

Engineering Directorate Consolidation Complex Phase 1A Environmental Assessment

JSC Environmental Management Office (JE)

Availability:

Available only with approval of issuing office:



September 2025



National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

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ABSTRACT

LEAD AGENCY	National Aeronautics and Space Administration (NASA) Lyndon B. Johnson Space Center (JSC)
PROPOSED ACTION	Construction of an Engineering Directorate Consolidation Complex (Phase 1A High Bay Machine Shop)
INFORMATION CONTACT	Jennifer Morrison, JSC NEPA/Cultural Resources Manager, (Mail Code: JE111; Telephone: 281-244-0878; E-mail: jennifer.l.morrison@nasa.gov)
DATE	September 2025
ABSTRACT	JSC has prepared this tiered Environmental Assessment (EA) for the construction and operation of an Engineering Directorate Consolidation Complex Phase 1A High Bay Machine Shop. The JSC Master Plan Programmatic Environmental Assessment (PEA) outlines a tiered structure that requires each of its individual elements (e.g., projects) be addressed in a detailed environmental analysis that would be executed in the manner necessary to conform with the Master Plan and comply with NASA’s implementing regulations (14 Code of Federal Regulations [CFR] §1216). NASA policy requires each Center to develop, maintain, and implement a Master Plan for the orderly management and future development of the Center's real property assets, including land, buildings, physical resources, and infrastructure in support of mission requirements. This EA includes an environmental assessment of one project component of JSC’s 20-year revitalization strategy for constructing new state-of-the-art installations and vacating and/or demolishing (deconstructing) non-essential installations to support core capabilities, meet mission requirements, and respond effectively to mission changes. The Engineering Directorate Consolidation Complex would consist of five phases over the next 20-25 years, including Phase 1A’s construction of a new High Bay Machine Shop. Phase 1B includes revitalizing Building 13’s existing High Bay (13S). Phase 2A includes constructing a new High Bay Fabrication Shop. Phase 2B includes constructing a new 3-story laboratory/office building, and Phase 2C includes revitalizing Building 15 and Building 13N. The Proposed Action is the construction of Phase 1A, which includes the design of a new approximately 37,625 gross square foot (GSF) High Bay Machine Shop. The new facility consolidates all Structural Engineering Division (ES) machining capabilities into a single location, paving the way for future divestment of Building 10. The proposed new High Bay Machine Shop would be in a visually prominent location, between two large existing parking lots, close to the Center’s main entry, and inside the JSC Historic District. Through the National Environmental Policy Act (NEPA) public participation process, JSC provides transparency and solicits input from stakeholders into the decision to construct the Phase 1A High Bay Machine Shop. If not adopted, JSC would not have the infrastructure improvements necessary for mission success.

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Draft Finding of No Significant Impact

AGENCY	National Aeronautics and Space Administration (NASA) Lyndon B. Johnson Space Center (JSC)
ACTION	Publication of a Finding of No Significant Impact
SUMMARY	Pursuant to the National Environmental Policy Act of 1969, as amended (42 United States Code 4321, et seq.), and the National Aeronautics and Space Administration's (NASA) policy and procedures (14 Code of Federal Regulation [CFR] § 1216), JSC intends to make a Finding of No Significant Impact (FONSI) for the proposed construction of the Engineering Directorate Consolidation Complex Phase 1A High Bay Machine Shop in Houston, Texas. The Proposed Action is one of five potential phased projects over the next 20-25 years to modernize and consolidate the Engineering Directorate's buildings. The new facility consolidates all Structural Engineering Division (ES) machining capabilities into a single location. The proposed new High Bay Machine Shop would be in a visually prominent location, between two large existing parking lots, close to the Center's main entry, and inside the JSC Historic District.
ADDRESS	2101 NASA Parkway, Houston, TX 77058 NASA-JSC (Mail Code: JE111) The tiered EA that supports this FONSI will be available on the NASA public website at the following address: https://www.nasa.gov/johnson/jsc-public-review/.
CONTACTS FOR FURTHER INFORMATION	Requests for copies of the tiered EA and FONSI, or for additional information, please contact: Jennifer Morrison, JSC NEPA/Cultural Resources Manager Mail Code: JE-111; Telephone: 281-244-0878 E-mail: jennifer.l.morrison@nasa.gov
SUPPLEMENTAL INFORMATION	JSC prepared a tiered Environmental Assessment (EA) to support the NEPA decision-making process to construct the Phase 1A High Bay Machine Shop. This analysis tiered off the 2019 JSC Master Plan Supplemental Programmatic Environmental Assessment (SPEA) where appropriate. The EA is an analysis of the associated environmental impacts of the Proposed Action. The EA is hereby incorporated by reference into this FONSI and is available for public and interagency review and comment. The plan to consolidate the Engineering Directorate Consolidation Complex consists of five phases over the next 20-25 years. The Proposed Action considers only Phase 1A of the consolidation, specifically the construction of a new approximately 37,625 gross square foot (GSF) High Bay Machine Shop. The new facility consolidates all Structural Engineering Division (ES) machining capabilities into a single location, paving the way for divestment of

Building 10 (which can occur after completion of Phases 1A and 1B). The proposed new High Bay Machine Shop would be in a visually prominent location, between two large existing parking lots, close to the Center's main entry, and inside the JSC Historic District.

JSC evaluated the Proposed Action, one (1) Alternative, and the No-Action Alternative. Under the No-Action Alternative, JSC would not construct the High Bay Machine Shop, and JSC would continue to operate and maintain the buildings and infrastructure currently in use at the property. The No-Action Alternative would not provide the infrastructure deemed necessary to meet the current and future initiatives of NASA and JSC.

The Alternative considered was to extend the existing Buildings 13 and 15 high bays, adding a three-story office and laboratory addition linking the two buildings and housing many of the Directorate's new state-of-the-art wet laboratories, and a three-story addition to Building 15 to hold office and support space for several Divisions. In November of 2022, the original 2020 Engineering Consolidation Study and Concept Design was updated to reflect design and construction impacts in the aftermath of the COVID-19 pandemic. Due to potential impacts to JSC historic assets, rising construction costs, labor shortages, and material delays, this alternative was no longer feasible.

JSC evaluated the short-term and long-term environmental impacts from the Proposed Action of the construction of the Phase 1A High Bay Machine Shop. This included evaluating the direct and indirect environmental impacts, identifying reasonably foreseeable impacts, and identifying mitigation measures as required to ensure compliance. The environmental impacts to the environment from the Proposed Action affect land use, soils, stormwater, air quality, regulated Greenhouse Gases (GHGs), noise and traffic, floodplains, industrial solid waste and hazardous materials, vegetation, terrestrial wildlife and migratory birds and cultural resources; however, these impacts are temporary and short-term, and some have been lessened using mitigation measures. Vegetation has a long-term adverse effect due to the removal of mature trees in the Proposed Action site area. A tree removal mitigation plan has been developed to lessen the impact to the environment. JSC would employ various Best Management Practices (BMPs) and other mitigation measures, along with appropriate monitoring activities, to reduce any impacts.

JSC will distribute the tiered EA and preliminary FONSI to stakeholders and the public. Comments on the suggested project actions will be accepted during a 30-day public review period.

The proposed project meets the National Historic Preservation Act definition of a federal undertaking. The proposed location is within JSC's designated Historic District. Upon review and consultation with the SHPO, JSC and the SHPO have determined that the construction of the Engineering Directorate

Consolidation Complex Phase 1A High Bay Machine Shop will not have an adverse effect on the JSC Historic District.

Based upon the information presented in the tiered EA, I have determined that the environmental impacts associated with the construction of the Proposed Action will not have a significant effect on the human environment presently, nor in the short-term, foreseeable future of JSC's operations and missions. Therefore, issuance of a FONSI is warranted, and preparation of an Environmental Impact Statement is not required.

To be signed once finalized. _____

Vanessa Wyche

Date

Director, Johnson Space Center

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List of Acronyms

Acronym	Full Term
BMP	Best Management Practice
CAA	Clean Air Act
CFR	Code of Federal Regulations
CGP	Construction General Permit
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EMO	Environmental Management Office
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ES	Structural Engineering Division
FEMA	Federal Emergency Management Agency
FFE	Finished Floor Elevation
FIRM	Flood Insurance Rate Maps
FONSI	Finding on No Significant Impact
GHGs	Greenhouse Gases
GSF	Gross Square Feet
HGB	Houston/Galveston/Brazoria
JE	JSC Environmental Management Office Designation
JSC	Lyndon B. Johnson Space Center in Houston, Texas
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-Sector General Permit
NAAQS	National Ambient Air Quality Standard
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NO _x	Nitric Oxide
NPDES	National Pollutant Discharge Elimination System

Acronym	Full Term
NPR	NASA Procedural Requirements
NSR	New Source Review
O ₃	Ozone
Pb	Lead
PBR	Permit By Rule
PEA	Programmatic Environmental Assessment
PM	Particulate Matter
PSD	Prevention of Significant Deterioration
SEC	Sediment and Erosion Control
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO ₂	Sulfur Dioxide
SPEA	Supplemental Programmatic Environmental Assessment
SWMP	Stormwater Management Plan
SWPPP	Storm Water Pollution Prevention Plan
TAC	Texas Administrative Code
TERM	Transportation Emission Reduction Measure
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TPY	Tons Per Year
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

E.1 Introduction

The JSC Master Plan proposed the consolidation of the Engineering Directorate's operations into a reduced footprint to improve mission efficiency, employee morale, and operational costs with a goal of optimizing its existing footprint by approximately 40%. An Engineering Directorate Consolidation Study and Concept Design, completed in 2020, extensively evaluated existing Engineering operations and facilities at the National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) Main Campus to develop a facility program and concept design, which consolidated all technical engineering capabilities into a unified core campus (excluding Energy Systems Test Area buildings). The study surveyed Buildings 7, 13, 15, 16, and 34 for renovation opportunities and assessed the area around Buildings 13 and 15 for the feasibility of building additions. JSC also strategically phased the divestment of multiple buildings to optimize ongoing facility maintenance and operations costs.

JSC has prepared a tiered Environmental Assessment (EA) to provide transparency, encourage widespread information dissemination, and assist in the decision-making process to begin construction of Phase 1A High Bay Machine Shop of the Engineering Directorate Consolidation Complex. JSC has prepared the EA per the National Environmental Policy Act of 1969 (NEPA), as amended; NASA's NEPA policy and procedures (14 Code of Federal Regulations [CFR] §1216); and NASA Procedural Requirements (NPR) 8580.1, Implementing NEPA and Executive Order 12114. The EA considers the environmental impacts of the Proposed Action and the No-Action Alternative.

A public notice will be published in local newspapers in potentially affected areas to allow the public to review and provide comments for 30 days. In addition, JSC will contact tribal nations, local, state, and federal agencies, and other interested parties either directly or through each state's respective NEPA clearinghouse, as required. JSC will address comments that are received in the final EA (see Appendix B). This EA includes for review a draft Finding of No Significant Impact (FONSI) for the proposed project.

E.2 Proposed Action

The Proposed Action is for the construction of Phase 1A of the Engineering Directorate Consolidation Complex, which includes the design of a new approximately 37,625 gross square foot (GSF) High Bay Machine Shop. The new facility consolidates all Structural Engineering Division (ES) machining capabilities into a single location, paving the way for divestment of Building 10 (which can occur after completion of Phases 1A and 1B). The new Machine Shop is proposed in a visually prominent location, between two large existing parking lots, close to the Center's main entry, and part of the JSC historic district.

E.2.1 Alternative Considered

The Alternative considered was to extend the existing Buildings 13 and 15 high bays, adding a three-story office and laboratory addition linking the two buildings and housing many of the Directorate's new state-of-the-art wet laboratories, and a three-story addition to Building 15 to

hold office and support space for several Divisions. In November of 2022, the original 2020 Engineering Consolidation Study and Concept Design was updated to reflect design and construction impacts in the aftermath of the COVID-19 pandemic. Due to potential impacts to JSC historic assets, rising construction costs, labor shortages, and material delays, this alternative was no longer feasible.

E.2.2 No-Action Alternative

Under the No-Action Alternative, JSC would not construct Phase 1A High Bay Machine Shop and would continue to operate and maintain the buildings and infrastructure currently in use at the property. The No Action Alternative would not improve the infrastructure deemed necessary to meet the current and future initiatives of NASA and JSC.

E.3 Summary of Environmental Impacts

JSC has evaluated the short-term and long-term environmental impacts from the Proposed Action of the construction of the Phase 1A High Bay Machine Shop. The environmental impacts from the Proposed Action affect land use, soils, stormwater, air quality, regulated Greenhouse Gases (GHGs), noise and traffic, floodplains, industrial solid waste and hazardous materials, vegetation, terrestrial wildlife and migratory birds, and cultural resources; however, these impacts are temporary and short-term, and some have been lessened using mitigation measures. The Proposed Action would have a long-term impact on vegetation due to the removal of mature trees in the proposed area. A tree removal mitigation plan has been developed to lessen the impact on environmental resources. JSC will employ various Best Management Practices (BMPs) and other mitigation measures, along with appropriate monitoring activities, to reduce the impacts. Upon review and consultation with the State Historic Preservation Office (SHPO), JSC and the SHPO have determined that the construction of the Phase 1A High Bay Machine Shop will not have an adverse effect on the JSC Historic District.

JSC will distribute the Draft tiered EA and preliminary FONSI to stakeholders and the public as outlined in the NEPA policy for federal facilities. Comments on the suggested project actions will be accepted during a 30-day public review period. JSC evaluated the direct and indirect environmental impacts, identified the reasonably foreseeable impacts, and will implement the mitigation measures as required from the proposed project to ensure compliance. JSC has determined that the environmental analysis within this tiered EA is sufficient and that there are no significant impacts associated with the Proposed Action that have not been mitigated to a less than significant level; therefore, an Environmental Impact Statement (EIS) is not required.

1.0 INTRODUCTION

The National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) has prepared a Tiered Environmental Assessment (EA) to provide transparency, encourage widespread information dissemination, and assist in the decision-making process to construct a new facility, Engineering Directorate Consolidation Complex Phase 1A High Bay Machine Shop. JSC has prepared the EA per the National Environmental Policy Act of 1969 (NEPA), as amended; NASA's NEPA policy and procedures (14 Code of Federal Regulations CFR §1216); and NASA Procedural Requirements (NPR) 8580.1, Implementing NEPA and Executive Order 12114. The EA considered the environmental impacts of the Proposed Action and the No-Action Alternative.

A public notice will be published within local newspapers in potentially affected areas to allow the public to review and provide comments for 30 days. In addition, JSC will contact tribal nations, local, state, and federal agencies, and other interested parties either directly or through each state's respective NEPA clearinghouse, as required. The comments received will be addressed in the final TEA (see Appendix B). The TEA includes a draft Finding of No Significant Impact (FONSI) for review for the proposed project.

1.1 Location Description

The JSC Main Campus is in the city of Houston, Harris County, Texas on 650 hectares (1,620 acres), approximately 40 kilometers (26 miles) southeast of downtown Houston and three kilometers (two miles) northeast of Webster. The area is geographically characterized by the bodies of water in and around it, including Clear Lake (to the east and southeast), Lake Mark Kramer (to the northeast), Clear Creek (to the south), and Galveston Bay (to the east). A mix of residential, commercial, and institutional land uses surround JSC Main Campus. To the north is the Armand Bayou Nature Center. The Proposed Action location for the Phase 1A High Bay Machine Shop is near the corner of Second Street and Avenue D on the JSC Main Campus.

1.2 Regulatory Background

JSC has prepared this tiered EA to identify and evaluate the environmental consequences of constructing the Phase 1A High Bay Machine Shop. JSC has prepared this EA per the requirements of the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [U.S.C.] §4321 et seq.), NASA's implementing regulations (14 CFR §1216), and NPR 8580.1, Implementing NEPA and Executive Order 12114. JSC is utilizing the NEPA administrative process to engage stakeholders and the public in this decision-making process. The regulations specify that NASA must complete the NEPA process prior to proceeding with a Proposed Action that has the potential to affect the environment. Under these regulations, NASA must use a systematic, interdisciplinary process that includes public involvement to evaluate the potential environmental impacts of its activities.

The EA is a concise public document that serves to provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a FONSI. An EA includes a brief discussion of the purpose and need for the Proposed Action, a range of reasonable alternatives to the Proposed Action, environmental impacts analysis of the Proposed Action and

its alternatives, and a listing of preparers. NASA must prepare an Environmental Impact Statement (EIS) when significant environmental impacts are anticipated and cannot otherwise be avoided.

A Programmatic EA (PEA) was completed as part of the 2016 JSC Master Plan process and a Supplemental Programmatic EA (SPEA) was completed in 2020 as part of the 2019 JSC Master Plan update process, which included the proposed action. A PEA is used to assess the impacts of broader agency actions, such as a rulemaking or establishing a policy, program, or plan, as well as when decisions are based on subsequent tiered-NEPA review. This EA for the proposed new High Bay Machine Shop tiers off the 2019 Master Plan SPEA. Updates were captured as part of the most recent review process for the JSC Environmental Resource Document, which is being converted to a web-based Environmental Resources Tool.

2.0 PURPOSE AND NEED

The JSC Master Plan addresses land use planning and facility modifications supporting JSC's missions. The overall goals of the Master Plan are to further human spaceflight by developing resilient buildings, reliable infrastructure, safe and secure access, and a livable campus. The Master Plan is needed to implement JSC's vision for a sustainable capability to develop, operate, and integrate human exploration activities involving commercial, academic, international, and U.S. Government partners. The Master Plan provides guidelines to support redevelopment of JSC's real property assets that incorporate JSC's guiding principles and development constraints and embrace the concepts associated with energy and water conservation, renewable energy, resilience, floodplain management, and protection of NASA's rich historical and cultural assets while ensuring the appropriate level of sensitivity for protection of human health and the environment.

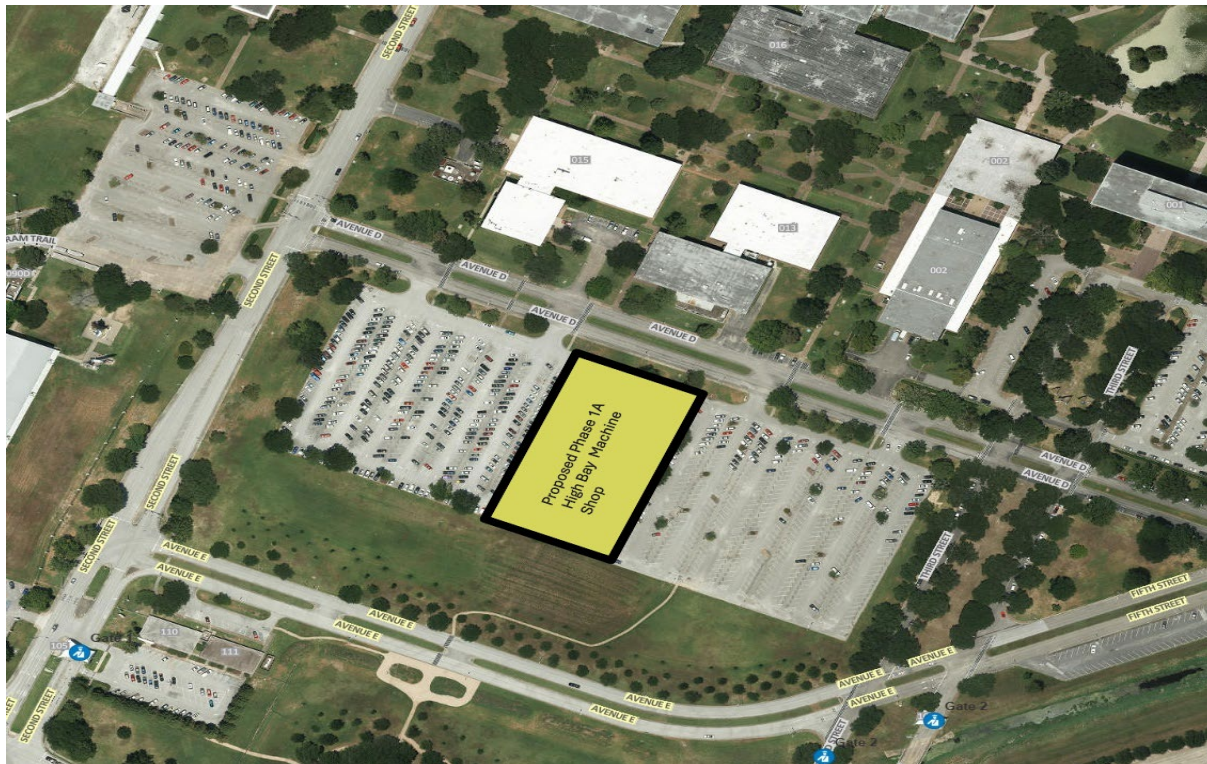
2.1 Proposed Action

The Proposed Action is for the construction of Phase 1A of a consolidated Engineering Complex, which includes the design of a new approximately 37,625 gross square foot (GSF) High Bay Machine Shop (Figure 1) and a service drive from Avenue D. Existing trees on the site will be removed and an underground fire water line will be relocated to accommodate the new construction. Both parking lots will remain; however, select portions will be restriped to accommodate service and emergency vehicle access and handicapped parking for the new facility. The new Machine Shop is proposed in a visually prominent location, between two large existing parking lots, close to the Center's main entry, and part of the JSC historic district. A rendering of the Proposed Action is shown below (Figure 3).

Hardscape features have been designed to connect Phase 1A to future buildings and to existing sidewalks and crosswalks that provide access to Building 13, Building 15, and the Engineering Quad. These sidewalks will also facilitate access from the existing parking lots on each side of the project site. Additional hardscape features are provided at building entrances to tie indoor and outdoor spaces together, and at the south end of the building to promote a more inviting outdoor environment with views of the Astronaut Memorial. Outdoor amenities are planned between the Machine Shop and future Fabrication Shop, and at the future Laboratory building. The new High Bay Machine Shop is oriented north-south to fit the selected site between the existing parking lots south of B13S. Benefits of this siting include:

- A. Simplified construction and reduced schedule and costs for Phase 1A through minimized impact to existing parking; and
- B. Direct access provided to the high bay from Avenue D.

Figure 1. Site Map of the Proposed Action



The Proposed Action is the first of five projects which will occur over the next 20-25 years and form a new Engineering Directorate Consolidation Complex in the area around Avenue D. These projects include:

- A. New Applied Spaceflight Fabrication Facility (ASFF) -Phase 1A
- B. Revitalization of Building 13S – Phase 1B
- C. New Project Integration High Bay – Phase 2A;
- D. New 3-story Laboratory/Office Building – Phase 2B; and
- E. Revitalization of Building 15 and Building 13N – Phase 2C

In addition, the Proposed Action will become the first building of a three-building, U-shaped complex (See Figure 2) which will provide a new service courtyard reflecting the arrangement of historic Buildings 13 and 15 directly across Avenue D (See Figure 1). The new High Bay Machine Shop would house the fabrication tools and equipment to shape and form components for assembly to support mission directives. The facility combines the equipment and functions housed in multiple buildings on campus, including Buildings 9 and 10, into a new, highly flexible, state-of-the-art facility. It is intended to share its site with the future Fabrication Building and future Laboratory/Office Building planned for Phase 2. This layout will create an interconnected process flow that starts with the machining of components in the Machine Shop, assembling these

components in the Fabrication Building, and analyzing data in the Laboratory Building. An exterior, covered storage yard on the northwest corner of the building and a utility transformer enclosure, which are both highly visible from Avenue D, will be screened as required by JSC Architectural Standards. This new complex of facilities efficiently and effectively consolidates functions that are currently scattered throughout the campus. This design provides for a working unit of combined synergies that will serve the Engineering Directorate for future mission directives (see Figure 2).

The complex site would offer the following advantages:

- A. Proximity to Building 13, Building 15, and the Engineering Quad;
- B. Access for service vehicles from Avenue D and potential for shared service access between new development and existing service area between Building 13 and Building 15;
- C. Access to existing utilities along Avenue D and in the utility tunnel between Building 13 and Building 15;
- D. Ease of land development and lack of current plans for other development;
- E. View from JSC main gate and opportunity to create a new “gateway” into JSC campus and the new EA complex; and
- F. Minimization of adverse effects to historic Building 13, Building 15, and Engineering Quad compared to sites A-D.

The new facility would consolidate all ES machining capabilities into a single location, paving the way for divestment of Building 10 (which can occur after completion of Phases 1A and 1B).

Figure 2. Site Plan for the Engineering Directorate Consolidation Complex



Figure 3. Rendering of Phase 1A High Bay Machine Shop



2.2 Alternative Considered

The alternative considered was to extend the existing Buildings 13 and 15 high bays, adding a three-story office and laboratory addition linking the two buildings and housing many of the Directorate's new state-of-the-art wet laboratories. A three-story addition to Building 15 was to hold office and support space for several Divisions (Figure 4). In November of 2022, the original 2020 Engineering Consolidation Study and Concept Design was updated to reflect design and construction impacts in the aftermath of the COVID-19 pandemic. Due to potential impacts to JSC historic assets, rising construction costs, labor shortages, and material delays, this alternative was no longer feasible.

Figure 4. Alternative Considered



2.3 No-Action Alternative

Under the No-Action Alternative, JSC would not construct the EA Consolidation Complex and would continue to operate and maintain the buildings and infrastructure currently in use at the property. The No-Action Alternative would not improve the infrastructure deemed necessary to meet the current and future initiatives of NASA and JSC.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The affected environment includes those environmental resources potentially impacted by the construction of the High Bay Machine Shop. For each environmental resource area, an impact assessment is provided for construction activities associated with the Proposed Action. Impacts are defined in general terms and are characterized as adverse or beneficial, and as short-term or long-term. For the purposes of this EA, beneficial impacts would improve resources and conditions. Adverse impacts could deplete or negatively alter environmental resources and conditions.

3.1 Resources Eliminated from Further Analysis

Resources determined unlikely to be impacted by the adoption of either the Proposed Action or the No-Action Alternative were not evaluated in this EA. These include:

- A. Topography;
- B. Wild and Scenic Rivers;
- C. Coastal Zone Management;
- D. Groundwater;
- E. Wetlands;
- F. Threatened and Endangered Species;
- G. Marine Mammals and Fish;
- H. Population; and
- I. Employment and Income.

Table 1 identifies resources that were evaluated and describes the rationale for elimination from further study in this EA.

Table 1. Resource Evaluation Summary			
Resources		Detailed Analysis Provided in this EA?	If Yes, EA Section If No, Rationale for Elimination
Physical Environment	Land Use	Yes	Section 3.2.1
	Geology, Soils, and Seismicity	Yes	Section 3.2.2
	Topography	No	No impact to topography.
	Wild and Scenic Rivers	No	No impact to Wild and Scenic Rivers.
	Coastal Zone Management	No	No impact to coastal resources.
	Air Quality	Yes	Section 3.2.3
	Greenhouse Gas	Yes	Section 3.2.3.5
	Stormwater	Yes	Section 3.2.4
	Groundwater	No	No impact to groundwater.
	Wetlands	No	No impact to wetlands.
	Floodplains	Yes	Section 3.2.5
	Noise and Traffic	Yes	Section 3.2.6
	Industrial Solid Waste	Yes	Section 3.2.7
	Hazardous Materials	Yes	Section 3.2.7.1
Biological Environment	Vegetation	Yes	Section 3.3.1
	Terrestrial Wildlife and Migratory Birds	Yes	Section 3.3.2
	Threatened and Endangered Species	No	No impact to threatened and endangered species. JSC has access to the IPaC (USFWS Information for Planning and Consultation) database and will review periodically for updates.
	Marine Mammals/Fish	No	No impact to Marine Mammals and Fish.
Socio-Economic Environment	Cultural Resources	Yes	Section 3.4
	Population	No	Temporary, minimal impact to population due to construction in the proposed area.
	Employment and Income	No	Minor, short-term beneficial impacts during construction are anticipated due to the creation of short-term jobs.

3.2 Physical Resources

3.2.1 Land Use

JSC Main Campus occupies approximately 656 hectares (1,620 acres). Some of the existing area for the proposed Engineering Consolidation Complex Phase 1A is covered by parking lots (Figure 1). The Phase 1A project includes the design of a new approximately 37,625 GSF High Bay Machine Shop in an undeveloped area that includes many mature trees. Most of the trees will be removed to accommodate the new location.

Environmental Impact of the Proposed Action

The proposed location coincides with the overall goals identified in the 2019 Master Plan, which include combining the Engineering Directorate's operations into a highly efficient, consolidated footprint to improve mission efficiency, employee morale, and operational costs. This is a beneficial impact. Additionally, most of the land for the Proposed Action has been previously disturbed.

3.2.2 Geology, Soils, and Seismicity

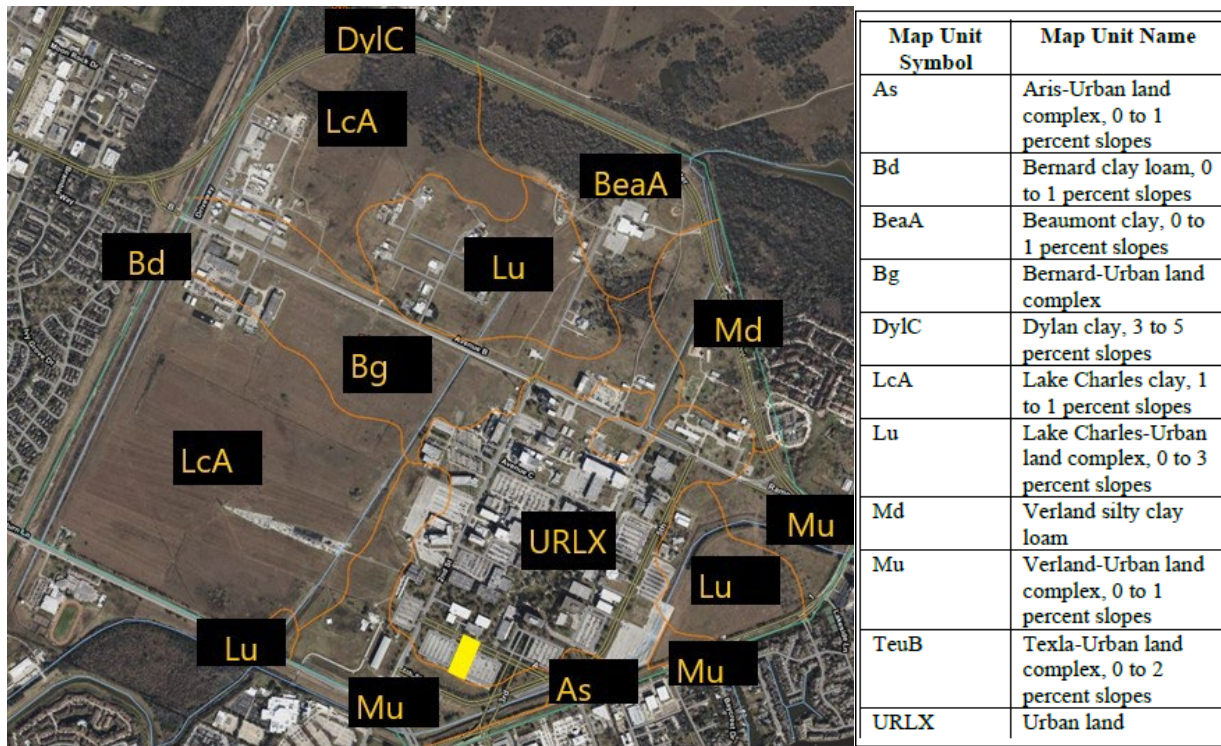
JSC is located on a nearly level plain of clayey and loamy prairie soils, classified as Lake Charles clay, Aris-Urban Land Complex, Bernard-Urban Land Complex, Verland silty clay loam, Verland-Urban Complex, Dylan clay, Beaumont clay, and Urban Land soils. The Proposed Action will primarily impact Urban Land soils (See Figure 5). The term Urban Land soil refers to soils in areas of high population density in the largely built environment. These soils can be composed of significantly changed human-transported materials, human altered materials, or minimally altered or intact "native" soils.

Approximately 38,000 square feet of soil will be disturbed during site leveling, grading, and construction of the Proposed Action (Phase 1A High Bay Machine Shop). The existing elevation of the site is approximately 15 feet (North American Vertical Datum of 1988 (NAVD 88)); therefore, where an eight-inch slab-on-grade occurs, the anticipated amount of fill required is five feet. Where the 30-inch thickened slab occurs, just over three feet of fill will be required.

Environmental Impact of the Proposed Action

Fill earth was added to the soil profile in various places after a significant amount of the Center was graded in 1961. The proposed action will use Best Management Practices (BMPs) to control and minimize soil impacts related to construction, such as erosion and compaction. The conditions outlined in the contract will identify the BMPs to prevent erosion. Figure 5 depicts soil types that have been identified on the JSC Main campus. Additional soil disturbance may occur during the subsequent phases of the construction of the EA Consolidation Complex, but the impact may be minimal due to pre-existing soil disturbance at the proposed future phases. Specific soil descriptions are available at: <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>.

Figure 5. JSC Soil Types and Boundaries with Proposed Location (in Yellow)



3.2.3 Air Quality

The Clean Air Act (CAA) was implemented to protect and enhance the quality of U.S. air resources to promote the public health and welfare and the country's productive capacity. Subsequently, the U.S. Environmental Protection Agency (EPA) established the National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment, referred to as criteria pollutants. Standards exist for carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O₃), particles smaller than 10 microns and 2.5 microns (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂), and lead (Pb). While not listed as a NAAQS pollutant, Volatile Organic Compounds (VOCs) contribute to ground-level O₃ generation when mixed with emissions of NO_x in the presence of sunlight.

To limit atmospheric concentration of criteria air pollutants, the EPA has established pollutant concentration standards monitored over specific timeframes. If the concentration of one or more criteria pollutants in a geographic area is found to violate the NAAQS, the area may be classified as a nonattainment area. Areas with concentrations of criteria pollutants below the levels established by the NAAQS are considered either attainment or unclassifiable areas. JSC and the associated Proposed Action is in Houston, Harris County, which is subject to NAAQS standard designations in the Houston-Galveston-Brazoria (HGB) designation area.

The HGB area is currently designated as severe nonattainment under the 2008 eight-hour ozone standard (0.075 parts per million (ppm)) and serious nonattainment under the 2015 eight-hour ozone standard (0.070 ppm) with attainment deadlines of July 20, 2027, and August 03, 2027, respectively. All other NAAQS applicable to HGB are classified as "Unclassifiable/Attainment."

JSC generates both VOC and NO_x, which may contribute to O₃. Table 2 provides the current NAAQS applicable to JSC by pollutant.

Table 2. Houston-Galveston-Brazoria Area Attainment Status by Pollutant ¹						
Pollutant	Primary NAAQS Standard	Averaging Period	Most Recent Classification Date:	Designation	Counties	Attainment Deadline
Ozone (O ₃)	0.070 ppm (2015 standard)	8-hour	July 22, 2024	Serious Nonattainment	Brazoria, Chambers, Fort Bend, Galveston, Harris, Montgomery	August 3, 2027
Ozone (O ₃)	0.075 ppm (2008 standard)	8-hour	November 7, 2022	Severe Nonattainment	Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller	July 20, 2027
Lead (Pb)	0.15 µg/m ³ (2008 standard)	Rolling 3-Month Average	December 31, 2011	Unclassifiable/Attainment	All HGB counties	Not Applicable
Carbon Monoxide (CO)	9 ppm (1971 standard)	8-hour	November 15, 1990	Unclassifiable/Attainment	All HGB counties	Not Applicable
Carbon Monoxide (CO)	35 ppm (1971 standard)	1-hour	November 15, 1990	Unclassifiable/Attainment	All HGB counties	Not Applicable
Nitrogen Dioxide (NO ₂)	0.053 ppm (1971 standard)	Annual	October 31, 2011	Unclassifiable/Attainment	All HGB counties	Not Applicable
Nitrogen Dioxide (NO ₂)	100 ppb (2010 standard)	1-hour	October 31, 2011	Unclassifiable/Attainment	All HGB counties	Not Applicable
Particulate Matter (PM ₁₀)	150 µg/m ³	24-hour	November 13, 2009	Unclassifiable/Attainment	All HGB counties	Not Applicable
Particulate Matter (PM _{2.5})	9.0 µg/m ³ (2024 standard)	Annual (Arithmetic Mean)	N/A	Official Designation in Process	All HGB counties	Not Applicable ¹

Table 2. Houston-Galveston-Brazoria Area Attainment Status by Pollutant ¹						
Pollutant	Primary NAAQS Standard	Averaging Period	Most Recent Classification Date:	Designation	Counties	Attainment Deadline
Particulate Matter (PM _{2.5})	12.0 µg/m ³ (2012 standard)	Annual (Arithmetic Mean)	April 15, 2015	Unclassifiable/ Attainment	All HGB counties	Not Applicable
Particulate Matter (PM _{2.5})	15.0 µg/m ³ (1997 standard)	Annual (Arithmetic Mean)	January 5, 2005	Unclassifiable/ Attainment	All HGB counties	Not Applicable
Particulate Matter (PM _{2.5})	35 µg/m ³ (2006 standard)	24-hour	November 13, 2009	Unclassifiable/ Attainment	All HGB counties	Not Applicable
Sulfur Dioxide (SO ₂)	0.03 ppm (1971 standard)	Annual (Arithmetic Mean)	November 15, 1990	Unclassifiable/ Attainment	All HGB counties	Not Applicable
Sulfur Dioxide (SO ₂)	0.14 ppm (1971 standard)	24-hour	November 15, 1990	Unclassifiable/ Attainment	All HGB counties	Not Applicable
Sulfur Dioxide (SO ₂)	75 ppb (2010 standard)	1-hour	August 23, 2010	Attainment/ Unclassifiable	All HGB counties	Not Applicable
¹ See 40 CFR Part 50 for codified NAAQS Standards. See 40 CFR §81.344 for codified designations of Texas counties.						

EPA's revision of the annual PM_{2.5} NAAQS to 9.0 µg/m³ went into effect on May 6, 2024. The EPA determined Harris County to be above the revised standard. The Texas Commission on Environmental Quality (TCEQ) proposed classification of Harris County as nonattainment. The 120-day letter is due to the governor of Texas in October 2025. The anticipated final designations are due by February 6, 2026. One or more counties of the HGB area may be designated as nonattainment for PM_{2.5} in the near future. Designation of Harris County as nonattainment for PM_{2.5} may result in applicable rule revisions or new rules in accordance with potential revision of the Texas State Implementation Plan (SIP), including Air Conformity thresholds discussed later in this section. Currently, Harris County is designated in attainment with the 2012 PM_{2.5} annual standard of 12.0 µg/m³, the 1997 PM_{2.5} annual standard of 15.0 µg/m³, and the 24-hour PM_{2.5} standard of 35 µg/m³.

3.2.3.1 Background on Stationary Sources at JSC

The State of Texas classified JSC as a Major Source of air pollutants under Title V of the 1990 Clean Air Act, due to JSC having the potential to emit 25 tons per year (TPY) or more of VOCs

or NO_x in a “severe” ozone nonattainment area, in accordance with Title 30 Texas Administrative Code (TAC) §122.10 (D). In accordance with the Texas Clean Air Act, Chapter 382 of the Texas Health and Safety Code, and 30 TAC §122, JSC operates under Title V Permit O1552, initially issued November 17, 2004, and last renewed on December 22, 2021. The construction and emissions of onsite stationary emission sources are authorized and limited under several New Source Review (NSR) Permits, Standard Permits, and Permit by Rule (PBR) authorizations. Stationary onsite emission sources include steam boilers; gas turbines; heating, ventilation, and air conditioning systems; generators; stand-by-pump engines; surface coating operations; fuel storage tanks; oil-water separators; solvent cleaning operations; cooling towers; loading operations; laboratory hood vents; test equipment; autoclaves; specialized research activity; and fugitive emission area sources. The Combined Heat and Power (CHP) plant in Building 24 and boilers, generators, and test equipment located Center-wide represent the largest actual emission sources at JSC. JSC also has condensers, chillers, and other units containing chlorofluorocarbon and hydrochlorofluorocarbon refrigerants. In 2024, stationary emission sources at JSC, including all fugitive emissions, emitted approximately 14.81 TPY of VOC, 4.57 TPY of CO, 2.89 TPY of NO_x, 0.03 TPY of SO₂, 33.99 TPY of PM₁₀, and 33.97 TPY of PM_{2.5}.

3.2.3.2 Background on Mobile Sources at JSC

Mobile emission sources at JSC include employee vehicles (commuters), government fleet vehicles, delivery trucks, construction equipment, and non-road engines. Thousands of vehicles may enter JSC each day, the vast majority of which are commuting workers. The designated Metropolitan Planning Organization (MPO) assesses emissions from mobile sources for the eight-county HGB Transportation Management Area. Federal Transportation Air Conformity assessments include JSC employees and commuters as part of the metropolitan area. The MPO implements various transportation emission reduction measures (TERMs). In addition, JSC conducts TERMS through programs, such as encouraging carpooling and utilizing low-emission vehicles.

JSC also maintains several registered fuel tanks for diesel fuel and gasoline for use in mobile equipment, such as government fleet vehicles, ground services equipment (i.e., lawn mowers), and as backup fuel for boilers and generators located in critical buildings. Fuel transfers from fuel transport vehicles occur intermittently. During high VOC fuel transfers, JSC uses vapor recovery units to capture VOC emissions. JSC monitors or estimates fuel tank throughputs and vapor losses and reports them within the annual air emissions inventory report for stationary emission sources.

3.2.3.3 Prevention of Significant Deterioration and Visibility Impairment

Prevention of Significant Deterioration (PSD) is a CAA permitting program for new major sources or major modifications of existing sources of air pollution that are in attainment areas for one or more pollutants. For stationary sources of significant emissions, the TCEQ may require additional analysis to ensure that the attainment status of the area is not impacted. This project does not propose installation of stationary sources above the PSD thresholds for significant emissions. In addition, under PSD regulations, the EPA classifies areas as either Class I, Class II, or Class III. A Class I area is a designation under the EPA’s Clean Air Act aimed at providing special protection to certain national parks, wilderness areas, and other natural areas. These areas receive the highest level of air quality protection to preserve their natural beauty, visibility, and ecological integrity.

No areas designated as Class I areas are present in the Project Area, and no visibility or ecological impairments are expected at any such areas due to the proposed project. The nearest Class I area is the Caney Creek Wilderness located approximately 400 miles to the north of the project location.

3.2.3.4 General Air Conformity

The TCEQ has adopted EPA's NAAQS as criteria pollutants for Texas in accordance with the Texas SIP. Areas that fail to meet federal standards for ambient air quality are classified as nonattainment areas. The project construction and operation will be within the main JSC Campus located in Harris County, Texas. Harris County is currently designated as nonattainment for O₃, with designations of Moderate Nonattainment for O₃ regarding the 2015 8-hour standard and Severe Nonattainment for Ozone regarding the 2008 8-hour standard. The remaining NAAQS pollutants are currently designated as Attainment within Harris County.

Title 40, Chapter I, Subchapter C, Part 93 (40 CFR §93), Determining Conformity of Federal Actions to State or Federal Implementation Plans, establishes rules for determining conformity of federal actions to state or federal implementation plans for air quality. Specifically, 40 CFR §93 Subpart A establishes air conformity rules for federal highway and Federal Transit Act funded projects, and 40 CFR §93 Subpart B establishes air conformity rules for all other federal projects, such as large-scale demolition, renovation, construction, and major changes in operations.

Construction activities may be divided into different construction phases, each with their own timing, duration, and type of air pollutants. The initial phase of site disturbance may include demolition and removal of debris and topsoil, site grading, and subsequent excavating and trenching in preparation for the construction phase. The building construction phase may utilize numerous pieces of construction equipment, such as cranes, forklifts, and loaders. Emissions from those activities are primarily vehicle exhaust, with more limited particulate emissions resulting from traffic on bare ground. The final phase includes building finishing and coating. Emissions could result from the application of surface coatings (e.g., primer, paint), off-gassing of asphalt, pavement markers, coatings, sealants, and other potential applied materials and waterproofing.

Motor vehicle emissions, including road and non-road vehicle emissions related to the construction phase of the Proposed Action, were determined in accordance with 40 CFR §93.159(b)(1). Specifically, emission factors derived from the latest version of the EPA Motor Vehicle Emission Simulator were utilized in conjunction with available planning assumptions. On-road vehicle planning assumptions include, but are not limited to, the following parameters: on-road vehicle type, fuel-type, total vehicle miles traveled, and corresponding pollutant-specific emission factors. Non-road vehicle planning assumptions include, but are not limited to, the following parameters: vehicle/equipment type, total hours of use for project, and corresponding pollutant-specific emission factors. Non-road vehicle planning assumptions also include equipment unable to move under their power, such as gensets and welding machines. In addition, particulate emissions from transport on paved and/or non-paved roads were assessed and calculated.

Area source emissions (40 CFR §93.159(b)(2)) from the site disturbance and preparation area associated with the Proposed Action were calculated utilizing EPA's method from AP-42 Chapter 32.2.3, Heavy Construction Operations. The acreage of site preparation and months of site

preparation per the Planning Assumptions were assessed to calculate resulting particulate (Total PM/PM₁₀/PM_{2.5}) emissions. Other non-particulate pollutants resulting from earth moving equipment were accounted for under the non-road vehicle planning assumptions and emission factors. Site disturbance may occur during several construction phases, including site grading, excavating, and trenching.

Other miscellaneous construction emission sources considered include paving materials, paints, thinners, solvents, and other materials. Emissions were calculated per EPA conformity guidance, utilizing coating surface area and average or worst-case VOC content of coatings and other materials. In addition, emissions were calculated from potential use of temporary portable fuel containers and trailers necessary to fuel onsite motorized equipment. Emissions from loading and unloading of fuel from portable containers were calculated utilizing AP-42 Loading Operations calculation methodology.

During and upon completion of construction, the Proposed Action itself is expected to be a negligible source of stationary source emissions under the CAA. However, one or more stationary emergency generators may be constructed adjacent to the building, and such generators will be authorized through TCEQ's NSR program. In addition, specialized laboratory equipment, such as orbital cutters, electric ovens (off-gassing of products), spray booths, and welding tables may require specific or general PBRs. In accordance with 40 CFR §93.153(d)(1), conformity determination is not required for sources that may require a permit under the NSR program, such as paint booths. Other stationary sources within the project include small natural gas fired water heaters for personal use, which may be authorized by PBRs and do not require registration or authorization. Water heaters are expected to contribute negligible emissions. Note that certain activities, such as the routine, recurring transportation of material and personnel, do not require conformity determination, in accordance with 40 CFR §93.153(c).

Table 3 below provides the results of the analysis for General Conformity Applicability. Thresholds for applicability are provided directly from 40 CFR §93.153(b)(1), in accordance with Harris County's nonattainment status for O₃. Additionally, the lowest thresholds for all other NAAQS pollutants were selected for comparative purposes and as an additional precaution. Mitigation efforts will be conducted during the construction phase and the emissions presented in Table 3 are reported with applicable control and efficiency factors, in accordance with applicable technical references. O₃ is characterized by the addition of NO_x and VOC in accordance with 40 CFR §93.153(b)(1). The Proposed Action has no expected lead (Pb) emissions.

Table 3. Air Quality Analysis for General Conformity Applicability, Harris County, with Mitigation Efforts								
Source of Emissions:	NO_x	VOC	O₃	CO	SO₂	PM₁₀	PM_{2.5}	Pb
Total Tons of Emissions from Site Disturbance/Preparation Fugitives:	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00
Total Tons of Emission from Material/Storage Piles Wind Erosion:	0.00	0.00	0.00	0.00	0.00	0.97	0.97	0.00

Table 3. Air Quality Analysis for General Conformity Applicability, Harris County, with Mitigation Efforts								
Source of Emissions:	NO_x	VOC	O₃	CO	SO₂	PM₁₀	PM_{2.5}	Pb
Total tons of Emissions from Material Handling (Onsite Haul; Off-Site Haul):	0.00	0.00	0.00	0.00	0.00	2.20	1.03	0.00
Total Tons of Emissions from Motorized Construction Equipment Operation:	1.58	0.63	2.20	1.70	0.00	0.07	0.06	0.00
Total Tons of Emissions from Worker Trips (Motor Vehicles, Heavy-Duty Vehicles):	0.56	0.19	0.75	2.70	0.00	0.01	0.01	0.00
Total Tons of Emissions Miscellaneous Fugitive Sources:	0.00	4.18	4.18	0.00	0.00	0.00	0.00	0.00
Sum of Total Emissions with Mitigation as Applicable:	2.14	5.00	7.13	4.40	0.00	4.25	3.07	0.00
Maximum Threshold (in Tons) for Conformity Determination (40 CFR 93.153) in Harris County:	25	25	25	100	100	70	70	25
Below Conformity Determination Threshold?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

3.2.3.5 Greenhouse Gases

The JSC Main Campus is subject to the Mandatory Reporting of Greenhouse Gases (GHGs) rule, 40 CFR §98, which requires annual reporting for installations that exceed 25,000 metric TPY of carbon dioxide equivalent (CO₂e) emissions. A Greenhouse Gas Monitoring Plan has been prepared and is maintained onsite in accordance with EPA GHG reporting requirements. Each year, JSC submits the previous year's GHG Emissions to the EPA as required and, for 2024, the JSC Main Campus reported a total of 59,988 metric tons of CO₂e.

Environmental Impacts of the Proposed Action

Based on the calculated total tons of potential direct and indirect emissions per 40 CFR §93.159(d) respective to each NAAQS criteria pollutant, the Proposed Action emissions are below the maximum thresholds established by 40 CFR §93.153(b)(1). Accordingly, further conformity analysis and determination is not required, and the project has been demonstrated to be a de

minimis source of emissions in the context of General Conformity rules within 40 CFR Part §93. Emissions were well below the respective emission thresholds that would constitute applicability for a conformity determination. Consequently, this action is not anticipated to contribute significantly to the adverse air quality issues in Harris County, Texas.

3.2.4 Stormwater

JSC is set in a landscape with many tidal streams and estuaries of Galveston Bay and is within the Clear Creek and Armand Bayou watersheds. Clear Lake is at the southeast corner, Lake Mark Kramer and Armand Bayou are northeast, Cow Bayou is southwest, and Horsepen Bayou is north of JSC. Galveston Bay is recognized by the EPA as an estuary of national significance and was included in the National Estuary Program in 1989.

The National Pollution Discharge Elimination System (NPDES) controls pollutant discharges to surface waters of the U.S. In Texas, the NPDES is administered by the Texas Pollutant Discharge Elimination System (TPDES). The State of Texas under the TPDES issued a site-specific Phase II Municipal Separate Storm Sewer System (MS4) permit (Permit Number TXR040214) to JSC that authorizes the discharge of stormwater to surface water in the state. JSC developed a Storm Water Management Plan (SWMP), to reduce adverse impacts to water quality and aquatic habitat by instituting controls on stormwater discharge as required by the MS4 permit. JSC's SWMP also includes an education program and identifies BMPs to prevent discharges to the storm water system (e.g., sedimentation and erosion control (SEC) during construction and maintenance activities).

For the discharge of stormwater associated with construction activities that disturb one or more acres of soil, JSC's construction contractor obtains authorization under the TPDES Construction General Permit (CGP). For all regulated construction activities, a Storm Water Pollution Prevention Plan (SWPPP) that addresses discharges authorized by the CGP is prepared. BMPs, water quality parameters, and monitoring requirements for these activities vary based upon the nature of the discharge.

The TPDES Multi-Sector General Permit (MSGP) authorizes stormwater discharges associated with industrial activities at JSC. Under this MSGP, JSC maintains coverage under a No Exposure Exclusion (Permit Number TXRNEAA42). Under the No Exposure Exclusion, JSC maintains many practices and measures to prevent pollutant discharges to the environment from materials and processes associated with its industrial activities, including a Spill Prevention, Control, and Countermeasures Plan and a Hazardous Waste Contingency Plan.

Environmental Impacts of the Proposed Action

The Proposed Action would disturb approximately 1.8 acres of Drainage Area 25, which discharges to Cow Bayou. TCEQ lists Cow Bayou as an impaired waterway. The building design accommodates stormwater drainage and runoff, including calculations that demonstrate no significant increases in surface flow.

The Proposed Action could cause short-term, adverse impacts to surface water due to the operation of heavy equipment and soil disturbance during construction and demolition activities although no construction is planned to take place in waterways.

There is a potential for construction activities associated with the Engineering Directorate Consolidation Complex to impact stormwater through a spill or release of a hazardous materials to the environment that could migrate to nearby ditches and subsequently offsite to navigable waters. JSC employs environmental mitigation measures, as necessary, to limit these impacts. Environmental mitigation measures include, but are not limited to, the following:

- A. Obtaining a JSC-specific dig permit;
- A. Developing an SEC Plan;
- B. Employing BMPs using silt fences, hay bales, and similar measures to prevent contaminated runoff from entering water bodies; and
- C. Revegetating disturbed soils to provide stability and runoff filtration after construction activities are complete.

The construction contractor will be required to develop a SWPPP as the proposed construction and associated staging and laydown yard will impact an area greater than one acre. A Notice of Intent to the State is only required if the impacted area, including the associated staging and laydown yard, equals or exceeds five acres. This project is not expected to exceed five acres. The SWPPP and associated SEC Plan would contain BMPs to minimize stormwater impacts from potential pollutants during construction. In addition, concrete washouts are required for concrete work during construction activities. Discharge of high pH concrete wash water or rinse water onto the ground or into any stormwater feature is prohibited; excess wet concrete not used would be managed in the washout.

The operational phase of the Proposed Action will consider the facility requirements, and the facility personnel will take actions to mitigate any surface and groundwater contamination, including, but not limited to:

- A. Covering scrap metal stored outside to comply with the JSC MSGP No Exposure Exclusion (which is the current requirement site-wide);
- B. Requiring oil filled equipment (e.g., transformers, generators) to be double walled and/or placed in a properly sized, covered secondary containment;
- C. Storing chemicals (not just oil) in Conex boxes, in properly sized containment areas (with adequate cover and protection from weather), or inside the building (preferred);
- D. Prohibiting open chemical storage on any gravel surface; and
- E. Prohibiting operations that may produce contaminants from fueling, welding, painting, etc. on gravel areas to ensure pollutants do not impact soil, surface water, or groundwater.

Any new systems or equipment that consume water and/or generate wastewater must be reviewed and approved through the completion of a JSC Form 1109, Sanitary Sewer Discharge Approval Request, prior to discharging any wastewater to sanitary sewer to ensure compliance with applicable regulations and permits. Any wastewater not approved for discharge will be collected and disposed of through the Industrial Solid Waste program.

3.2.5 Floodplains

Executive Order (EO) 11988 defines floodplains as "the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year." The flood level

that has a one percent chance of occurring each year is the base or 100-year flood, and the area inundated by a flood event is the base or 100-year floodplain.

Per EO 11988, all Federal actions must avoid modifying or developing floodplains if practical alternatives exist. Additionally, critical actions (defined as "any activity for which even a slight chance of flooding would be too great" by the Water Resources Council) must avoid modifying or developing the floodplain having a 0.2 percent chance of flooding each year (the 500-year floodplain). The EO does not prohibit actions or critical actions within a floodplain, but it requires consideration of alternatives before the action is taken.

The Federal Emergency Management Agency (FEMA) evaluate flood potential. According to the FEMA Flood Insurance Rate Maps (FIRMs), the majority of JSC lies outside the 100-year floodplain; however, the northeastern corner of JSC near the intersection of NASA Parkway and Space Center Boulevard and a section located along a tributary to Lake Mark Kramer in the northeastern portion of JSC lie within the 100-year floodplain. Extending further into the campus, a large portion of the northern, eastern, and southern portions of JSC are located within the 500-year floodplain. As shown in Figure 6, the Proposed Action is located within the 500-year floodplain.

For facilities constructed within the 500-year floodplain, the City of Houston requires all new structures to be at least 2 feet above the 500-year elevation per American Society of Civil Engineers 24-14 as outlined by FEMA Floodplain Management and Harris County Flood Control District. The 500-year floodplain elevation was interpolated at 16.7 feet, based on the 2022 USGS League City Quadrangle Map and the FIRM. Using the City of Houston's requirements, the proposed Finished Floor Elevation (FFE) was originally estimated at 18.7 feet. However, in coordination with JSC, these calculations were augmented to raise the finished floor to accommodate potential storm surges. The new FFE is 20.9 feet to meet this requirement.

The FFE is significantly higher than Avenue D and the existing parking lots, so the design has been adjusted to lessen the slopes on the west side of the new facility to accommodate ADA parking and access. On the East, North, and South sides, the slope will be graded away from the new facility. On the north side, the access drive includes a hinge point so that the slope is gradual near the facility, then becomes steeper as the access drive approaches Avenue D.

The Proposed Action will not cause long-term adverse impacts to floodplains. All applicable local, state, and federal regulations must be followed prior to conducting activities that could alter base elevations within the designated floodplain. JSC would ensure that the proposed construction complies with EO 11988 and 14 CFR §1216.2 (NASA regulations on Floodplain and Wetland Management).

Figure 6. FEMA Floodplain Maps for JSC



3.2.6 Noise and Traffic

Major noise sources at JSC include the CHP (Building 24N) with associated cooling tower, the Auxiliary Chiller Facility (Building 28) with associated cooling tower, the Emergency Power Building (Building 48), and the Propulsion Test Facility (Building 353). There are several sensitive receptors nearby, including the Childcare Facility (Building 211), the Gilruth Center (Building 207), Space Center Houston, and surrounding commercial and residential areas.

JSC has several entrance gates into the JSC Main Campus, but most vehicular traffic enters through Gate 1, which is the main gate and is closest to the Proposed Action site. All large construction vehicles will have to enter through Gate 4 for inspection.

Environmental Impacts of the Proposed Action

The Proposed Action will have temporary, short-term impacts on noise during construction activities, but it is not expected to add noise sources long-term because existing operations will be relocated to the Machine Shop. These existing noise sources typically do not exceed 65 A-weighted decibels at external receptors beyond property lines, and there are no records of noise complaints from offsite receptors regarding noise produced from these sources at JSC's Main Campus.

There will be a temporary, short-term increase in traffic for the Proposed Action due to construction activities. The existing Environmental Directorate personnel will be relocated to the new site after construction is complete, resulting in a minimal effect. The existing parking areas

will remain during construction of the Proposed Action. The long-term effects of the noise and traffic in the proposed area will be evaluated as the design of the remaining complex buildings are developed, but they are expected to be minimal.

3.2.7 Industrial Solid Waste

JSC is categorized as a Large Quantity Generator of hazardous waste. The Center also generates regulated nonhazardous waste that must meet applicable federal and state requirements for management, handling, transportation, and disposal.

The Hazardous Waste 90-day Accumulation Facility (Building 358) is the primary storage site for hazardous waste. Hazardous industrial solid wastes generated throughout JSC, including waste oil, antifreeze, polychlorinated biphenyl (PCB)-containing electrical equipment, empty containers, and laboratory chemicals that have exceeded their useful lives, are transferred to this facility to be prepared for transferal to disposal sites. Authorized transport vehicles take the wastes to federal/state and JSC approved/audited hazardous waste disposal operations.

Nonhazardous municipal-type, non-putrescible refuse is taken to roll-off containers at the Central Waste Collection Facility (Building 332) and shipped to a permitted landfill. Nonhazardous municipal-type solid waste, including construction and demolition debris (e.g., concrete, scrap metal), paper, cardboard, wood, and plastic refuse, is picked up by a commercial transporter and transported for recycling or disposal as appropriate. Since 2007, JSC consistently diverts well over 50% of all nonhazardous construction and demolition wastes generated at JSC from disposal in landfills.

JSC restricts the use of certain chemicals onsite to minimize hazardous situations. Waiving this restriction requires an Environmental and Occupational Health review of the circumstances surrounding the request and an evaluation of any necessary mitigation measures or constraints to allow the chemical to be brought onsite.

Environmental Impacts of the Proposed Action

The Proposed Action would result in an increase in the waste generated at this location in the short-term during construction activities. Potential long-term impacts relating to waste generation by the Engineering Directorate are considered minor, and the Proposed Action does not anticipate any additional waste generation since most of the anticipated operations would be very similar to existing operations.

3.2.7.1 Hazardous Materials

NASA requires all personnel to account for all hazardous and toxic materials used and stored at JSC annually. The JSC Environmental Management Office (EMO) compiles the information to determine whether formal reporting is necessary. NASA activities at JSC use large quantities of regulated hazardous substances. The JSC EMO maintains Emergency Planning and Community Right-to-Know Act (EPCRA) related documentation to substantiate compliance with EPCRA reporting requirements. JSC's Space and Occupational Medicine Branch maintains an annual inventory by location of toxic substances and hazardous materials and keeps a searchable database that is available for review upon request.

Environmental Impacts of the Proposed Action

The Proposed Action will result in a temporary, short-term increase in hazardous materials storage for the construction of the facility, including paints, solvent, adhesives, degreasers, caulking, and others. Materials that have a safety datasheet (SDS) must be submitted to the Occupational Health and Medicine Branch for restricted and prohibited chemical review and included in the JSC Hazardous Material Inventory. The materials are assigned unique SDS identifier numbers for JSC, and usage is tracked by location and/or project. Some materials may require disposal after construction is completed; the onsite environmental services contractor will manage this. JSC anticipates that hazardous material usage will return to previous quantities once construction has been completed and normal operations have resumed.

3.3 Biological Resources

3.3.1 Vegetation

The Proposed Action site was previously developed, and vegetation consists of primarily non-native species. The area is covered with grass and trees and the Proposed Action will require significant tree removal. To the greatest extent possible, the design and subsequent construction activities will protect existing trees as integral elements of the campus, ensuring protection where feasible. A tree mitigation table and other tree protection details can be found in Appendix A (LD 70-1, page 29) that identifies the number of trees to be removed and plant species to be replanted. Figure 7 depicts the plant communities in and around the Proposed Action site.

Environmental Impacts of the Proposed Action

Tree removal will be mitigated with the development of a tree mitigation plan. The design team will coordinate with the JSC Wildlife Biologist, Natural Resource Manager, and other stakeholders to identify suitable areas for tree planting, which would be dependent on mission needs at the time of building completion; however, the JSC Main Campus near the 200-area jogging trail in the northeastern quadrant of the site is a current candidate for tree replanting given current land use, water availability, and floodplain boundaries. Tree mitigation may also be needed for the future phases of the Engineering Directorate Consolidation Complex and will be evaluated once the designs are developed.

Figure 7. Plant Communities at JSC



3.3.2 Terrestrial Wildlife and Migratory Birds

There are many wildlife species at JSC, including approximately 150-300 white-tailed deer (*Odocoileus virginianus*), as well as raccoon (*Procyon lotor*), eastern cottontail (*Sylvilagus floridanus*), migratory and non-migratory birds, and about 30 species of native reptiles and amphibians that utilize both developed and undeveloped areas. Given the location of JSC within the Gulf Prairies and Marshes ecoregion of southeast Texas and the abundance of natural areas onsite, wildlife encounters will be likely during the construction of the Proposed Action.

There is an active heronry in the Houston Lighting and Power cooling water canal near the Pecan Grove on the south side of JSC (0.77 miles from project site), which provides nesting areas for several different species of herons, egrets, and other similar species of birds. Several species utilize the heronry during nesting season, including native little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), and tricolored heron (*Egretta tricolor*), as well as non-native cattle egret (*Bubulcus ibis*). Nesting typically starts the last week of March and continues into July.

Environmental Impacts of the Proposed Action

Construction activities and equipment may have a temporary adverse impact on wildlife, such as deer, birds, small mammals, and aquatic species present at or near the Proposed Action site. The project would utilize BMPs, such as silt fences, to reduce wildlife migration into and around the project area. The silt fences would remain in place until project completion. If construction or tree removal activities begin during nesting season, the resident Wildlife Biologist will conduct

nest surveys and wildlife inspections no more than a week prior to the Proposed Action's construction and related tree removal. Any tree removal activities will be performed prior to March 15 or after September 15, when feasible.

To minimize impacts on wildlife, employers are responsible for identifying potential hazards to their employees and conducting training on wildlife encounter preparation and general safety. Site disturbance may include site grading, excavating, and trenching. These activities may cause personnel to encounter wildlife. Any open trenches and excavation areas would be covered while not in use and checked for wildlife prior to the start of daily activities. Other mitigation measures, such as securing waste in sealed containers, can help reduce the likelihood of potentially dangerous wildlife encounters.

The Proposed Action design integrates features, such as window coverings or fritted glass, to make highly reflective windows more visible to birds to avoid bird-window collisions. This will reduce impacts to birds traveling to and from Central and South America during biennial migration.

The resident Wildlife Biologist provides monthly training and awareness outreach on flora and fauna found at JSC. JSC personnel are on-call to respond to any wildlife conflicts or assist injured wildlife. Per federal and state regulations, any injured animals are sent to permitted Wildlife Rehabilitators. For any other wildlife concerns, JSC would contact the local Texas Parks and Wildlife and/or the USFWS for guidance.

3.4 Cultural Resources

The entire JSC Main Campus lies within a National Register of Historic Places (NRHP)-eligible Historic District, with many buildings that are individually eligible for listing on the NRHP for their significant contributions to spaceflight programs. The NRHP-listed Armand Bayou Archaeological District also overlaps the northernmost part of JSC (near Building 207). The Proposed Action and site alternative are not located near the Archaeological District, so impacts to archaeological resources are not anticipated. Consultation with the Texas State Historic Preservation Office (SHPO) is required for all federal actions or undertakings that could impact listed or eligible historic assets, including new construction, renovations of existing facilities, and demolition of existing structures. The JSC Historic Preservation Officer evaluates proposed designs for impacts to historic resources, coordinates with project design teams to reduce impacts to those resources, and coordinates with SHPO to determine any required actions to mitigate adverse effects to historic assets. NRHP-eligible Buildings 2S, 13, 14, 15, and 90 are within the visual area of potential effects.

Environmental Impacts of the Proposed Action

JSC submitted the project for review in accordance with Section 106 of the National Historic Preservation Act (NHPA), 36 CFR §800: Protection of Historic Properties. Based on the proposed building design, SHPO determined that the Proposed Action for the construction of the Phase 1A High Bay Machine Shop will have no adverse effect on historic properties or the JSC Historic District. The future buildings for the Engineering Directorate Consolidation Complex will be consulted separately during the respective design phases.

4.0 REASONABLY FORESEEABLE IMPACTS

4.1 Future Impacts

The 2019 revised Master Plan Supplemental Programmatic EA includes the construction of the Engineering Directorate Consolidation Complex in addition to an overall reduced footprint for JSC infrastructure. It includes the removal of buildings from floodplains, the continuation of construction and renovation to achieve Leadership in Energy and Environmental Design certification, and the integration of architectural controls to ensure new structures are less impacted by extreme weather events. These actions should limit and further reduce direct impacts on the environment.

The Engineering Directorate Consolidation Complex's design has been modified due to rising costs and potential impacts to the JSC Historic District. The complex will be constructed in phases beginning with the Proposed Action. JSC has concluded that no significant foreseeable effects will occur associated with the construction of the Proposed Action based on the current design documents. The timing and the design of the futures phases has not been determined at this time.

4.2 Mitigation Measures

JSC is committed to conforming to all applicable federal and state regulations, EOs, and management policies and directives. This commitment includes complying with regulatory agency permits and associated permit conditions, such as implementing applicable BMPs to prevent pollution and incorporating environmental requirements into all construction specifications. Construction contractors for this project are required to comply with permit conditions and JSC contractual requirements, including BMPs that are required during construction activities to mitigate and reduce impacts. The contractor would be responsible for acquiring any necessary permits prior to commencing construction at the proposed project site.

JSC will commit an appropriate level of resources to perform monitoring and inspections to ensure conformity and will undertake corrective and preventive actions should any non-conformity issues arise. Adjustments to any mitigation measures due to site-specific conditions may be necessary and would be decided on a case-by-case basis by JSC, construction contractors, and applicable agencies. Table 4 provides a summary of impacts and mitigation measures for this project.

Table 4. Summary of Impacts		
Affected Environment	Impacts	Mitigation
Land Use	Construction of the new facility will impact approximately 38,000 GSF of land.	Most of the land for the Proposed Action has been previously disturbed; therefore, no mitigation is required.

**Table 4.
Summary of Impacts**

Affected Environment	Impacts	Mitigation
Geology, Soils, and Seismicity	Construction activities would disturb approximately 38,000 square feet of soil, not including parking lots, and tie-ins to sanitary sewer, fire water, and storm drains where required. The proposed new Engineering Directorate Consolidation Complex and Phase 1A High Bay Machine Shop will primarily impact Urban land complex soils.	Construction activities are not expected to affect underlying geologic resources or seismicity. Urban soil can be human-transported or human-altered materials or minimally altered or intact "native" soils. No mitigation is required for the short-term impact on potential native soils. Excavated soils and waste materials would be managed and disposed in accordance with applicable local, state, and federal regulations.
Air Quality	Construction activities, equipment, and fugitive dust have the potential to cause short-term impacts to criteria pollutant emissions.	The construction of the Engineering Directorate Consolidation Complex would not exceed any permit emission limits, and no mitigation is required. However, JSC will require the contractor to use dust control measures and properly certified and maintained construction equipment to reduce emissions from construction activities.
Regulated Greenhouse Gas	Construction equipment and operational emissions will have minimal short-term impact to GHGs.	No mitigation is required as impacts will be minimal. Increasing the use of renewable energy and low-GHG-emitting construction equipment may minimize emissions.
Stormwater	There is a potential for construction activities associated with the Engineering Directorate Consolidation Complex to impact stormwater during construction or through a spill or release of a hazardous materials to the environment that could migrate to nearby ditches and subsequently offsite to navigable waters.	The applicant would be required to prepare a SWPPP prior to construction. Implementation of appropriate BMPs, as described in the SWPPP and compliance with the TPDES Texas Construction General Permit, would help minimize site runoff. BMPs would include the installation of silt fences, hay bales, and revegetation of disturbed soils to minimize erosion.

Table 4. Summary of Impacts		
Affected Environment	Impacts	Mitigation
Floodplains	The proposed location of the new Engineering Directorate Consolidation Complex and the Phase 1A High Bay Machine Shop is within the 500-yr floodplain, which increases the risk of flooding.	The FFE of the Phase 1A High Bay Machine Shop is set at an elevation of 20.9 ft to provide protection from a Category 3 hurricane storm surge and to elevate the building above the 500-year floodplain elevation.
Noise and Traffic	Construction activities may increase noise and traffic near the intersection of 2nd Street and Avenue D.	The increased noise and traffic will be temporary during construction and will return to near current conditions in the Engineering Quad Area, as operations will be relocated to the new facility.
Industrial Solid Waste and Hazardous Materials	Construction may cause a minimal short-term impact to hazardous waste generation and hazardous materials.	No mitigation is required as JSC would dispose of any generated waste according to local and state regulations. Most excess materials used in the construction process will be removed by the contractor at the completion of the project.
Vegetation	Tree removal for the Proposed Action will result in a minor, long-term effect.	JSC will implement a tree mitigation plan to replant trees near the 200-area jogging trail or other appropriate area. Some trees in the Proposed Action area will remain.
Terrestrial Wildlife and Migratory Birds	Construction activities have the potential to impact wildlife (deer, turtles, birds, snakes, frogs, coyotes, bobcats, etc.) due to displacement. The new facility has the potential to impact migratory birds due to window collisions.	Wildlife displacement will be temporary. JSC Architectural Standards specify clear glass with ceramic frit or film to reduce bird-window collisions. The design will specify larger glazed openings to mitigate the risk of bird strikes by reducing glare from the south and west exposures. Tree removal activities will be performed before March 15 or after September 15, when feasible, or nest surveys will occur no more than a week prior to any disturbance activities.

Table 4. Summary of Impacts		
Affected Environment	Impacts	Mitigation
Cultural Resources	JSC lies within an NRHP-eligible Historic District. JSC must consult with the Texas SHPO on actions or undertakings within the District that may impact historic resources, including new construction, renovations of existing facilities, and demolition of existing structures.	JSC and the Texas SHPO have determined the Proposed Action for Phase 1A High Bay Machine Shop will not have any adverse effects to the Historic District.

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APPENDIX A

SITE PLANS

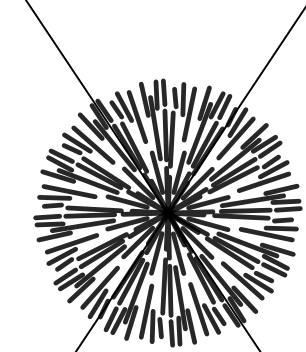
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MATCHLINE - SEE SHEET LD-70-3

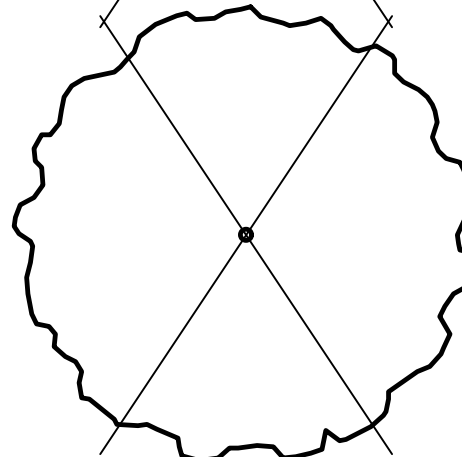
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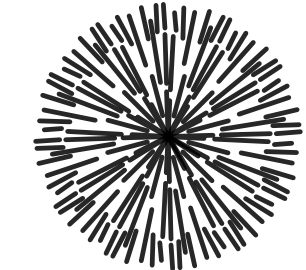
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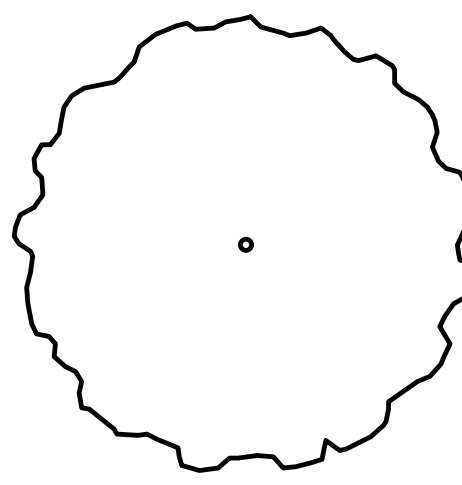
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EXISTING TREE TO BE REMOVED



EXISTING PINE TO REMAIN



EXISTING TREE TO REMAIN

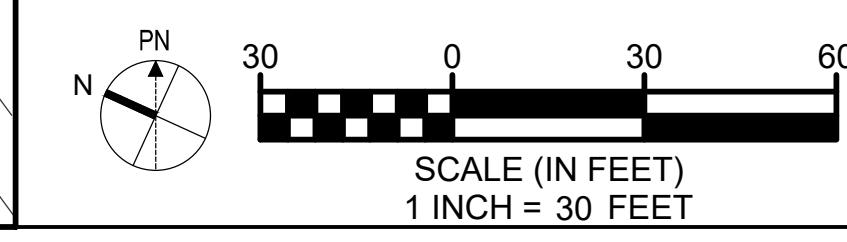
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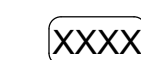
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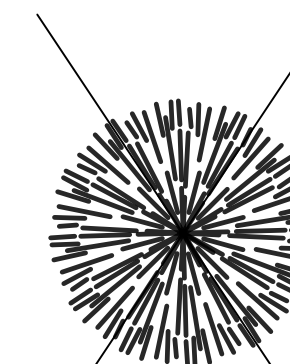
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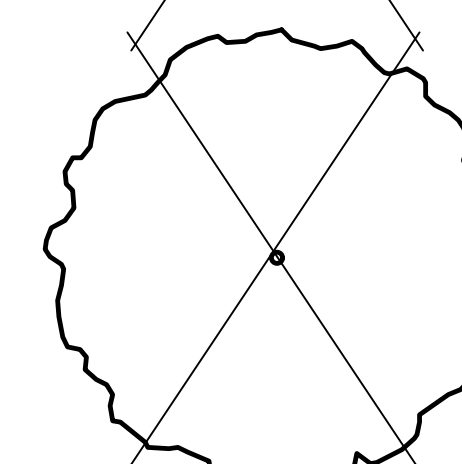
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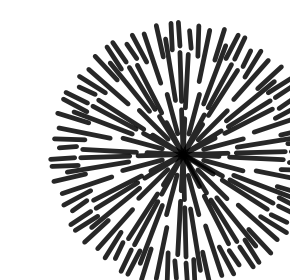
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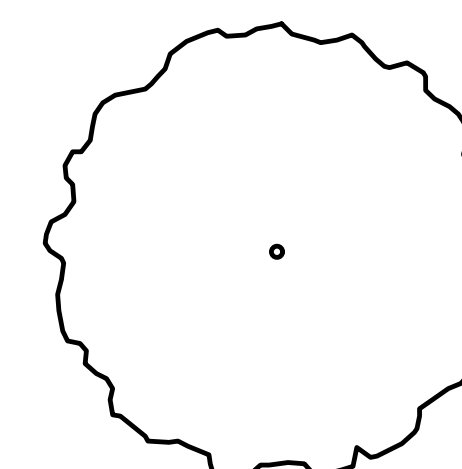
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EXISTING TREE TO BE REMOVED



EXISTING PINE TO REMAIN



EXISTING TREE TO REMAIN

MATCHLINE - SEE SHEET LD-70-2

RS&H
TX. CERT. NO. F-3401

90% NOT FOR CONSTRUCTION

REVISION				DATE				DESCRIPTION			
SIGNATURES				DATE				NATIONAL AERONAUTICS & SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS BUILDING 70 - ASSFF TREE MITIGATION PLAN			
DR.	MRC	ENG	DMB	06-10-2025							
CH	RS	APPR	DMB								
REV				PROJECT NO.				SHEET NO.			
DISC				2023-0123-006							
PE				PROJECT NO.		WIR		DWG NO.			
APPR				COORDINATE NO.		SHEET		LD-70-3			

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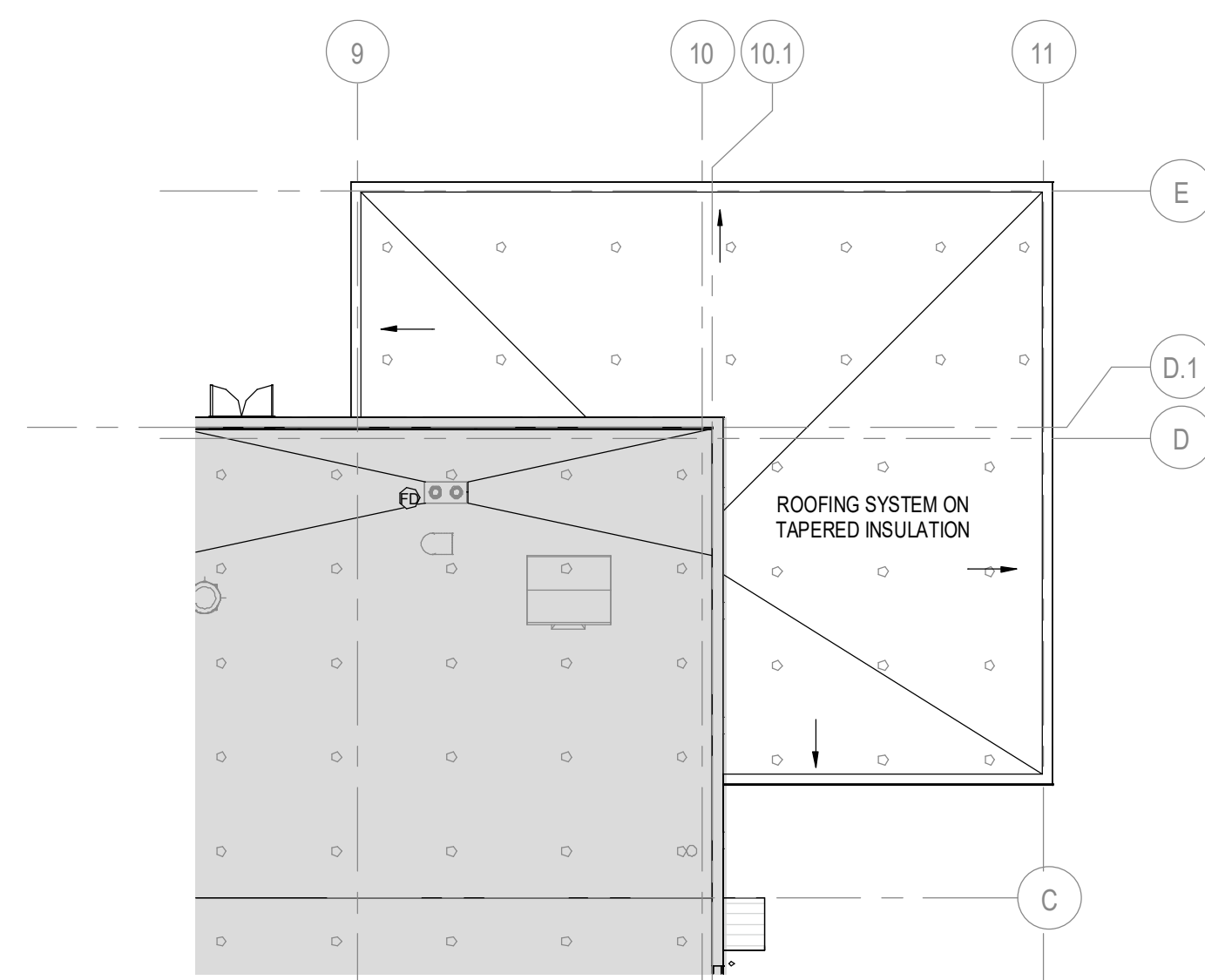
SITE PLAN KEYNOTES

- | | | | |
|---|----------------------------------|----|---|
| 1 | PRIMARY ENTRANCE | 11 | 1:20 SLOPED CONCRETE SIDEWALK; SEE CIVIL |
| 2 | SECONDARY ENTRANCE | 12 | 10x10" SECONDARY CONTAINMENT CURB AND SUMPS |
| 3 | SCREENED ELECTRICAL YARD | 13 | 10x10" HAZARDOUS STORAGE UNIT, GFGI |
| 4 | PAVED SERVICE ACCESS, SEE CIVIL | 14 | EXTERIOR STAIRS, SEE CIVIL |
| 5 | CONCRETE SIDEWALK, SEE CIVIL | 15 | 1HR FIRE RATED EXT. WALL EXT. LOUVERS TO BE FIRE RATED W/ ACCEPTANCE OF ALT. 1. |
| 6 | GAS CYLINDER STORAGE | 16 | EXISTING UTILITY TRENCH; SEE CIVIL |
| 7 | DRUM STORAGE | 17 | NEW 10'-0" WIDE UNDERGROUND UTILITY CONNECTION, SEE CIVIL |
| 8 | RETAINING WALL, SEE CIVIL | | |
| 9 | DUST COLLECTION SYSTEM, SEE MECH | | |
| 9 | CONDENSER UNIT, SEE MECH | | |

SITE SHEET NOTES

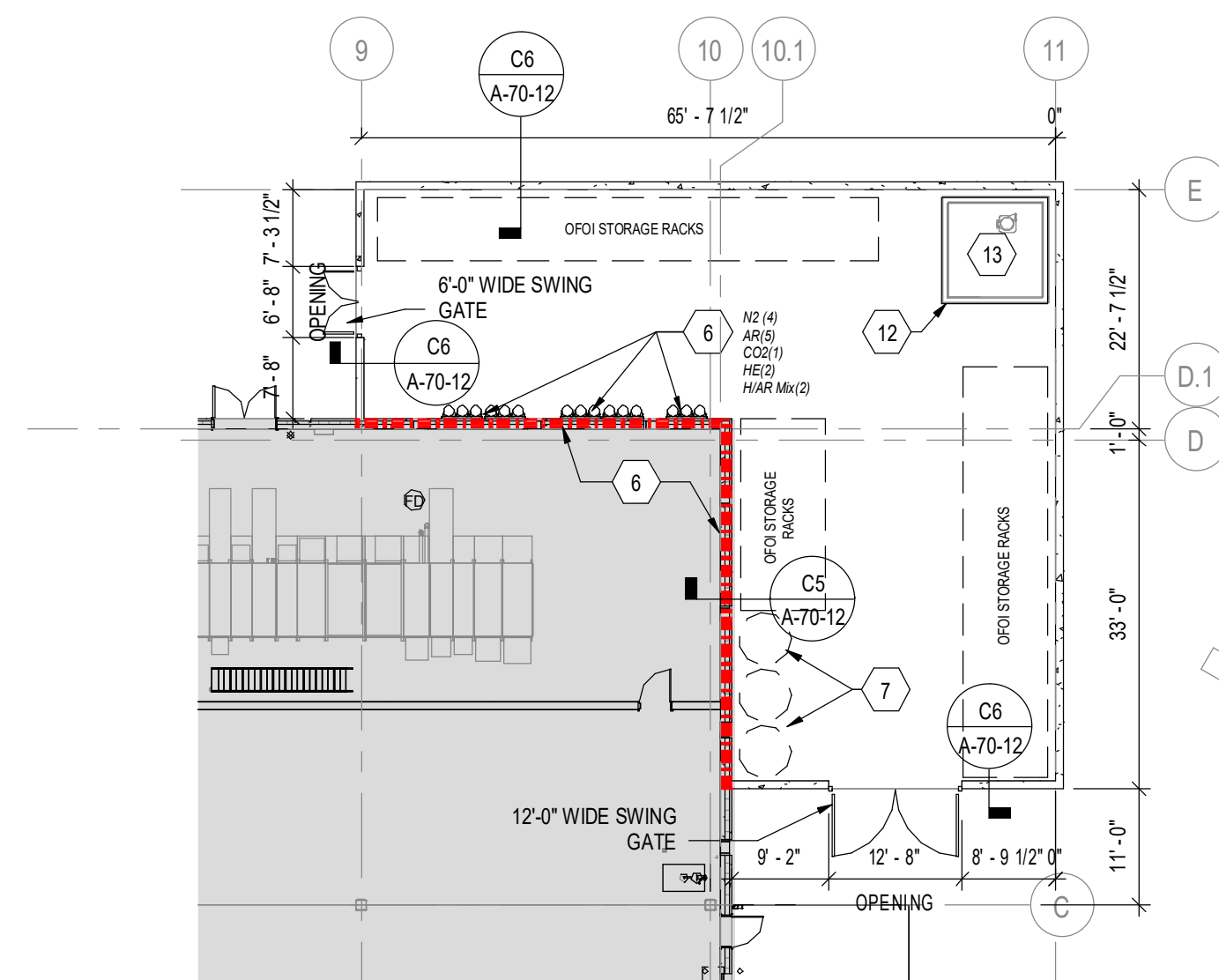
GENERAL SHEET NOTE

1. REFER TO CIVIL, MECHANICAL, AND ELECTRICAL SITE PLAN FOR ADDITIONAL INFORMATION.
2. REFER TO SPECIFICATIONS SECTION 01 23 00 ALTERNATES FOR BASE BID AND ALTERNATE DESCRIPTIONS.



65 ALTERNATE 1 - PARTIAL ROOF PLAN COVERED STORAGE

SCALE: 1/16" = 1'-0"



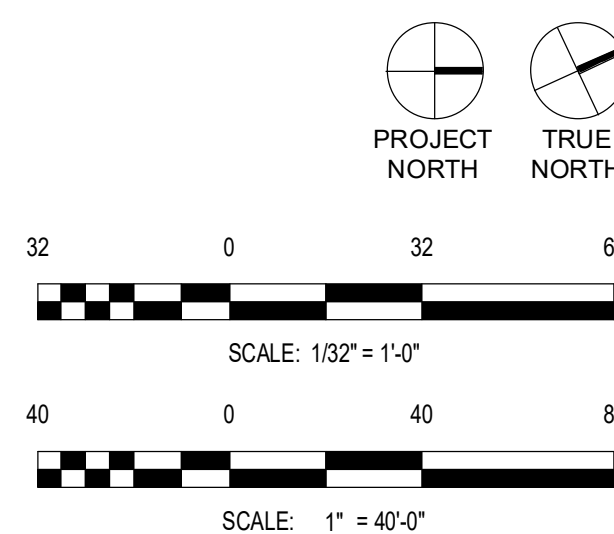
NOTE: REFER TO CIVIL, LANDSCAPE, STRUCTURAL, FP, AND ELEC DRAWINGS FOR OTHER WORK ASSOCIATED WITH ALTERNATE NO. 1.

ALTERNATE 1 - PARTIAL PLAN COVERED STORAGE

SCALE: 1/16" = 1'-0"



90% NOT FOR CONSTRUCTION



ARCHITECTURAL SITE PLAN

SCALE: 1" = 40'-0"

REVISION		DATE		DESCRIPTION			
SIGNATURES				NATIONAL AERONAUTICS & SPACE ADMINISTRATION LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS BUILDING 70 - ASFF ENGINEERING CONSOLIDATION PHASE 1A ARCHITECTURAL SITE PLAN			
DR. JL		ENG. MK				DATE	
CH. BP		APPR. SC				06/10/2025	
REV				PROJECT NO.			
DISCP				2023-0123-006			
PE				SHEET NO.			
APPR				DWG NO. A-70-2			
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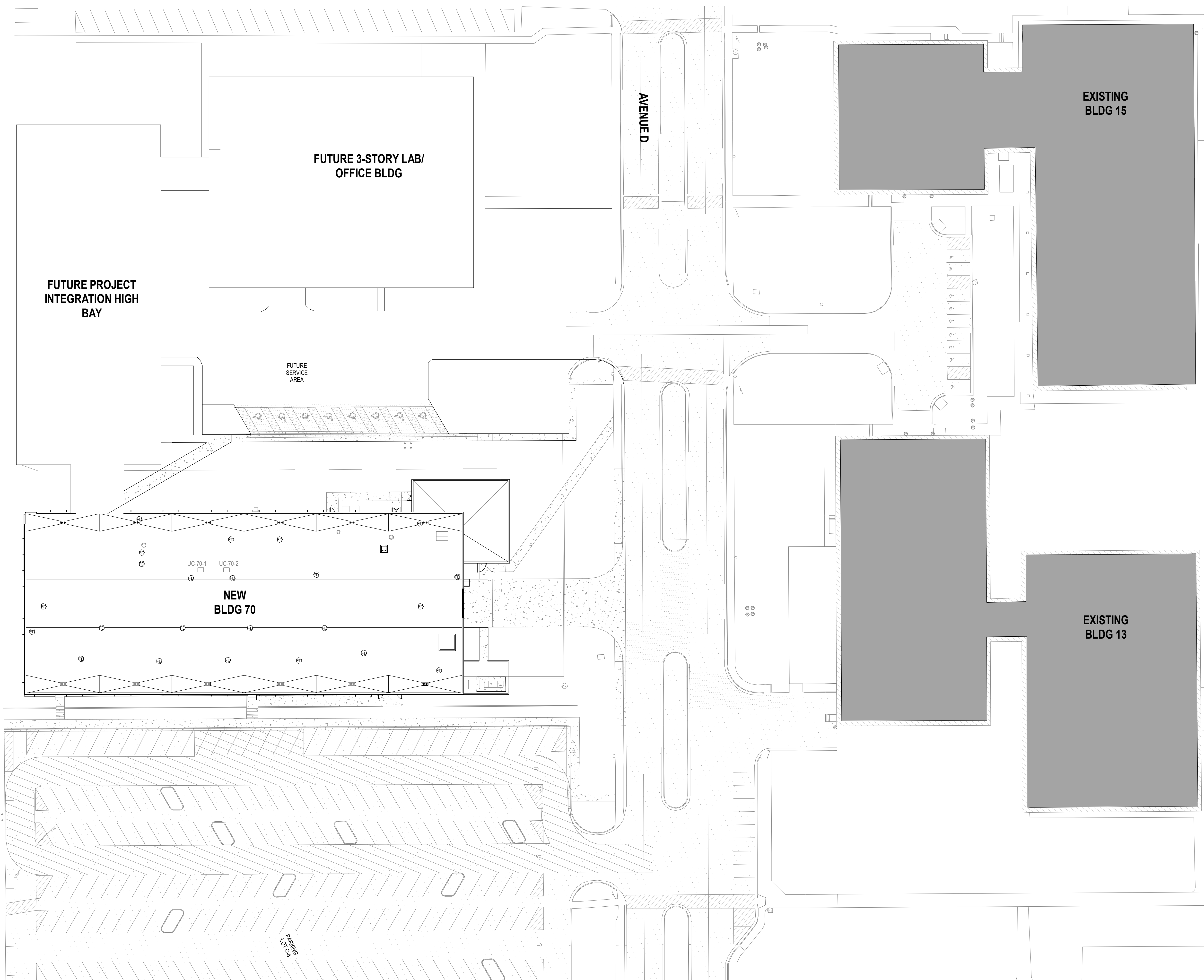
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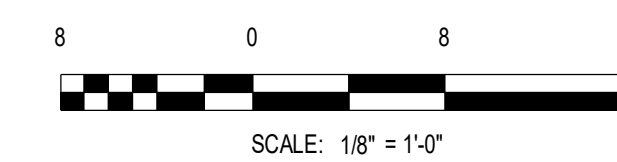
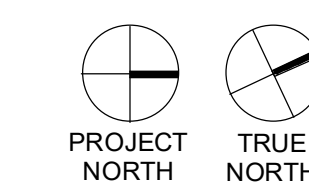
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A1 FUTURE BUILDOUT SITE PLAN
SCALE: 1/32" = 1'-0"



90% NOT FOR CONSTRUCTION										TX. CERT. NO. F-3401	

APPENDIX B

PUBLIC NOTICE COMMENTS AND RESPONSES

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This section will be populated after the public comment period.