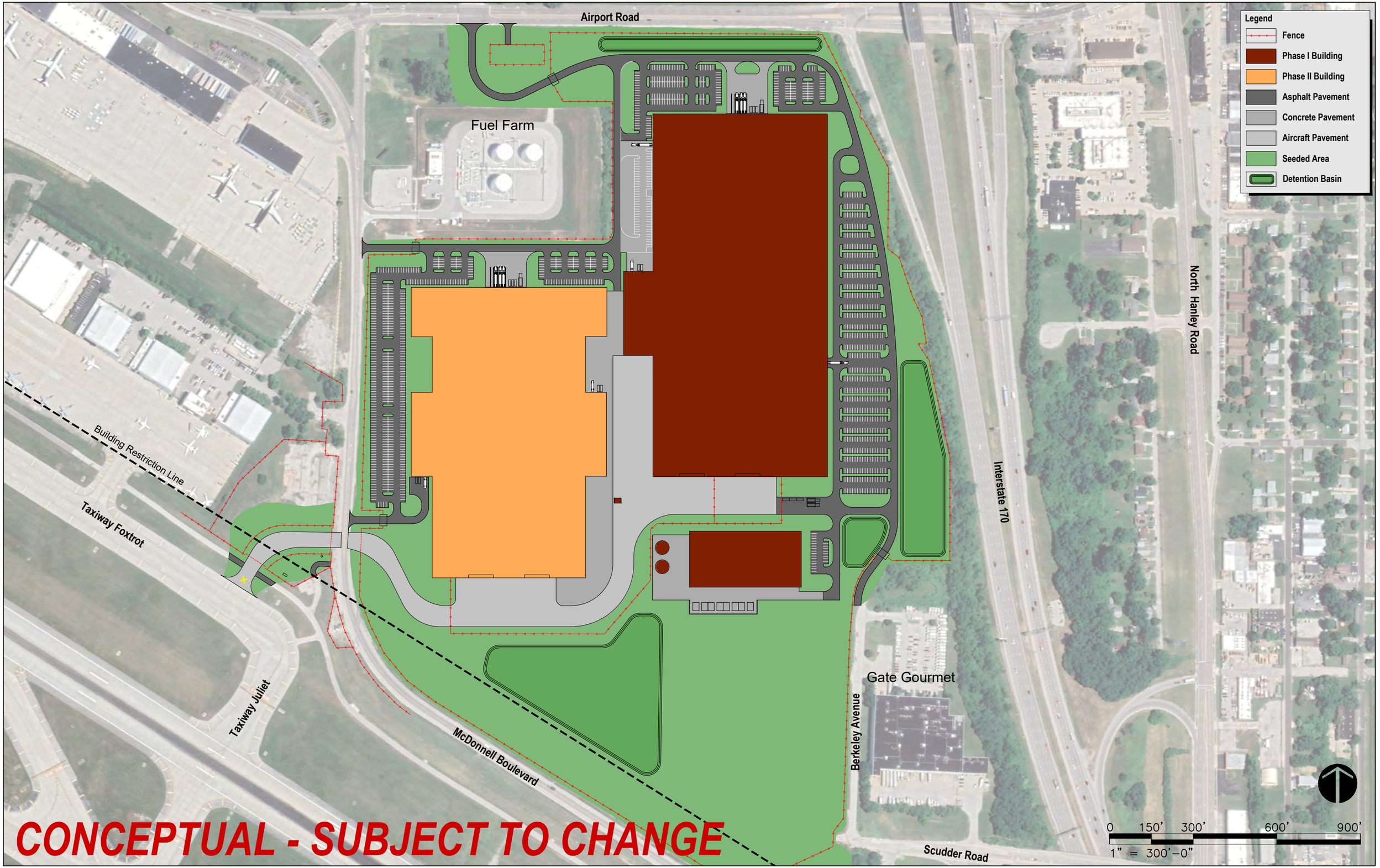
Runway 6/24

0 150’ 300’ 600’ 900’

1” = 300’–0”

Legend

- Fence
- Phase I Building
- Phase II Building
- Asphalt Pavement
- Concrete Pavement
- Aircraft Pavement
- Seeded Area

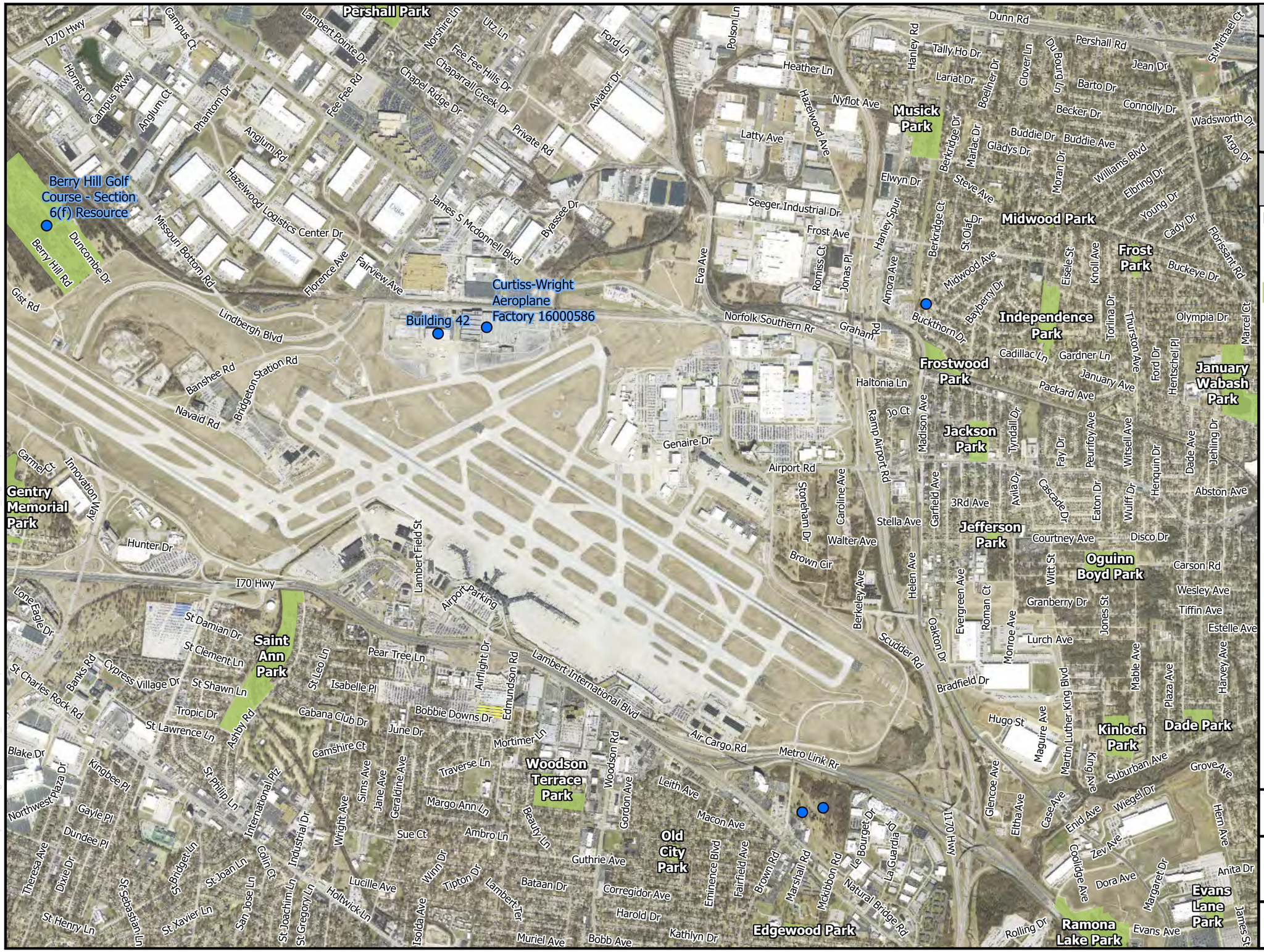

Airport Road
Fuel Farm
Legend
Fence
Phase I Building
Phase II Building
Asphalt Pavement
Concrete Pavement
Aircraft Pavement
Seeded Area
Detention Basin
North Hanley Road
Interstate 170
Building Restriction Line
Taxiway Foxtrot
Taxiway Juliet
McDonnell Boulevard
Gate Gourmet
Berkeley Avenue
Scudder Road
0 150’ 300’ 600’ 900’
1” = 300’–0”
CONCEPTUAL - SUBJECT TO CHANGE

3. Purpose and Need

The FAA *Reauthorization Act of 2018* requires that FAA ensure the safe and efficient use of airport properties and monitor the value of federal investments at airports. The purpose of the Proposed Action Alternative is to improve aircraft assembly capabilities at the airport and to allow Boeing additional airfield access for aircraft flight testing. The Proposed Action needs to occur to allow for the development of currently underused airport property, support regional economic development, and provide facilities necessary to support national defense objectives. FAA's major Federal action is the approval of a change to the airport's Airport Layout Plan (ALP).

4. Description of the Section 4(f) Properties

This section summarizes the historic properties that are protected under Section 4(f). The Section 4(f) properties are mapped on Figure 4-1. Information relating to the nature and location of archaeological sites is considered private and confidential and not for public disclosure in accordance with Section 304 of the *National Historic Preservation Act* (NHPA; 54 U.S.C. § 307103); 36 *Code of Federal Regulations* (CFR) Part 800.6(a)(5) of the Advisory Council on Historic Preservation's (ACHP's) rules implementing Sections 106 and 110 of NHPA; and Section 9(a) of the *Archaeological Resource Protection Act* (54 U.S.C. § 100707).



LEGEND:

- Historic Section 4(f) Resource
- Recreational Section 4(f) Resource

N

BASE MAP SOURCE:
USGS USA Topo Map

0 1,000 2,000
FEET

St. Louis Expansion, St. Louis County, Missouri

FIGURE 4-1
SECTION 4(F) RESOURCES

DATE: 8/16/2023

Jacobs

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Of the Section 4(f) properties shown on Figure 4-1, two historic properties would experience a physical use. The location of one archaeological site is unknown but the potential for physical use exists, as described herein. Constructive use and *de minimis* use of Section 4(f) properties are not anticipated.

4.1 Curtiss-Wright Aeroplane Factory

The Curtiss-Wright Aeroplane Factory (16000586), referred to as the McDonnell Douglas complex (5250 Banshee Road), is within the Northern Tract parcel, owned by the airport, and is a historic property listed in the National Register of Historic Places (NRHP) in 2016. It was listed as significant under Criterion A for its association with the military and industry, with a period of significance from 1940 to 1946. The property contains one contributing building composed of four sections and two contributing structures, a parking lot and an aeroplane apron. Although it is one building with connected sections (referred to as Sections A, B, C, and F in the NRHP nomination), this evaluation uses the building numbers provided by Boeing. Building 1 (Section A) was the administrative building, Building 2 (Sections B and C) was the factory, and Building 3 (Section F) was the engineering annex.

For this project, the property and its contributing resources were re-evaluated for NRHP eligibility. The complex was designed in the Modern style by master architect Albert Kahn (1869 to 1942), and the re-evaluation found it to be significant for its architectural characteristics and for its representation of the work of a master architect. The FAA determined the property eligible for listing in the NRHP under Criterion C, as the embodiment of a distinctive period in architecture and the representative work of a master architect. The Missouri State Historic Preservation Office (SHPO) concurred in a letter dated June 20, 2023. The findings of the 2016 nomination remain unchanged, including the period of significance and historic property boundary. The complex is significant under both NRHP Criterion A and Criterion C.

The Curtis-Wright Aeroplane Factory is mapped on Figure 4-1, which shows its contributing resources. Photos of the property are provided as Figures 4-2 through 4-6.

Figure 4-2. Curtiss-Wright Aeroplane Factory, Building Section B, looking east

Figure 4-3. Curtiss-Wright Aeroplane Factory, Building Section A, Section B (background), and Section C, looking west

Figure 4-4. Curtiss-Wright Aeroplane Factory, Building Section A, looking north

Figure 4-5. Curtiss-Wright Aeroplane Factory, Building Section A and Section B (center), looking north

Figure 4-6. Curtiss-Wright Aeroplane Factory, Building 3, Segment F, looking north

Under Phase 1 activities for the Proposed Action, Boeing would demolish all of the contributing resources and associated facilities of the Curtiss-Wright Aeroplane Factory, resulting in an adverse effect under Section 106 of NHPA and a Section 4(f) use of the historic property.

4.2 Building 42

Building 42 is part of the airport property within the Northern Tract parcel and is privately used as the GoJet maintenance, repair, overhaul (MRO) base and the ATS Jet Center fixed base operator. Built in 1951, Building 42 is a mid-20th-century industrial building with Modern architectural design elements similar to the Curtiss-Wright Aeroplane Factory (16000586). The building retains original features, such as the metal sash curtain wall windows, wooden doors, and metal sash hangar doors with multi-pane windows, typical of the early 1950s.

McDonnell Douglas constructed the building during a period of expanded operation that occurred in the postwar years. No master architect or engineer associated with the building was uncovered through research. The building is a representative property type constructed for the aerospace industry during the mid-20th century. The building was constructed outside of the period of significance for the Curtiss-Wright Aeroplane Factory property and does not contribute to that property.

The building retains sufficient historic integrity of association, design, materials, workmanship, location, and feeling with some diminishment in integrity of setting to reflect its architectural significance as a representative example of mid-century industrial design. Therefore, FAA determined Building 42 individually eligible for listing in the NRHP under Criterion C as an example of mid-20th-century aerospace architecture As part of the May 2023 Missouri SHPO submittal, Missouri SHPO's response in June 2023 did not include any comments on Building 42. Because the federal agency found the property eligible and the Missouri SHPO did not object, the property is considered eligible for listing in the NRHP under Criterion C.

Building 42 is mapped on Figure 4-1. Photos of the building are provided as Figures 4-7 through 4-9.

Figure 4-7. Building 42, looking northwest

Figure 4-8. Building 42, looking west

Figure 4-9. Building 42, looking northwest

Under Phase 2 activities for the Proposed Action, Boeing would demolish Building 42, resulting in an adverse effect under Section 106 of the NHPA and a Section 4(f) use of the historic property.

4.3 Archaeological Site 23SL354

Section 4(f) applies to archaeological sites that are listed on or eligible for the NRHP and that warrant preservation in place. Within the Brownleigh parcel, a single archaeological site was identified during the records search conducted for the project. Site 23SL354 is a pre-contact (prehistoric) lithic scatter of Archaic temporal affiliation and is unevaluated for NRHP eligibility. Originally reported in 1979, the site location is ambiguous, and it is therefore unknown if the Proposed Action will impact this archaeological site. Because ground-disturbing activities would occur within the Brownleigh parcel from the proposed construction activities, monitoring during construction was recommended by the Osage Nation. If subsurface cultural deposits are found during construction, additional archaeological investigations would be done to determine the nature and extent of the deposits within the project footprint. If archaeological materials are identified during the monitoring, if project plans change, or additional parcels are added further consultation with Missouri SHPO would occur under Section 106 of the NHPA. If the site was found to be in the project footprint and determined eligible for the NRHP, a Section 4(f) evaluation would be required at that time.

5. Alternatives Analysis

5.1 Feasibility and Prudent Analysis

This section provides the analysis to determine if there are any feasible and prudent alternatives that would completely avoid the use of the Section 4(f) resources described in Section 4.0. Procedural requirements for complying with Section 4(f) are set forth in DOT Order 5610.1C. The FAA's desk reference to FAA Order 1050.1F, Environmental Impacts: Policies and Procedures provides the FAA with guidance on how the FAA should undertake Section 4(f) evaluations. This guidance is based on Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) regulations in 23 CFR Part 774 and FHWA guidance (for example, Section 4(f) Policy Paper, 77 Federal Register 42802). These requirements are not binding on the FAA; however, the FAA may use them as guidance to the extent relevant to aviation projects.

According to the FHWA/FTA regulation at 23 CFR Section (§) 774.17:

1. A feasible and prudent alternative is one that avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property. In assessing the importance of protecting the Section 4(f) property, it is appropriate to consider the relative value of the property [that is, some Section 4(f) properties are worthy of a greater degree of protection than others].
2. An alternative is not feasible if it cannot be built as a matter of sound engineering judgment.
3. An alternative is not prudent if it:
    a. Compromises a project to such a degree that it is unreasonable to proceed with the project in view of its stated Purpose and Need (that is, the alternative does not address the Purpose and Need of the project).
    b. Results in unacceptable safety or operational problems.
    c. Causes, after reasonable mitigation, the following:
        i. Severe social, economic, or environmental impacts
        ii. Severe disruption to established communities
        iii. Severe or disproportionate impacts to minority or low-income populations
        iv. Severe impacts to environmental resources protected under other federal statutes
    d. Results in additional construction, maintenance, or operational costs of an extraordinary magnitude.
    e. Causes other unique problems or unusual factors.
    f. Involves multiple factors above that, although individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

A preliminary review of various avoidance alternatives was conducted. The review included:

- Use of another airport for aircraft assembly and testing
- No Action Alternative
- Action Alternative 3: Brownleigh Parcel and Existing Northern Air Cargo Facility Parcel

The use of another airport would not meet the project's Purpose and Need because the use of a different airport would not improve aircraft assembly capabilities at the airport. Boeing currently has facilities at the airport and moving the aircraft assembly and testing activities to another airport would increase operation costs for Boeing substantially to the point that the project would be unlikely to occur. For these reasons, the use of another airport was not considered a prudent avoidance alternative.

Other alternatives were developed that did meet the Purpose and Need. However, only the No Action Alternative and Action Alternative 3 – Brownleigh Parcel and Existing Northern Air Cargo Facility Parcel, would completely avoid the use of a Section 4(f) resource. Therefore, the alternatives that would involve the use of a Section 4(f) resource are described in more detail in the Least Overall Harm Analysis (Section 5.2).

5.1.1 No Action Alternative

Description: Under the No Action Alternative, the construction and demolition activities would not occur, and Boeing would be unable to develop national defense aircraft assembly and testing at the airport.

Feasible and Prudent Evaluation:

- The No Action Alternative would continue Boeing's operations as they are today; therefore, this alternative would be feasible.
- The No Action Alternative would avoid the physical use of Section 4(f) resources because Boeing would make no changes to their existing operations.
- The No Action Alternative would not meet the need of the project to allow for the development of currently underused airport property, support regional economic development, and provide facilities necessary to support national defense requirements at the airport.
- The No Action Alternative could result in Boeing moving their operations elsewhere because the airport is unable to provide the necessary facilities for its national defense assembly and testing needs. This could result in unacceptable operational problems for Boeing because it would be unable to co-locate its current facilities with those needed for national defense aircraft assembly and testing (23 CFR § 774.17, factor ii) and it would increase the costs for Boeing substantially to the point that the project would be unlikely to occur. Additionally, if Boeing were to move elsewhere in order to be able to avoid operational problems, it could cause severe economic impacts to the St. Louis area (23 CFR § 774.17, factor iii).

Summary: The No Action Alternative is feasible but is not prudent per 23 CFR § 774.17 because it would not meet the project's Purpose and Need.

5.1.2 Action Alternative 3: Brownleigh Parcel and Existing Northern Air Cargo Facility

Description: Under Action Alternative 3, Boeing's testing and assembly campus would be constructed on the Brownleigh parcel and the existing Northern Air Cargo Facility parcel.

Feasible and Prudent Evaluation:

- There is sufficient space at the Brownleigh and Northern Air Cargo Facility parcels for Boeing to construct their testing and assembly campus, and runway access for testing can be provided; therefore, this alternative would be feasible.
- Action Alternative 3 would avoid the physical use of historic Section 4(f) resources, as none were identified on these parcels. However, archaeological site 23SL354 is located on the Brownleigh parcel. The location of this unevaluated site remains ambiguous, therefore it is unknown if Action Alternative 3 would impact it. There is a potential for artifact discovery during construction monitoring, which could lead to additional historic property(s) impacted by construction. If that were to happen, additional Section 106 consultation and possible Section 4(f) evaluation would have to be conducted. Therefore, Action Alternative 3 may not be an avoidance alternative and determining whether it is an avoidance alternative cannot occur until construction.
- Action Alternative 3 would meet the need of the project to allow for the development of currently underused airport property, support regional economic development, and provide facilities necessary to support national defense requirements at the airport.

- Action Alternative 3 would require the relocation of FedEx, UPS, and Amazon Air (Prime), the primary tenants at the Northern Air Cargo Facility. Air cargo services must be maintained at the airport so these tenants could not be relocated until a replacement facility at a new location at the airport has been selected, designed, and constructed. The relocation of these tenants would result in extraordinary construction costs (23 CFR § 774.17, factor iv) and would result in substantial delays in the construction of the Boeing testing and assembly campus such that the required implementation schedule could not be met and the project could no longer proceed (23 CFR § 774.17, factor i). Additionally, depending on where these facilities could be constructed, there is a possibility that the only option available would result in use of a Section 4(f) resource.

Summary: Action Alternative 3 may be an avoidance alternative. Additionally, it is feasible but is not prudent per 23 CFR § 774.17.

5.1.3 Summary of Avoidance Alternatives

The No Action Alternative and Action Alternative 3 are both considered feasible but are not prudent per 23 CFR § 774.17. There are no feasible and prudent alternatives that completely avoid the use of Section 4(f) resources.

5.2 Least Overall Harm Analysis

The Section 4(f) regulation states that, if there is no feasible and prudent alternative that avoids use of Section 4(f) properties, FAA "may approve only the alternative that causes the least overall harm in light of the statute's preservation purpose." In determining the alternative that causes the least overall harm, the following factors must be balanced (23 CFR § 774.3):

a. The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property).

b. The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection.

c. The relative significance of each Section 4(f) property.

d. The views of the official(s) with jurisdiction over each Section 4(f) property.

e. The degree to which each alternative meets the Purpose and Need for the project.

f. After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f).

g. Substantial differences in costs among the alternatives.

Three alternatives were considered for the project: the Proposed Action Alternative (Brownleigh and Northern Tract Parcels – Concurrent Development), Action Alternative 1 (Berry Hill/Golf Course Parcels), and Action Alternative 2 (Brownleigh and Northern Tract Parcels – Sequential Development – Brownleigh Parcel only for Phase 1).

5.2.1 Proposed Action Alternative: Brownleigh and Northern Tract Parcels (Concurrent Development)

Description: Under the Proposed Action Alternative, the airport's partner, Boeing, would lease two parcels, the 75-acre Northern Tract and 110-acre Brownleigh, from the airport to support construction and operation of Boeing's Assembly and Testing Campus. Phases 1 and 2, as designed on Brownleigh and Northern Tract, include a total of 2,612,000 ft^2 of building construction, would have approximately 2,096 occupants, and would result in 165 to 185 acres of land development. Facilities that would be constructed include assembly buildings, CUPs, taxiway connections, a hangar and hangar addition, an RCS-range building, open-air aircraft shelters, hush houses, maintenance building, fuel calibration buildings, fire department satellite building, support/storage structures, and a paint hangar. Roads, parking areas, and

other infrastructure would be created within the parcels during both phases. Parcels would be secured with new perimeter fencing, guardhouses, and badge access, similar to other Boeing facilities in the area.

To construct the Phase 1 facilities, Boeing would demolish functionally obsolete buildings and structures on the parcels, clear vegetation, and level the ground as needed to create a pad-ready environment for the campus. Northern Tract facilities that would need to be demolished include the McDonnell Douglas complex (Building 1, Building 2, Building 3, Building 48, and associated structures) and asphalt surface parking.

Boeing would demolish Building 42 and asphalt surface parking as part of the implementation of Phase 2. Existing tenants of Building 42 (ATS Jet Center and GoJet Airlines) would need to be relocated to new or existing facilities on airport property. The airport, in coordination with FAA, would evaluate available sites to determine compatibility with other airport uses in a future *National Environmental Policy Act of 1969* process.

Least Overall Harm Evaluation:

- The Proposed Action best meets the project Purpose and Need by developing the currently underused Brownleigh and Northern Tracts parcels and providing the facilities necessary to support national defense requirements.
- The Proposed Action would result in a physical use of a Section 4(f) resource with the total demolition of the NRHP-listed Curtiss-Wright Aeroplane Factory contributing buildings and associated facilities and NRHP-eligible Building 42. All of the existing structures on the Northern Tract would need to be demolished in order to allow Boeing to construct their Assembly and Testing Campus. The demolition of these sites would constitute an adverse effect to eligible or listed historic properties under Section 106 and a physical use of Section 4(f) resources.
- Reuse of the existing historic buildings and structures that compose the Curtiss-Wright Aeroplane Factory was considered but it was determined that reuse would result in design challenges that could not be entirely overcome. The functionally obsolete existing buildings have been unoccupied and disconnected from utilities for more than 20 years and damaged by storms in recent years, resulting in flooding (over 6 feet of standing water) and roof and external structure damage. Efforts by the airport to bring new tenants to the buildings using state tax credits and other incentives have not been successful. The security level of the Boeing programs requires that the Proposed Action facilities meet Intelligence Community Directive Number 705 standards, and the existing buildings do not meet those standards. The directive requires that Sensitive Compartmented Information Facilities (SCIFs) be designed such that perimeter walls, windows, doors, ceiling, and floor act as a physical barrier to forced, covert, and surreptitious entry. There are limitations on allowable facility design that include how the walls, floors, and ceilings all attach to one another in a manner that essentially forms a 6-sided box with radio frequency shielding that is tied and grounded. Additional acoustic protections and access control would also be required. The existing buildings were purpose built for hands-on assembly line construction methods for the small planes that the Curtiss-Wright Aeroplane Factory produced during World War II. The buildings do not meet the internal configuration needs of a modern aeronautical manufacturing tenant because of numerous internal structural support columns, 20-foot-tall ceiling trusses (35-foot clearance is required), and a limited floor load (because of basements under the majority of the building footprints). The cost to renovate and reuse the historic properties to meet SCIF security standards and design requirements would cost an estimated $600 million, which is substantially higher than the cost to demolish the historic structures and construct a new facility (estimated $200 million).
- The SHPO has been consulted regarding the proposed project and concurs there are no mitigation measures under this alternative that would avoid the physical use of Section 4(f) resources.
- Based on Boeing's site sizing, taxiway connection needs, and schedule requirements, the Brownleigh and Northern Tract parcels (Concurrent Development) has been selected as the option that best meets the Purpose and Need compared to the other alternatives; therefore, it has been selected as the Proposed Action Alternative.

5.2.2 Action Alternative 1: Berry Hill/Golf Course Parcels

Description: Action Alternative 1 would involve constructing Boeing's Assembly and Testing Campus on two parcels, the Berry Hill and Golf Course parcels during Phase 1 and Phase 2. The location of the Berry Hill/Golf Course parcels is shown on Figure 2-1.

The Berry Hill/Golf Course parcels are at the western end of the airport with limited vehicular access. They are also furthest from the existing Boeing facilities, requiring long tow operations to reach these existing facilities. The parcels slope into a large stormwater runoff pit, which creates challenges in grading the site and would result in substantial earthwork. Additionally, the airfield runoff would have to be diverted to a new location if the site was developed, and there is no known suitable location.

Large areas of the parcels closest to the runway are unusable because of mandatory height restrictions in areas with navigable airspace (14 CFR Part 77). The test fit assessment evaluated a layout using initial design requirements. This initial review found the taller assembly, radar testing, and hangar structures would create substantial layout challenges and result in additional site development costs as more of the parcels would need to be developed.

The center of the parcels contains the municipal Berry Hill/Golf Course, which is owned and maintained by the City of Bridgeton, and was funded using a Land and Water Conservation Fund (LWCF) grant (LWCF, 2023). The golf course would also be considered a Section 4(f) resource.

Least Overall Harm Evaluation:

- Action Alternative 1 partially meets the project Purpose and Need because it would develop the currently underused Berry Hill/Golf Course parcels and would provide the facilities necessary to support national defense requirements. However, Action Alternative 1 would result in severe constructability challenges because of the existing site topography and 14 CFR Part 77 glidepath restrictions. Large areas of the parcel closest to the runway are unusable for development due to mandatory height restrictions in areas with navigable airspace, resulting in constructability issues and schedule delays that reduce the degree to which Action Alternative 1 is able meet the project's Purpose and Need.
- The Proposed Action would not require the demolition of the historic properties on the Northern Tract parcel. However, it would result in the physical use of the municipal Berry Hill/Golf Course, a recreational Section 4(f) resource owned and maintained for public use by the City of Bridgeton. Action Alternative 1 would require total demolition of all of the existing structures and site features on the Berry Hill/Golf Course parcels. The demolition of the Berry Hill/Golf Course would constitute a physical use of a Section 4(f) resource.
- There are no mitigation measures under this alternative that would avoid the physical use of the recreational Section 4(f) resource.
- Section 6(f) of the LWCF Act (16 U.S.C. Section 4601 et. seq.) (36 CFR Part 59) provides funds for buying or developing public use recreational lands through grants to local and state governments. Section 6(f)(3) prevents conversion of lands purchased or developed with LWCF funds to non-recreation uses, unless the Secretary of the Department of the Interior, through the National Park Service, approves the conversion. The regulations state that a Section 6(f) resource must be continually maintained in public recreation use unless the Secretary of the Department of the Interior, through the National Park Service, approves substitution property of reasonably equivalent usefulness and location and of at least equal fair market value. The Berry Hill/Golf Course was funded through LWCF grants and is considered a Section 6(f) resource. Relocation of the Berry Hill/Golf Course to a comparable location within the City of Bridgeton would be challenging and time-consuming given the limited available options for relocation, resulting in construction delays for the project and additional cost.
- Other potential environmental impacts at the site would include the removal of bat roosting habitat. Construction activities are prohibited when bat species are present (April 1 through October 31), which would threaten Boeing's ability to complete the project within the required schedule. Additionally,

there would be permanent impacts to the streams located on the Berry Hill parcel, requiring additional mitigation.

- No specific cost estimate was prepared for Action Alternative 1; however, it is assumed that Action Alternative 1 would cost substantially more than the Proposed Action because Action Alternative 1 would require mitigation for stream impacts as well as the relocation of the airfield runoff and the Berry Hill/Golf Course to new locations, both of which would be costly and time-consuming.

5.2.3 Action Alternative 2: Brownleigh and Northern Tract Parcels (Sequential Development – Brownleigh Parcel only for Phase 1)

Description: Throughout the planning process, different approaches using the Brownleigh and Northern Tract parcels were studied. Action Alternative 2, similar to the Proposed Action Alternative, uses the Northern Tract and Brownleigh to support construction and operation of Boeing's Assembly and Testing Campus, but Phase 1 construction would only occur on Brownleigh, and Phase 2 construction would occur on Brownleigh and the Northern Tract. Sequential phasing in Action Alternative 2 would require James S. McDonnell Boulevard to be permanently closed to accommodate the flight ramp from the Brownleigh parcel and to create the necessary access to the airfield.

Least Overall Harm Evaluation:

- The Proposed Action meets the project Purpose and Need because it would develop currently underused Brownleigh and Northern Tracts parcels, and would provide the facilities necessary to support national defense requirements. However, a sequential approach to construction would not meet the facility design requirements, resulting in a decreased functionality of the Assembly and Testing Campus that reduces the degree to which Action Alternative 2 meets the project's Purpose and Need.
- The Proposed Action would result in a physical use of a Section 4(f) resource with the total demolition of the NRHP-listed Curtiss-Wright Aeroplane Factory contributing buildings and associated facilities and NRHP-eligible Building 42. As described for the Proposed Action, all of the existing buildings and structures on the Northern Tract would have to be demolished in order to allow Boeing to construct their Assembly and Testing Campus. The demolition of these sites would constitute an adverse effect to historic properties under Section 106 and a physical use of Section 4(f) resources.
- There are no mitigation measures under this alternative that would avoid the physical use of Section 4(f) resources.
- Other potential environmental impacts at the site include the permanent closure of James S. McDonnell Boulevard. Although traffic could be rerouted to other local roadways, long-term residual impacts to local traffic patterns would be expected and the closure could affect access to general aviation facilities and impact area automobile and truck traffic.

5.3 Least Overall Harm Summary

The Proposed Action Alternative: Brownleigh and Northern Tract Parcels (Concurrent Development) has been identified as the alternative that best meets the project's Purpose and Need, results in the best alternative from a constructability and cost standpoint, and that causes the least overall harm. The least overall harm analysis is summarized, by alternative, in Table 5-1.

Table 5-1. Last Overall Harm Analysis Summary

Criteria	Proposed Action Alternative: Brownleigh and Northern Tract Parcels (Concurrent Development)	Action Alternative 1: Berry Hill/Golf Course Parcels	Action Alternative 2 Brownleigh and Northern Tract Parcels (Sequential Development)
Meets the Purpose and Need for the project?	Yes	Yes, however, failure to meet alternatives screening criteria reduces how well this alternative satisfies the Purpose and Need	Yes, however, failure to satisfy design requirements reduces how well this alternative satisfies the Purpose and Need
Ability to Mitigate adverse impacts to each Section 4(f) property	Yes, mitigation through the implementation of a Memorandum of Agreement (MOA) would be completed.	Limited. The Berry Hill/Golf Course would have to be relocated within the City of Bridgeton. It is unknown if there are suitable sites for a replacement recreation facility to be constructed. Section 6(f) coordination would have to occur regarding relocation options for the golf course.	Yes, mitigation through the implementation of an MOA would be completed.
Relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection	Equal	Equal, assuming a sufficient location for the relocation of the Berry Hill/Golf Course could be found.	Equal
Relative significance of each Section 4(f) property	Equal	Presumed equal. The City of Bridgeton (as the official with jurisdiction) was not consulted about the potential impacts of the Berry Hill/Golf Course.	Equal
Views of the official(s) with jurisdiction over each Section 4(f) property	Equal, acknowledged the adverse effect due to the demolition of Section 4(f) resources	Unknown. The City of Bridgeton was not consulted about the potential impacts to the Berry Hill/Golf Course because of the severe costs and constructability challenges associated with this alternative.	Equal, acknowledged adverse effect due to the demolition of Section 4(f) resources
After reasonable mitigation, the magnitude of any remaining adverse impacts to resources not protected by Section 4(f)	Temporary disruptions to traffic would occur when aircraft are towed from the assembly areas to the taxiways for testing (anticipated to occur between two to four times per month).	Several streams would be removed to accommodate the construction of this alternative. Permanent removal of bat roosting habitat onsite. Section 6(f) impacts would occur due to relocation of Berry Hill/Golf Course.	Long-term impacts to local traffic patterns would occur with the permanent closure of James S. McDonnell Boulevard. Although traffic could be rerouted to other local roadways, residual impacts to local traffic patterns would be expected and the closure could affect access to general aviation facilities and impact area automobile and truck traffic.

Criteria	Proposed Action Alternative: Brownleigh and Northern Tract Parcels (Concurrent Development)	Action Alternative 1: Berry Hill/Golf Course Parcels	Action Alternative 2 Brownleigh and Northern Tract Parcels (Sequential Development)
Substantial differences in costs among the alternatives	Equal.	Cost estimate not developed; would be substantially higher than other alternatives due to the relocation and construction of a new airfield stormwater runoff facility and relocation of the golf course pursuant to Section 6(f) requirements.	Equal.
Alternative with the least overall harm?	Yes. Two Section 4(f) resources would be demolished; however, this alternative would avoid Section 4(f)/6(f) impacts to the golf course, is less costly than other alternatives, and best meets the Purpose and Need by satisfying all design requirements.	No. One Section 4(f)/6(f) resource would be demolished requiring costly and challenging relocation of the golf course, bat roosting habitat and several streams will have to be removed likely resulting in higher costs, and the alternative does not fully meet the screening criteria reducing how well it satisfies the Purpose and Need.	No. The same Section 4(f) resources would be demolished as the Proposed Action; however, this alternative would require permanent closure of James S. McDonnell Boulevard, which would result in impacts to local traffic patterns, and the alternative does not meet the design requirements causing decreased functionality that reduces the degree to which it satisfies the Purpose and Need.

6. Mitigation

After thorough review of the identified alternatives, it was determined that there would be no feasible and prudent alternative that would meet the project's Purpose and Need and avoid the use Section 4(f) properties. The Preferred Alternative has the least overall harm of those alternatives that meet the Purpose and Need, but has a physical use of two historic Section 4(f) properties: Curtiss-Wright Aeroplane Factory and Building 42. If the Section 4(f) evaluation concludes there are no feasible and prudent alternatives to the use of Section 4(f) resource, it must also document that the project includes all possible planning to minimize harm or mitigate the Section 4(f) resource. As defined in 23 CFR 774.17, all possible planning means that all reasonable measures to minimize harm or mitigate adverse impacts must be included in the project.

Because the project requires the complete demolition of both historic properties, there are no measures to minimize harm to them. The FAA, in consultation with the St. Louis Airport Authority (STLAA), Boeing, the Osage Nation, and the Missouri SHPO, executed an MOA under Section 106 of the NHPA, which stipulates mitigation measures to address the adverse effects.

The mitigation measures in the MOA to resolve the adverse effects are as follows:

A. PHOTOGRAPHIC RECORD AND DRONE VIDEO

Prior to the demolition of the Curtiss-Wright Aeroplane Factory and Building 42, Boeing will create a photographic record, including a drone video and 15 to 20 images of the interior and exterior of each of the facilities, in accordance with the National Register Photo Policy Standards. The SHPO will be consulted on the selection of images to be printed for archival purposes.

B. HISTORIC AMERICAN BUILDINGS SURVEY (HABS)/HISTORIC AMERICAN ENGINEERING RECORD DOCUMENTATION

Prior to demolition of Curtiss-Wright Aeroplane Factory and Building 42, Boeing will prepare Level II HABS documentation of both buildings. The documentation will follow the National Park Service Guidelines for HABS recordation and will include the original as-built drawings, digital photographs, historical photographs, and a narrative history. MOA signatories will review and comment on the documentation.

C. WEBSITE HISTORY

Boeing, in consultation with STLAA, the FAA, and SHPO, will create a website on the history of the Curtiss-Wright Aeroplane Factory and Building 42 using historical information from the Cultural Resources Report and the HABS documentation. The website will include historical recordation photos and drone footage of the facilities. Boeing will create the content of the website, and it will be hosted by STLAA.

D. PHYSICAL DISPLAY

Boeing, in consultation with STL, the FAA, and the SHPO, will create a physical display inside the airport terminal building illustrating the history of the Curtiss-Wright Aeroplane Factory and Building 42 with text and images of the facilities, possible salvaged items that can be displayed, images of the original plans for the construction of the facilities, and a QR code leading people to the website.

E. ARCHAEOLOGICAL MONITORING

Boeing will contract with a Project Archaeologist to provide construction archaeological monitoring during ground disturbing activities at the Brownleigh and Northern Tract locations. Boeing will coordinate with the Osage Nation, in accordance with the MOA, to contract with an archaeological firm that has experience in Missouri.

7. Coordination with Agencies with Jurisdiction over the Section 4(f) Resource

As a part of the Section 4(f) requirements, the FAA is responsible for soliciting and considering the comments of the Department of Interior (DOI) and, where appropriate, U.S. Department of Agriculture (USDA), or U.S. Department of Housing and Urban Development (HUD), as well as the appropriate official(s) with jurisdiction over the Section 4(f) property. The Proposed Action does not include the use of a national forest or land holding under the jurisdiction of the U.S. Forest Service; therefore, the USDA does not have jurisdiction over the identified Section 4(f) resource. In addition, because the Section 4(f) resource is building owned and operated by the City of St. Louis, HUD should have no interest in this Section 4(f) resource. DOI was provided a copy of the Draft Section 4(f) Statement for review in September 2023. DOI responded via letter in September 2023 that they concurred with FAA's adverse effect finding and that there is no feasible and prudent avoidance alternative to the Section 4(f) use of the historic properties. DOI concurred with the MOA mitigation measures and recommended that HABS documentation be completed for both the Curtiss-Wright Aeroplane Factory and Building 42. This has been added as a stipulation to the MOA.

Because the properties that would be used under Section 4(f) are historic properties, the Missouri SHPO is the official with jurisdiction for these two properties. The FAA initiated consultation under Section 106 of the NHPA with the Missouri SHPO in May 2023. After the Missouri SHPO concurred with the Adverse Effect finding, FAA contacted the ACHP to ask if they want to participate in resolving the adverse effect. In response, in July 2023, the ACHP declined the invitation to consult. The ACHP requested the FAA to file the final Section 106 agreement document, developed in consultation with the Missouri SHPO and any other consulting parties with the ACHP at the conclusion of the consultation process. The filing of the Agreement and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the NHPA. The following provides the date and summary of the coordination. Copies of the coordination documents are provided in the Final Environmental Assessment.

- Initiated the Section 106 consultation process in May 2023 via letter to Missouri SHPO and identified tribes.
- Submitted the Cultural Resources Technical Report with eligibility determinations and an Adverse Effect finding in May 2023.
- Missouri SHPO concurred via letter in June 2023, that they concurred with the Adverse Effect finding.
- Upon Missouri SHPO concurrence, FAA notified the ACHP in June 2023 of the Adverse Effect finding and asked if they wanted to participate in the development of an MOA to address the adverse effect.
- ACHP responded in July 2023 declining the invitation to consult and requesting an executed copy of the MOA.
- DOI provided a copy of the Draft Section 4(f) Statement for review in September 2023. DOI provided comments via letter and requested changes to the MOU were incorporated and are reflected in this Final Section 4(f) Statement.
- The Draft Environmental Assessment and Draft Section 4(f) Statement were made available for public review from September 22 through October 26, 2023. No public comments were received regarding the Draft Section 4(f) Statement.

8. Section 4(f) Statement Conclusion

There are no alternatives that meet the Purpose and Need, are both prudent and feasible, and completely avoid the use of Section 4(f) resources. The Proposed Action has been identified as the alternative that causes the least overall harm. The FAA has consulted with the airport, Boeing, the Quapaw Nation, the Peoria Tribe of Oklahoma, the Osage Nation, and the Missouri SHPO to develop an MOA under Section 106 of the NHPA. The MOA stipulates the mitigation measures required to address and resolve the adverse effects of the Proposed Action on historic properties.

The mitigation measures are a requirement of the Proposed Action and would address the Section 4(f) requirement that the project minimize adverse impacts when there is a use of a Section 4(f) resource. FAA has determined and DOI concurs that there is not a feasible and prudent alternative to the use of Section 4(f) resources, and the Proposed Action includes all possible planning to minimize harm to the Section 4(f) resources resulting from the use. DOI determined that if an agreement under Section 106 with the Missouri SHPO and the airport is fully executed, it will have no objection to the Section 4(f) evaluation and concurs with the measures to minimize and mitigate the use of the Section 4(f) resource if HABS documentation requirements are included in the MOA.

9. References

Land and Water Conservation Fund (LWCF). 2023. Past Projects Mapping: St. Louis. Accessed June 23, 2023.