BUREAU OF RECLAMATION

Administration Building and Training Center Xeriscape Project

Final Draft Environmental Assessment and Finding of No Significant Impact LC-23-08
Interior Region 8: Lower Colorado Basin, Boulder City Nevada

U.S. Department of the Interior

February 2023

Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Administration Building and Training Center Xeriscape Project

Final Draft Environmental Assessment and Finding of No Significant Impact LC-23-08
Lower Colorado Basin

prepared by

United States Department of the Interior
Bureau of Reclamation
Lower Colorado Basin Region
Boulder City, Nevada

Cover Photo: The Bureau of Reclamation's Administrative Building (bottom right) and Conference and Training Center (top left) is located in Boulder City, Nevada. (Reclamation/Justin DeMaio)

Contents

List of Figures

List of Tables

Appendices

List of Acronyms and Abbreviations

Acronym / Abbreviation	Term
AB356	Nevada Legislature Assembly Bill No. 356
Admin Building	Administrative Building
APE	Area of Potential Effect
BCHPC	Boulder City Historic Preservation Commission
DSC	Date Street Campus
EA	Environmental Assessment
EPA	Environmental Protection Agency
FONSI	Finding of No Significant Impact
gal/year	Gallons per year
ITA	Indian Trust Assets
LEED	Leadership in Energy and Environmental Design
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NV SHPO	Nevada State Historic Preservation Office
Regional Plant List	Southern Nevada Water Authority and Southern Nevada Regional Planning Coalition Regional Plant List
Rehabilitation Project	2013 Date Street 100 and 200 Building Rehabilitation Project
SNWA	Southern Nevada Water Authority
Training Center	Conference and Training Center

Finding of No Significant Impact

(FONSI)

LC-23-08

for

Final Environmental Assessment (EA) for the Administration Building and Training Center Xeriscape Project

Boulder City, Nevada

Based on a thorough of the analysis of the potential environmental impacts presented in the EA, the Bureau of Reclamation (Reclamation) finds that implementation of the Proposed Action will not significantly affect the quality of the human environment within or adjacent to the project area, therefore an Environmental Impact Statement will not be prepared.

Accordingly, this FONSI is submitted to document environmental review and evaluation of the Proposed Action Alternative in compliance with the National Environmental Policy Act of 1969, as amended.

Prepared: DANA MARIE OWEN Digitally signed by DANA MARIE OWEN Date: 2023.02.14 10:06:17 -08'00' Date: 2/14/23

Environmental Protection Specialist

Recommended: MICHAEL BOYLES Digitally signed by MICHAEL BOYLES Date: 2023.02.14 10:25:02 -08'00' Date: 2/14/23

Manager, Environmental Compliance Group

Approved: SHONNA DOOMAN Digitally signed by SHONNA DOOMAN Date: 2023.02.14 12:44:22 -08'00' Date: 2/14/23

Chief, Resource Management Office

Background

Reclamation prepared an EA for the conversion of existing turf, trees, and other vegetation at the Administration Building (Admin Building) located at 1200 Park Street and the Conference and Training Center (Training Center) located at 500 Date Street in Boulder City, Nevada, to xeriscape landscaping with modern, zoned drip irrigation systems to provide greater water efficiency. Both properties are located on Reclamation administered lands within the NE1/4NE1/4 of Section 8 in Township 23 South, Range 64 East, MDM, Clark County, Nevada.

The purpose of the Proposed Action is to correct unsatisfactory environmental conditions created by the inefficient use of water used to irrigate non-functional turf, trees, and other vegetation at both the Admin Building and Training Center. The project will implement Reclamation's goals in efficient maintenance and water reduction by converting the non-functional turf, trees, and other vegetation into a drought-tolerant xeriscape that will address the inconsistency of the irrigation system, inefficiency of water use, maintenance difficulties created by the slope of the Admin Building lawn, and the unattractive aesthetics of the existing vegetation. This action permits Reclamation to advance the policy outlined in Nevada Legislature Assembly Bill No. 356 (AB356) that requires the removal and/or replacement of non-functional grass adjacent to Reclamation's buildings by the deadline of January 1, 2027.

Alternatives Considered

No Action Alternative

Under the no action alternative, landscape of both Reclamation properties, the Admin Building and Training Center, will remain in their existing conditions. The turf, trees, and other vegetation will not be removed and replaced, and Reclamation will continue its routine maintenance of the landscape and grounds, including the use of the estimated annual average of 4 million gallons of potable water used to maintain the turf. Although the No Action Alternative does not meet the purpose of the Proposed Action, this alternative provides the baseline to analyze the Proposed Action.

The Proposed Action Alternative

Under the Proposed Action Alternative, Reclamation will remove and replace the turf, and other vegetation at the Admin Building and Training Center. The Proposed Action includes design, construction, maintenance, and mitigation measures.

Reclamation will construct a landscape consisting of low-maintenance, drought-tolerant xeriscape to promote healthy plants native to the region and utilize a drip system that will have a "smart" irrigation monitoring and control system to optimize the irrigation schedule and water usage that will bring 2.4 million gallons per year (gal/year) in water savings. The Proposed Action will also relocate an existing gas pipeline located on Reclamation property at the Admin Building, issue an updated license for the new gas pipeline location if appropriate, and incorporate pathways, artifacts, boulders, and interpretive displays.

Alternatives Considered but Eliminated

Reclamation considered an alternative to install a new irrigation system that will continue to preserve the Admin Building turf's appearance but will save up to 1.2 million gallons of water annually. By incorporating a smart irrigation monitoring and control system that can optimize irrigation schedule and water use, Reclamation proposed it will minimize water loss, increase the health of plant material, and reduce maintenance costs.

This alternative will result in waters savings up to 1.2 million gal/year as a result of installing new "smart" irrigation, but the Admin Building turf will remain in place and Reclamation will not fulfill the requirements of AB356 by the deadline of January 1, 2027. Reclamation will continue to maintain the non-functional grass prohibited by the Nevada legislation put into place in 2021. Since this alternative does not accomplish the need for complying with AB356, it was not considered further.

The water usage for both the Admin Building and the Training Center turf, trees, and other vegetation is estimated at an average of 4 million gal/year. The proposed new xeriscape design is estimated to require approximately 1.6 million gal/year to irrigate, an estimated water usage reduction of over 60% annually.

The design, construction, and maintenance are discussed in detail in the Final EA under "Description of Alternatives". The mitigation measures are listed as "Environmental Commitments" below.

Environmental Commitments

The following measures will be implemented as part of the Proposed Action to reduce or eliminate impacts to resources:

Air Quality

The Clark County Department of Air Quality and Environmental Management (DAQEM) requires dust permits for all construction activities in which greater than 0.25 acres of land are disturbed, or whenever greater than 100 feet of trenching is planned.

Dust containment during construction will be managed as required by the approved Storm-Water Pollution Prevention Plan and the approved Clark County Dust Control Permit for Construction.

Biological Resources

To ensure compliance with the Migratory Bird Treaty Act: construction, operations and maintenance activities that may affect vegetation, will occur outside of the migratory bird breeding season (February 15 to September 1) to the maximum extent practicable. If construction and maintenance activities cannot occur outside February 15 to September 1, a biologist, approved by

Reclamation, will conduct nesting bird clearance surveys. If any nesting bird activity is detected, all activities will cease until the biologist determines that no active nests, eggs, nestlings or recently fledged birds will be affected. Indications that migratory birds are present include: bird nests, birds carrying nesting materials, birds fixating on a particular spot, birds making excessive noise and birds dive-bombing humans.

Vegetation incorporated into the Proposed Action xeriscape design will consists of a combination of native and drought tolerant vegetation. This includes ensuring the greatest consideration of incorporating vegetation listed on the *Southern Nevada Water Authority and Southern Nevada Regional Planning Coalition Regional Plant List* published in December of 2011 and excluding the planting of vegetation considered invasive, such as but not limited to Fountain Grass (*Pennisetum setaceum*), which is listed as a noxious weed in the State of Nevada.

To prevent the spread of noxious and invasive weeds, equipment used for this project shall be thoroughly cleaned prior to entering and exiting the project site. The cleaning process will ensure that all dirt and debris that may harbor noxious or invasive weeds seeds are removed and disposed of at an appropriate facility. Reclamation's *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species: 2021 Edition* should be referenced for inspection and cleaning activities. The manual can be found at:

Equipment Inspection and Cleaning Manual 2021 (usbr.gov)

Cultural Resources

Consultations are being undertaken under Section 106 of the National Historic Preservation Act (NHPA) with the Nevada State Historic Preservation Office (NV SHPO) and coordination with the Boulder City Historic Preservation Commission (BCHPC). This process will continue throughout the design and construction process and the results of this consultation will be incorporated into the final look and appearance of the xeriscape projects.

Operations and maintenance activities will be reviewed by a Reclamation archaeologist to ensure compliance with the results of the NHPA consultation and coordination with the BCHPC.

In the event of an unanticipated discovery, all operations in the area of the discovery will cease and a Reclamation archaeologist will be contacted. "Discovery" means the encounter of any previously unidentified or incorrectly identified cultural resource including, but not limited to, archaeological deposits, human remains, or places reported to be associated with Native American religious beliefs and practices.

Human Health and Safety / Hazardous Materials

If any hazardous material is found or if any spills of 20 gallons or more occur on Reclamation lands and/or projects, all operations will cease and local emergency response organizations shall be notified by calling 911. After calling 911, the Regional Hazardous Materials Coordinator shall be notified within one hour. Construction or project associated spills of less than 20 gallons must be cleaned up immediately, and the Regional Hazardous Materials Coordinator must be notified within 24 hours of the spill.

Appropriate measures to contain or remove lead-based paint and asbestos will be incorporated into the overall design and construction.

The DAQEM will be notified of any asbestos abatement or demolition as required by the National Emission Standards for Hazardous Air Pollutants.

Soils in portions of the Date Street Campus (DSC) where the Training Center is located were contaminated from metals resulting from mineral processing of ores when the U.S. Bureau of Mines Metallurgy Research Laboratory was in operation. Remediation of these soils was completed in 2006. The location of the Training Center and the turf, trees, and other vegetation is located just adjacent to the area where contaminated soils was identified and remediated during the Date Street 100 Building rehabilitation. Prior to initiating any activities that may breach the clean soil barrier on the DSC, all environmental and safety precautions will be in place on the DSC, and the Regional Hazardous Materials Coordinator shall be notified of Reclamation's activities.

Prior to construction, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared addressing construction activities, mitigation measures such as drainage channels and rip rap protection, and other stormwater best management practices.

Individuals working in and entering the proposed project site will be required to wear appropriate personal protective equipment, including hearing protection during certain activities and phases of the project.

Noise

The contractor will take appropriate measures to reduce noise to the fullest extent practicable in the performance of the construction work at the Admin Building and the Training Center. Work will be conducted between the hours of 7:00am – 6:00pm, Monday through Sunday to avoid and minimize temporary impacts resulting from noise. Between 6:00 PM and 7:00 AM the contractor will not use, except with the express written permission of Reclamation or in case of an emergency, any tool, appliance, or equipment producing noise of sufficient volume to disturb the sleep or repose of occupants of the neighboring properties.

Traffic Circulation

The contractor will take appropriate steps to coordinate with the City of Boulder City during special events and other emergency circumstances related to traffic circulation around the Proposed Action locations. The contractor will also take appropriate steps to coordinate with residents if construction activities would obstruct or prevent residents from accessing private dwellings during construction.

Water Quality

To minimize potential impacts to water quality, standard operating practices will be implemented in accordance with the Clean Water Act and the Nevada Division of Environmental Protection during removal, establishment, construction, and maintenance activities.

Environmental Impacts and Findings

Implementation of the Proposed Action Alternative will not result in significant impacts to any of the resources evaluated in the EA. The reasons for this determination are summarized by resource below.

Air Quality/Greenhouse Gases/Climate Change- Short term, minor impacts to air quality from vehicle emissions and wind-blown dust during construction are expected. There may be a slight increase in emissions from vehicles accessing the buildings during construction. The greenhouse gases emitted from construction are not expected to have a long-term effect on climate change.

Biological Resources - The two properties are located on a previously developed site within an urban area that has no native vegetation. There is no habitat on the site for any Threatened or Endangered species. The Proposed Action contains a mitigation measure to prevent impacts to migratory birds.

Cultural Resources - The Proposed Action will have an adverse effect to the setting of the two historic properties. Compliance with the Memorandum of Agreement (MOA) will assure proper treatment of the two properties as contributing, non-contributing, and previously recorded resources to the Boulder City Historic District. Reclamation consulted with the NV SHPO and received concurrence of Reclamation's determination of an Adverse Effect. Reclamation coordinated with the NV SHPO to develop an MOA to ensure proper treatment of the two properties. Reclamation will adhere to its stipulations, mitigation measures, and conditions. In addition, the mitigation measures included in the Proposed Action will further minimize impacts to cultural resources within the Proposed Action area.

Environmental Justice - The short-term, minor impacts identified to air quality and from noise during construction will not be greater for low income or minority populations. Therefore, the xeriscape project for the two properties will not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Floodplains and Wetlands - There are no floodplains or wetlands located within or adjacent to the Admin Building and the Training Center at the DSC.

Human Health and Human Safety - Existing protective measures and environmental commitments identified as part of the Proposed Action will prevent impacts to human health from past contamination at the two properties.

Indian Trust Assets (**ITA**) - There are no ITAs in or adjacent to the Admin Building or the Training Center where the xeriscape project is proposed to be constructed.

Indian Sacred Sites - There are no Indian Sacred Sites identified within the location of the Admin Building and the Training Center at the DSC.

Noise - A temporary, periodic increase in noise during construction is expected. Once construction is completed, noise levels will return to ambient conditions.

Recreation - The two properties are located within areas that are not used for any recreational purposes.

Soils/Hydrology - Existing protective measures and environmental commitments identified as part of the Proposed Action will prevent impacts to soils and hydrology from past contamination at the two properties.

Traffic Circulation - Traffic is anticipated to have short-term impacts during construction of the Proposed Action. However, once construction is completed, there will be no changes to traffic circulation at the Admin Building and Training Center. In addition, mitigation measures included in the Proposed Action will minimize temporary impacts to traffic circulation.

Visual Resources - Potential impacts to visual resources is discussed under "Cultural Resources/Traditional Cultural Properties".

Water Use and Conservation - The Proposed Action will have positive impacts to water resources by reducing the amount of water used to maintain the existing landscape at the Admin Building and Training Center. Construction of the Proposed Action will allow Reclamation to conserve an estimated 66% or 2.4 million gal/year by installing a new smart water-savings drip system, planting native and drought-tolerant plants, and installing other xeriscape features. The Proposed Action is designed as a mitigation measure to correct the unsatisfactory environmental conditions created by inefficient use of water used to irrigate the current landscape that include non-functional turf, trees and other vegetation.

Cumulative Impacts - Negative cumulative impacts were identified under Cultural Resources. The Proposed Action does not retain and preserve the historic character of a property due to the removal and alteration of distinctive materials, features, spaces, and spatial relationships that characterize the properties and the District. Therefore, Reclamation consulted with the NV SHPO on the finding of Adverse Effect to the two historic properties in accordance with 36 CFR Part 800.5.

Positive cumulative impacts were identified in Water Use and Conservation. The Proposed Action is designed to significantly reduce the amount of water used to maintain the landscaping at the Admin Building and Training Center by installing xeriscape that will include a new smart water-saving drip system, native and drought-tolerant plants, and other features more suitable for the climate in Boulder City Nevada.

No cumulative impacts were identified in other resource areas discussed in the EA.

1.0 Introduction

1.1 Proposed Federal Action

This Environmental Assessment (EA) was prepared in compliance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA. The purpose of this EA is to evaluate the potential impacts of the proposed project and its alternative on the physical and human environment and determine if the impacts will be significant, thus warranting the preparation of an Environmental Impact Statement.

The Bureau of Reclamation (Reclamation), Lower Colorado Basin Engineering Services Office proposes to convert existing turf, trees, and other vegetation from the south and west slopes of "Government Hill" south of the Administration Building (Admin Building), located at 1200 Park Street and the main (east) façade of the Conference and Training Center (Training Center), located at 500 Date Street, to a xeriscape with modern, zoned drip irrigation systems that would greatly reduce potable water used to maintain the existing landscape at both properties. The Admin Building and Training Center are located in Boulder City, Clark County, Nevada. This project is in response to Nevada Legislature Assembly Bill No. 356 (AB356) stating that waters of the Colorado River can no longer be used to irrigate non-functional lawns outside of single-family residences starting January 1st, 2027.

1.2 Background to the Purpose and Need

The Admin Building is set above 2.34 acres of open space consisting of turf, trees, and other vegetation to the south and west slopes of "Government Hill" and 0.57 acres of xeriscape at the southwest corner of the open area. The Training Center open area consists of turf with one ash tree located in the south end of the 3,500-square-foot (.08 acre) pie-shaped open area located south and east of the Training Center main facade. Reclamation uses an estimated annual average of 4 million gallons of water to maintain both the Admin Building and Training Center landscape.

In 2021, Nevada passed state legislation AB356, prohibiting the use of Colorado River water to irrigate non-functional grass, which includes irrigated grass along public and private hardscapes, adjacent to commercial, multi-family, and government buildings, and HOA-managed hardscape areas. According to AB356, the existing turf adjacent to the Admin Building and the Training Center is considered prohibited non-functional grass. AB356 requires non-functional grass to be removed or replaced by January 1, 2027.

1.3 Purpose and Need

The purpose of the Proposed Action is to correct unsatisfactory environmental conditions created by the inefficient use of water used to irrigate non-functional turf, trees, and other vegetation at both the Admin Building and Training Center. The project would implement Reclamation's goals of

efficient maintenance and water reduction by converting the non-functional turf, and other vegetation into a drought-tolerant xeriscape that would improve the inconsistency of the irrigation system, inefficiency of water use, and maintenance difficulties created by the slope of the Admin Building lawn. In addition, implementation of the Proposed Action would fulfill the need to comply with AB356 requirements to remove and/or replace the non-functional grass adjacent to Reclamation's buildings by the deadline of January 1, 2027, as stated in the Nevada legislation.

Figure 1. Aerial Map of the Admin Building and Conference Training Center Xeriscape Project

2.0 Description of Alternatives

2.1 No Action Alternative

Under the no action alternative, Reclamation's Admin Building and Training Center landscapes would remain in their existing condition. The turf, trees, and other vegetation would not be removed and replaced with xeriscape; Reclamation would continue its routine maintenance of the landscape and grounds, including the irrigation of the landscapes at current use levels to maintain the turf; and Reclamation would not be compliant with AB356.

2.2 Proposed Action Alternative

Under the Proposed Action, Reclamation would design and construct xeriscapes at the Admin Building and Training Center with modern, zoned drip irrigation systems to provide greater efficiency. Desired features of the new system include a deep root drip system for watering mature and new trees. This drip system would have a "smart" irrigation monitoring and control system that can optimize the irrigation schedule and water usage which would reduce or eliminate water losses and improve the health of plants. The Proposed Action would also incorporate artifacts, boulders, and interpretive displays that tie to Hoover Dam and the lawn's historical status at the Admin Building. A detailed description and specifications of the Proposed Action can be viewed in Appendix A.

The Proposed Action would include the relocation of an existing gas pipeline located on Reclamation property at the Admin Building, and Reclamation would issue an updated license for the new gas pipeline location if appropriate. In addition, the following design elements and construction for both Reclamation properties as needed (see Figure 2 for proposed conceptual xeriscape design for the Admin Building that incorporates the listed design elements below. Specific details and layouts are subject to change.):

a) Removal of all existing irrigated grass and unhealthy plants and trees.

b) Replacement of the irrigated grass with low-maintenance, drought-tolerant xeriscape landscaping to promote healthy plants (Figure 3, 4 and 5).

c) Enhance existing xeriscape areas to provide consistency with the new xeriscape landscaping areas.

d) Removal of existing irrigation systems.

e) Provide new smart, water-saving drip irrigation systems that reduce overall water usage and meet the requirements of Southern Nevada Water Authority (SNWA).

f) Changing irrigation water supply source from municipal potable water to raw water (i.e., non-potable water) sources.

g) Provide a sidewalk along the east side of Nevada Way between Park Street and Denver Street.

h) Provide a paved access route for persons with varying abilities and an accessible route from the intersection of Park Street and Nevada Way to the Admin and Annex Buildings.

Figure 2. Conceptual Rendering of the Administraion Building xeriscape design.

Figure 3. Example photos of drought resistant vegetation and landscape elements proposed for the Training Center xeriscape design.

Figure 4. Proposed xeriscape vegetation plan for the Admin Building.

Figure 5. Conceptual plant pallet for the Admin Building and Training Center Xeriscape Project.

On average, the current water usage for both the Admin Building and the Training Center turf, trees, and other vegetation is estimated at 4 million gallons per year (gal/year). The proposed new xeriscape design is estimated to require approximately 1.6 million gal/year, an estimated reduction of over 60% compared to Reclamation's current water use. Table 1 shows the water usage and savings calculations estimated for the Proposed Action.

Table 1. Proposed Action Estimated Water Savings Calculation.

Admin Building Annual Average Usage	3,628,500.00
Training Center Estimated Annual Average Usage*	371,500.00
Proposed Action Estimated New Design Water Usage (gal/year)	1,600,000.00
Estimated Total Savings (gal/FY)	**2,400,000.00**
Estimated Percent Savings	**66.14%**

**Note: The Training Center water usage is monitored by a shared meter with other buildings at the Date Street Campus. This estimate for water usage for landscape maintenance for the Training Center turf and vegetation accounts for the recent rehabilitation to the building in 2013, which followed the Environmental Protection Agency's Guiding Principles for Sustainable Buildings. The Training Center received a Gold Leadership in Energy and Environmental Design (LEED) Certification in 2013 and continues to maintain its LEED Certification status. Both these guidelines and certification requirements require the design and installation of water conservation technologies to optimize water efficiencies.*

The time for construction of the Proposed Action is estimated to be approximately 6 months with work proposed to begin in February 2023, as identified in Table 2.

Table 2. Proposed Timeline for Proposed Action.

Proposed Schedule	Task / Milestone
December 2022	100% Design
February 2023	Begin Construction
July 2023	Complete Construction

2.2.1 Mitigation Measures

The following measures would be implemented as part of the Proposed Action to reduce or eliminate impacts to resources:

Biological Resources

To ensure compliance with the Migratory Bird Treaty Act: construction, operations and maintenance activities that may affect vegetation, will occur outside of the migratory bird breeding season (February 15 to September 1) to the maximum extent practicable. If construction and maintenance activities cannot occur outside February 15 to September 1, a biologist, approved by Reclamation, will conduct nesting bird clearance surveys. If any nesting bird activity is detected, all activities will cease until the biologist determines that no active nests, eggs, nestlings or recently fledged birds will be affected. Indications that migratory birds are present include: bird nests, birds carrying nesting materials, birds fixating on a particular spot, birds making excessive noise and birds dive-bombing humans.

Vegetation incorporated into the Proposed Action xeriscape design would consist of a combination of native and drought tolerant vegetation. This includes ensuring the greatest consideration of incorporating vegetation listed on the *Southern Nevada Water Authority and Southern Nevada Regional Planning Coalition Regional Plant List* (Regional Plant List) published in December of 2011 and excluding the planting of vegetation considered invasive, such as, but not limited to, Fountain Grass (*Pennisetum setaceum*), which is listed as a noxious weed in the State of Nevada.

To prevent the spread of noxious and invasive weeds, equipment used for this project shall be thoroughly cleaned prior to entering and exiting the project site. The cleaning process would ensure that all dirt and debris that may harbor noxious or invasive weeds seeds are removed and disposed of at an appropriate facility. Reclamation's *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species: 2021 Edition* should be referenced for inspection and cleaning activities. The manual can be found at:

Equipment Inspection and Cleaning Manual 2021 (usbr.gov)

Human Health and Safety / Hazardous Materials

If any hazardous material is found or if any spills of 20 gallons or more occur on Reclamation lands and/or projects, all operations would cease and local emergency response organizations shall be notified by calling 911. After calling 911, the Regional Hazardous Materials Coordinator shall be notified within one hour. Construction or project associated spills of less than 20 gallons must be cleaned up immediately, and the Regional Hazardous Materials Coordinator must be notified within 24 hours of the spill.

Appropriate measures to contain or remove asbestos would be incorporated into the overall design and construction.

The Clark County Department of Air Quality and Environmental Management (DAQEM) would be notified of any asbestos abatement or demolition as required by the National Emission Standards for Hazardous Air Pollutants.

Soils in portions of the Date Street Campus (DSC) where the Training Center is located, were contaminated from metals resulting from mineral processing of ores when the U.S. Bureau of Mines Metallurgy Research Laboratory was in operation. Remediation of these soils was completed in 2006. The location of the Training Center and the turf, trees, and other vegetation is located just adjacent to the area where contaminated soils was identified and remediated during the Date Street 100 Building rehabilitation. Prior to initiating any activities that may breach the clean soil barrier on the DSC, all environmental and safety precautions would be in place on the DSC and the Regional Hazardous Materials Coordinator shall be notified of Reclamation's activities.

Prior to construction, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared addressing construction activities, mitigation measures such as drainage channels and rip rap protection, and other stormwater best management practices.

Individuals working in and entering the proposed project site would be required to wear appropriate personal protective equipment including hearing protection during certain activities and phases of the project.

Water Quality

To minimize potential impacts to water quality, standard operating practices would be implemented in accordance with the Clean Water Act and the Nevada Division of Environmental Protection during removal, establishment, construction, and maintenance activities.

Air Quality

The DAQEM requires dust permits for all construction activities in which greater than 0.25 acres of land are disturbed, or whenever greater than 100 feet of trenching is planned.

Dust containment during construction would be managed as required by the approved Storm-Water Pollution Prevention Plan and the approved Clark County Dust Control Permit for Construction.

Cultural Resources

Consultations are being undertaken under Section 106 of the National Historic Preservation Act (NHPA) with the Nevada State Historic Preservation Office (NV SHPO) and coordination with the Boulder City Historic Preservation Commission (BCHPC). This process would continue throughout the design and construction process and the results of this consultation would be incorporated into the final look and appearance of the xeriscape projects.

Operations and maintenance activities would be reviewed by a Reclamation archaeologist to ensure compliance with the results of the NHPA consultation and coordination with the BCHPC.

In the event of an unanticipated discovery, all operations in the area of the discovery would cease and a Reclamation archaeologist contacted. "Discovery" means the encounter of any previously unidentified or incorrectly identified cultural resource including, but not limited to, archaeological deposits, human remains, or places reported to be associated with Native American religious beliefs and practices.

Noise

The contractor would take appropriate measures to reduce noise to the fullest extent practicable in the performance of the construction work at the Admin Building and the Training Center. Work would be conducted between the hours of 7:00am – 6:00pm, Monday through Sunday to avoid and minimize temporary impacts resulting from noise. Between 6:00 PM and 7:00 AM the contractor would not use, except with the express written permission of Reclamation or in case of an emergency, any tool, appliance, or equipment producing noise of sufficient volume to disturb the sleep or repose of occupants of the neighboring properties.

Traffic Circulation

The contractor would take appropriate steps to coordinate with the City of Boulder City during special events occurring and other emergency circumstances related to traffic circulation with the Proposed Action locations. The contractor will also take appropriate steps to coordinate with residents if construction activities would obstruct or prevent residents from accessing private dwellings during construction.

2.3 Alternatives Considered but Not Evaluated in Detail

Reclamation considered an alternative to install a new irrigation system that would continue to preserve the Admin Building turf's appearance but would save up to 1.2 million gallons of water annually. By incorporating a smart irrigation monitoring and control system that can optimize the irrigation schedule and water use, Reclamation proposed it would minimize water loss, increase the health of plant material, and reduce maintenance costs. Other improvements to the landscape include slope recontouring, plant removal, and establishment of new vegetation. In addition, a new sidewalk, along with a ramp, to improve accessibility, and an existing Reclamation sign would be upgraded in its current location.

This alternative would result in water savings up to 1.2 million gal/year as a result of installing new "smart" irrigation, but the Admin Building turf would remain in place and Reclamation would not fulfill the requirements of AB356 by the deadline of January 1, 2027. Reclamation would continue to maintain the non-functional grass prohibited by the Nevada legislation put into place in 2021. Since this alternative does not accomplish the need for complying with AB356, it was not considered further.

3.0 Affected Environment and Environmental Consequences

The following section presents a description of the existing condition for the selected resource areas being reviewed as well as an analysis of the direct, indirect, and cumulative impacts of the Proposed Action on those resources.

3.1 Resources not Discussed in Detail

The following resources were considered and are either considered under other resource sections or not further addressed in this document because they would not be impacted by the Proposed Action.

- **Air Quality** – Short-term impacts are anticipated for air quality due to wind causing particulates to become airborne during the construction activities. This is expected to be minor because impacts are expected to be temporary. Mitigation measures included in the Proposed Action and the imposed by the dust permit would reduce most construction related air quality impacts.

- **Biological Resources** – The two properties are located on a previously altered site within an urban area that has no native vegetation. There is no habitat on the site for any Threatened or Endangered species. The Proposed Action contains a mitigation measure to prevent impacts to migratory birds.

- **Environmental Justice** – The short-term, minor impacts identified to air quality and from noise during construction will not be greater for low income or minority populations. Therefore, the Proposed Action will not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations.

- **Floodplains and Wetlands** – There are no floodplains or wetlands located within or adjacent to the Admin Building and the Training Center at the DSC.

- **Human Health and Safety** – The mitigation measures included as part of the Proposed Action that addresses protective measures and environmental commitments will prevent impacts to human health and safety from past contamination at the two properties and during construction.

- **Indian Trust Assets (ITA)** – There are no ITAs in or adjacent to the Admin Building or the Training Center where the xeriscape project is proposed to be constructed.

- **Indian Sacred Sites** – There are no Indian Sacred Sites identified within the location of the Admin Building and the Training Center at the DSC.

- **Noise** – During construction there would be temporary, periodic, increase in daytime noise from the use of equipment at the site during construction. Noise levels at night would remain at current levels as work would be limited between the hours of 7:00am – 6:00pm, Monday through Sunday to avoid and minimize noise levels resulting from construction activities. Mitigation measures included in the Proposed Action would reduce the short-term impacts anticipated to noise levels.

- **Recreation** – The two properties are located within areas that are not used for any recreational purposes.

- **Soils/Hydrology** – The mitigation measures included under "Human Health and Safety" as part of the Proposed Action that addresses protective measures and environmental commitments will prevent impacts to Soils/Hydrology during construction.

- **Traffic Circulation** – Traffic is anticipated to have short-term impacts during construction of the Proposed Action. However, once construction is completed, there would be no changes to traffic circulation at the Admin Building and Training Center. In addition, mitigation measures included in the Proposed Action would minimize temporary impacts to traffic circulation.

- **Visual Resources** – Potential impacts to visual resources is discussed under "Cultural Resources/Traditional Cultural Properties."

3.2 Resources Discussed in Detail

The following resource areas are discussed below:

- **Cultural Resources/Traditional Cultural Properties**

- **Water Use and Conservation**

3.3 Cultural Resources/Traditional Cultural Properties

3.3.1 Affected Environment

The Area of Potential Effect (APE) for the Proposed Action was determined by field observation completed on November 10, 2022, by Reclamation's regional archaeologist and a qualified architectural historian contracted by Reclamation to consult on this undertaking. The APE for the Admin Building was determined based on the visibility of Government Hill from the Admin Building's front (south) façade, and from nearby residential, commercial, and public properties. The

APE for the Training Center was determined based on the visibility of the Training Center's grassy court on the east end of the property from the Training Center and from nearby residential, commercial, and public properties.

The Admin Building was among the first buildings constructed by Reclamation in Boulder City. After construction an extensive landscape design was developed to include an expansive lawn, abundant shade trees to mitigate for the region's intense heat, and concrete stairs and walkways from Park Street to the Admin Building's front (south) entrance. Landscaping was completed in 1932 and consisted of broad-leaved evergreen shrubs, elms, Guadalupe cypresses, and rye grass.

The current open space landscape consists of a relatively flat area with xeriscape located directly in front of the Admin Building, an additional xeriscape area at the southwest corner of the open space area, and a large expanse of turf. Xeriscape areas consists of decomposed granite with drought tolerant trees, shrubs, and plants. The area also includes additional landscape features such as the turf, trees, other vegetation, concrete pathways, sidewalks, and other features that surround the south and east facades of the Admin Building and Government Hill.

The Admin Building was recommended individually eligible for listing in the National Register in 2021 under Criterion A as part of the 2021 *Updated Architectural Survey and Inventory of the Boulder City Historic District*. In this survey and inventory report it was recommended that the property retains its integrity of setting, as well as location, design, workmanship, materials, feeling and association. The character defining features of the Government Hill itself include its location in front of the Admin Building; the sloping topography; minimal, orthogonal, concrete pathways; and existing historic tree species such as ash, mulberry, and elm trees. Although the installation of the xeriscape portions of Government Hill has slightly compromised the historic setting, it has retained its open space viewable from the west, south and east, and the ability to view the Boulder City Historic District from the location.

The Training Center was originally constructed by the Bureau of Mines in 1941 for use as an engineering laboratory. The property consists of a masonry structure with a tile roof and a T-shaped plan. Between 2006 and 2010, the roof was removed, not to be replaced until the building was rehabilitated in 2013. After its construction in 1941, landscaping around the Training Center was minimal and was primarily confined to a landscaped court located on the property's southeast corner. Plantings largely consisted of a row of evergreen shrubs located along verandas on the building's southeast and northwest façades and a single ash tree located west of the parking lot.

Today, the Training Center includes the grassy court area that is largely an unobstructed open space that is a character defining feature. An existing ash tree propagated from a long-standing tree original to the landscape was planted during the 2013 Date Street 100 and 200 Building Rehabilitation Project (Rehabilitation Project) and is located at the south end.

The Training Center was included as a contributing property to the Boulder City Historic District in Janus Associates Inc.'s 1983 National Register of Historic Places (NRHP) nomination but was not determined to be individually eligible for listing at that time. The Updated *Architectural Survey and Inventory of the Boulder City Historic District*, completed in 2021, concurred that the Training Center was eligible as contributing resource of the Boulder City Historic District, and also recommended that

the building was individually eligible for designation in the NRHP under Criterion A for its association with Community Planning and Development and Engineering in Boulder City.

The description above of the affected APE of the Proposed Action incorporated into this section of the EA is provided in the November 21, 2022, consultation letter Reclamation prepared and sent to the NV SHPO (Consultation Letter). The Consultation Letter outlines a comprehensive report of the methodology employed to identify the two locations of the Proposed Action as historic properties, and of a detailed description and discussion of the APE, character defining features, and the site history of the Admin Building and Training Center. The Consultation Letter includes historic photos of the Proposed Action Locations and the APE, site maps, historic photos, and other important information to determine of the effects of the Proposed Action within and adjacent to the APE. The Consultation Letter can be referenced in Appendix B.

3.3.2 Environmental Consequences

3.3.2.1 No Action Alternative

The no action alternative would not alter the exiting character defining features to the Admin Building and Training Center and would retain and preserve the existing historic character of the two properties.

3.3.2.2 Proposed Action Alternative

The Consultation Letter identified a list of five contributing resources and one non-contributing resource within the APE at the Training Center. The Consultation Letter also identified a list of 60 previous recorded resources located entirely or partially within the APE for the Admin Building. A list of these resources that identifies its NRHP eligibility and direct effect determination can be reviewed in Table 1 and Table 2 of the Consultation Letter (Appendix B, pp. 6-7 and pp. 13-17).

As a result of the determination of direct effects or visual effects to the listed contributing, non-contributing, or previously recorded resources, Reclamation consulted with the NV SHPO for concurrence with Reclamation's finding of Adverse Effect in accordance with 36 CFR Part 800.5. In a response Reclamation received on December 21, 2022, the NV SHPO concurred with Reclamation determination (Concurrence Letter) (Appendix C).

A Memorandum of Agreement (MOA) was developed and signed by Reclamation and the Nevada SHPO on February 13, 2023 (Appendix D). Reclamation will adhere to the stipulations, mitigation measures, and conditions of the MOA as it proceeds with the implementation and construction of the Proposed Action. In addition, the mitigation measures included in the Proposed Action would further minimize impacts to cultural resources within the Proposed Action area.

3.3.2.3 Cumulative Impacts

The cumulative impact as a result of the implementation of the Proposed Action would have a negative effect on the historic properties within the APE. The Proposed Action would impact its potential to be included in the National Register. The work would diminish the integrity of the

setting for both properties, and work would not be in compliance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR part 68(b) Rehabilitation).

3.4 Water Use and Conservation

3.4.1 Affected Environment

The landscape surrounding the Admin Building and Training Center consists of open spaces totaling 2.42 acres of turf, trees, and other vegetation. On average, Reclamation has used 4 million gallons of water annually to maintain the existing landscape. This includes an annual water use of 3.6 million gallons at the Admin Building and 317,500 gallons at the Training Center.

The Training Center has a 3,500-square-foot (.08 acre) pie-shaped open area that consists of turf with one ash tree located at the south end, and building signage is located at the north end. A flagpole is located in the center of the open space. A six-foot strip of decomposed granite with steel-reinforced masonry bollards lines the eastern boundary of the open space area. A small grouping of lantana shrubs is located at the northeast corner of the turf area. Parking and a concrete sidewalk are located along Date Street east of the Training Center. The existing ash tree is not original to the property, having been planted during the Building 100 (Training Center) Rehabilitation Project in 2013; however, it is purportedly a propagation of a long-standing tree original to the building (Figure 6).

The Training Center Rehabilitation Project was designed and constructed under the Environmental Protection Agency's (EPA) Guiding Principles for Federal Sustainable Buildings and was completed in 2013. One of the major criteria for meeting the EPA's guidelines in water conservation is to minimize or eliminate landscape irrigation. During the rehabilitation of the Training Center, water use for the building and landscape was reduced by over 20 percent, fulfilling the EPA requirements. The water used for the Training Center turf and vegetation is measured through a central water meter that connects all the buildings in the DSC. By meeting the EPA's Guiding Principles, Reclamation was able to nominate the Training Center for LEED Certification given by the U.S. Green Building Council and received Gold LEED Certification for its sustainable design to include the water conservation measures built into the building and its landscape.

The landscaped open space located south of the main (south) façade of the Admin Building is an open space of approximately 2.34 acres and consists of a relatively flat area with xeriscape located directly in front of the Admin Building. In addition, the landscape includes a xeriscape area is located at the southwest corner of the open space area, and a large expanse of turf. The existing xeriscape areas consist of decomposed granite with drought tolerant trees, shrubs, and plants. The sidewalk begins at the west end of the property (Nevada Way), extends east across the façade of the Admin Building, and continues to wrap around the building to the north and west.

Figure 6. View of southeast façade of the Training Center and court, facing northwest.

The xeriscape area located just south of the entrance to the Admin Building is bounded by a concrete curb with a scalloped pattern on the southern boundary. A low stone retaining wall extends south from the northwest corner of the xeriscape area before turning southeast and finally extending eastward across the xeriscape area. South of the retaining wall the xeriscape area slopes slightly toward the south. A similar xeriscape area is located at the southeast corner of the property with a sliver extending north at the eastern boundary. A narrow strip of decomposed granite is located at the northern boundary of the turf area southwest of the Admin Building. The strip is bordered on the south by a curving concrete curb and contains three mulberry trees. The remainder of the open space is landscaped with turf, and juniper, ash, Chinese elm, mulberry, and palo verde trees. A narrow strip of riprap with a low concrete curb, signage, and streetlights, lines the western boundary of the turf area (Figure 7).

Figure 7. Aerial photograph showing the landscaping surrounding the Admin Building as it appeared in 2006 (Image courtesy of the Clark County Assessor, Las Vegas).

3.4.2 Environmental Consequences

3.4.2.1 No Action Alternative

The No-Action alternative would not change the existing landscape at the Admin Building and the Training Center. Reclamation would continue to maintain the turf, trees, and other vegetation and Reclamation would not replace existing vegetation with native plants and other drought tolerant plants listed in SNWA's Regional Plant List. Reclamation would continue to utilize an annual average of 4 million gallons of water to maintain its landscape at both locations and no water savings would occur. Furthermore, the No Action Alternative would result in Reclamation's inability to meet the requirements of AB356 by January 1, 2027, to remove the non-functional turf around government buildings.

3.4.2.2 Proposed Action Alternative

The Proposed Action would correct the unsatisfactory environmental conditions created by the inefficient use of water used to irrigate non-functional turf, trees, and other vegetation at the Admin Building and Training Center. Construction of the xeriscape would require the installation of new

smart, water-saving drip irrigation systems that reduce overall water usage. Water Savings would be achieved by delivering small amounts of water directly to the plants roots allowing for efficient water use and reducing evaporation and runoff.

In addition, since the existing turf at both the Admin Building and the Training Center will be removed and replaced with xeriscape, it would not require irrigation systems that sprays water onto the entire lawn; rather, the planting of native and drought-tolerant plant species would utilize the new smart water-saving drip system that would minimize the need for supplemental irrigation required by turf (see Figure 4 and Figure 5 for a list of native and drought tolerant plants proposed). The xeriscape design would include plants listed in the SNWA's Regional Plant List and would exclude noxious weeds and invasive vegetation listed by the State of Nevada.

Overall, the Proposed Action is anticipated to have a positive impact to water use and conservation during construction and the years anticipated for plant establishment as a result of the turf removal alone. Once established, maintenance of the new xeriscape would allow for an estimated 66% water savings from the current annual 4 million gallons of water used to maintain both landscape locations (See Table 1 for estimated water savings calculations). The new smart, water-saving drip irrigation systems, planting of native and drought tolerant plants, and other sustainable design elements of the Proposed Action at the Admin Building and Training Center would reduce water use from the 4 million gal/year to an estimated 1.6 million gal/year. Construction of the Proposed Action would allow Reclamation to save an estimated 2.4 million gal/year of water.

3.4.2.3 Cumulative Impacts

The cumulative impacts of the Proposed Action would result in the significant water saved by reducing the amount of water used to maintain the current turf, trees, and other vegetation located at the Admin Building and Training Center. The xeriscape design elements, including the installation of the new smart drip system and the planting of native and drought tolerant plants, would show immediate water savings once construction is initiated, through the plant establishment phase and eventually into future maintenance of the landscape. The estimated water savings of 66% or 2.4 million gal/year, would be a positive cumulative impact to the water resources, water use and conservation.

4.0 Coordination and Consultation

4.1 Persons/Agencies Consulted

- Las Vegas Paiute Tribe
- Moapa Band of Paiutes
- Chemehuevi Indian Tribe
- Colorado River Indian Tribes
- Nevada State Historic Preservation Office
- Boulder City Historic Committee
- Boulder City Mayor, Kiernan McManus
- Boulder City Manager, Taylour Tedder

4.2 Scoping/Public Involvement

Reclamation's efforts to address the Admin Building landscape has been a process of continued minor improvement projects to ensure the maintenance of the exiting turf and vegetation. Earlier design proposals to correct the inefficient water use of the existing turf and vegetation at the Admin Building was presented during a public meeting on November 17, 2020, in Boulder City, NV. The presentation outlined Reclamation's original plan to replace the existing irrigation system to a "smart" system to reduce water used to maintain the turf and vegetation at the Admin Building (See Section 2.3, *Alternative Considered but not Evaluated in Detail*). The intent of the original plan was to keep the exiting turf in place to maintain the historic setting of the Admin Building. After the meeting, Reclamation received one comment recommending the replacement the existing turf with artificial turf or xeriscape that included shrubs and trees more suitable to the desert environment to maximize water conservation. The public response to the information presented in this meeting mainly identified concerns of the amount of water Reclamation is using to maintain the landscape around the Admin Building.

Reclamation has provided information about the Proposed Action evaluated in this EA to the Las Vegas Paiute Tribe, Moapa Band of Paiutes, Chemehuevi Indian Tribe, and Colorado River Indian Tribes, and has requested consultation about the effect of this project to significant cultural or religious areas. There has been no response at the time of this EA; however, if these tribes do respond with information pertaining to areas of tribal concern affected by the undertaking, Reclamation will inform the NV SHPO of newly acquired information and consultation will take place accordingly.

Reclamation has and is continuing to conduct an extensive public outreach effort to the local community of Boulder City. The goal of this effort is to solicit comments on the project in hopes of gathering concerns and incorporating ideas for alternative design considerations and mitigation for the effects this project has to the Boulder City Historic District. This outreach began with a meeting

that Reclamation management had with the now former Boulder City Mayor, Kiernan McManus, and the city manager, Taylour Tedder, on September 8, 2022. The main concern that the mayor had with the project was with the surrounding viewshed and suggested that the view of the Admin Building not be blocked by any obstacles so that it can be seen from the surrounding street level. Reclamation's design team has incorporated this comment into the design plan and has removed any large vegetation in front of the building that was initially in the plan.

A public meeting was held at the Admin Building on November 10, 2022, where Reclamation provided an open house for members of the community to submit comments on the project and talk to the Reclamation design team directly. An email address for comments was provided to guests at the meeting, and two comments were submitted. One had the history of the lawn as a concern and suggested to deed the lawn over to Boulder City so that the local community could take control of it and make decisions about its property. The other comment suggested that only native vegetation should be used instead of just general desert-adapted plants.

A presentation was provided during the Boulder City Historic Preservation Commission meeting that occurred on December 7, 2022. This was an opportunity for entire committee to learn about all aspects of the proposed project and provide feedback. The general consensus of the committee was an understanding that the lawn had to be removed for water conservation purposes but wanted to see more native vegetation used in the design. They also requested that they play a role in the review process of the interpretive materials being installed at the site and Reclamation agreed that they would be included.

4.3 Distribution List

Reclamation will publish the Final EA and Finding of No Significant Impact on Reclamation's website for public view. A press release will be distributed to local news outlets to inform the public and interested parties of the availability of this document.

5.0 References

Clark County Nevada, Department of Environmental Quality. 2021. National Ambient Air Quality Standards. Accessed at: https://files.clarkcountynv.gov/clarknv/Environmental%20Sustainability/Planning/20180904_NAAQS_Designation_Map.pdf?t=1672900193037&t=1672900193037

Council on Environmental Quality. 2016. Final Guidance for Federal Department and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews.

Federal Highway Administration. 2011. Highway Traffic Noise. Available at: http://www.fhwa.dot.gov/environment/noise/construction_noise/special_report/hcn06.cfm

Intergovernmental Panel on Climate Change. 2007. Fourth Assessment Report: Climate Change 2007. Available at: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#1

United States Department of the Interior, National Park Service. 1983. "Boulder City Historic District." National Register of Historic Places Inventory-Nomination Form, listed August 19, 1983.

United States Environmental Protection Agency. 2022a. "Overview of Greenhouse Gases." Last updated May 16, 2022. Available online at https://www.epa.gov/ghgemissions/overview-greenhouse-gases

United States Environmental Protection Agency. 2023. Environmental Justice Screening and Mapping Tool. Accessed at: https://ejscreen.epa.gov/mapper/

United States Environmental Protection Agency. 1974. Protective Noise Levels. Available at: http://www.nonoise.org/library/levels/levels.htm#levelsof

United States Environmental Protection Agency. 2022b. Greenhouse Gas Equivalencies Calculator. Available at: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Veritas Laboratories. 2012. Date Street Building 200 Soils Laboratory Report.

Zenitech Environmental, LLC. 2005a. Summary of Corrective Action: Date Street Complex, US Bureau of Reclamation, 500 Date Street, Boulder City, Nevada. Volume I - Narrative and Appendix A. On file, U.S. Bureau of Reclamation, Boulder City, Nevada.

Zenitech Environmental, LLC. 2005b. Summary Report of Corrective Action at Former Substation No. 1: Western Area Power Administration, Date Street and Railroad Avenue, Boulder City, Nevada. On file, U.S. Bureau of Reclamation, Boulder City, Nevada.

Zenitech Environmental, LLC. 2006. Stormwater pollution Prevention Permit for Construction Activities: At the Date Street Complex. On file, U.S. Bureau of Reclamation, Boulder City, Nevada.

Appendices

Appendix A

Administration and Training Building Xeriscape Design 100% Design Specifications

SPECIFICATIONS
100% Design Documents Submittal

December 21, 2022

Administration & Training Building
Xeriscape Design

— BUREAU OF —
RECLAMATION

LGA
ARCHITECTURE

SECTION 00 01 05

CERTIFICATION PAGE

<table>
<tr>
<td> 

11/15/22

Lance J. Kirk
Architect
NO. 7053</td>
<td> 

Cassie Grimes
Landscape Architect
NO. 584</td>
</tr>
<tr>
<td> 

12/21/22

Edgar León, PE
Civil Engineer
NO. 21493</td>
<td> 

December 21, 2022

Phillip A. Whisenhunt, PE
Electrical Engineer
No. 015391</td>
</tr>
</table>

END OF SECTION

TABLE OF CONTENTS

DIVISION 04 - MASONRY

DIVISION 05 – DIVISION 08

Not used

DIVISION 09 - FINISHES

DIVISION 10 – DIVISION 11

Not used

DIVISION 12 – FURNISHINGS

DIVISION 13 – DIVISION 25

Not used

DIVISION 26 – ELECTRICAL

DIVISION 27 – DIVISION 30

Not used

DIVISION 31 - EARTHWORK

DIVISION 32 – EXTERIOR IMPROVEMENTS

DIVISION 33 – UTILITIES

DIVISION 34 - DIVISION 49

Not used

END OF TABLE OF CONTENTS

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 LOCATION

A. Work is for the Bureau of Reclamation, Interior Region 8: Lower Colorado Basin. Project locations are within the states of Arizona, California, and Nevada.

1.02 PRINCIPAL COMPONENTS OF WORK

A. Specific quantities and types of work to be performed under this contract are unknown at this time but will be detailed in each individual task orders that will be issued prior to performance of the work. Work shall conform to the Reclamation Safety and Health Standards (RSHS); take all necessary precautions to ensure the safety of the public. The period of performance specified by each task order will be negotiated with the contractor prior to Task Order issuance and must perform all work items as specified within each task order.

Future task orders may include, but are not limited to, any or all of the following tasks:

1. The contractor shall conduct mobilization and demobilization, along with preparatory work as indicated on the task order.

2. The contractor shall provide bonding and insurance.

3. Furnish and submit all permits, licenses, and regulatory approvals that may be required by, including but not limited to, Federal, state, city, and county agencies.

4. The contractor shall provide qualified surveyors with all the labor, equipment, and materials necessary to conduct preliminary, construction, and as-built surveys, this may include but not limited to setting control, staking, and record data for work indicated on the drawings.

5. Provide all plans, labor, equipment, and materials necessary for Traffic Control for parking lots, office roads, storage slab areas, public roads, and highways as designated per drawings.

6. Furnish all labor and materials but not limited to pothole to locate and verify existing utilities.

7. Furnish all labor, equipment, and materials but not limited to place temporary fencing, barricades, lighting, and signage to secure work area.

8. Demolish, remove, dispose, reuse, or stockpile of but not limited to existing structures, foundations, utilities, and appurtenances.

9. Demolish, saw cut, remove, dispose, reuse, or stockpile but not limited to existing concrete slab, curbs and sidewalks, and other identified materials as indicated on the drawings.

10. Demolish, saw cut, remove dispose, reuse, or stockpile but not limited to existing asphalt paving, asphalt curbs and patching, and other identified materials as indicated on the drawings.

11. Furnish all labor, equipment, and materials but not limited to clearing and grubbing along roads, and parking lot maximum five (5) feet wide for construction as indicated on the drawings.

12. Furnish all labor, equipment, and materials needed but not limited to installation of segmental block or cast-in-place retaining walls as indicated on the drawings.

13. Furnish all labor, equipment, and materials needed but not limited to installation of Architectural Barriers Act/American with Disabilities Act (ABA/ADA) compliant curb ramps, and cross walks as indicated on the drawings.

14. Furnish all labor, equipment, and materials needed but not limited to place slurry sealant or fog seal on existing asphalt pavement as indicated on the drawings.

15. Furnish all labor, equipment, and materials needed but not limited for milling roads, parking lots, and storage areas of existing asphalt as designated on the drawings.

16. Furnish all labor, equipment, and materials needed but not limited to stockpile all recyclable materials as indicated on the drawings on the drawings.

17. Furnish all labor, equipment, and materials required but not limited to perform earthwork for roadway and parking area subgrade as indicated on the drawings.

18. Furnish and place subgrade material as indicated on the drawings.

19. Furnish and place compacted aggregate base material, for new pathways, sidewalks, walls, asphalt pavement or patching as indicated on the drawings.

20. Furnish all labor, equipment, and materials needed but not limited to grading shoulders along roads and parking lot for drainage as indicated on the drawings.

21. Furnish and install new asphalt concrete pavement as indicated on the drawings.

22. Furnish and install asphalt patching as indicated on the drawings.

23. Furnish and install buried utilities, including trenching, pipe-bedding, backfill, compaction, and asphalt or concrete patching as indicated on drawings.

24. Furnish and place aggregate base, Plant Mix bituminous surface, concrete curb, gutter, and sidewalks as indicated on the drawings.

25. Furnish and apply striping and markings for roads and parking lots as indicated on the drawings.

26. Furnish and install roadside reflectors, mile post markers, roadway reflectors and signage as indicated on the drawings.

27. Furnish and install new reinforced concrete slab and joints as indicated on the drawings.

28. Conduct, and submit all asphalt, concrete, or other material testing to comply with specifications indicated on the drawings.

29. Furnish all labor, equipment, and materials needed but not limited to perform earthwork for the installation of but not limited to retaining walls as indicated on the drawings.

30. Furnish all labor, equipment, and materials required to construct but not limited to new concrete structures as indicated on the drawings.

31. Furnish all labor, equipment, and materials needed but not limited to installation site landscaping and irrigation system as indicated on the drawings.

32. Furnish all labor and equipment needed but not limited to for sweep and clean parking lots and roads as indicated on the drawings.

33. Furnish all labor, equipment, and materials needed but not limited to power sweep or hand broom concrete surface.

34. Furnish all labor, equipment, and materials needed but not limited to remove and haul demolished concrete, excess sand, soil, and surplus excavation from the project site.

B. The actual work required will be detailed within the individual drawings.

C. The contractor may be directed on the drawings to work under different time restraints due to ongoing work, site conditions, or traffic in the area. This may include working during weekends.

D. The contractor shall supply all utilities which includes but not limited to water, electric, and fuel for the work designated on the drawings.

1.03 SPECIFICATIONS REQUIREMENTS

A. Requirements in Division 1, General Requirements, apply to Divisions 2 through 53.

B. Imperative statements in these specifications are Contractor requirements, unless otherwise stated.

1.04 DEFINITIONS

A. When specifications use a word or term defined in Federal Acquisition Regulations (FAR), definition of the word or term shall be in accordance with FAR sections in effect at the time solicitation was issued.

1.05 ACRONYMS

A. The following acronyms apply to specifications Divisions 1 through 53:

1. CO: Contracting Officer.
2. COR: Contracting Officer's Representative.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 14 10
USE OF SITE

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 REFERENCE STANDARDS

1. Not used

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. Land Use and Landscape Rehabilitation Plan:

1. For each Contractor use site on Government land.
    a. Show use location and extent of impact. Uses include but are not limited to the following:
        1) Buildings and service areas including offices, shops, warehouses, storage areas, fuel and oil storage areas.
        2) Parking areas, temporary roads, and haul routes.
        3) Utilities including air, power, and water lines; fire hydrants; and compressor station.
        4) Areas for processing, storing, and disposing of waste materials from construction operations.
        5) Temporary fences.
    b. Describe methods to preserve, protect, and repair, vegetation (such as trees, shrubs, and grass) and other landscape features on or adjacent to jobsite, which are not to be removed and which do not interfere with work required under this contract. Include methods to mark work area limits, protect disturbed areas, and prevent erosion.
    c. Describe methods to protect, and repair if damaged, existing improvements and utilities at or near jobsite.
    d. Describe methods for removing temporary structures and facilities, cleanup, and rehabilitating site after completion of construction activities.

1.04 PROJECT CONDITIONS

A. Government land as shown on drawings may be used for required construction facilities.

B. When private land is used for construction facilities, or other construction purposes, make necessary arrangements associated with use of private land.

C. Location, construction, operation, maintenance, and removal of construction facilities on Government land will be subject to approval of COR.

D. Do not interfere with work of other contractors or the Government in vicinity, or with reservations made by the Government for use of such land.

E. Housing for construction personnel will not be permitted on Government land.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CLEANING

A. Construction equipment:

1. Before bringing on site, clean construction equipment to remove dirt, vegetation, and other organic material to prevent introduction of noxious weeds, and invasive plant and animal species.

3.02 RESTORATION

A. Restore Contractor use areas to pre-construction condition.

END OF SECTION

SECTION 01 14 30
INTERRUPTION OF SERVICE

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include cost in prices offered in the Price Schedule for items of work for which interruption of services are required.

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00 - Submittals.

B. Interruption of Service Request:

1. Area where work will be done (by number or other description).
2. Outline procedures for accomplishing work including:
    a. Specific safety precautions to be taken.
    b. Type and location of barricades.
    c. Warning signs.
    d. Protective grounds and devices to be used.
3. Commencement time of work.
4. Duration of work.
5. Number of personnel and their classification.
6. Description of equipment to be used.
7. Information indicating that required materials are on site or data indicating shipping dates of materials not on site.

1.03 PROJECT CONDITIONS

A. Coordinate and schedule interruption of services with COR:

1. Coordinate work with Government operations.
2. No specific interruption of service request will be considered unless:
    a. COR has reasonable assurance that materials and equipment required for work will be onsite.

b. Contractor will be prepared to perform work on date and during period of time requested for specific interruption of service.

3. Allowable time and available interruption of service periods will govern interruption of service requests, work scheduling, onsite delivery of materials, and required drawings and data submittals.

B. When work cannot be performed during an approved interruption of service period, notify COR that interruption of service is not required.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 31 22
COORDINATION MEETINGS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00 Submittals.

1.03 SPECIFICATION DRAWINGS

A. AUTOCAD files of drawings are available to Contractor. With at least 14 days' notice, Government will make these files available to Contractor.

1.04 COORDINATION MEETING[S]

1. On-Site Construction Meeting: Regular coordination meetings will be held at work site during construction. These meetings will be between the Contractor and Reclamation staff assigned to the project. These meetings will be used to document progress of the project, resolve concerns, inspect work, and ensure a safe building site. The interval of these meetings will be determined by the CO and Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 31 30
CONTRACT DOCUMENT MANAGEMENT SYSTEM

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Contract Document Management System:

1. Payment: Lump sum price offered in the Price Schedule.

1.02 DEFINITIONS

A. CDMS: Contract Document Management System.

1. Contract Documents include, but are not limited to:

a. Specifications.

b. Contract Drawings.

c. Submittals.

d. RFCs: Request for Change (Contractor generated document).

e. RFIs: Request for Information (Contractor generated document).

f. RFPs: Request for Proposal (Government generated document).

g. CMs: Contract Modifications.

h. Contractor Proposals.

i. Value Engineering Proposals.

j. Government Inspection Reports.

k. invoices and Progress Payments.

l. Contract Schedules.

m. Meeting Agendas and Meeting Minutes.

n. Letters and Memos.

1.03 SUBMITTALS

A. Submit in accordance with Section 01 33 00 -Submittals.

B. RSN 01 31 30-1, Approval Data:

1. System provider experience, number of systems operating, references.

2. Documentation of system capabilities.

3. Instructions for system use.

C. RSN 01 31 30-2, Final Data:

1. DVD or CD of documents uploaded to CDMS.

1.04 QUALIFICATIONS

A. System provider: At least 5 years successful performance in providing required services.

1.05 CDMS REQUIREMENTS

A. CDMS shall be capable of generating, storing, tracking, categorizing, and managing Contract Documents.

B. Access:

1. Web-based:
    a. Contract Documents are stored and accessed by authorized individuals via an internet site.
    b. Compatible with web browsers MS Internet Explorer, Apple Safari, Mozilla Firefox and Google Chrome.
2. Ability to upload Contract Documents and make available for user download in supported file formats, minimum:
    a. Adobe Acrobat.
    b. MS Word.
    c. MS Excel.
    d. MS Project.
    e. Oracle Primavera P6 Project Manager.
    f. Autodesk AutoCAD Civil 3D.
3. Allow Contract Documents to be prepared by the Contractor or by Government.
    a. Preparing organization will control access of documents. See Document Security and Backup paragraph below.
4. Contractor and Government shall each have a project manager for CDMS.
    a. Each project manager shall have capabilities to assign users within their organization and to assign user rights which control access to documents based on user class and document type.
    b. Each organization shall be capable of defining its access hierarchy.
    c. Inclusion of users will be prerogative of organizational project manager.
    d. Government shall be able to create and modify project properties (i.e. Contractor, project location, description, bid amount, project directory, etc.).

5. Email notifications shall be automatically sent to selectable users when new documents are submitted and available for viewing, or alerts are generated. Examples:
    a. Updates to project information (e.g. entry of a new submittal);
    b. Changes to project information (e.g. approval of a submittal);
    c. Alerts (e.g. submittal under review for greater than 15 days without action).
6. Ability to link files, examples:
    a. RFP linked to a CM.
    b. Submittal linked to a Specification Section or Drawing.

C. Reports:
1. Generate reports that list and sort documents by status, examples include:
    a. Submittals that have been approved.
    b. Invoices paid to date.
    c. RFIs under review.
2. Generate alerts when documents requiring action approach or exceed allowable time.
3. Generate customizable summary reports, examples include:
    a. Submittal Turn-around.
    b. RFI Turn-Around.
    c. CM Processing Turn-Around.
    d. Total CM costs.
    e. Total CM Request Exposure.
4. Reports shall be printable, exportable as searchable pdf or printer friendly HTML, and exportable to Excel, XML, or CSV.
5. Ability to link from an item in a report directly to item by clicking on it.
    a. For example: in a submittal report, clicking on a submittal that is 15 days old takes you directly to information on that submittal.
6. Capable of producing a complete and logically organized set of documents within CDMS in both pdf and xml format.

D. Document Security and Backup:
1. SSL encryption for secured data exchange between browser and server (Secure access to documents and information).

2. Allow document access security until authoring party chooses to share it with others.
    a. Show parties that have access to a document.
    b. Extent of document sharing shall be determined by authoring party.
    c. Once documents are shared, track documents so that changes cannot occur without a record of changes.
3. Backup/Archiving to FTP site of documents to which an organization has access on a regular (minimum monthly) basis.
    a. Backups shall be in pdf format.
4. Documents shall be downloadable to FTP sites where Government and other organizations can each access their own data confidentially.

E. General Tracking and Control:
1. Documents shall be grouped into categories (Submittals, RFC, RFI, RFP, CM, Payments, Daily Inspection Reports, Meeting Minutes).
2. CDMS shall track:
    a. When documents were received or returned, as well as status of documents (e.g. Under Review; or Returned, Approved or Rejected, etc.).
    b. Document changes including who entered or changed document and date change was made.
    c. When a reviewer has opened an item.

F. Submittal Tracking and Control:
1. Ability to create master list of submittals ("Schedule of Submittals").
2. Supply standard submittal form for entering information. CDMS shall allow customizing of standard submittal form. Contractor shall be able to enter submittal summary information (required submittal number, title, description, due date, and specification section shall be required fields) and then upload submittal data in electronic format.
3. Track date received, date response due, date returned, and approval status.
    a. Status designations may be modified to fit Government standard designations - A/AAN/PAR/NA/ACK (Approved/Approved As Noted/Partially Approved - Resubmit/Not Approved/Acknowledged).
4. Supply Submittal Tracking form for Government to enter review comments and action taken. CDMS shall allow customizing of submittal tracking form.
    a. Allow for Government to route submittal to third parties by generating design-review transmittals with each submittal package item, to track status of individual sub-items within submittal package, and to route each sub-item to appropriate reviewers.

5. Ability to generate automatic notification after specified days without response.

G. RFI Tracking and Control:

1. Supply standard RFI form to enter information.
2. Ability to create or attach documents to the RFI form or links to other documents within CDMS.
3. Ability for Government to route RFI to appropriate reviewers and for reviewers to enter comments into standard response form.

H. Inspection Reports Tracking and Control:

1. Ability to attach Government standard inspection and report forms into CDMS and ability to create customizable inspection forms in CDMS. Typical forms:
   a. Daily Inspection Report (DIR).
   b. Survey requests.
   c. Plant inspection reports.
   d. Testing reports.
2. Ability to link or attach photos to forms and link forms to other documents within CDMS.

I. Contract Modifications:

1. Supply standard Contractor Proposal form with ability to attach documents and link to other documents within CDMS.
2. Supply ability to upload Government's standard CM form and RFP forms, or create an acceptable alternative, to enter information.
3. Ability to attach documents to these forms, and link to other documents within CDMS.
4. Ability for Contractor to respond to RFP and CM form with Cost & Time impacts.
5. Ability to track date CM issued and date responded, with automatic notification after specified days without response.

J. Cost Tracking and Payment Request Management:

1. Ability to import payment bid items cost from aMS Excel spreadsheet.
2. Ability to edit percent complete and payment amount each month. Format to be spreadsheet, e.g. items available for editing at once, rather than needing to edit one item at atime, save, open next item and edit that, etc.

K. Correspondence:

1. Ability to generate letters and memos.

a. Ability to attach documents to letters and memos, and to reference other documents within CDMS.

b. CDMS shall ability automatically assign sequential numbers to letters and memos.

2. Ability to generate responses to letters and memos.

a. System automatically generates memo suffixes, e.g. 1st response to Memo 32 to be 32.1, 2nd response to be 32.2, etc.

3. Official correspondence from Government to Contractor shall contain Government's official letterhead and corresponding logos.

4. Ability to generate meeting agendas and meeting minutes and to attach documents to minutes.

a. CDMS shall automatically assign sequential meeting numbers.

L. Miscellaneous Tracking and Controls. Ability to:

1. Generate reports tracking RFCs, RFIs, RFPs, CMs, Submittals, Payments, Memos, DIR's, survey requests, plant inspection reports and testing reports.

2. Filter logs based on criteria:

a. Submittals: Specification Section, Days Out, Status (A/AAN/R&R/ ACK/RWR).

b. RFI's: Days out, Status (Open/Closed), Specification Section/Dwg No., Responsibility/Ball-In-Court.

3. Sort Logs based on acriteria, e.g. for Submittal, Specification Section, Days Out, Status, or other criteria determined by the COR.

4. Supply forms to match Government's CM Form and Progress Payment Form or other forms when needed.

5. Track Cost Exposure with links to RFI and CM requests.

6. Measure productivity benchmarks on aproject such as computing average review days for RFIs and submittals, categorize CMs, and track total CM percentages by category.

7. Keyword search of documents in database.

8. Allow online Payment Requests by Contractor.

M. Budget and Funding Source Tracking:

1. Ability to enter funding sources and assign contract line items to multiple funding sources.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 IMPLEMENTATION

A. CDMS shall be in place and operating before Contractor transmits Contract Documents to Government, except RSN 01 31 30-1, Approval Data.

1. CDMS operation includes COR, or other authorized Government representative, having program control to assign users and user rights to Government personnel to access appropriate areas of system.

B. Contractor shall input Schedule of Submittals before making submittals. Include:

1. RSNs listed in Table 01 33 00A - List of Submittals.
2. Scheduled submittal date.

C. Contractor shall provide a report of submittal status monthly or as requested by COR. Submittal status report shall be in a table format and include:

1. Required Submittal Number (RSN).
2. Section Title.
3. Submittal Title.
4. Date Submitted.
5. Date of Response.
6. Approval Status (Approved-Complete, Approved as Noted - Resubmit, Received, Not Approved).
7. Days in Review.
8. Due Date.

D. CDMS shall be operational until final project closeout.

END OF SECTION

SECTION 01 32 10
CONSTRUCTION PROGRAM

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Costs:

1. Developing Baseline Schedule: Include in lump sum price offered in the Prices Schedule for Mobilization and Preparatory Work.
2. Updating and Using Construction Program: Include as part of Contractor's overhead.

1.02 DEFINITIONS

A. Schedule: The Critical Path Method (CPM) of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the project.

B. Project Calendar(s): Cross reference of numerical work days with calendar days. Project calendars serve as the basis for day/date conversion and assign work days and non-workdays.

C. Resources: Equipment, labor or crews, materials, subcontractors, fabricators, manufacturers, and consultants.

D. Out of Sequence Work: An activity that starts before its predecessor activities are completed.

1.03 REFERENCE STANDARDS

Associated General Contractors of America (AGC)

1.	AGC Manual	Construction Planning and Scheduling Manual, 2004

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

1. Furnish database files in format compatible with Oracle Primavera P6 Professional Project Management.
2. Upon request, provide information and data used to develop and maintain the Construction Program to the CO.

B. RSN 01 32 10-1, Representative Information:

1. Designation of authorized representative to develop and maintain Construction Program. Include resume with training and experience.

C. RSN 01 32 10-2, Baseline Schedule:

1. Include:

a. Construction Program/Schedule database.

b. Definition of project calendars.

c. Primavera layout file (.plf).

d. Gantt chart (Bar chart) for project on 11 by 17-inch print(s) and in portable document format (.pdf).

e. Activity report including logic constraints consisting of predecessors, successors, and constraint dates.

f. Tabular listings of resources and resource limitations used to produce baseline schedule. Correlate resources with schedule assumptions and offered price. Resource listings may be independent of schedule database.

g. Narrative explanation of project schedule development. Include impacts of resource limitations and weather conditions on project schedule development. Include planned number of work hours per day and hours per day for subcontractors.

D. RSN 01 32 10-3, Updated Schedule Reports:

1. This submittal is required for a proper invoice for progress payments in accordance with the clauses at FAR 52.232-27 - Prompt Payment for Construction Contracts and WBR 1452.232-82 - Other Invoice Requirements. In accordance with subparagraph (a)(i)(A) of the clause at FAR 52.232-27 - Prompt Payment for Construction Contracts, Government disapproval of this submittal will be considered failure of the Contractor to comply with contract requirements and payment due date may be delayed until 14 days after submittal contents are approved.

2. Include:

a. Construction Program database with updated activity and milestone data.

b. Definition of project calendars if revised from baseline calendars.

c. Primavera layout file (.plf).

d. Gantt chart for project on 11 by 17-inch print(s) and in portable document format (.pdf).

e. Narrative report specifically stating status of project.

1) When negative float exists, cite specific actions and conditions which caused "behind schedule" condition and provide proposed course of action to complete the project within the specified delivery time. When float changed from previous month's updated schedule, explain reason for change.

2) List of Contractor-initiated changes to current schedule stating reason for action taken and unresolved issues relating to the Construction Program. Government reserves the right to reject Contractor-initiated changes to current schedule which negatively impact Government action which was initiated on the basis of current schedule.

3) Discuss contract milestones and significant activities that were started, continued, or completed during the update period or scheduled during the next update period.

f. Submittal Register:

1) List submittals as listed in Table 01 33 00A.

2) Update Submittal Register monthly to include submittals and revised submittals. Register fields shall include RSN name and number, date submitted, date of response, status (e.g., approved, not approved, resubmittal required).

3) This register document is separate from scheduling database.

E. RSN 01 32 10-4, Time Impact Analysis:

1. Include:

a. Construction Program database with proposed revised activity and milestone data.

b. Proposed revised schedule due to change or delay. Highlight or list added, changed, or deleted activities.

c. Primavera layout file (.plf).

d. Gantt chart for project on 11 by 17-inch print(s) and in portable document format (.pdf).

e. Narrative report explaining results and conclusions.

1.05 QUALIFICATIONS

A. Representative: Experienced in developing and maintaining construction schedules and knowledgeable of activities and progress on-site to develop and maintain accurate and reliable schedules.

1.06 GENERAL

A. Develop, maintain, and use Construction Program to plan, monitor, evaluate, and report accomplishment of work.

1.07 SCHEDULES

A. Prepare construction schedules using Critical Path Method outlined in AGC Manual. Use a computer software program to perform mathematical analysis of scheduling data.

1. Prepare schedule based on required sequence and interdependence of activities. Logically sequence activities.
2. Prepare detailed activity network for accomplishing required work organized by Work Breakdown Structure (WBS). Utilize WBS in lieu of activity codes for organization of schedule. If activity codes are utilized in addition to WBS, use unique activity code names assigned as project codes rather than global codes.
3. Activities except "Award" shall have predecessor activities and activities except "Contract Complete" shall have successor activities.
4. Meet contract requirements; milestone(s) in accordance with the clause at FAR 52.211-10, Commencement, Prosecution, and Completion of Work; and relevant clauses and specification sections. Include interim milestone dates, Government interface dates, contract completion date, and other time or seasonal constraints specified in contract documents.
5. Include work of subcontractors, Government interfaces, and contract milestones.
6. Adjust Construction Program/schedule for seasonal weather conditions. Provide a narrative explaining the expected weather and plan for incorporation in schedule. Consider work influenced by high or low ambient temperatures or precipitation. Utilize Primavera P6 calendars to depict historical weather days that impact work. Assign weather calendars to work impacted by weather.
7. Define activities to level of detail resulting in their durations being no greater than 20 workdays.
    a. Durations for administrative activities (e.g., submittals and reviews) fabrication, manufacturing, and typical level of effort activities (e.g., dewatering, storm water management) will not be subject to workday duration limitation.
8. Include separate activities for submittal preparation and submittal reviews when submittal addresses work that involves significant quantities, long lead times, is on the critical path or near critical path, or as requested by the COR. Assign Government submittal review activities to a seven-day calendar with durations as specified in Section 01 33 00 - Submittals. Include Required Submittal Number (RSN) in activity description.

9. Include separate activities for fabrication or manufacturing when work involves significant quantities, long lead times, is on the critical path or near critical path, or as requested by the COR

10. Include contract title, contract number, and Contractor's name on transmittal cover sheet and each sheet of Gantt chart.

11. For each activity on Gantt chart, display activity identification number, activity description, planned or original duration, start date, finish date, total float, and calendar identification. Do not display early start and late start fields.

12. Include table of abbreviations used in the schedule, listed and defined alphabetically.

13. Use finish to start logic relationships between activities. Do not utilize start to start, finish to finish, or start to finish logic relationships. Do not use negative lead or lag times.

14. Use durations in units of whole workdays.

15. Provide best estimate of time required to complete activity considering quantity of work, work conditions, location of work, and planned resources for activity.

16. Equate durations of Government reviews and other identified actions to maximum number of calendar days specified in their respective paragraphs.

17. Establish workday calendar(s) and use these in the schedule to translate activity's workday duration into calendar dates. Use unique calendar names; do not use software default calendar names. Save calendars as project calendars, not global calendars.

B. Baseline Schedule:

1. Represents Contractor's as-planned approach to accomplishing the work. Do not include actual start dates, percent completes, or actual finish dates.

C. Updated Schedule:

1. Meet monthly with COR at Government's project office, or at a location approved by the COR, to review progress made to end date of progress payment period. Establish dates that activities were started and completed and remaining duration for each activity started but not completed during the period.

   a. Discuss and mutually agree upon changes to the schedule.

   b. Out-of-sequence activities are not allowed. Revise logic to reflect change in work plan.

   c. Finalize updated Construction Program database with mutually agreed upon changes.

2. Following receipt of executed contract modification, incorporate activity data stipulated in modification into current schedule for inclusion in next scheduled progress update. Provide appropriate logic relationships for revised activities.

3. Assign a unique project file name for each schedule update.

1.08 TIME IMPACT ANALYSIS

A. Provide time impact analysis for contract changes (e.g., change order, proposed modification, or value engineering change proposal) to support a claim or request for equitable adjustment to the contract due to delay or accelerated schedule.

B. The CO may use time impact analysis to determine if time extension or reduction to contract milestone dates is justified.

1. Time impact analysis is required for contract changes whether the Contractor's current schedule milestone dates are the same as, earlier than, or later than, those required under the contract.

2. Changes, additions, or deletions to activities; activity durations; activity time frames; or activity predecessors and successors will not automatically determine that extension or reduction of contract time is warranted or due the Contractor.

3. Time extensions for performance will be considered only to the extent that the Contractor's current scheduled milestone dates exceed contract milestone dates.

C. Float is not for exclusive use by or benefit of either the Government or the Contractor.

D. Perform time impact analyses using data in most recent approved schedule update prior to change or delay event.

1. Prepare proposed revised schedule and narrative description describing and highlighting changes or delays.

2. Prepare summary comparing results of two schedule analyses: One using current schedule data from last approved updated schedule prior to event requiring analysis, and one using proposed schedule data incorporating changes or delays.

a. Show contract milestones and activities whose periods of performance have shifted as result of change which affects production and/or manufacture schedules, material orders, construction seasons, and labor and/or equipment utilization.

b. For activities directly affected by change or delay, include the current and proposed items:

1) Activity description.

2) Types and quantities of major pieces of equipment, principal manpower, and pacing materials (materials that affect activity start, duration, or finish).

3) Activity duration.

4) Narrative containing rationale used in developing the proposed logic relationships and activity data.

c. Data date for impacted schedule used in comparison shall be the same as approved updated schedule data date.

d. Base schedule comparisons on status of work and available float at time the CO directs or proposes change to the work, the Contractor submits a value engineering change proposal, or when a delay occurs as shown in approved updated schedule.

1.09 [GOVERNMENT-FURNISHED LOGIC DIAGRAM

A. Government's basic assumptions used in designing and planning the work are depicted on the Government-developed summary logic diagram shown on the drawings.

B. Government-developed summary logic diagram is furnished for information purposes and is not binding as procedure for accomplishing the work.

1. Government does not recommend or require that the work under this contract be performed in the manner and sequence shown on Government-developed summary logic diagram.

2. Government does not represent that the manner and sequence of performing the work shown on this diagram is the best or only way to proceed with required work.]

1.10 REVIEW AND EVALUATION

A. Baseline Schedule:

1. Within 21 calendar days after receipt of baseline schedule:

a. CO will approve or not approve proposed baseline schedule.

b. Upon request from the CO, meet with COR for a joint review of proposed baseline schedule.

c. If schedule is not approved, revise and resubmit within 7 calendar days following date of rejection letter.

2. Do not proceed with onsite work, except mobilization and surveying, until baseline schedule has been approved by the Government.

B. Updated schedules:

1. Submit updated Construction Program schedule monthly.

2. Submit updated schedule at least seven days prior to the submission of each invoice request for progress payment.

3. If updated schedule is not approved, revise and resubmit updated schedule within 7 calendar days following date of rejection letter.

4. [The COR will schedule pre-submittal meeting with the Contractor's representative each month to review draft updated schedule prior to the Contractor submitting RSN 01 32 10-3, Updated Schedule.]

C. Failure to include elements of the work in schedules will not release Contractor from completing required work under the contract.

D. Performance will be evaluated by the Government using approved CPM schedules.

1.11 FAILURE TO COMPLY

A. Failure to comply with requirements of this Section shall be grounds for determination by the CO that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within specified time.

B. The CO may terminate the Contractor's right to proceed with the work, or separable part of it, in accordance with default terms of this contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 33 00
SUBMITTALS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 REFERENCE STANDARDS

A. American Society of Mechanical Engineers (ASME)

1.	ASME Y14.1-12	Decimal Inch Drawing Sheet Size and Format

B. National Institute of Building Sciences (NIBS)

1.	NIBS NCS-14	United States National CAD Standards, Version 6

1.03 DEFINITIONS

A. Days: Calendar days.

B. Required Submittal Number (RSN): Identifies items to be submitted together as a complete submittal.

C. Submittal Types, as listed in Table 01 33 00A - List of Submittals:

1. A - Action:
    a. Government will respond as to adequacy of submittal.
    b. Action submittals are considered “shop drawings” within terms of clause at FAR 52.236-21, Specifications and Drawings for Construction.
2. I - Informational:
    a. Government will acknowledge receipt of Informational submittals.
    b. Government may reject an Informational submittal when submittal does not satisfy contract requirements. Contractor shall correct mistakes or deficiencies in rejected Informational submittals and resubmit.
    c. Informational submittals are considered “shop drawings” within terms of clause at FAR 52.236-21, Specifications and Drawings for Construction, except that approval by Government is not required.

1.04 SUBMITTAL REQUIREMENTS

A. In case of conflict between requirements of this section and requirements included elsewhere in these specifications, requirements included elsewhere take precedence.

B. General:

1. Prepare in English.
2. Label with contract number and title, and RSN.
3. Measurement Units: US Customary Units.
4. Provide a unique transmittal number for each submittal.

C. Drawings:

1. Minimum Identification in Title Block:
   a. Contract number and title.
   b. Contractor's or supplier's title and drawing number.
   c. Date.
2. Reserve 3- by 3-inch space next to title block for review stamps.
3. Size: D size (22 inches by 34 inches) as defined by ASME Y14.1.
4. Draw to scale using computer drafting or drafting equipment, unless otherwise specified.
   a. Computer drafted drawings:
      1) In accordance with NIBS NCS.
      2) Electronic file format: Compatible with AUTOCAD, Version 2019 or later.
      3) Compile using "eTransmit" utility in AUTOCAD.
   b. Drawing prepared with drafting equipment, when allowed: Lettering shall be neat.
5. Drawings Designated as "Government Format" in Specifications:
   a. Computer drafted.
   b. Government will provide electronic AutoCAD format template.
   c. Title block and sheet format:
      1) As shown on standard drawing 40-D-7102.
      2) Government will supply template.
      3) Government will supply specific title block information to be used.

6. Final Drawings:
    a. Computer drafted.
    b. Government will supply electronic AutoCAD format template.
    c. Show as-built changes, including revision dates, made during installation. Indicate changes by clouding.
7. Electronic Files: On CD or DVD discs.

D. Product Data:
1. Mark manufacturer's data for commercial products or equipment, such as catalog cut sheets.
    a. Identify manufacturer's name, type, model, size, and characteristics.
    b. Illustrate that product or equipment meets requirements of specifications.
    c. Mark items to be furnished in a manner that will photocopy (no highlighter).
    d. Strike through items that do not apply.

E. Certifications:
1. Certifications by a registered professional: Signed and sealed by registered professional.
2. Manufacturer’s certifications: Signed by authorized representative of manufacturer.

1.05 SUBMITTALS PROCEDURES

A. Submit only checked submittals. Submittals without evidence of Contractor's approval will be returned for resubmission.

B. Submit complete sets of required materials for each RSN as specified in “Submittals Required” column in Table 01 33 00A - List of Submittals. A complete set includes all listed items for RSNs with multiple parts.

C. Submit number of sets specified in “No. of sets to be sent to:” columns in Table 01 33 00A - List of Submittals.

D. Include the following information in transmittal letters:
1. Contract number and title.
2. RSN for each attached submittal.
3. Responsible code.
4. Number of sets for each RSN.
5. Identify submittal as initial or resubmittal.

E. Resubmittal of submittals not approved:

1. Mark changes such that they are readily identifiable and show revision date.
2. Describe reasons for significant changes in transmittal letter.
3. Resubmit returned submittals within 7 days after receiving comments, unless otherwise directed.
4. Requirements for initial submittals apply to resubmittals.

F. More than 1 RSN may be submitted under a transmittal letter, provided responsible code is same.

1.06 REVIEW OF SUBMITTALS

A. Time Required:

1. Submittal review will require 10 days for review of each submittal or resubmittal, unless otherwise specified.
2. Time required for review of each submittal or resubmittal begins when complete sets of materials required for a particular RSN are received and extends through return mailing postmark date.

B. Time in Excess of Specified:

1. CO may extend contract completion date to allow additional time for completing work, or delivering materials or equipment affected by excess review time.
    a. Time extension will be to extent that excess review time caused delay to contract completion date.
    b. Time extension will not exceed time used in excess of specified number of days for review of submittals or resubmittals.
2. No time extension will be allowed if Contractor fails to make complete action submittals in sequence and within time periods specified.
3. Adjustment for delay will be made only to extent that:
    a. Approval was required under contract, and.
    b. Requests for approval were properly and timely submitted and were approved.

C. Return of Submittals:

1. Action Submittals: One set of submittals required for action will be returned either approved, approved with comments, or not approved.
    a. Revise and resubmit submittals not approved.
    b. Do not change designs without approval of CO after drawings, documentation, and technical data have been approved.

2. Informational Submittals: Government will acknowledge Informational submittals.

   a. Informational submittals will not be returned when they satisfy contract requirements.

   b. Informational submittals that do not satisfy contract requirements may be returned for resubmittal or additional information may be requested.

1.07 TRANSMITTAL

A. Addresses for codes listed in Table 01 33 00A - List of Submittals:

1. Contracting Officer, Bureau of Reclamation, PO Box 61470, Boulder City, NV 89006-1470.

2. Contracting Officer's Representative, Bureau of Reclamation, PO Box 61470, Boulder City, NV 89006-1470

3. Project Manager, Bureau of Reclamation, PO Box 60400, Boulder City, NV 89006-0400

B. Submittals required by specifications, but not listed in Table 01 33 00A - List of Submittals:

1. Submit in accordance with this section.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

						CO	COR	PM
I-1	Schedules for Construction Contracts (52.236-15)	Practicable Schedule: Blackline Prints	Within 14 days after Notice to Proceed but prior to Mobilization to the Jobsite	A	CO	1	2	1
I-2	Schedules for Construction Contracts (52.236-15)	Updated schedule showing actual progress: Bar Chart and/or Timeline	As directed by the CO	A	CO	1	1	1
I-3	Schedules for Construction Contracts (52.236-15)	Supplementary Schedule or Schedules: Blackline Prints	As deemed necessary by the CO.	A	CO	1	1	1

						CO	COR	PM
I-4	Safety and Health (WBR 1452.223-81)	Safety Program	Submitted and accepted before commencing onsite work. See section 3 of RSHS	A	CO	1	1	0
01 35 10-1	Safety Data Sheets	Complete LHM and SDS	At least 14 days before jobsite delivery of hazardous material	I	COR	1	1	1
01 35 10-2	Safety Data Sheets	Updated LHM and SDS	At least 14 days before jobsite delivery of hazardous material not previously listed	I	COR	1	1	1
01 35 30-1	Contractor‘s Onsite Safety Personnel	Qualifications	Prior to employment	I	COR	1	1	1
01 35 30-2	Contractor’s Onsite Safety Personnel	Detailed Safety Inspection Report	At least biweekly	I	COR	0	1	0
01 46 20-1	Testing Agency Services	Testing Agency Services Plan	Within 14 days after Notice to Proceed but prior to Mobilization to the Jobsite	I	COR	0	1	1
01 46 20-2		Contractor Quality testing results		I	COR	0	1	1
01 55 00-1	Vehicular Access and Parking	Initial Digital Recording	At least 21 days before beginning on-site work	A	COR	0	1	0
01 55 00-2	Vehicular Access and Parking	Post Construction Digital Recording	At least 21 days before leaving site.	A	COR	0	1	0
01 55 00-3	Vehicular Access and Parking	Post Repair Digital Recording	Within 14 days of making repairs.	A	COR	0	1	0
01 55 20-1	Traffic Control	Traffic Control Plan	At least 15 days before affecting public traffic.	A	COR	0	1	0
01 57 30-1	Water Pollution Control	Water Management Plan	At least 28 days before commencing construction activities]	A	COR	0	1	1
01 57 30-1	Water Pollution Control	Pollution Prevention Plan	At least 28 days before start of onsite construction work	A	COR	0	1	1
01 57 30-2	Water Pollution Control	Spill Prevention Control and Countermeasure Plan (SPCC)	At least 28 days before delivery or storage of oil	A	COR	0	1	0
01 57 50-1	Tree and Plant Protection	Protection Plan	At least 28 days before start of onsite construction work	A	COR	0	1	0
01 71 20-1	Surveying	Surveying Plan	At least 28 days before beginning survey work	A	COR	0	1	1

						CO	COR	PM
01 71 20-2	Surveying	Resume	At least 28 days before beginning survey work; At least 28 days before personnel change	I	COR	0	1	0
01 71 20-3	Surveying	Accuracy Check Results	At least 14 days before beginning survey work	I	COR	0	1	1
01 71 20-4	Surveying	Completed and Reduced Survey Notes	Within 2 days of completing and reducing notes	I	COR	0	1	1
01 71 20-5	Surveying	Quantity Survey Notes and Computations	Accompanying progress payment requests	I	COR	0	1	1
01 71 20-6	Surveying	Workday's Survey Notes	At conclusion of workday when requested by Government	I	COR	0	1	0
01 74 00-1	Cleaning and Waste Management	Waste Production and Disposal Plan	At least 28 days before starting onsite work	I	COR	0	1	0
01 74 00-2	Cleaning and Waste Management	Waste Production and Disposal Records	Within 7 days of waste disposal	I	COR	0	1	0
01 74 00-3	Cleaning and Waste Management	Environmental Consultant Resume	At least 28 days before beginning environmental assessment	I	COR	0	1	0
01 74 00-4	Cleaning and Waste Management	Environmental Site Assessment	Within 14 days of completion of work	I	COR	0	1	0
01 78 30-2	Project Record Documents	Progress As-built Drawings	Within 14 days after construction of a particular structure or work is completed	I	COR	0	1	0
01 78 30-5	Project Record Documents	Final Drawings	Before final project Closeout	I	COR	0	1	0
02 82 20-1	Removal and Disposal of Asbestos Containing Materials	Contractors and asbestos abatement sub-contractors' history	At least 40 days before asbestos removal starts	I	COR	1	1	1
02 82 20-2	Removal and Disposal of Asbestos Containing Materials	Resumes, certificates, and qualifications	At least 40 days before asbestos removal starts	I	COR	1	1	1
02 82 20-3	Removal and Disposal of Asbestos Containing Materials	Asbestos hazard abatement plan	At least 40 days before asbestos removal starts	A	COR	1	1	1

						CO	COR	PM
02 82 20-4	Removal and Disposal of Asbestos Containing Materials	Working level test results	Within 2 days after tests completed	I	COR	1	1	1
02 82 20-5	Removal and Disposal of Asbestos Containing Materials	Certificate of disposal	Within 15 days after disposal	I	COR	1	1	1
03 20 00-1	Concrete Reinforcing	Reinforcement diagrams and lists	Within 14 days prior to construction	I	COR	0	1	1
03 30 00-1	Cast in Place Concrete	Mix design for each concrete mix	within 14 days of notice to proceed	A	COR	0	1	1
03 30 00-7	Cast in Place Concrete	Test reports	Within 24 hours for failing test results, 7 days after final break of specimen.	A	COR	0	1	1
03 81 10-1	Concrete Removal	Concrete removal plan	within 14 days of notice to proceed	A	COR	0	1	1
31 23 02-1	Compacting Earth Materials	Contractor materials testing requirements and frequency	Within 24 hours with COR's approval to proceed.	A	COR		1	1
31 23 70-1	Controlled Low Strength Material (CLSM)	Approval data	As requested by COR	A	COR	0	1	1
31 23 70-2	Controlled Low Strength Material (CLSM)	Contractor field quality testing results	As requested by COR	A	COR	0	1	1
32 12 22-1	Asphalt Concrete Pavement	Job mix formula	within 14 days of notice to proceed	A	COR	5	1	1
32 32 20-1	Segmental Retaining Wall	Approval drawings and data	At least 14 days prior to installation	A	COR	1	1	1
32 32 20-2	Segmental Retaining Wall	Approval samples	At least 14 days prior to material purchase	A	COR	1	1	0
32 32 20-3	Segmental Retaining Wall	Certifications	At least 14 days prior to material purchase	A	COR	1	1	0
32 32 20-4	Segmental Retaining Wall	Instructions	At least 14 days prior to material purchase	A	COR	1	1	1

END OF SECTION

SECTION 01 35 10
SAFETY DATA SHEETS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 DEFINITIONS

A. LHM: List of Hazardous Materials.

B. SDS: Safety Data Sheet.

1. Referred to as Material Safety Data Sheets in the clause at 52.223-3, Hazardous Material Identifications and Material Safety Data -Alternate 1.

1.03 APPLICATION

A. For the purposes of this contract, “delivered under this contract” in paragraph (b) of the clause at FAR 52.223-3, Hazardous Material Identification and Material Safety Data - Alternate 1, includes:

1. Materials delivered to Government.
2. Materials incorporated into work.
3. Materials used by the Contractor during contract performance at the jobsite.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 -Submittals.

B. RSN 01 35 10-1, Complete LHM and SDS.

C. RSN 01 35 10-2, Updated LHM and SDS:

1. Comply with paragraph (e) of clause at FAR 52.223-3, Hazardous Material Identification and Material Safety Data - Alternate 1.

1.05 DELIVERY

A. Do not deliver hazardous materials to jobsite which are not included on original or previously updated LH

END OF SECTION

SECTION 01 35 20
SAFETY AND HEALTH

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in the prices offered in the Price Schedule for other items of work.

1.02 REFERENCE STANDARDS

A. Bureau of Reclamation (USBR)

1. RSHS — Reclamation Safety and Health Standards including revisions posted at https://www.usbr.gov/safety/rshs/index.html

B. Applicable State Safety and Health Regulations for Construction.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 35 20-1, Safety Program:

1. Written safety program in accordance with of RSHS.
2. Cover aspects of on site and applicable off site operations and activities associated with this contract.
3. Follow the outline in Appendix B of RSHS
4. Will not be accepted for review by the COR unless it addresses, in order, lettered and numbered per Appendix B, a narrative for each applicable item in the outline. For items in the outline that do not apply to this contract write “Not applicable to Contract” next to the number/letter.
5. A generic company safety program is not acceptable. Safety Program must be site specific for this contract.
6. Submitted and accepted prior to commencing onsite work, including mobilization.

C. RSN 01 35 20-2, Job Hazard Analysis List:

1. Provide a list of JHA’s that shall be submitted throughout the project.

1.04 DOCUMENTATION AND RECORDS

A. Prepare and retain all safety plans, programs, training content, and training records that are applicable to the scope of the work and make them available to the COR unless they are already included in the written safety program. Some examples include but are not limited to:

1. Asbestos Exposure Assessment and Training Records.
2. Cadmium Written Compliance Program and Training Records.
3. Chromium VI Training Records.
4. Confined Space and when deemed necessary by existing and/or introduced hazards of Permit Required Confined Space through the Written Program and Training Records.
5. Forklifts and Other Industrial Trucks Training Records.
6. Electrical Safety Requirement Training Records.
7. Fall Protection Written Program and Training Records.
8. Fire Protection and Prevention Written Program and Training Records.
9. Flammable and Combustible Liquids Written Spill Control Plan.
10. General Safety and Health Provisions, Written Safety Program, and Regular Safety Inspection Records.
11. Hazard Communication Written Program and Training Records.
12. Ladder Written Compliance Program and Training Records.
13. Lead Written Program and Training Records.
14. Lockout/Tagout: Refer to RSHS Section 15 Hazardous Energy Control Program (HECP) Training Records.
15. Bloodborne Pathogens Exposure Control Plan, Training Records.
16. Occupational Noise Exposure Written Program and Training Audiometric Testing Records.
17. Personal Protective Equipment (PPE) Hazard Assessments and Training Records.
18. Power Operated Hand Tools Training Records.
19. Respiratory Protection Written Program and Training Records.
20. Safety Training and Education Written Program and Training Records.
21. Scaffolds Training Records.
22. Steel Erection Training Records, if applicable.
23. Welding, Cutting, and Brazing Written Program and Training Records.

1.05 SAFETY AND HEALTH

A. Provide and maintain a work environment and procedures that:

1. Safeguard the public and Government's personnel, and Contractor employees exposed to Contractor operations and activities.

1. Avoid interruptions of site operations and delays in project completion dates.

2. Control costs in contract performance.

B. Do not begin on site work, including mobilization, until the COR accepts the Safety Program.

C. Participate in Contractor Safety Program Review meeting prior to mobilization.

D. Minimum work crew shall consist of no less than two (2) people, unless approved by COR.

E. Develop Job Hazard Analyses for each distinct phase of work under the contract.

1. Do not begin a phase of work until a JHA is acceptable to COR and shared with construction employees.

2. Activities involving hazardous materials shall have the appropriate Safety Data Sheet(s) attached to the JHA.

F. Comply with RSHS 29 CFR 1926, FAR 52.236-13.

1. One copy of RSHS (in digital format) will be provided at no charge for use in connection with the specifications.

G. Correct safety and health violations identified by the CO or the COR.

H. When the Contractor fails or refuses to correct a compliance directive, the CO may issue an order to stop all or part of the work.

1. When satisfactory corrective action is taken, an order to resume work will be issued.

2. The Contractor shall not be entitled to extension of time or to claim for damage or to additional compensation by reason of either the directive or stop order.

3. Failure of the CO to order discontinuance of the Contractor’s operations shall not relieve the Contractor of the responsibility for the safety of personnel and property.

I. Maintain accurate record of and report to the CO the following occurrences during performance of this contract:

1. Death.

2. Occupational disease.

3. Traumatic injury to employees or the public.

4. Property damage in excess of $2,500.

J. The rights and remedies of the Government provided in this section are in addition to any other rights and remedies provided by law or under this contract.

1. In the event there is a conflict between requirements contained in RSHS, specification paragraphs, Contractor's approved Safety Program, referenced safety and health codes, and standards, or the U.S. Department of Labor Construction Safety and Health Standards, promulgated under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327 et seq.), as amended, the more stringent requirement shall prevail.

K. Provide appropriate safety barricades, signs, and warnings.

L. Perform all training as required by federal, state, and local regulations prior to any activity that requires it.

1. Training records must be submitted to the COR upon request.

2. In no case shall an employee perform work until all required training is complete.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 35 30
CONTRACTOR'S ONSITE SAFETY PERSONNEL

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 REFERENCE STANDARDS

A. Bureau of Reclamation (USBR)

1.	RSHS	Reclamation Safety and Health Standards, including revisions posted at https://www.usbr.gov/safety/rshs/index.html

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 35 30-1, Qualifications:

1. Contractor's Onsite Safety Represent.
2. Part-time Onsite Safety and Health Representative.

C. RSN 01 35 30-2, Safety Inspection Reports:

1. Prepare detailed biweekly safety inspection reports listing noted deficiencies, digital photos, abatement dates and follow-up action for all jobsite activities.
2. Inspection report shall include findings of jobsite walk-through with Government representative.

1.04 QUALIFICATIONS

A. Contractor's Onsite Safety Representative:

1. Competent supervisory employee with current safety and health related training, experience and duties on at least three projects of similar nature, size, complexity, and work to be performed as the current project
2. OSHA Construction 30-Hour Training Course including applicable elective subjects, for example Concrete and Masonry Construction; Confined Space Entry; Cranes, Derricks, Hoists, Elevators, and Conveyors; Ergonomics; Excavations; Fire Protection and Prevention; Materials Handling, Storage, Use and Disposal; Motor Vehicles, Mechanized Equipment and Marine Operations; Rollover

Protective Structures and Overhead Protection; and Signs; Signals and Barricades; Powered Industrial Vehicles; Safety and Health Programs; Scaffolds; Steel Erection; Tools - Hand and Power; Welding and Cutting. Current first aid CPR certification.

3. Include resume with current telephone numbers of references, description of safety representative responsibilities, and copies of training certifications.

1.05 APPLICATION

A. Designate a supervisory employee as the Contractor's Onsite Safety Representative prior to start of construction and employ Safety Professional for part-time on the job.

1. Safety Representative requirements may be met by retaining appropriate level of services of an acceptable safety consultant.

B. Contractor's Onsite Safety Representative Authorities, Duties, and Responsibilities:

1. Responsible for effectively implementing the Contractor's Safety Program.
2. The Safety Representative shall coordinate all emergency response activities.
3. Recommend controls for observed hazards or predicted hazards.
4. Full authorization to correct unsafe acts on the spot, including the authority to stop work to correct safety and health problems.
5. Lead weekly safety meetings at the jobsite.
6. Onsite, during any and all construction activities.
7. Assemble, review, and sign each Job Hazard Analysis (JHA).
    a. Review of JHA with employees.
8. Verify the correct use of respiratory protection and personal protective equipment.
9. Conduct and prepare weekly safety inspections in conjunction with the onsite government representative listing noted deficiencies, their abatement dates, follow up action. The report shall be available for review onsite.
10. Provide direct oversight and assemble a detailed report of all incident reviews, near-misses, accidents, and emergency response or rescue actions.
11. The Onsite Safety Representative may have other non-safety duties.

1.06 QUALITY CONTROL

A. Contractor's Onsite Safety Representative:

1. The effectiveness of the Contractor's Onsite Safety Representative in prosecuting the safety program will be subject to continued review and approval by the COR.

2. Should the Contractor's onsite safety representative's effort be deemed insufficient the Contractor may be required to provide the services of a qualified, full-time safety and health representative at no additional cost to the Government.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

END OF SECTION

This page intentionally left blank.

SECTION 01 42 10
REFERENCE STANDARDS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 REFERENCE STANDARDS

A. Referenced editions of standard specifications, codes, and manuals form a part of this specification to the extent referenced.

B. These specifications take precedence when conflicting requirements occur between specifications and referenced standard.

1.03 JOBSITE REFERENCE STANDARDS

A. Maintain onsite, access to referenced standard specifications, codes, and manuals required for onsite work in progress. Make available for use by the Government.

1.04 AVAILABILITY

A. Code of Federal Regulations (CFR):

1. Available online, authorized by the National Archives and Records Administration (NARA) and the Government Printing Office (GPO), at http://www.gpo.gov/fdsys/search/home.action

B. Federal Specifications, Standards, and Commercial Item Descriptions:

1. Copies of Federal Specifications, Standards, and Commercial Item Descriptions may be obtained from GSA Federal Supply Service, see the provision at FAR 52.211-1, Availability of Specifications Listed in the GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29.

C. Bureau of Reclamation Documents:

1. Reclamation Safety and Health Standards (RSHS) may be downloaded at https://www.usbr.gov/safety/rshs/index.html.

a. Hard copies of RSHS, stock number 024-003-00204-6, may be purchased from The Superintendent of Documents at the U.S. Government Printing Office (GPO), phone number 202-512-1800. Hard copies of RSHS are subject to revisions posted on the site shown above.

1) GPO online bookstore: http://bookstore.gpo.gov/actions/GetPublication.do?stocknumber=024-003-00204-6.

D. Industrial and Governmental Documents:

1. When areference has a joint designation (e.g. ANSI/IEEE) these specifications generally cite the proponent organization (e.g. IEEE).

2. Addresses for obtaining industrial and governmental (other than Federal and Bureau of Reclamation specifications and standards) specifications, standards, and codes are listed in Table 01 42 10A -Addresses for Specifications, Standards, and Codes.

Table 01 42 10A - Addresses for Specifications, Standards, and Codes

Acronym	Name and Address	Telephone
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW., Suite 249 Washington, DC 20001 www.transportation.org	202-624-5800 800-231-3475
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 https://www.concrete.org/home.aspx"	248-848-3700
ADOT	Arizona Department of Transportation 1655 W Jackson Street, MD 126F Phoenix, AZ 85007 https://azdot.gov/	602-712-7355
AEIC	Association of Edison Illuminating Companies PO Box 2641 Birmingham, AL 35291-0992 https://aeic.org/	205-257-3839
AGC	Associated General Contractors of America 333 John Carlyle Street, Suite 200 Alexandria, VA 22314 www.agc.org	703-548-3118
AISC	American Institute of Steel Construction One East Wacker Drive, Suite 3100 Chicago, IL 60601-2001 https://www.aisc.org	312-670-2400

Table 01 42 10A - Addresses for Specifications, Standards, and Codes

Acronym	Name and Address	Telephone
AMPP	Association for Materials Protection and Performance 15835 Park Ten Place Houston, Texas 77084	1-800-797-6223
ANSI	American National Standards Institute 1899 L. Street, NW. Washington, DC 20036 https://www.ansi.org	202-293-8020
APA/EWA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253-565-6600
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers 180 Technology Parkway Peachtree Corners, GA 30092 https://www.ashrae.org/	800-527-4723
ASME	American Society of Mechanical Engineers Two Park Avenue New York, NY 10016-5990 www.asme.org	800-843-2763
ASTM	ASTM International P.O. Box C700 100 Barr Harbor Drive West Conshohocken, PA 19428-2959 www.astm.org	610-832-9500
AWS	American Welding Society 8669 NW 36 Street, #130 Miami, FL 33166-6672 https://www.aws.org/about/page/home	800-443-9353 305-443-9353
CALTRANS	California Department of Transportation 1120 N Street Sacramento, CA 95814 https://dot.ca.gov/programs/construction	916-654-3082

Table 01 42 10A - Addresses for Specifications, Standards, and Codes

Acronym	Name and Address	Telephone
ICEA	Insulated Cable Engineers Association P.O. Box 2694 Alpharetta, GA 30023 http://www.icea.net/	
ICRI	International Concrete Repair Institute 1000 Westgate Drive, Suite 252 St. Paul, Minnesota 55114 http://www.icri.org/	651-366-6095
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue,17th Floor New York, NY 10016-5997 www.ieee.org	732-562-5501
NDOT	Nevada DOT 1263 South Stewart Street Carson City, NV 89712 Standard Specifications, Standard Plans, and Design Guides | Nevada Department of Transportation (nevadadot.com)	775-888-7000
NEMA	National Electrical Manufacturers Association 1300 N 17th Street, Suite 1847 Rosslyn, VA 22209 www.nema.org	703-841-3200
NETA	International Electrical Testing Association Inc. 3050 Old Centre Ave., Suite 102 Portage, MI 49024 http://www.netaworld.org/	269-488-6382
NFPA	National Fire Protection Association One Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101 www.nfpa.org	800-344-3555 617-770-3000
NIBS	National Institute of Building Sciences 1090 Vermont Avenue, NW., Suite 700 Washington, DC 20005-4905 www.nibs.org	202-289-7800
RTC	Uniform Standard Specifications and Drawing Archives - Projects and Initiatives (rtcsnv.com)	

Table 01 42 10A - Addresses for Specifications, Standards, and Codes

Acronym	Name and Address	Telephone
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance 2500 Wilson Boulevard, Suite 300 Arlington, VA 22201 www.tiaonline.org	703-907-7700
UL	Underwriters Laboratories, Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847-272-8800

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 46 00
QUALITY PROCEDURES

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 DEFINITIONS

A. Government Contract Quality Assurance: (from FAR 46.101) Various functions, including inspection, performed by the Government to determine whether a contractor has fulfilled the contract obligations pertaining to quality and quantity.

B. Contractor Quality Assurance / Quality Control (QA/QC): Activities performed by the Contractor to ensure work conforms to contract requirements.

1. The clause at FAR 52.246-12 - Inspection of Construction, requires the Contractor to establish an inspection system to ensure quality.

2. Contractor QA/QC includes activities in addition to specified Contractor Quality Testing to ensure work conforms to contract requirements.

C. Contractor Quality Testing: Specified tests shall be performed by the Contractor.

1 The Government will evaluate results of these tests when determining acceptability of work.

2. The Contractor may use the test results as part of Contractor QA/QC.

a. The Government anticipates that these tests will be part of the Contractor's QA/QC program, however the tests do not relieve the Contractor of maintaining adequate quality system in accordance with the clause at FAR 52.246-12 - Inspection of Construction.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

This page intentionally left blank.

SECTION 01 46 20
TESTING AGENCY SERVICES

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Testing Agency Services:

1. Payment: Lump-sum price offered in the Price Schedule.

B. Progress Payments: If test reports are not submitted in a timely manner, the Contractor will be considered to be in non-compliance and delaying that phase of the work to which the testing applies. The CO may retain appropriate amounts of applicable progress payments.

1.02 REFERENCE STANDARDS

A. ASTM International (ASTM)

1.	ASTM C1077-16a	Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
2.	ASTM C1093-15a	Accreditation of Testing Agencies for Masonry
3.	ASTM D3666-16	Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
4.	ASTM D3740-12a	Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
5.	ASTM E329-14a	Agencies Engaged in Construction Inspection, Testing, or Special Inspection
6.	ASTM E543-15	Agencies Performing Nondestructive Testing

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 46 20-1, Testing Agency Services Plan:

1. Include:

a. Names of agencies to perform sampling and testing.

b. Agency accreditation to perform specified testing or agency qualifications to perform specified testing.

c. Resumes of personnel performing tests.

d. Samples of report forms.

2. No change in the approved plan may be made without written concurrence by the COR.

C. RSN 01 46 20-2, Contractor quality testing results:

1. Recommended submittal times:

1. Within 24 hours after completing individual tests, or

2. within 3 days after completing individual tests for passing test results, or within 4 hours after completing individual tests for failing test results. Include proposed remedial actions with failing test results.

1.04 QUALIFICATIONS

A. Testing agency organization:

1. Agencies testing construction materials: Meet requirements of ASTM E329.

2. Agencies testing concrete and concrete aggregates: Meet requirements of ASTM C1077.

3. Agencies testing concrete masonry units: Meet requirements of ASTM C1093.

4. Agencies testing soil and rock: Meet requirements of ASTM D3740.

5. Agencies testing bituminous paving materials: Meet requirements of ASTM D3666.

B. Equipment:

1. Calibrate measuring devices, laboratory equipment, and instruments at established intervals.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CONTRACTOR QUALITY TESTING

C. Employ accredited independent agency to perform sampling, testing, and reporting as required in the following Sections:

1. Section 03 30 00; Cast-In-Place Concrete
2. Section 31 23 02; Compacting Earth Materials
3. Section 31 23 22; Pipe Trench Earthwork
4. Section 31 23 70; Controlled Low Strength Material

3.02 GOVERNMENT CONTRACT QUALITY ASSURANCE

A. During the course of the work, the Government may perform quality assurance tests. Tests performed by the Government will be used to ensure compliance with contract requirements and not as replacement for specified Contractor quality testing.

END OF SECTION

SECTION 01 51 00
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the price schedule for other items of work.

1.02 REFERENCE STANDARDS

A. Institute of Electrical and Electronics Engineers (IEEE)

1. IEEE C2-12 National Electrical Safety Code (NESC)

1.03 TEMPORARY ELECTRICITY

A. Provide electric power required for construction.

B. Provide generators, transmission lines, distribution circuits, transformers, and other electrical equipment and facilities required for obtaining power and distributing power to points of use.

C. Comply with IEEE C2 clearances and spacing for temporary communications and supply lines.

1.04 TEMPORARY WATER

A. Provide water required for construction purposes.

B. Use water which meets specified requirements for water used in concrete, soil-cement, masonry, grouting, and other permanent work.

C. Provide means of conveying water to points of use.

TELEPHONE

D. No telephone service is available at the site. Contractor shall determine which (if any) cell phone service is available in the vicinity.

1.05 SANITARY FACILITIES

A. Restroom facilities will not be available to Contractor personnel.

B. Contractor shall provide sanitary facilities.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 REMOVAL

A. Remove temporary equipment and facilities upon completion of work under this contract.

END OF SECTION

SECTION 01 55 00
VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 REGULATORY REQUIREMENTS

A. Meet requirements established by jurisdictional authority for use of existing roadways and haul routes; including seasonal or other limitations or restrictions, payment of excess size and weight fees, and posting of bonds conditioned upon repair of damage.

B. Comply with applicable regulations for haul routes over public highways, roads, or bridges.

C. Rights-of-way for access to work from existing roads will be established by Government.

1. In accordance with clause at FAR 52.236-10, Operations and Storage Areas, use only established roadways, parking areas, and haul routes; or temporary roadways, parking areas, or haul routes constructed by Contractor when and as authorized by CO.

2. Subject to clause at FAR 52.249-10, Default (Fixed-Price Construction), unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials to maintain and repair existing roadways, parking areas, and haul routes: In accordance with requirements of jurisdictional authority.

B. Materials to construct, maintain, and repair temporary roadways, parking areas, and haul routes: As approved by COR.

C. Materials to maintain roadways and parking areas constructed under this contract and used by Contractor for construction work: In accordance with specified requirements for construction of those roadways and parking areas.

PART 3 EXECUTION

3.01 EXAMINATION

A. Investigate condition of available public or private roads for clearances, restrictions, bridge-load limits, bond requirements, and other limitations that affect or may affect access and transportation operations to and from jobsite.

B. COR will be present during recording. Notify COR at least 3 days prior to recording.]

3.02 ESTABLISHED ROADWAYS AND PARKING AREAS

A. Established roadways and parking areas are available for Contractor's use subject to existing restrictions and approval of the COR.

B. Designated existing onsite streets and driveways may be used for construction traffic. Tracked vehicles are not allowed.

C. Designated areas of existing parking facilities may be used by construction personnel.

D. Do not allow heavy vehicles or construction equipment in established parking areas.

3.03 TEMPORARY ROADWAYS AND PARKING AREAS

A. Parking Areas:

1. Arrange for temporary parking areas to accommodate use of construction personnel.
2. Provide additional offsite parking when site space is not adequate.
3. Locate as approved by the COR.

3.04 ROADWAYS AND PARKING AREAS CONSTRUCTED UNDER THE CONTRACT

A. Roadways and parking areas constructed under this contract will be available for Contractor's use in accordance with requirements of this section.

B. Prior to acceptance permanent roads and parking areas may be used for construction traffic.

1. Avoid traffic loading beyond design capacity.
2. Tracked vehicles not allowed.
3. Contractor is responsible for damage caused by construction operations.

C. After completion, roadways and parking areas constructed under contract will be accepted by CO and will be available for use by the public.

3.05 HAUL ROUTES

A. Perform work on rights-of-way established by Government as necessary to construct and maintain any roads, bridges, or drainage structures required for establishment and use of haul routes for construction operations.

B. Use existing available public highways, roads, or bridges as haul routes subject to applicable local regulations.

C. Minimize interference with or congestion of local traffic.

D. Provide barricades, flaggers, and other necessary precautions for safety of public where haul routes cross public highways or roads.

3.06 MAINTENANCE

A. Maintain roadways, parking areas, and haul routes in a sound, smooth condition.

B. Maintain roadbed, side slopes, structures, and surfacing of roads and parking areas until completion and acceptance of all work under this contract. As approved by COR, defer until latest practicable date within specified completion period, placement of surfacing on roads or parking areas subject to heavy and deteriorating use by Contractor's construction operations or equipment.

C. Maintain surfacing of gravel-surfaced roads and parking areas in a smooth condition until completion and acceptance of work under this contract.

D. Snow removal for convenience of Contractor or to facilitate work operations of Contractor is considered to be normal required maintenance.

3.07 REPAIR

A. Promptly repair ruts, broken pavement, potholes, low areas with standing water, and other deficiencies to maintain road surfacing and drainage in original or specified condition.

3.08 REMOVAL

A. Remove materials used to construct temporary roadways, parking areas, and haul routes prior to contract completion. Recycle salvageable materials as approved by COR.

END OF SECTION

SECTION 01 55 20
TRAFFIC CONTROL

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost: Include in prices offered in the Price Schedule for other items of work

1.02 REFERENCE STANDARDS

A. Federal Highway Administration, Department of Transportation

1.	MUTCD, Part 6	Part 6, Temporary Traffic Control, Manual on Uniform Traffic Control Devices, 2009 Edition with Revisions 1 and 2, (http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm)

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 55 20-1, Traffic control plan.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 TRAFFIC CONTROL

A. Meet requirements of MUTCD, Part 6.

B. Provide cones, delineators, concrete safety barriers, barricades, flasher lights, danger signals, signs, and other temporary traffic control devices as required to protect work and public safety.

C. Provide flaggers and guards as required to prevent accidents and damage or injury to passing traffic.

D. Do not begin work along public or private roads until proper traffic control devices for warning, channeling, and protecting motorists are in place in accordance with approved traffic control plan.

E. Maintain traffic flow and conduct construction operations to minimize obstruction and inconvenience to public traffic.

F. Provide unobstructed, smooth, and dustless passageway for one lane of traffic through construction operations.

G. Construct temporary connections for one lane of traffic between existing roadway and new construction.

H. Maintain convenient access to driveways and buildings along line of work.

I. Protect roads closed to traffic with effective barricades and warning signs. Illuminate barricades and obstructions from sunset to sunrise.

J. Remove traffic control devices when no longer needed.

END OF SECTION

SECTION 01 56 10
PROTECTION OF EXISTING INSTALLATIONS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work, except as specified.
2. Costs for repair of installations damaged by the Contractor's operations are the Contractor's responsibility.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittals:

B. RSN 01 56 10-1, Plan for protecting existing installations.

1.03 PROJECT CONDITIONS

A. Drawings included in these specifications show items of existing materials and equipment but may not show all equipment and materials existing at the jobsite.

B. Obtain the location of embedded conduit, pipe, cable, ground mat, and other buried items before performing any drilling or cutting of concrete.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PROTECTION

A. Provide protection for personnel and existing facilities from harm due to the Contractor's operations. Protection shall be subject to approval of the Government.

B. Arrange protective installations to permit operation of existing equipment and facilities by the Government while work is in progress.

C. Do not discharge anything but clear water into building drainage system.

D. Prevent dust from entering ventilating systems.

3.02 REMOVAL OF PROTECTIVE INSTALLATIONS

A. Remove protective installations after purpose has been served. Materials furnished by the Contractor to provide protection remain property of the Contractor.

3.03 REPAIR

A. Repair, at Contractor's expense, damage to existing installations due to Contractor's operations or Contractor's failure to provide proper protection. At the Government's option, damage may be repaired by the Government, and the Contractor will be backcharged repair costs.

END OF SECTION

SECTION 01 56 15
PROTECTION OF EXISTING UTILITIES

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 REFERENCE STANDARDS

A. Bureau of Reclamation (USBR)

1. RSHS-2009 Reclamation Safety and Health Standards

B. Institute of Electrical and Electronics Engineers (IEEE)

1. IEEE C2-2012 National Electrical Safety Code (NESC)

1.03 PROJECT CONDITIONS

A. Drawings included in these specifications show existing utilities but may not show all utilities existing at the jobsite.

B. Obtain location of buried conduit, pipe, cable, ground mat, and other buried items before excavating.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 INTERFERENCE WITH OPERATION OR MAINTENANCE

A. Do not interfere with operation or maintenance service on utilities, existing on date offers are received.

1. Provide for access to utilities in a manner satisfactory to owners and operators and the Government.

B. Provide required temporary structures; make necessary repairs, replacements, or similar operations; and furnish indemnity or other bonds.

3.02 CLEARANCES

A. Clearances in accordance with IEEE C2 provided by Government:

1. Where existing buried powerline or communication line crosses a feature of work to be constructed, the Government will provide clearance at the crossing site between the line and the lower of (1) original ground; or (2) final elevation of constructed work.

B. Additional clearances required for construction operations: The Contractor shall provide in accordance with RSHS.

3.03 REPAIR

A. Repair, at Contractor's expense, damage to existing utilities due to Contractor's operations or Contractor's failure to provide proper protection. At the Government's option, damage may be repaired by the Government, and the Contractor will be back-charged repair costs.

END OF SECTION

SECTION 01 56 20
EXISTING FENCES

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Salvage and reuse existing fencing materials if structurally sound and not damaged during removal.

B. Provide replacement materials of similar type, when necessary.

PART 3 EXECUTION

3.01 FENCE REMOVAL

A. Remove existing fences where necessary for performance of the work, only when authorized by the COR. Maintain fences, where designated, until work is completed, or their removal is authorized.

3.02 TEMPORARY FENCES

A. Where fences are removed on rights-of-way, provide temporary fence protection for adjacent lands to prevent livestock from straying from or onto adjacent lands, complete with gates and cattle guards.

B. Where existing chain link fence is removed, protect openings made in existing chain link fencing to prevent unauthorized entry into area.

1. Provide temporary fencing or other approved means to protect openings, such that, entry through or over protection will entail no less difficulty than that provided by adjacent existing fencing.

2. Maintain temporary protection until openings are closed by permanent construction.

C. If the Contractor does not provide necessary temporary fencing or protection within a reasonable time after need for fencing or protection arises, the CO will cause the work to be performed and back-charge the Contractor for such work.

D. Remove temporary fences and protection as a part of cleanup operations prior to final acceptance of completed work.

3.03 FENCE REBUILDING

A. Where fences are removed to accommodate construction, rebuild at original locations.

B. Construct rebuilt fencing that is structurally sound and matches, or is better than, existing fencing installation.

END OF SECTION

SECTION 01 56 32
TEMPORARY SAFETY FENCE

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in Price Schedule for other items of work.

PART 2 PRODUCTS

2.01 SAFETY FENCE

A. Fence:

1. High-density polyethylene grid.
2. Minimum height: 48-inch.
3. Color: Safety orange.
4. Recovered Material Content:
   a. 90 to 100 percent.
5. Postconsumer Content:
   a. 60 to 100 percent.

B. Posts: Steel fence posts.

PART 3 EXECUTION

3.01 INSTALLATION

A. Erect fence around work areas at location approved by the COR.

B. Space posts 10 feet, maximum, on center.

C. Secure grid to posts.

3.02 MAINTENANCE AND REMOVAL

A. Maintain fence until work in area is complete and accepted by the COR.

B. Remove fence when no longer required.

END OF SECTION

SECTION 01 57 30
WATER POLLUTION CONTROL

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 REFERENCE STANDARDS

A. Bureau of Reclamation (USBR)

1.	RSHS-09	Reclamation Safety and Health Standards, including revisions posted at http://www.usbr.gov/ssle/safety/RSHS/rshs.html

B. Code of Federal Regulations (CFR)

1.	40 CFR, Part 112	Oil Pollution Prevention

C. Public Law

1.	Sections 311, 402, and 404	Clean Water Act (Public Law 92-500, as amended)

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 57 30-1, Water Management Plan:

1. Detailed Water Quality Management Plan for construction activities that involve less than 1 acre of land in the vicinity of any stream, flowing or dry watercourse, lake, wetland, reservoir, or underground water source.
    a. Name of person who will be responsible for implementing and carrying out plan.
    b. Relationship of methods and descriptions herein to conditions of required permits specified in article titled "Contractor Responsibilities."
    c. Precautions which will be taken to avoid discharge or accidental spills of pollutants into a river, stream, watercourse, or lake.
    d Demonstrated compliance with State and local waste disposal, sanitary sewer, or septic regulations.

e. Methods of handling and treating wastewater, including drawings or maps indicating locations for evaporation or settling ponds, treatment facilities, best management practices to prevent water pollution, and discharge points. Provide estimates of amount of wastewater which may be handled and treated at each location.

f. Methods for preventing or controlling runoff and erosion for construction sites, both during and after construction, including:

1) Access and haul roads;

2) Stockpile, borrow, and waste areas;

3) Construction plant and equipment yards;

4) All excavated surfaces;

5) Areas containing slurry ponds or water treatment facilities;

6) Buffer zones; and

7) Other impacted areas.

g. Information on vegetative practices, structural control, silt fences, straw dikes, sediment and operator controls, stormwater controls, and solid waste controls. Address stormwater controls for appropriate stormwater management measures including velocity dissipators. Address solid waste controls for building materials and offsite tracking of sediment.]

C. RSN 01 57 30-2, Spill Prevention, Control, and Countermeasure (SPCC) Plan:

1. Submit when SPCC Plan is required in accordance with 40 CFR, Part 112.

a. SPCC Plan is required where release of oil and oil products could reasonably be expected to enter into or upon navigable waters of the United States or adjoining shorelines in quantities that may be harmful (40 CFR, Part 110), and aggregate on site oil storage capacity is over 1,320 gallons. Only containers with capacity of 55 gallons and greater are included in determining on site aggregate storage capacity.

2. Reviewed and certified by a registered professional engineer in accordance with 40 CFR, Part 112, as required by section 311 of the Clean Water Act (Public Law 92500 as amended).

1.04 REGULATORY REQUIREMENTS

A. Construction Safety Standards:

1. Comply with sanitation and potable water requirements of section 7 of RSHS.

B. Laws, Regulations, and Permits:

1. Perform construction operations to comply, and ensure subcontractors comply, with:

a. Applicable Federal, State, and local laws, orders, regulations, and Water Quality Standards concerning control and abatement of water pollution; and terms and conditions of applicable permits issued by permit issuing authority.

b. If conflict occurs between Federal, State, and local laws, regulations, and requirements, the most stringent shall apply.

C. Contractor Violations:

1. If noncompliance should occur, immediately (verbally) report noncompliance to the CO. Submit specific written information within 2 days.

2. Violation of applicable Federal, State, or local laws, orders, regulations, or Water Quality Standards may result in the CO stopping site activity until compliance is ensured.

3. The Contractor shall not be entitled to extension of time, claim for damage, or additional compensation by reason of such a work stoppage.

4. Corrective measures required to bring activities into compliance shall be at the Contractor's expense.

1.05 REQUIRED PERMITS

A. Wastewater Discharge Permit:

1. Permit:

a. Prior to discharging wastewater or other pollutants, secure a permit to discharge pollutants as required under section 402 of the Clean Water Act (Public Law 92-500 as amended).]

2. Terms and Conditions: Comply with terms and conditions as stated in the permit.

3. Monitoring and Treatment:

a. Provide monitoring and water treatment, if necessary, to achieve compliance with permit conditions

b. Provide recordkeeping required of the section 402 permittee, as stated in the section 402 permit.

4. Sampling: Include sampling in monitoring required of the Contractor to meet section 402 requirements, as well as required laboratory tests to determine effluent characteristics.

5. Monitoring Results:

a. Provide monitoring results to the CO 2 weeks prior to submittal deadline to appropriate State and/or Environmental Protection Agency (EPA) Regional Administrator.

b. Send copies of all information transmitted to EPA and/or the State to the CO.

B. Stormwater Discharge Permit Associated with a Construction Site:

1. Notice of Intent (NOI):

a. Both the Bureau of Reclamation and the Contractor shall sign the NOI to obtain coverage under a stormwater general permit to control stormwater discharges from the construction site as required under section 402 of the Clean Water Act (Public Law 92-500, as amended).

2. Pollution Prevention Plan:

a. The Contractor shall prepare a Pollution Prevention Plan as required by the permit.

b. Comply with terms and conditions to obtain and maintain this stormwater discharge permit.

3. Monitoring and Water Treatment:

a. Provide monitoring and water treatment, if necessary, to achieve compliance with applicable Water Quality Standards.

b. Provide the recordkeeping required by the stormwater discharge permit associated with construction activity.

1.06 CONTRACTOR RESPONSIBILITIES

A. Permits:

1. Any permits obtained by the Bureau of Reclamation are exceptions to the clause at FAR 52.236-7, Permits and Responsibilities, which requires the Contractor to obtain necessary licenses and permits.

B. Monitoring:

1. Conduct monitoring in order to meet the requirements of the permits which may include:

a. Sampling,

b. Site inspections, and

c. Required laboratory tests to determine effluent characteristics.

C. Reporting Results:

1. The Government will report required monitoring results to appropriate agencies. The section 402 wastewater discharge permit has specific reporting requirements for the permittee for noncompliance when effluent limitations are exceeded.

D. Recordkeeping:

1. Retain records and data required by permits.

PART 2 PRODUCTS

2.01 STRAW BALES

A. Straw bales, if used: Certified weed free.

PART 3 EXECUTION

3.01 POLLUTION CONTROLS

A. Control pollutants by use of sediment and erosion controls, wastewater and stormwater management controls, construction site management practices, and other controls including State and local control requirements.

B. Sediment and Erosion Controls:

1. Establish methods for controlling sediment and erosion which address vegetative practices, structural control, silt fences, straw dikes, sediment controls, and operator controls as appropriate.

2. Institute stormwater management measures as required, including velocity dissipators, and solid waste controls which address controls for building materials and offsite tracking of sediment.

C. Wastewater and Stormwater Management Controls:

1. Pollution prevention measures:

a. Use methods of dewatering, unwatering, excavating, or stockpiling earth and rock materials which include prevention measures to control silting and erosion, and which will intercept and settle any runoff of sediment-ladened waters.

b. Prevent wastewater from general construction activities such as drainwater collection, aggregate processing, concrete batching, drilling, grouting, or other construction operations, from entering flowing or dry watercourses without the use of approved turbidity control methods.

c. Divert stormwater runoff from upslope areas away from disturbed areas.

2. Turbidity prevention measures:

a. Use methods for prevention of excess turbidity which include, but are not restricted to, intercepting ditches, settling ponds, gravel filter entrapment dikes, flocculating processes, recirculation, combinations thereof, or other approved methods that are not harmful to aquatic life.

b. Wastewaters discharged into surface waters shall meet conditions of section 402, the National Pollutant Discharge Elimination System (NPDES) permit.

c. Do not operate mechanized equipment in waterbodies without having first obtained a section 404 permit, and then only as necessary to construct crossings or perform the required construction.

D. Construction Site Management:

1. Contractor construction operations:

a. Perform construction activities by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, or other pollutants or wastes into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources.

1) Pollutants and wastes include, but are not restricted to: refuse, garbage, cement, sanitary waste, industrial waste, hazardous materials, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

2. Stockpiled or deposited materials:

a. Do not stockpile or deposit excavated materials or other construction materials, near or on, stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff, or can in any way encroach upon the watercourse.

3. Petroleum product storage tanks management:

a. Place oil or other petroleum product storage tanks at least 20 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, and any other water source.

b. Do not use underground storage tanks.

c. Construct storage area dikes at least 12 inches high or graded and sloped to permit safe containment of leaks and spills equal to storage tank capacity located in the area plus sufficient freeboard to contain the 25-year rainstorm.

1) Line diked areas with an impermeable barrier at least 50 mils thick.

d. Areas for refueling operations: Lined with impermeable barrier at least 10 mils thick covered with 2 to 4 inches of soil.

END OF SECTION

SECTION 01 57 50
TREE AND PLANT PROTECTION

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

Cost:

Include in prices offered in the Price Schedule for other items of work, except as specified.

Costs for repair or treatment of injured vegetation and replacement of trees or shrubs are the Contractor's responsibility.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 57 50-1, Protection Plan:

1. Description of protective barriers or other methods used to protect vegetation from damage or injury caused by construction operations.

PART 2 PRODUCTS

2.01 REPLACEMENT TREES AND SHRUBS

A. Species: Same as removed tree or shrub or other species approved by the COR.

B. Size: Same size as removed tree or shrub, or maximum practicable size that can be planted and sustained in the particular environment as approved by the COR.

PART 3 EXECUTION

3.01 PRESERVATION AND PROTECTION

A. Preserve natural landscape and preserve and protect existing vegetation not required or otherwise authorized to be removed.

1. Submit requests to remove vegetation not specifically required to be removed to the COR.

B. Conduct operations to prevent unnecessary destruction, scarring, or defacing of natural surroundings in the vicinity of the work.

C. Move crews and equipment within the rights-of-way and over routes provided for access to the work in a manner to prevent damage to grazing land, crops, or property.

D. Protect vegetation from damage or injury caused by construction operations, personnel, or equipment by the use of protective barriers or other methods approved by the COR.

E. Minimize, to the greatest extent practicable, clearings and cuts through vegetation. Irregularly shape authorized clearings and cuts to soften undesirable aesthetic impacts.

F. Do not use trees for anchorages except in emergency cases or as approved by the COR.

1. For such use, wrap the trunk with a sufficient thickness of approved protective material before rope, cable, or wire is placed.

2. Submit requests to use trees for anchorage, except for emergencies. Include description of protective material.

G. Use safety ropes where tree climbing is necessary; do not use climbing spurs.

3.02 REPAIR, TREATMENT, OR REPLACEMENT

A. The Contractor is responsible for injuries to vegetation caused by Contractor operations, personnel, or equipment.

B. Employ the services of an experienced arborist or licensed tree surgeon to direct repair, treatment, and replacement of injured vegetation. Submit qualifications of experienced arborist or licensed tree surgeon to COR prior to employment.

C. Repair or treat injured vegetation without delay and as recommended by and under direction of an experienced arborist or licensed tree surgeon.

D. Remove and dispose of trees or shrubs not required or otherwise authorized to be removed that, in the opinion of the COR, are injured beyond saving.

E. Replace removed tree or shrub with tree or shrub approved by the COR.

Remove and replace replacement trees or shrubs that die within the 1year period.

END OF SECTION

SECTION 01 57 90

PRESERVATION OF HISTORICAL AND ARCHAEOLOGICAL DATA

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Except as provided for an equitable adjustment, include in prices offered in the Price Schedule for other items of work.

1.02 DEFINITIONS

A. Cultural resources: Includes prehistoric, historic, architectural, and traditional cultural properties. These include, but are not limited to, human skeletal remains, archaeological artifacts, records, and material remains related to such property.

B. Cultural items: Native American cultural items (i.e., funerary objects, sacred objects, objects of cultural patrimony, or human remains) for which protection is prescribed under the Native American Graves Protection and Repatriation Act (NAGPRA) - Public Law 101-601; 104 Stat. 3042, Section 3(d); and 43 CFR Part 10.4.

C. Human remains: Physical remains of the body of a person.

D. Funerary objects: Native American items that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed intentionally at the time of death or later with or near individual human remains.

E. Native American: Of, or relating to, a tribe, people, or culture that is indigenous to the United States.

F. Sacred Objects: Native American items that are specific ceremonial objects needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present-day adherents. These items are specifically limited to objects that were devoted to a traditional Native American religious ceremony or ritual and which have religious significance or function in the continued observance or renewal of such ceremony.

G. Objects of cultural patrimony: Native American items having ongoing historical, traditional, or cultural importance central to the Indian tribe itself, rather than property owned by an individual tribal member. These objects are of such central importance that they may not be alienated, appropriated, or conveyed by any individual tribal member.

1.03 [SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 57 90-1, Alternate use area or borrow area:

1. When use area or borrow area other than those approved is to be used, submit map showing location of unapproved use or borrow areas, for approval.]

1.04 PROJECT CONDITIONS

A. Federal legislation provides for protection, preservation, and collection of scientific, prehistorical, historical, and archeological data, including relics and specimens, which might otherwise be lost due to alteration of terrain as a result of any Federal construction project.

B. Any person who, without permission, injures, destroys, excavates, appropriates, or removes any historical or prehistorical artifact, object of antiquity, or archeological resource on public lands of the United States is subject to arrest and penalty of law.

C. Comply with state laws when operating on non-Federal and non-Indian lands.

D. Discovery of Resources

1. When the Contractor, or any of the Contractor's employees, or parties operating or associated with the Contractor, in performance of this contract discover cultural resources on any lands:
   a. Immediately cease work at that location.
   b. Provide immediate verbal notification to the CO, giving the location and nature of the findings.
   c. Follow with written confirmation to the CO within 2 days.
2. In addition to notifying the CO, where the discovery occurs on tribal land:
   a. Provide immediate verbal notification to [ ]
   b. Follow with written confirmation to [ ] within 2 days.
3. In addition to notifying the CO; where the discovery occurs on state, municipal, or private lands, notify the appropriate state officials as prescribed by state law.
4. Exercise care so as not to disturb or damage cultural resources uncovered during construction activities and provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by the CO.
5. Do not resume work in the area of discovery until receipt of written notice to proceed from the CO.

E. Where appropriate by reason of discovery, the CO may order delays in time of performance or changes in work, or both. When such delays or changes are ordered, an equitable adjustment will be made in the contract in accordance with applicable clauses of the contract.

F. When the Contractor proposes to use a location other than an approved site, the location must first be approved by the CO.

1. Submit a map showing the location of proposed sites to the CO at least 45 days in advance of use.

2. Take no action to use or alter the proposed location until written approval for site use is received from the Contacting Officer.

G. Include permission for Government access in arrangements for use of private lands for use areas or borrow sources. Government access to the private land shall be to identify cultural resources and conduct appropriate inspections.

H. Insert this section in subcontracts which involve performance of work on jobsite terrain.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 64 40
GOVERNMENT-FURNISHED PRODUCTS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Except as specified below for backcharges and expenses to the Contractor, include cost of unloading, hauling, inspecting, storing, protecting, handling, and caring for products furnished by the Government in prices offered in the Price Schedule for work in which products are to be used.
2. Include cost of handling and installing minor miscellaneous items of metal, timber, and other products for which specific prices are not provided in the Price Schedule, in prices offered in the Price Schedule for work to which they are appurtenant.
3. Pay demurrage charges incurred due to failure to promptly unload railroad cars or trucks.

B. Backcharges and Expenses to the Contractor:

1. The Contractor will be charged for, or required to replace, any product lost or damaged after delivery and inspection.
2. The Contractor will be backcharged for products lost or damaged beyond repair after delivery and inspection or for products not incorporated in the work and not returned to the Government. The backcharge amount will be the initial Government product cost at point of delivery or the Government replacement cost at point of delivery, whichever is higher. This amount will include reasonable charges for Government warehousing and handling.
3. When directed by the CO to replace products lost or damaged by the Contractor, such replacement shall be at the Contractor's expense.
4. Repair of products damaged by the Contractor shall be at the Contractor's expense.

C. Estimated Costs:

1. Estimated costs listed in Table 01 64 40A ~~G~~overnment-Furnished Products are provided so that offerors may include in their offers applicable Federal, State, and local taxes and duties on Government-furnished products. These costs are not guaranteed, however, and the Government obligates itself only in that the costs are the Government's best estimates at time offers are received.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 Submittals.

B. RSN 01 64 40-1, Shortage report.

1. Written report of shortage in or damage to Government-furnished products.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Contractor must be responsible for loading and delivery of products furnished by the Government such as:

1. Turbine rings located at the Hoover Dam boneyard. The steel rings are approximately 10 feet in diameter and weigh approximately one ton apiece. The distance from the Hoover Dam boneyard to the site is approximately 8 miles. This effort requires coordination with COR.

2. Boulders and rock materials from Hoover Dam surplus excavation site is approximately 16 miles from the site. This effort requires coordination with COR.

B. Repair products damaged after delivery to the Contractor, which in the opinion of the CO can be repaired satisfactorily.

C. The Government reserves the right to direct the Contractor to provide means of protection for Government-furnished products which reasonably might be required for their storage and care; however, the exercise of or failure to exercise this right shall not be deemed to relieve the Contractor of primary responsibility for protecting Government-furnished products

D. Return unused Government-furnished products to the Government [at the railway station most convenient to the work or] at points convenient to the work, as directed.

1.04 ACCEPTANCE AT SITE

A. Lift, load, transport, unload, and install government-furnished products. Schedule a joint inspection of products with the COR to determine existing condition. The Contractor must be responsible for damage sustained by products after this inspection.

B. Report to the CO in writing, within 24 hours after unloading, any shortage in or damage to products when delivered.

PART 2 PRODUCTS

2.01 PRODUCTS

A. The Government will furnish products listed in Table 01 64 40A Government-Furnished Products.

Table 01 64 40A Government-Furnished Products

Item No.	Description	Estimated quantity	Estimated delivery date	Estimated cost
1	Turbine Rings	3	TBD	TBD
2	Boulders and Rocks	12	TBD	TBD

PART 3 EXECUTION

Not Used

END OF SECTION

This page intentionally left blank.

SECTION 01 70 32
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

B. SUMMARY

1. This Section includes the following:

a. Demolition and removal of selected site elements.

b. Salvage of existing items to be reused or recycled.

1.02 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Government ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.03 SUBMITTALS

A Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, and means of ingress and egress.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Predemolition Conference: Conduct conference at Project site.

1.05 PROJECT CONDITIONS

A. Government will occupy portions of the site and buildings immediately adjacent to selective demolition areas. Conduct selective demolition so Government operations will not be disrupted.

B. Notify Contracting Officer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Contracting Officer.

D. Hazardous Materials: Areport on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.

2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.06 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 EXECUTION

2.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Contracting Officer.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

2.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

Arrange to shut off indicated utilities with utility companies.

If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

2.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

2.04 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

5. Dispose of demolished items and materials promptly.

B. Salvageable items shall become property of the Government. Replace or reimburse Government for items designated as salvage for Government that are lost or destroyed during demolition work.

C. Removed and Salvaged Items:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in asecure area until delivery to Government.

4. Transport items to Government storage area designated by Contracting Officer or as indicated on Drawings.

5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.

2. Pack or crate items after cleaning and repairing. Identify contents of containers.

3. Protect items from damage during transport and storage.

4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Contracting Officer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

2.05 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Government property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Government property and legally dispose of them.

2.06 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 01 71 20
SURVEYING

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 DEFINITIONS

A. GPS: Global Positioning System

B. GNSS: Global Navigation Satellite Systems

C. TPS: Terrestrial Positioning Systems (i.e. total stations and automatic levels)

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 71 20-1, Surveying Plan:

1. Describe work layout and survey methods.
2. Surveying schedule.
3. Example of field records format on electronic data collection devices.
4. Plan for quantity surveys for bid schedule items requiring field measurement (sequence and schedule).

C. RSN 01 71 20-2, Resumes:

1. Professional Land Surveyor responsible for supervising and directing survey work.
2. Construction surveyor.

D. RSN 01 71 20-3, Accuracy Check Results:

1. Accuracy check of Government-established primary control.

E. RSN 01 71 20-4, Completed and Reduced Survey Notes:

1. Copy of completed and reduced survey notes (electronic) for a survey or portion of survey. Include ASCII coordinate files.

2. Field records on electronic data collection devices: Include electronic files and paper copies of notes.

F. RSN 01 71 20-5, Quantity Survey Notes and Computations:

1. Itemized statement for work covered by notes and computations.

2. Electronic files that support calculations (i.e. dwg, ASCII, dems, land XML).

3. When progress payment invoice includes unit priced pay item that surveys required for computing quantities, this submittal is part of documentation required for aproper invoice for progress payments in accordance paragraph (a)(2)(xi) of the clause at FAR 52.232-27 -Prompt Payment for Construction Contracts.]

G. RSN 01 71 20-6, Workday's survey notes:

1. Copies when requested by Government.

1.04 PRIMARY CONTROL

A. Primary control shall be established by contractor of benchmarks and horizontal control points in work vicinity.

B. Survey data is based on the following datums (reference frames):

1. Coordinate system: United States/State Plane 1983, Nevada East 2701, and US Feet (Datum: NAVD 88).

C. Check and verify primary control and resolve discrepancies with Government before beginning work.

D. Preserve and maintain primary control points until otherwise authorized. Government may reestablish damaged or destroyed primary control points and back charge reestablishment cost to the Contractor.

1.05 QUALIFICATIONS

A. Responsible Surveyor:

1. Professional Land Surveyor.

2. Registered in the state the work is taking place.

3. When GPS/GNSS is utilized, shall have working knowledge of geodesy, GNSS/GPS capabilities.

B. Construction Surveyors:

1. Under supervision and direction of Professional Land Surveyor.

2. In charge of construction surveys for at least two (2) projects similar in nature to that required by this contract.

PART 2 PRODUCTS

2.01 SURVEYING MATERIALS AND EQUIPMENT

A. Provide materials required for surveying work, including, but not limited to, stakes, spikes, steel pins, templates, platforms, and tools.

1. Except as required to be incorporated in work or left in place, surveying materials remain property of Contractor.

B. Instruments:

1. GNSS/GPS: Dual or multi-frequency survey grade receivers using accepted standards of practice.
2. TPS: Check total station level calibration, vertical index and horizontal collimation as recommended by instrument manufacturer. Include pre-measurement checks in surveyor reports.
3. Check and adjust optical plummets, tribrachs, tripods, and leveling bubbles daily and after harsh treatment or long-term storage. For barometers and thermometers, check regularly for accuracy.

PART 3 EXECUTION

3.01 LAYOUT OF WORK SURVEYS

A. Establish lines and grades for work layout from primary control points.

B. Establish measurements required for work execution to specified tolerances.

C. Provide stakes, markers, and other survey controls necessary to control, check, and guide construction. Place and mark controls so COR can monitor progress without the use of survey equipment.

3.02 QUANTITY SURVEYS

A. Perform surveys and computations to determine quantities of work performed or placed during each progress payment period.

B. Perform surveys necessary for the Government to determine final quantities of work in place. Final payment quantities will be based on the Government's original terrain data and submitted survey notes and computations.

C. Perform quantity surveys in presence of authorized Government representative, unless specifically waived. Notify the Government at least 24 hours before performing a quantity survey.

D. Use Government provided AutoCAD Civil 3D 2019 drawing template (DWT), Figure Prefix Database, Linework Code Set to import survey points file and to import survey data and generate 3D surfaces. Naming utilities for original ground and final ground surfaces include project year, project I.D., abbreviated project name, OG (Original Ground), FG (Final Ground) (e.g., xx-xxx NDM OG_01 or xx-xxx NDM FG_01).

1. Use Government provided codes and special codes from Figure Prefix Database Manager and Linework Code Set when collecting topographic data points and importing survey data into drawing file. Refer to Government provided Linework Code Set for Special Codes, Line Segment Codes and Curve Segment Codes.

2. Survey data points (Numeric Point ID, Northing, Easting, Elevation, and Description) shall be provided to the Government as acomma delimited ASCII text format only (csv). When importing survey point data (project coordinates only) into AutoCAD Civil 3D 2019 Survey Data Base (SDB), the point file format shall be PNEZD (comma delimited). See surveyor's report as shown on drawings for geodesy details.

3. Geo-reference drawing file in accordance with Government furnished geodesy.

4. Include in each drawing all metadata (i.e. surveyors report) including but not limited to, control points table associated with specific surveying event, survey methodology, equipment, datums, units, control points used, check shot Northing, Easting and Elevation differences, geodesy, and post processing survey software and version.

5. Control point table in AutoCAD Civil 3D 2019 survey drawing shall display point number, project coordinates, orthometric heights (elevations), and description or point name. Northings, Eastings and orthometric heights shall be shown to the nearest 0.01 ft. Use point table style "Survey Control Points" provided by Government when inserting survey control table in survey drawing files.

3.03 SURVEY REQUIREMENTS

A. Alignment Staking:

1. Each 50 feet on tangent.

2. Each 25 feet on curves, plus the following:

a. Horizontal event points:

1) Points of curvature (PC)

2) Points of tangency (PT)

3) Spiral to curve (SC)

4) Curve to spiral (CS)

5) Spiral to tangent (ST)}

b. Vertical event points:

1) Vertical point of intersection (VPI)

2) Vertical curve (VC)

B. Slope Staking: Each 50 feet on tangent and each 25 feet on curves, stake every 10 feet in elevation on slopes.

C. Structures: Stake out of structures and checkouts before and during construction.

D. Roads: Blue tops each 50 feet on tangent and each 25 feet on curves.

1. When using GPS/GNSS/Real Time Kinematics (RTK) or TPS, input roadway design templates, horizontal and vertical alignments, and superelevation rate data or aDigital Terrain Model (DTM) surface in Data Controller before proceeding with construction staking work.

E. Quantity surveys: Original, final, and intermediate Digital Terrain Models (DTMs) for structure sites and other locations as required for quantity surveys. Volumetric quantities shall be determined by preliminary (before) and final (as-constructed) DTM.

F. Set additional stakes as required by COR.

G. As-builts: As required for structures and other features of work.

3.04 ACCURACY

H. Degree of Accuracy:

1. Alignment of Tangents and Curves: Within 0.1 foot.

2. Structure Points: Within 0.01 foot, except where installation or operation considerations require tighter tolerances.

3. Blue Tops:

a. Subgrades and gravel surfaced roads: Within 0.1 foot.

b. Pavements: Within 0.01 foot.

4. DTMs and slope stakes: Within 0.10 foot, horizontally and vertically.

5. Horizontal Control Surveys: Precision shall be dictated by expected use of control point utilizing accepted standards of practice.

6. Vertical Control Surveys: Close within 0.05-foot times the square root of the circuit length in miles.

I. Beginning and ending of each survey shall include check measurement on known survey point(s).

3.05 FIELD RECORDS

J. Record field notes, computations, and other surveying data on electronic data collection devices or in field books. Field records shall be complete and accurate record of survey.

K. Record survey data in accordance with recognized professional surveying standards.

1. Notes or data not in accordance with standard formats will be rejected.
2. Electronic files of notes on electronic data collection devices: In approved format.
3. Field books:
    a. Illegible notes or data or erasures in a field book will be sufficient cause for rejection of part or all of field book.
    b. Corrections by ruling or lining out errors will be permitted.
    c. Copied notes or data will not be permitted.
    d. Rejection of part or all of a field book may necessitate resurveying.

L. Field notes shall include as a minimum:

1. Daily title page.
2. Date of survey.
3. Names and duties of survey crew members.
4. Pertinent atmospheric conditions, such as temperature, pressure and ppm settings.
5. Explanatory notes about conditions(s) that might affect accuracy or result of survey.
6. Instrument data:
    a. Instrument model(s) and serial numbers, including GPS antenna type(s), offsets, measurement to ARP (Antenna Reference Point), atmospheric conditions entered, curvature and refraction constant, sea level correction, scale factor, prism model and offset.
    b. Care and adjustment of instruments including pegging the leveling instrument, level rod length checks, use of rod levels, collimation of total stations, prism model and offsets, and other pertinent information.
7. Survey location.
8. Diagrams or sketches.
9. Pertinent record information and references.
10. Original “raw” data values (without mathematical manipulations and without corrections for errors) of distance, angle, and elevations.

11. Monuments found or set; with complete descriptions (e.g., found 5/8-inch rebar with 1 ½-inch plastic yellow cap, including markings), and description of stampings.

12. Consecutively number pages in upper righthand corner.

END OF SECTION

SECTION 01 74 00
CLEANING AND WASTE MANAGEMENT

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

Include in prices offered in the schedule for other items of work except as specified.

Cost of environmental site assessments are the Contractor's responsibility.

1.02 REFERENCE STANDARDS

A. Bureau of Reclamation (USBR)

1.	RSHS-2009	Reclamation Safety and Health Standards, including revisions posted at http://www.usbr.gov/ssle/safety/RSHS/rshs.html

B. Code of Federal Regulations (CFR)

1.	40 CFR 261.3	Definition of Hazardous Waste
2.	49 CFR 171-179	Transportation - Hazardous Waste Regulations

1.03 DEFINITIONS

A. Hazardous waste: Defined as hazardous by 40 CFR 261.3; or by other Federal, State, or local laws or regulations.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 74 00-1, Waste production and disposal plan:

1. For each type of waste, list estimated quantity and planned disposal location.

C. RSN 01 74 00-2, Waste production and disposal records.

1. For each type of waste, list quantity and disposal location.
2. Include certifications that waste was properly disposed.
3. Hazardous wastes manifests.

D. RSN 01 74 00-3, Environmental consultant resume:

1. Describe experience on similar project.

E. RSN 01 74 00-4, Environmental site assessment.

1.05 QUALIFICATIONS

A. Environmental consultant: Minimum two (2) years of experience in conducting environmental site assessments for similar construction.

1.06 REGULATORY REQUIREMENTS

A. Comply with Federal, State, and local laws and regulations.

B. Comply with RSHS.

C. Conform to most stringent requirement in cases of conflict between specifications, regulatory requirements, and RSHS.

1.07 PROJECT CONDITIONS

A. Report waste materials discovered at jobsite to COR.

1. Cease work in areas where waste may be hazardous until waste materials are investigated by the Government.
2. If waste is hazardous, the CO may order delays in time of performance or changes in work, or both.
3. If such delays or changes are ordered, an equitable adjustment will be made in the contract in accordance with applicable clauses of the contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PROGRESS CLEANING

A. Keep work and storage areas free from accumulations of waste materials and rubbish.

3.02 FINAL CLEANUP

A. Remove temporary plant facilities, buildings, concrete footings and slabs, rubbish, unused materials, concrete forms, and other similar materials which are not part of permanent work.

3.03 DISPOSAL

A. Nonhazardous waste materials:

4. Reuse at jobsite or reuse or recycle waste materials removed from jobsite whenever possible.

5. Dispose of materials not reused at jobsite by removal from jobsite.

6. Dispose of nonhazardous waste materials that are not reused or recycled at appropriately permitted disposal facilities.

B. Hazardous Waste Disposal:

1. Dispose by removal from jobsite.

2. Recycle hazardous waste whenever possible.

3. Dispose of hazardous waste materials that are not recycled at appropriately permitted treatment or disposal facilities.

7. Transport hazardous waste in accordance with 49 CFR 171-179.

C. Certification: Certify that wastes are disposed of in accordance with Federal, State, and local regulations.

3.04 SITE ASSESSMENT

A. Upon completion of work, perform site assessment at following areas for work done under these specifications:

1. Hazardous waste accumulation areas.

2. Petroleum dispensing and storage areas where aggregate storage of petroleum at jobsite was over 110 gallons.

3. Hazardous material storage areas.

B. Employ qualified environmental consultant to perform assessments.

C. Demonstrate and document by appropriate analytical sampling that site contamination is less than State action cleanup levels.

3.05 RECORDS

A. Keep records of types and amounts of waste materials produced.

B. Keep records of waste material disposal.

END OF SECTION

SECTION 01 78 30
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. Include in prices offered in the Price Schedule for other items of work.

1.02 UPDATED RECORD DRAWINGS

A. Update record drawings to document work or services performed for progress payments in accordance with the clauses at FAR 52.232-27 - Prompt Payment for Construction Contracts. The CO will retain from progress payments in accordance with WBR 1452.232-83 Payment for Technical Data if project drawings are not updated.

1. At a minimum, meet monthly with COR to review and approve progress made to full-sized record drawings prior to the submittal for progress payment. Meeting location to be approved by COR.
2. Verify with the COR that mark-ups to the drawings are current with the progress of the work prior to submitting invoice for progress payment.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 - Submittals.

B. RSN 01 78 30-1, Electronic Media Release Form, Upon Request.

1. Refer to Article 1.04 Electronic Drawings below.

C. RSN 01 78 30-2, Progress As-built Drawings:

1. Copies of As-built drawings maintained on site. Colored copies are not required.

D. RSN 01 78 30-3, Final As-built Drawings:

1. Certified marked sets: As-built drawings that have been certified by Contractor as up to date and accurate in the description of work.
2. Submit to COR for approval prior to commissioning, training, and/or Government possession.
3. For Information Only (FIO) Drawings: Revision date and details.

E. RSN 01 78 30-4, Draft O&M Manual:

1. Submit to COR for approval prior to commissioning, training, and/or Government possession.

2. Transmit in both hardcopy and electronic form for review and use in training sessions.

F. RSN 01 78 30-5, Final Drawings:

1. Drawings shall be provided in AutoCAD drawing (.dwg) format and Adobe Acrobat (.pdf) format on CD-ROM or DVD.

2. Drawings or output data files produced on a Computer Aided Design and Drafting (CADD) system and furnished to Reclamation shall be compatible with 2019 Autodesk products, .DWG file format, manufactured by Autodesk, Inc., Sausalito, CA. CO may require other versions of Autodesk.

3. Topographical drawings shall contain proper point files, point groups, and intelligent Civil 3D object entities such as surfaces, alignments, profiles and cross-sections as required.

4. ASCII point files must be included, with a point descriptor glossary.

5. Deliverables shall be "eTransmit" from with the Civil 3D application, to package .DWG files with all resource files and dependencies including fonts, external references and images.

6. Updated with all changes as marked on As-built drawings to reflect approval comments.

G. RSN 01 78 30-6, Final O&M Manuals

1. Provide O&M Manuals.

a. In both hardcopy and electronic form.

b. Number of hard copies as indicated in Section 01 33 00 – Submittals.

1.04 ELECTRONIC DRAWINGS

A. CADD Files, will be distributed upon request, after:

1. Notice to Proceed.

2. Contractor signs form in Section 51 00 50 – Electronic Media Release.

1.05 RECORD DRAWINGS

A. Maintain 2 sets of full-size prints of contract drawings marked to show accurate and complete records of as-built conditions.

1. Keep drawings at the jobsite and mark as work progresses.

2. If FIO drawings require changes, mark with revisions.

B. Use the following to represent changes.

1. Supplementary notes, legends, and details necessary to clearly portray as-built construction.

2. In lieu of referencing, incorporate clarifications from other documents such as RFI's, where as-built construction is identified.

3. Include pictures, sketches or other representations to further explain as-built construction. Do not provide in lieu of as-built drawings.

4. Mark and dimension to show variations between actual construction and that indicated or specified in contract documents.

   a. Include buried or concealed construction and utilities.

   b. Include existing items, topographic features, and utility lines revealed during construction which differ from those shown on contract drawings.

5. Mark to define construction actually provided where choice of materials or methods is permitted in specifications, or where variations in scope or character of work from that of the original contract are authorized.

C. Mark drawings in the following colors:

1. Red: Additions.

2. Green: Deletions.

3. Blue: Notations necessary for explanation of markings.

D. Always allow the Government to review the drawings.

E. Following successful commissioning of each unit or Government possession, submit As-builts with changes resulting from commissioning and training to COR for review and approval.

F. Upon completion of work, sign marked as-built drawings.

1. Sign and date each as-built drawing as certified correct. If no revisions were necessary to illustrate as-built conditions mark the drawing with "As-Built, No Changes."

2. Only certify FIO drawings which require changes.

PART 2 PRODUCTS

1. Not Used

PART 3 EXECUTION

2. Not Used

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: Demolition necessary or required so that the new construction, alterations, remodeling and related work can be performed and completed in accordance with the Contract Documents.

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00:
   1. Copies of permits and notices authorizing building demolition as may be required by law, including permits to transport and dispose of debris.
   2. Shop Drawings: Drawings of temporary structural support locations and calculations sealed by a Structural CO/COR registered in the State of Nevada.

B. Submit project record documents which accurately record actual locations of capped utilities and concealed obstructions.

1.3 QUALITY ASSURANCE

A. Demolition Firm Qualifications:
   1. Specializing in performing the Work required by this Section.
   2. Minimum 5 years documented experience.
   3. Utilizing workers experienced in disconnecting and capping utilities, if applicable.

B. Regulatory Requirements
   1. Conform to applicable code(s) for demolition of structures, safety of adjacent structures, dust control, runoff control and disposal.
   2. Obtain required permits from authorities.
   3. Conform to applicable regulatory procedures if hazardous or contaminated materials are discovered.

1.4 PROJECT CONDITIONS

A. No extra compensation will be considered for the coordination work which may be required due to unknown project conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Carefully remove salvageable items such as light fixtures, grilles, doors, hardware, plumbing fixtures, ball washers, trash cans, tee markers and other items which are not specifically indicated for reuse, but which may have salvage value to the CO/COR.
   1. Demolished materials and equipment shall be stockpiled in an area designated by the CO/COR, in a manner that the CO/COR may determine those items which have salvage value to the CO/COR.
   2. Those materials, which are not salvaged by the CO/COR, shall become the possession of the Contractor and shall be immediately removed from the site.

B. Carefully remove materials (in whole or in part as required) that are scheduled for reuse. Store and protect for reinstallation the materials identified by the CO/COR.

C. Fill materials at excavations: As specified in Section 31 23 23.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions and notify the CO/COR Representative in writing of discrepancies before proceeding with the work.

B. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the CO/COR Representative.

3.2 PREPARATION

A. Notify affected utility companies before starting work and comply with their requirements.
   1. Mark location of utilities.
   2. Identify, disconnect, remove and cap designated utilities within demolition areas.

B. Provide, erect, and maintain temporary barriers and security devices where required and as indicated on drawings.

C. Protect existing landscaping materials, appurtenances, and structures which are not to be demolished.

D. Protect benchmarks and existing work from damage or displacement.

E. Prevent movement or settlement of adjacent structures.

F. Obtain written permission from adjacent property CO/COR when demolition equipment will traverse, infringe upon or limit access to their property.

G. Protection of existing building exterior:
   1. Erect weatherproof closures for exterior openings. Maintain exit requirements.
   2. Protect from weather openings cut in existing roof for new work, or where existing roofing is removed to allow new construction to join existing.
   3. Install temporary deck of exterior grade plywood and wood skids, or other material approved by CO/COR representative, for material and personnel traffic over existing roofing, to protect existing roof and surrounding surfaces from damage. Repair damage caused to the roof and other items.

H. Dustproof Partitions:
   1. Erect and maintain as required to prevent spread of dust, fumes and smoke to other parts of the building.
   2. On completion, remove partitions and repair damage surfaces to match adjacent surfaces.

I. Roofing Removal: During the removal of the existing parapets and roofing, provide proper protection from falling objects. Maintain interior of building rain and water protection.

3.3 GENERAL DEMOLITION

A. Carry out demolition work to cause as little inconvenience to any adjacent occupied building or site areas as possible and with minimum interference to public or private accesses. Maintain protected egress and access at all times.

B. Perform the removal, cutting, drilling, etc., of existing work such as concrete pilasters, sanitary sewer manholes, and vitrified clay pipe with extreme care, and using small tools in order not to jeopardize the structural integrity of the building.

C. Main lines, laterals, and manholes to be demolished shall be excavated and removed. Crushing the mainline and lateral in place shall not be allowed. Pressure grouting mainlines, laterals, and manholes shall not be allowed. Non-conforming and non-approved material (e.g., vitrified clay pipe) shall be removed in its entirety from point-of-connection to point-of-connection.

D. Shore existing construction whenever existing supports are removed to allow the installation of new work.

E. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction and CO/COR representative. Do not resume operations until directed by CO/COR representative.

F. Rebuild existing work, which must be removed to allow the installation of new work as, indicated on the Drawings.

G. Perform cutting of existing concrete and masonry with saws and core drills. Do not use jackhammers.

H. Provide hoses and water connections for sprinkling of debris as necessary to limit dust to lowest practicable level.

I. Material Disposal:
   1. Remove materials from site and dispose of in a legal manner at no additional expense to CO/COR.
   2. No materials are to be sold on, or adjacent to, the site. Signs advertising the sale of materials shall not be allowed.
   3. Burning of materials on site is not permitted.
   4. Break concrete and masonry into sections less than 3 feet in any dimension.
   5. Remove from site, contaminated, vermin infested, or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers and public.
   6. Debris from the demolition shall not be allowed to accumulate within the building or on the site.

END OF SECTION

SECTION 03 21 00

REINFORCEMENT STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish, fabricate and install reinforcing steel as shown on Drawings and specified.

B. Work shall include installation of tie wires, clips, supports and other appurtenances necessary to meet Specifications and produce finished concrete structures.

1.2 REFERENCES

A. American Concrete Institute Standards:
   1. ACI 315 - Details of Concrete Reinforcement.
   2. ACI 318 - Standard Building Code.

B. ASTM International Standards:
   1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
   2. ASTM A185 - Standard Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
   3. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

1.3 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Submit manufacturer’s certification.

C. Include, but not limit to, the following:
   1. Complete bar schedule, bar details and erection drawings to conform to ACI 315.
   2. Each type of bar marked with identification corresponding to identification tag on bar.
   3. Erection drawings shall be clear, easily legible and to a minimum scale of:
      a. 1/4 inch = 1 foot.
      b. 1/8 inch = 1 foot if bars in each face are shown in separate views.
   4. Size and location of openings.

D. Contract Drawings shall not be used as erection drawings.

1.4 DELIVERY, STORAGE AND HANDLING

A. In accordance with Section 01 66 00.

B. Store reinforcing steel on wood supports in a manner that prevents it from coming in contact with the ground.

C. Store only bars with same identifying label in same stack.

D. Cover epoxy coated reinforcement for protection against both moisture and ultraviolet light and so that condensation does not form on the bars.

E. When handling coated bars, use systems with padded contact areas.

F. Thoroughly inspect coated steel after delivery to the job site and again after installation to ensure that it is not damaged:
   1. Repair damage with patching material meeting manufacturer's requirements.
   2. Promptly patch sheared ends and other cuts or exposed areas before detrimental oxidation occurs.

PART 2 - PRODUCTS

2.1 REINFORCEMENT STEEL

A. Materials:
   1. Conform to ASTM A615, Grade 60.
   2. Column ties and beam stirrups of any size and all No. 3 bars may conform to ASTM A615, Grade 40.
   3. Smooth dowels ASTM A615, Grade 60 plain billet steel bars epoxy coated in accordance with ASTM A775.

B. Fabrication of bars:
   1. Fabricate with cold bends conforming to recommended dimensions shown in ACI 318.
   2. Field fabrication will be allowed only if Contractor has equipment to properly fabricate steel to same tolerances as for shop fabrications.
   3. Attach identification tags with identifying mark.
   4. Contractor may at his option continue steel reinforcement through openings in walls and slabs, then field cut opening.

2.2 TESTING

A. Perform at mill for each heat.

B. Furnish a certified Affidavit of Compliance issued by steel manufacturer that reinforcing steel furnished for project meets requirements of ASTM A615, Grade 60.

2.3 BOLSTERS, CHAIRS AND ACCESSORIES

A. Conform to ACI 315 and Concrete Reinforcing Steel Institute Manual of Standard Practices.

B. Provide spacers, bolsters, chairs, ties and other devices necessary to properly space, place, support and fasten steel reinforcement in place during concrete placement.

C. Metal accessories shall be galvanized and plastic coated where legs will be exposed in finished concrete surfaces.

D. Do not use rocks, broken bricks, wood blocks, or concrete fragments for support of steel reinforcement.

E. Support between Reinforcing Steel and Formed Exposed Surfaces: Metal bar chairs.

2.4 PRECAST CONCRETE BLOCK BAR SUPPORTS (DOBIES)

A. Supports between Reinforcing Steel for Roof Slabs: Concrete block prohibited.

B. Minimum Compressive Strength of Blocks: 3,000 psi.

C. Minimum Bearing Area: 9 square inches. Place as required to maintain specified clearances.

2.5 MECHANICAL COUPLERS

A. Provide mechanical couplers where shown and where approved by Engineer. The couplers shall develop a tensile strength, which exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.

B. Where the type of coupler used is composed of more than one component, supply all components required for a complete splice. This shall apply to all mechanical splices, including those splices intended for future connections.

C. Reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross section of the bar.

D. Couplers:
1. Lenton Form Saver by Erico Products.
2. Dowel Bar Splicer System by Richmond Screw Anchor Company.
3. CO/COR approved equal.

PART 3 - EXECUTION

3.1 PLACEMENT OF STEEL REINFORCEMENT

A. Place steel reinforcement in accordance with Chapters 7 and 12 of ACI 318 and the CRSI Manual of Standard Practice. Accurately position reinforcement steel in accordance with Drawings and support by concrete or metal supports, spacers, or metal hangers.
1. Bars additional to those shown on Drawings which may be found necessary or desirable by Contractor for purpose of securing reinforcement in position shall be provided by Contractor at his own expense.
2. In reservoir roof slab, do not place metal bar chairs in contact with forms. Bend tie wires away from forms to provide specified concrete coverage.

B. Tie securely at intersections with 16-gage or larger annealed iron wire.

C. Accommodate placement of formed openings.

D. Place to maintain concrete cover to conform to Chapter 7 of ACI 318 unless otherwise indicated.

E. Splices In reinforcement:
1. Lapped splices shall be not less than Class B splice for reinforcement unless otherwise indicated.
2. When it is necessary to splice reinforcement at points other than where shown, character of splice shall be determined by Engineer. Reinforcing bars, other than tie bars, shall not be spliced at points other than shown on approved bending diagrams and placing lists.

F. Ensure that steel reinforcement and embedments do not exceed 160 degrees F at time of concrete placement.

3.2 COORDINATION

A. Coordination with placement of formwork, formed openings and other Work.

END OF SECTION

SECTION 03 30 00

CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Provide concrete work as shown on Drawings and as specified.

B. Section includes:
1. Concrete Materials.
2. Proportioning and Mixing.
3. Ready Mixed Concrete.
4. Curing Materials.
5. Expansion Joint Filler.
6. Forms.
7. Waterstops.
8. Liquid Floor Hardener.
9. Grouts.
10. Waterproofing/Dampproofing.
11. Preparing for Concreting.
12. Placing of Concrete.
13. Finishing.
14. Curing.
15. Form Removal.
16. Field Quality Control.

1.2 RELATED SECTION

A. Section 03 21 00 - Reinforcement Steel.

B. Section 01 46 00 - Quality Assurance/Quality Control.

1.3 REFERENCES

A. American Concrete Institute Standards:
1. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials and Commentary.
2. ACI 301 - Specifications for Structural Concrete.
3. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
4. ACI 305 - Specification for Hot Weather Concreting.
5. ACI 306 - Standard Specification for Cold Weather Concreting.
6. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International Standards:
1. ASTM C33/C33M - Standard Specifications for Concrete Aggregates.
2. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
3. ASTM C94/C94M - Standard Specifications for Ready-Mixed Concrete.

4. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
5. ASTM C150 - Standard Specification for Portland Cement.
6. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
7. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
8. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
9. ASTM C1107/C1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
10. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers –Tension.
11. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
12. ASTM D746 – Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
13. ASTM D747 – Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.
14. ASTM D1751 – Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
15. ASTM D1752 – Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
16. ASTM D2240 – Standard Test Method for Rubber Property - Durometer Hardness.

C. U. S. Army Corps of Engineers Standards:
   1. CRD-C 572 - PVC Waterstops.

D. Standard Specifications:
   1. Comply with referenced sections and subsections of Standard Specifications.
   2. Contractual, measurement and payment provisions of Standard Specifications do not apply.

1.4 DEFINITIONS

A. Construction Joint: The surface where two successive placements of concrete meet, across which it may be desirable to achieve bond and through which reinforcement may be continuous. Unless otherwise indicated, provide construction joints with a waterstop and sealant groove of the shape indicated.

B. Expansion Joints: A separation provided between two adjoining parts of a structure, to allow concrete to expand freely. Space is made by placing filler joint material against the first pour; acts as a form for the second pour.

C. Control Joints: Formed, sawed, or tooled groove in a concrete structure to create a weakened plane to regulate the location of cracking resulting from the dimensional change of different parts of the structure. Groove is filled with joint sealant material.

D. Laitance: A layer of weak, nondurable material containing cement and fines from aggregates, which is brought up to the surface of over wet concrete by the bleeding of water to the top.

1.5 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Concrete mix design:
   1. Concrete mix design strength history: 10 breaks less than 12 months old from date of submittal.
   2. Batch tickets.

C. Aggregates with sand equivalency.

D. Admixtures.

E. Fly Ash: Provide current certification for duration of Work for conformance with ASTM C618. Current certification: Less than 60 Days old.

F. Waterstops.

1.6 DELIVERY, STORAGE AND HANDLING

A. Mixing, transporting, handling, placing, curing, and testing of concrete in accordance with applicable ACI and ASTM Specifications and as specified.

1.7 ENVIRONMENTAL REQUIREMENTS

A. When temperature is below 40 degrees F or is likely to fall below 40 degrees F during 24-hour period after placing concrete, apply insulating blankets so that temperature of the concrete is between 50 degrees F and 90 degrees F for 24-hour period after placing concrete.

B. When temperature is below 20 degrees F or likely to fall below 20 degrees F during 24-hour period after placing concrete, provide an external heat source (not in excess of 140 degrees F) so that temperature of the concrete is between 50 degrees F and 90 degrees F for 24-hour period after placing concrete.
   1. Additional moisture may be needed to keep the relative humidity of the heated air not less than 40 percent.

C. During hot weather, shade materials from sun and wind and use cool water or ice so temperature of concrete does not exceed 90 degrees F at time of placing concrete.
   1. Curing methods: In accordance with Part II.

D. Hot and Cold Weather Concreting: Other procedures may be used in accordance with ACI 305 and ACI 306 if approved by Engineer.

E. Placing of concrete not permitted where, in opinion of Engineer, wind, rain or inadequate facilities furnished by Contractor prevents proper finishing or curing of concrete.

F. Alternate mix designs may be required over the course of contract if weather conditions vary.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Components: Clean and meet requirements of ASTM C150 and ASTM C33.

B. Portland Cement: Type V for concrete in contact with ground and Type II or V for all other concrete.

C. Fly ash:
1. In accordance with ASTM C618, Class F.
2. Substitution Ratio: 1.2 pounds fly ash for each 1.0-pound cement.
3. Maximum Fly Ash Content: 20 percent of cement removed of specified cement weight.
4. Maximum Sulfate Resistance Factor R: 1.5, where R = (Percent CaO - 5)/Percent Fe2O3.

D. Aggregates: Obtain from pits approved by Government.

E. Water: Clean and free of injurious amounts of acids, alkalies, organic matter, or other deleterious substances.

F. Ready Mix Concrete: Comply with ASTM C94.

G. Admixtures (if allowed by Engineer): Air entrainment; conform to ASTM C260; air content of 4.5 to 6 percent unless otherwise specified.

H. Pigments for underground conduit banks as manufactured by:
1. Bayer, Bayferrox #130.
2. Davis, #117.
3. As currently approved by NV Energy.

2.2 PROPORTIONING AND MIXING

A. In accordance with ACI 301 specifications. Slump: Not to exceed 4 inches unless otherwise specified.

B. Concrete mixes:
1. Concrete compressive strength, aggregate size and slump in accordance with the following:

Type of Construction	Compressive Strength (psi)	Maximum Size Aggregate in Inches	Slump in Inches (Max.)
Slabs, walls, footings and foundations	4,500	3/4	4
Pipeline structures	4,500	1	4

Type of Construction	Compressive Strength (psi)	Maximum Size Aggregate in Inches	Slump in Inches (Max.)
Reinforced concrete encasements, thrust blocks and extruded or formed curb and gutter	3,000	1	4
Site underground conduit banks: Min. 3 lbs. red pigment/sack cement	3,000	3/8	6

2. Compressive Strength: 28 Day minimum.
3. Reinforced Concrete: Minimum six sacks Portland Cement per cubic yard.
4. Unreinforced Concrete: Minimum five sacks Portland Cement per cubic yard.
5. Maximum Water Cement Ratio: 0.45 by weight.

2.3 READY MIXED CONCRETE

A. Provide batch ticket to Government for each delivered load ready-mixed concrete, indicating:
   1. Volume of concrete.
   2. Weight of cement in pounds.
   3. Total weight of all ingredients in pounds.
   4. Time of Day at which the materials were batched.
   5. In accordance with ASTM C94.

2.4 CURING MATERIALS

A. Use polyethylene-bonded waterproof paper sheeting at least 4 mils thick to cover wetted fresh concrete slab surface.

B. Water Saturated Curing Mats: Durable; manufactured for this purpose may also be used to cover finished surface of concrete.

C. Liquid curing compound, in accordance with ASTM C309, Type I, Class B (with fugitive dye added): Spray on surface of concrete slab within 2 hours after completion. Liquid compounds:
   1. WR Meadows 1100 Clear.
   2. US SPEC Maxcure Resin Clear.
   3. Government approved equal.

2.5 EXPANSION JOINT FILLER

A. Provide expansion joints in concrete slabs where shown on Drawings.

B. Expansion Joint Filler: Preformed, non-extruding, resilient type, constructed of cellular neoprene sponge rubber, extending full thickness of slab, in accordance with ASTM D1751 or ASTM D1752, Type I.

2.6 FORMS

A. Exposed concrete:
   1. Fir Plywood, concrete form grade or faced with tempered hardboard.
   2. Metal forms resulting in concrete finish equivalent to that obtained by use of plywood forms.
   3. Unless otherwise approved by Engineer, new lumber for forms, shoring or bracing.
   4. Maintain forms in good condition at all times, particularly as to size, shape, strength, rigidity, tightness and smoothness of surface.
   5. Thoroughly clean forms before concrete is placed.
   6. Set forms to established alignment and grade.
   7. Coat forms with colorless, non-staining mineral oil specifically manufactured for this purpose.

B. Unexposed concrete:
   1. Type specified for exposed concrete.
   2. Wood sheathing boards of uniform thickness, without loose knots, reasonably straight and butted with tight joints.
   3. Forms for unexposed concrete may be coated with form oil or wetted with water before concrete is placed.

2.7 MECHANICAL WATERSTOPS

A. Extruded elastomeric polyvinyl chloride compound; containing plasticizers, resins, stabilizers and other materials necessary to meet requirements of Specifications:
   1. Store waterstops to permit free circulation of air around water-stop material.
   2. Provide special fittings fabricated for splices and joints.
   3. In accordance with Specification CRD-C572.

	Value	ASTM STD.
Physical Property, Sheet Material		
Tensile Strength-minimum (psi)	1750	D412, Die C
Ultimate Elongation-minimum (%)	350	D412, Die C
Low Temp. Brittle-maximum (°F)	-35	D746
Stiffness in Flexure-minimum (psi)	400	D747
Accelerated Extraction (CRD-C572)		
Tensile Strength-minimum (psi)	1500	D412, Die C
Ultimate Elongation-minimum (%)	300	D412, Die C
Effect Of Alkalies (CRD-C572)		
Change in Weight (%)	+.25/-.10	-----
Change in Durometer, Shore A	+5	D2240

	Value	ASTM STD.
Finished Water-Stop		
Tensile Strength minimum (psi)	1400	D412, Die C
Ultimate Elongation minimum (%)	280	D412, Die C

4. Style: Center-Bulb, flat strip.
5. Waterstops as manufactured by:
   a. Greenstreak Plastic Products Co., St. Louis, Missouri.
   b. Vinylex, Carrolton, Texas.
   c. Government approved equal.

2.8 HYDROPHILIC WATERSTOPS

A. Combination of chloroprene rubber and chloroprene rubber modified to provide hydrophilic properties:
   1. Performance Requirement for chloroprene rubber.

	Value	ASTM STD.
Physical Property, Sheet Material		
Tensile Strength-minimum (psi)	1300 min.	D412
Ultimate Elongation-minimum (percent)	400 min.	D412
Hardness (Shore A)	50 ± 5	D2240
Tear Resistance (lb/inch)	100 min.	D624

   2. Performance requirements for chloroprene rubber modified (hydrophilic):

	Value	ASTM STD.
Physical Property, Sheet Material		
Tensile Strength-minimum (psi)	350 min.	D412
Ultimate Elongation-minimum (percent)	600 min.	D412
Hardness (Shore A)	52 ± 5	D2240
Tear Resistance (lb/inch)	50 min.	D624
Expansion Ratio (Volumetric Change)	Distilled water @ 70 degrees F	3 : 1 min.

2.9 LIQUID FLOOR HARDENER

A. Manufacturers:
   1. Surfhard, Euclid Chemical Company, Cleveland, Ohio.
   2. Solidus Hardener, Lambert Corporation.
   3. Government approved equal.

2.10 GROUTS

A. Consistency: Use grouts with the consistency necessary to completely fill space to be grouted for the particular application. Where "dry pack" is called for in the Contract Documents, use grout with a consistency such that the grout is plastic and moldable but will not flow.

B. Non-shrink grout:
   1. Prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water.
   2. Class B and C non-shrink grouts: Minimum 28 Day compressive strength of 5000 psi and meet requirements of ASTM C1107.
   3. Manufacturers:
      a. 5 Star Grout, U.S. Grout Corporation.
      b. Masterflow, BASF Building Systems.
      c. US SPEC GP Grout, US Mix Products Company.
      d. Government approved equal.

C. Waterproofing Grout: Cement base, aggregate type, heavy-duty, such as:
   1. Thoroseal, as manufactured by Thoro Systems Product.
   2. US SPEC Aquacoat, as manufactured by US Mix Products Company.
   3. Government approved equal.

D. Epoxy grout:
   1. Consists of a 3-component epoxy system with two liquid epoxy components and one inert aggregate filler component.
   2. Each component packaged separately for mixing at job site.
   3. Acceptable manufacturers:
      a. US SPEC EPG 2000.
      b. Masterflow 648 CP, BASF Building Systems.
      c. Government approved equal.

2.11 WATERPROOFING/DAMPPROOFING

A. Asphalt emulsion dampproofing, Type II, brush-on or spray grade, fiber reinforced, as manufactured by:
   1. Hydrocide 700B, BASF Building Systems.
   2. Dehydratine 85, Euclid Chemical Company.
   3. Sealmastic Emulsion, Type II, WR Meadows Inc.
   4. Government approved equal.

PART 3 - EXECUTION

3.1 PREPARING FOR CONCRETING

A. Keep ground surfaces free from standing water, mud and debris. Wet surfaces and keep moist up to time of placing concrete.

B. Construct forms to the shape, lines and dimensions of members shown on Drawings and sufficiently tight to prevent leakage of mortar. Brace and tie forms to maintain position and shape. Unless otherwise indicated, provide exterior corners in concrete members with 3/4 inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

C. Complete all formwork, installation of parts to be embedded, reinforcement and surface preparation prior to placing concrete.

D. Thoroughly clean surfaces of metalwork to be in contact with concrete immediately before concrete is placed.

E. Remove ponded water from the excavation and moisten fill.

F. Remove laitance, tighten forms, roughen, clean, wet and slush hardened concrete with cement grout prior to placing fresh concrete at construction joints.

3.2 PLACING OF CONCRETE

A. In accordance with ACI 304R and this Section.

B. Place concrete only in presence of authorized representative of Engineer.

C. Ready mix equipment:
1. Volume of Concrete for each Batch: Do not exceed manufacturer's rated capacity of the mixer.
2. Ensure sufficient mixing time for uniform distribution of materials.
3. Discharge all concrete from mixer prior to mixing new batch.
4. In accordance with ASTM C94.

D. Transporting:
1. Transport concrete from mixer to place of deposit by methods, which prevent segregation or loss of material.
2. Provide runways when wheelbarrows are used to transport concrete.
3. Do not wheel conveying equipment over reinforcement or support runways on reinforcement.

E. Placing:
1. Deposit concrete in continuous manner and as rapidly as possible.
2. Do not use concrete, which has attained initial set or contained mixing water for more than one hour.
3. Uniformly distribute concrete during process of depositing and in no case move deposited concrete in forms more than 6 feet in horizontal direction.
4. Deposit concrete in forms in uniform horizontal layers not deeper than 2 feet. Place each layer while the previous layer is still workable. No retempering of concrete will be permitted.
5. Do not drop freely more than 4 feet in unexposed work or more than 3 feet in exposed work; where greater drops are required, use duct or other approved method.
6. Do not place concrete against icy or frost covered earth surfaces.

F. Compacting:
1. Compact by internal type vibrators supplemented by rodding and tamping as necessary, to maximum practicable density, free from pockets of coarse aggregate in such a manner that surfaces are smooth and free from voids.
2. Avoid excessive vibration of concrete; avoid segregation of aggregates.
3. Avoid disturbance of previous lifts where initial set has taken place.
4. Use of form vibrators or tapping of forms is prohibited.

3.3 FINISHING

A. Apply finish to surface free from fins, bulges, ridges, offsets, honeycombing and roughness of any kind and presenting a finished, smooth and continuous hard surface.

B. Finishing:
   1. Where exposed concrete surfaces are shown on Drawings:
      a. Remove fins and nails and patch defects to match adjacent surfaces in color and texture.
      b. Chamfer all edges, which will be exposed.
   2. Finish floor slabs to true plane surfaces with a tolerance of 1/8 inch in 10 feet and finish monolithically:
      a. Slope floor slabs to drain where shown on Drawings.
      b. Unless otherwise shown or specified, steel trowel finish interior floor slabs.
      c. Tamp concrete to force coarse aggregate away from surface, then screed and float with a straightedge to bring surface to required finish level.
      d. When surface water has disappeared, steel trowel surface to a smooth and impervious finish, free from trowel marks.
   3. In lieu of hand-finishing, Contractor may use a power finishing machine, provided that, in opinion of Engineer, results are as good as or better than those obtained by hand-finishing method specified.
   4. When approved by Engineer, vacuum process may be used in dehydrating and finishing floor slabs.

C. Floor hardener:
   1. Apply to all concrete floor surfaces.
   2. Apply after concrete has cured minimum 7 Days.
   3. Apply in accordance with manufacturer's recommendations.

D. Prepackage Grouts: Follow instructions and recommendations of the manufacturer for all mixing, surface preparation, handling, placing, consolidation and curing for prepackaged grouts.

E. Waterproofing grout:
   1. Apply as needed to correct surface irregularities.
   2. Surfaces: Structurally sound, clean and free of dirt, loose mortar particles, paints, films, protective coatings, efflorescence, laitance and so forth.
   3. Form concrete to receive cement base coating to provide smooth surface. Dampen surface immediately prior to application with clean water. Follow manufacturer's instructions on mixing and application.
   4. Distribute base coat of evenly, a minimum of 2 pounds per square yard. Apply a second coat of 2 pounds per square yard.

3.4 CURING

A. Cure concrete for not less than 14 Days after placing.

B. Leave forms in place at least 14 Days, or until concrete has attained specified 28-Day strength, unless otherwise approved by Engineer. If forms are allowed to be removed within 14 Days of placing concrete, continue curing in accordance with applicable method or as directed by Engineer.

C. Strictly follow careful procedures for the removal of forms and perform with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted.

D. Keep encasement concrete, concrete cradles and anchor blocks moist until covered. Backfill no sooner than 24 hours after placing.

E. Concrete slabs may be cured by either of the following two methods:
   1. Method 1:
      a. After finishing slab, wet surface with a fine spray of water and cover with polyethylene-bonded waterproof paper sheeting.
      b. Lap sheets 4 inches at sides and ends and seal with adhesive tape.
      c. Weigh sheeting down with wood planks to keep sheeting in contact with concrete.
      d. Repair or replace sheets immediately if damage occurs.
      e. Period of curing by this method: Not less than 7 Days.
   2. Method 2:
      a. Cover concrete with water-saturated curing mats and keep continuously wet for not less than 7 Days.

F. As an alternate to above referenced curing methods for formed and slab concrete, spray surface with liquid curing compound which does not affect bond of paint to concrete surface:
   1. Apply curing compound in accordance with manufacturer's instructions within 2 hours after completion of finish or stripping of forms, if stripped in less than 14 Days, at a maximum coverage rate of 200 square feet per gallon in such a manner as to cover surface with a uniform film to seal thoroughly.
   2. Curing Compound: As specified herein.
   3. Take care to avoid damage to seal during curing period.
   4. Repair broken or damaged seals occurring before expiration of curing period by application of additional curing compound over damaged portion.
   5. Do not use curing film method where construction joints are to be made.

3.5 FORM REMOVAL

A. Remove forms in manner to ensure safety of structure:
   1. Results of strength tests may be used as evidence that concrete has attained required strength.
   2. Avoid spalling concrete surfaces.
   3. Fill tie rod or bolt holes solidly with mortar after removal of forms.
   4. Match color and texture of mortar used for filling holes on exposed concrete surfaces.

3.6 WATERPROOFING

A. Apply waterproofing to exterior walls and roofs of all underground concrete structures:
   1. Upon removal of wall forms, coat surface with curing compound as specified.
   2. Prior to backfill, coat surface with waterproofing agent consisting of asphaltic emulsion applied in two coats.
      a. Dilute first coat to 1/2 strength by addition of water and spray on so as to provide maximum coverage rate of 100 square feet per gallon.

b. Apply second coat undiluted and spray on at a coverage rate of 100 square feet per gallon.
c. Asphaltic emulsion as specified herein.

3.7 TOLERANCES

A. Tolerances for concrete construction shall conform to all requirements of ACI 117, except as modified herein:
1. The following non-cumulative construction tolerances apply to finished walls and slab:

Item	Tolerance
Variation of the constructed linear outline from the established position in plan	In 10 feet: 1/4 inch In 20 feet or more: 1/2 inch
Variation from level or from the grades shown	In 10 feet: 1/4 inch In 20 feet or more: 1/2 inch
Variation from the plumb	In 10 feet: 1/4 inch In 20 feet or more: 1/2 inch
Variation in thickness	Minus 1/4 inch; plus 1/2 inch
Variation in the locations and sizes of slabs and wall openings	Plus/minus 1/4 inch

B. Variation from the indicated spacing of reinforcement steel shall not exceed 1-inch, but the total number of bars in any 10 foot strip shall not vary from the number of bars shown on Drawings.

3.8 CONSTRUCTION JOINTS

A. Provide construction joints where shown on Drawings.

B. Exercise caution preparing concrete surfaces at joints where bonding between two sections of concrete is required:
1. Bonding required at all horizontal joints in walls unless otherwise specified.
2. Prepare surface as specified.

C. Vertical Joints where Waterstops are Required: Coat joint face in accordance with manufacturer recommendations. Sealant groove surfaces: Do not coat.

D. Place concrete next to waterstops as specified.

3.9 WATERSTOPS

A. Waterstops as shown on Drawings:
1. Provide proper anchoring of waterstops to concrete.
2. Prevent folding of waterstops during placement of concrete.
3. Provide continuous 3/8 inch diameter pencil rod steel support at top edge of horizontal waterstops attached 12 inches on center or as directed by Engineer.
4. Provide continuous 3/8 inch diameter pencil rod steel support at both edges of vertical waterstops, attached 12 inches on center or as directed by Engineer.

B. Prevent formation of air and rock pockets under waterstops when placing roof and floor slab concrete. Work concrete by hand if required or as directed by Engineer.

3.10 CORROSION PROTECTION REQUIREMENT

A. Provide 2 inches clearance between pipe, conduit, dowels and other ferrous items required to be embedded in concrete and concrete reinforcement. Position and support prior to placement of concrete.

B. Secure cast-in-place items by use of chairs or other non-conductive means.

3.11 PUMPING OF CONCRETE

A. Pumping of concrete permitted only with Engineer's approval. If in Engineer's opinion, the pumped concrete does not produce end results as required by these Specifications, discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Replace pumping equipment and hoses (conduits) that, in the opinion of Engineer, are not functioning properly.

C. Slump Samples and Test Cylinders: Procure samples at placement (discharge) end of pumping hose.

3.12 PROTECTION

A. Protect concrete against injury until final acceptance by Government:
   1. Protect fresh concrete from damage due to rain, hail, sleet or snow.
   2. Provide protection while the concrete is still plastic and whenever such precipitation is imminent or occurring, as determined by Engineer.
   3. Immediately following the first frost in the fall, be prepared to protect concrete against freezing.
   4. If the mean daily temperature in the vicinity of the work site falls below 40 degrees Fahrenheit for more than 1 Day, maintain concrete at a temperature above 50 degrees Fahrenheit for at least 72 hours after it is placed.

B. Concrete cured by an application of curing compound will require no additional protection from freezing if the 50 degrees Fahrenheit protection for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise, protect concrete against freezing temperatures for an additional 72 hours immediately following 72 hours of 50 degrees Fahrenheit. Protect concrete cured by water curing against freezing temperatures for 3 Days immediately following the 72 hours of protection at 50 degrees Fahrenheit.

C. Discontinue protection against freezing temperatures so that drop in temperature of any portion of concrete will be gradual and will not exceed 40 degrees Fahrenheit in 24 hours. When mean daily temperature rises above 40 degrees Fahrenheit for more than three successive Days, specified 72 hour protection at temperature not lower than 50 degrees Fahrenheit may be discontinued for as long as the mean daily temperature remains above 40 degrees Fahrenheit; provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

D. Where artificial heat is employed, take special care to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted by these specifications.

E. Take particular care to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Concrete found to be damaged or which may have been originally defective or which becomes defective at any time prior to the final acceptance of the completed Work or which departs from the established line or grade or which for any other reason does not conform to the specifications, shall be satisfactorily repaired or removed and replaced with acceptable concrete at Contractor's expense.

3.13 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, carefully examine exposed surfaces and immediately rub or grind irregularities to provide a smooth, uniform and continuous surface:
   1. Plastering or coating of surfaces to be smoothed will not be permitted.
   2. Make no repairs until after inspection by Engineer and then only in strict accordance with Engineer's directions.
   3. Concrete containing surface defects, as defined above, shall be repaired with gunite or with cement mortar placed by an approved compressed air mortar gun.
      a. Defects outside of the specified definition shall be replaced with new.
      b. Surface defects are individual in nature. A combination of extensive surface defects in a small area shall be replaced with new.
   4. In no case will extensive patching of honeycombed concrete be permitted.
   5. Repairs and replacements required herein and including those ordered by Engineer shall be promptly executed by Contractor at no additional cost to Government.
   6. The Engineer may require a change to work procedures if extensive surface defects occur.

B. Cut back defective surfaces to be repaired from trueline minimum depth of 1/2 inch over entire area. Avoid feathered edges:
   1. Where chipping or cutting tools are not required in order to deepen area properly, surface shall be prepared for bonding by removal of laitance or soft material and removal of not less than 1/32 inch depth of surface film from hard portions, by means of efficient sandblast.
   2. After cutting and sandblasting, surfaces under repair shall remain moist, but not so wet as to overcome the suction upon which good bond depends. Material used for repair purposes shall consist of mixture of one sack of cement to 3 cubic feet of sand.
   3. For exposed walls, cement shall contain proportion of Atlas White Portland Cement as required to make color of patch match color of surrounding concrete.

C. Ream holes left by tie-rod cones with suitable toothed reamers to leave the surfaces of the holes clean and rough:
   1. Repair these holes in an approved manner with dry-packed mortar.

2. Holes left by form-tying devices having a rectangular cross section and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with dry-packed mortar.

D. Build up repairs and shape so that completed Work will conform to the requirements of Article 318, using methods approved by Engineer which will not disturb the bond or cause sagging or horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete being repaired.

E. Prior to filling any structure with water, cracks that may have developed shall be "vee'd" as shown on Drawings and filled with sealant as specified.

3.14 FIELD QUALITY CONTROL

A. Tests:
1. Test concrete for compressive strength in accordance with ASTM C39 at a frequency indicated in Table A of Section 01 45 00.
2. Slump tests as specified in ASTM C143 at a frequency indicated in Table A of Section 01 45 00.
3. Daily measure and record ambient temperature, concrete temperature, relative humidity, and wind speed.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 30 05

SITE CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. Concrete slabs on grade.

B. Control, and expansion and contraction joint filler material

C. Control, and expansion and contraction joint filler material.

D. Equipment pads bolted light pole base (parking lot lighting only), and benches.

E. Formwork, shoring, bracing and anchorage.

F. Concrete reinforcement and accessories.

G. Concrete curing and finishing.

H. Concrete curbs, gutters and channels.

1.2 RELATED SECTION

A. Section 01400 - Quality Requirements.

1.3 REFERENCES

A. ACI 304 - Measuring, Mixing, Transporting and Placing Concrete.

B. ACI 305R - Hot Weather Concreting.

C. ACE 306R - Cold Weather Concreting.

D. ACI 308 - Curing Concrete.

E. ACE 347R - Recommended Practice for Concrete Formwork.

F. ASTM A185 - Steel Welded Wire Fabric.

G. ASTM A615 - Deformed and Plain Billet Steel Reinforcement.

H. ASTM C33 - Concrete Aggregates.

I. ASTM C94 - Ready-Mixed Concrete.

J. ASTM C150 - Portland Cement.

K. ASTM C260 - Air Entrainment Admixtures.

L. ASTM C309 - Liquid Membrane Curing Compound.

M. ASTM C494 - Admixtures for Concrete.

N. ASTM D1751 - Preformed Expansion Joints.

O. CRSI - Concrete Reinforcing Steel Institute Manual of Practice

P. Uniform Building Code (UBC), 1994 edition.

Q. Americans with Disabilities Act (ADA).

1.4 SUBMITTALS

A. Submit under provisions of Section 01600.

B. Product Data: Provide data on admixtures and accessories.

C. Mix Design: Submit proposed mix design of each class of concrete to the CO.COR for review prior to commencement of Work. All mix designs shall bear the project name and the location where the concrete mix is to be used. All mix designs shall bear the wet seal and signature of a Registered Professional Engineer licensed to practice in the State of Nevada.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

B. Acquire cement and aggregate from same source for all work.

C. Conform to ACI 305R when concreting during hot weather.

D. Conform to ACI 306R when concreting during cold weather.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Conform to ACI 301 and ACI 347R unless noted otherwise.

2.2 REINFORCING STEEL

A. Reinforcing Steel: ASTM A615, 60 ksi, 414 MPa yield grade; deformed billet steel bars,

B. Stirrup Steel: ASTM A615, 40 ksi, 414 MPa yield grade; deformed billet steel bars.

C. Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets or coiled rolls.

D. Non-Structural Steel such as slab-on-grade may be Grade 60, 40 ksi.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II - Moderate and Type V - Sulphate Resistant Portland type.

B. Aggregates (Hardrock Concrete): ASTM C33.

C. Water: Clean and not detrimental to concrete.

D. Fly Ash: Permitted.

2.4 ADMIXTURES

A. Water Reducer: ASTM C494, Type A.

B. Air Entrainment: ASTM C260.

2.5 ACCESSORIES

A. Bonding Agent: Two component modified epoxy resin.

B. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.6 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick.

B. Construction Joint Devices: Refer to Architectural Drawings.

C. Expansion and Contraction Joint Devices: Refer to Architectural Drawings.

D. Sealant and Primer: Type as specified in Section 07900.

2.7 CURING MATERIALS

A. Water: clean and drinkable.

B. Absorptive Mat: Cotton or burlap fabric.

C. Membrane Curing Compound: ASTM C309, Type 1-D, Class A Acrylic type.

D. For Terrazzo Slab: Surface of concrete slab must not be cured with a liquid membrane or contain other additives which could inhibit bond of terrazzo topping.

2.8 CONCRETE MIX

A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

B. Select proportions for normal weight concrete in accordance with ACI 301.

C. Provide concrete to the criteria as indicated in the Structural Drawings.

D. Use accelerating admixtures in cold weather only when accepted by CO/COR in coordination with Architect. Use of admixtures will not relax cold weather placement requirements.

E. Do not use calcium chloride.

F. Use set retarding admixtures during hot weather only when accepted by CO/COR in coordination with Architect.

G. All exterior concrete sidewalks and slabs shall contain between four (4) to six (6) percent air entraining in the mix.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify requirements for concrete cover over reinforcement.

B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding again accordance with manufacturer's instructions.

B. Wet all soils to receive concrete if there is no moisture barrier.

C. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.3 FORMWORK ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with ACI 301.

B. Provide bracing to ensure stability of formwork and to prevent overstressing by construction loads.

C. Hand trim sides and bottom of earth forms, remove loose dirt.

D. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors and other inserts.

3.4 REINFORCEMENT

A. Fabricate and place reinforcement in accordance with CRSI.

B. Place, support and secure reinforcement against displacement. Do not deviate from required position.

C. Provide additional reinforcement at all formed openings in accordance with structural drawings.

D. Maintain concrete cover around reinforcement in accordance with the structural drawings.

3.5 PLACING CONCRETE

A. Place concrete in accordance with ACI 304.

B. Notify CO/COR a minimum of 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed joint fillers and joint devices are not disturbed during concrete placement.

D. Place joint filler in required locations. Set top to required elevations. Secure to resist movement by wet concrete.

E. Separate slabs on grade from vertical surfaces with joint filler unless noted otherwise on drawings.

F. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.

G. Install construction joint devices in accordance with manufacturer's instructions and in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

H. Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.

I. Install joint covers in longest practical length, when adjacent construction activity is complete.

J. Place concrete continuously between predetermined expansion, control, and construction joints.

K. Do not interrupt successive placement; do not permit cold joints to occur.

L. Place floor slabs in pattern indicated on Structural and Architectural Drawing.

M. Saw cut joints within 24 hours after placing. Provide 1/8-inch-thick cut by 1/4 depth of slab thickness.

N. Screed slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft for exterior work and 1/8 inch in 10 ft for interior work.

O. Slope slabs to floor drains where floor drains are shown on drawings.

3.6 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Wet curing using fog spraying/sprinkling or cotton/burlap mats shall commence immediately after finishing operations have been completed and as soon as marring of the concrete will not occur. Wet curing shall continue for a minimum of 7 days.

D. Cure floor surfaces in accordance with ACI 308.
   1. Slabs to receive tile or carpet shall be moisture cured using fog spraying/sprinkling or with cotton/burlap mats.
   2. Slabs to receive topping slab shall be moisture cured using fog spraying/sprinkling or
   3. cotton/burlap mats.
   4. Stair treads and landings shall be moisture cured using fog spraying/sprinkling or
   5. cotton/burlap mats.
   6. Other concrete slabs may be cured using 2 coat liquid membrane curing compound with each coat being applied at right angles to the previous coat.

3.7 TOLERANCES

A. Maximum variation of surface flatness for interior concrete slabs, exposed and covered, shall be 1/8 " in 10 ft.

B. Maximum variation of surface flatness for exterior concrete slabs and walks shall be 1/4" in 10 ft.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01400.

B. Provide free access to Work and cooperate with appointed firm.

C. Four (4) concrete test cylinders of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cubic yards of concrete nor less than once for each 5,000 square feet of surface area.

D. One (1) additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

E. One (1) slump test will be taken for each set of test cylinders taken.

F. Provide for special inspection of concrete work where required by IBC.

3.9 PATCHING

A. Allow CO/COR to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify CO/COR upon discovery.

C. Patch imperfections in accordance with ACI 301.

3.10 CONCRETE FINISHING

A. Finish concrete floor and slab surfaces in accordance with ACI 301.

B. Wood float surfaces which will receive topping slab, quarry and ceramic tile with full be setting system.

C. Exterior concrete slabs and walks:
Provide heavy broom finish at all slabs and walks unless noted otherwise.
Provide stamped concrete tactile detectable warning walking surfaces complying with requirements of ADA at all ramps and curb ramps.

D. Sandblast exposed vertical concrete surfaces where noted on the drawings. Use of retarder in lieu of sandblasting is acceptable.

3.11 MISCELLANEOUS

A. Concrete mow curbs:
1. "A" type curb.
2. Fiberglass reinforcing.
3. Concrete sealer finish.
4. Control joints at 10 feet on center.

3.12 SCHEDULE

A. Exterior Slabs and Walks Outside Building Complex Perimeter: 6-inch thick, 4500 psi unless noted otherwise.

END OF SECTION

SECTION 04 22 00

REINFORCED MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete Masonry Units.

B. Reinforcement, Anchorage and Accessories.

1.2 RELATED SECTIONS

A. Section 09 96 00 - Protective Coatings.

1.3 REFERENCES

A. ASTM International Standards:
   1. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
   2. ASTM A951 - Masonry Joint Reinforcement.
   3. ASTM C55 - Concrete Building Brick.
   4. ASTM C90 - Loadbearing Concrete Masonry Units.
   5. ASTM C140 - Sampling and Testing Concrete Masonry Units and Related Units.
   6. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.4 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Reinforcement Shop Drawings:
   1. Indicate sizes, placement, quantities.
   2. Lap lengths, location.
   3. Bending, cutting schedules.
   4. Supporting, spacing devices.

C. Masonry accessory product data.

D. Provide full size split face CMU to illustrate color, texture.

E. Provide full size split face CMU coated with anti-graffiti coating to illustrate color. Refer to Section 09 96 00.

F. Test results.

1.5 QUALITY ASSURANCE

A. Provide CMU at Site for Testing: Minimum five days prior to start of masonry construction.

B. The Government selects 10 CMU for laboratory testing:
   1. Test in accordance with ASTM C140.
   2. The Government to pay initial test.

C. Remove CMU immediately from site if CMU fail test requirements.

D. In lieu of testing:
   1. Provide letter of certification from CMU manufacturer.
   2. Provide complete test reports from Engineering approved testing laboratory. Test report must be current within three months of CMU delivery to project site.

E. Acquire Engineer's approval of CMU prior to start of masonry work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01 66 00.

B. Storage:
   1. Store masonry units on pallets and protect from contamination and staining.
   2. Keep masonry units covered at all times.

1.7 PROJECT ENVIRONMENTAL REQUIREMENTS

A. Provide following protective provisions when ambient temperature is below 40 degrees (all temperatures Fahrenheit unless otherwise noted):
   1. Heat mortar sand and water to produce mortar temperatures between 40 and 120 degrees at time of mixing; maintain above freezing until used in masonry.
   2. Maintain air temperature minimum 40 degrees on both sides of walls for minimum 24 hours after completion of masonry work.
   3. Ambient temperature below 25 degrees: Place no masonry.

B. Provide following protective provisions when ambient temperature exceeds 100 degrees or 90 degrees with wind velocity greater than 8 miles per hours:
   1. Maintain mortar and grout temperatures below 120 degrees.
   2. Flush mixers, mortar transport containers, and mortarboards with cool water prior to contact with mortar or ingredients.
   3. Retemper mortar with cool water to maintain proper consistency.
   4. Use mortar within two hours of initial mixing.
   5. Fog spray until damp all new masonry construction minimum three times daily for 3 Days.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hollow Load Bearing CMU: ASTM C90, Type I - Moisture Controlled; gray color unless otherwise specified; light weight.

B. Decorative CMU: ASTM C90, Type I - Moisture Controlled; gray color unless otherwise specified; split-face, non-ribbed.

C. Concrete Brick Units: ASTM C55, of same Type and Weight as block units.

D. Masonry Units: Nominal modular size of masonry units shall be as shown on Drawings. Provide special units as required.

2.2 COMPONENTS

A. Single Wythe joint reinforcement:
   1. Ladder type; hot dip galvanized after fabrication; cold-drawn steel conforming to ASTM A951, 9 gage side rods with 9 gage cross ties.
   2. Corners: Prefabricated corner reinforcing.

3. Partitions: Prefabricated tees.

B. Reinforcing Steel: ASTM A615, 60-ksi yield grade, deformed billet bars, unprotected finish.

2.3 ACCESSORIES

A. Joint Filler: ASTM D1752 closed cell synthetic foam; oversized 50 percent to joint width.

B. Building Paper: 15 pound asphalt saturated felt.

C. Protective Covering: Polyethylene film.

D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive Work.

B. Verify items provided by other sections of work are properly sized and located.

C. Verify that built-in items are in proper location and ready for roughing into masonry work.

D. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

A. Coordinate placement of all embedded items.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

A. Establish lines, levels and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints to a uniform thickness of 3/8 inch.

C. Lay masonry units in running bond. Tool all joints concave.

3.4 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other Work.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar as Work progresses.

D. Interlock external corners.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Cut all masonry units with masonry saw; provide straight, clean, unchipped edges.

G. Isolate masonry partitions from exterior structural walls as indicated.

H. Isolate top joint of non-bearing masonry partitions from roof slab compressible joint filler.

3.5 REINFORCEMENT AND ANCHORAGES - REINFORCED UNIT MASONRY

A. Place reinforcement, wall ties, and anchors in accordance with sizes, types and locations as shown on Drawings, and as specified. Do not place dissimilar metals in contact with each other.

B. Install horizontal joint reinforcement 16 inches o.c. unless otherwise shown on Drawings.

C. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 24 inches each side of opening, unless otherwise shown on Drawings.

D. Lap joint reinforcement ends minimum 12 inches.

E. Reinforcing bar locations:
   1. Support and secure reinforcing bars from displacement. Maintain position within 1/4 inch of dimensioned position.
   2. In horizontal bond beams and lintels, bars shall be located a maximum of 4 inches above bottom of masonry unit.

3.6 LINTELS

A. Install reinforced unit masonry lintels over openings where steel lintels are not indicated.

B. Construct integrally with wall unless otherwise noted on Drawings.

C. Use single piece reinforcing bars only.

D. Support and secure reinforcing bars from displacement. Maintain position within 1/4 inch of dimensioned position.

E. Place and consolidate grout fill without displacing reinforcing.

F. Allow masonry lintels to attain specified strength before removing temporary supports.

3.7 GROUTED COMPONENTS

A. Reinforce bond beam with two No. 4 bars minimum.

B. Lap splices minimum 54 bar diameters.

C. Support and secure reinforcing bars from displacement. Maintain position within 1/4 inch of dimensioned position.

D. Place and consolidate grout fill without displacing reinforcing.

3.8 ENGINEERED MASONRY

A. Lay masonry units with core cells vertically aligned and unobstructed by excess mortar.

B. Reinforce masonry unit cores with reinforcement bars and grout as indicated.

C. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 160 bar diameters.

D. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low lift grouting techniques.

E. Terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.

F. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8-inch increments and rod for grout consolidation.
   1. High lift grouting:
   2. Clean out masonry cells and cavities.
   3. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
   4. Limit grout lift to 48 inches and vibrate for grout consolidation. Wait 24 hours before placing next lift.

3.9 CONTROL AND EXPANSION JOINTS

A. Do not place horizontal joint reinforcement through control and expansion joints, except where indicated otherwise.

3.10 BUILT-IN WORK

A. Build in metal door and glazed frames, anchor bolts, plates, jamb armors, etc., as work progresses.

B. Build in items plumb and level.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

D. Do not build in organic materials subject to deterioration.

3.11 SEALING EXTERIOR MASONRY

A. Exterior masonry coating in accordance with Section 09 96 00.

3.12 TOLERANCES

A. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

B. Maximum Variation from Plumb: 1/4 inch per story non-cumulative.

C. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

D. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.13 CUTTING AND FITTING

A. Cut and fit for pipes, conduit, sleeves, etc. Coordinate with other sections of Work to provide correct size, shape and location.

B. Obtain Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.14 CLEANING

A. Remove excess mortar and mortar smears.

B. Replace defective mortar. Match adjacent Work.

C. Clean all surfaces with cleaning solution and stiff fiber brushes.

D. Use non-metallic tools in cleaning operations.

3.15 PROTECTION

A. Protect finished installation.

B. Without damaging completed Work, provide protective boards at exposed external corners which may be damaged by construction activities.

3.16 SCHEDULES

A. Exterior Walls: Single wythe engineered concrete masonry units; split face exterior, smooth face interior.

B. Interior Walls: Single wythe engineered concrete masonry units, 8-inch nominal thickness, both faces smooth.

C. Perimeter Fence Wall: Single wythe engineered concrete masonry units, 8-inch nominal thickness, both faces smooth.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 04 70 00

MANUFACTURED STONE VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Exterior manufactured stone veneer over concrete substrates.

1.2 SUBMITTALS

A. Product Data:
   1. Submit manufacturer’s data on manufactured stone veneer units and recommended sealer, if required.

B. Samples: Submit samples for review prior to constructing job-site mock-ups, delivering materials to the site or commencing the work in this Section.
   1. Submit sufficient quantity of samples of manufactured stone veneer, showing range of texture and/or color variations of the exposed surfaces.

C. Shop Drawings: Submit Manufacturer's installation instructions and field erection or setting drawings indicating layout, pertinent dimensions, anchorages, reinforcement, head, jamb and sill opening details, and jointing methods.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Company with minimum 3 years experience in the installation of manufactured stone veneers of the type specified.

B. Regulatory Requirements: Materials and workmanship shall meet requirements of the building codes which are applicable to the jurisdiction in which Project is located.

C. Comply with requirements of NCMA-MSV’s “Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer”, current edition.

D. Mock-Ups:
   1. Prior to start of work, construct a sample panel from the approved materials, containing each different kind or color of manufactured stone veneer
   2. Size: approximately 4 feet wide by full height in location as directed by CO/COR
   3. Mockup shall provide a standard of workmanship, bond, thickness and tooling of joints, range of color and texture of the manufactured stone veneer and mortar.
   4. When accepted by CO/COR, mockup shall be the standard of comparison for the remainder of the manufactured stone veneer work.
   5. Approved mockup can remain in final construction.

1.4 DELIVERY, STORAGE AND HANDLING

A. Transport and handle manufactured stone veneer in such a manner as to prevent chipping and breakage.

B. Deliver and store materials in dry, protected areas.

C. Keep free of stain or other damage.

D. Locate storage piles, pallets, stacks or bins to avoid or protect material from heavy or unnecessary traffic.

E. Replace damaged material at no cost to Government.

1.5 PROJECT/SITE CONDITIONS

A. Hot Weather Requirements:
1. When the ambient air temperature exceeds 100 degrees F., or when the ambient air temperature exceeds 90 degrees F. and the wind velocity is greater than 8 mph, the manufactured stone veneer Contractor shall implement hot weather protection procedures.
2. Do not spread mortar beds more than 4 feet ahead of placing manufactured stone veneer.
3. Place manufactured stone veneer within one minute of spreading mortar.

B. Cold Weather Requirements:
1. Fully protect manufactured stone veneer against freezing by a weather-tight covering which shall also prevent accumulation of ice.
2. Do not lay manufactured stone veneer when the temperature of the surrounding atmosphere is below 40 degrees F. or is likely to fall below 40 degrees F. in the 24 hour period after laying, unless adequate protection is provided.

C. Field Measurements:
1. Verify measurements shown on Drawings by taking field measurements.
2. Proper fit and attachment of manufactured stone veneer is required.

PART 2 - PRODUCTS

2.1 MANUFACTURED STONE VENEER

A. Stone: As indicated on Drawings.

2.2 WEATHER-RESISTIVE BARRIER AND LATHING

A. Metal Lath: Provide one of the following:
1. 2.5 lb/yd2 (1.4 kg/m2) (or heavier) self-furring metal lath meeting ASTM C847.
2. Welded wire lath complying with ASTM C933.
3. 18 gauge (or heavier) woven wire lath meeting ASTM C1032.
4. Non-metallic lath complying with ASTM C1788.
5. Alternate lath products showing compliance with ICC-ES AC 275, or equivalent

B. Anchorages: Corrosion resistant concrete screws.

2.3 ACCESSORIES

A. Setting Bed Mortar: As recommended in NCMA-MSV's "Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer", Table 2, current edition.

B. Pointing Mortar:
1. Site Mixed: Meets the requirements of ASTM C270 Type N or Type S
2. Preblended: Meets the requirements of ASTM C1714/C1714M Type N or Type S

PART 3 - EXECUTION

3.1 EXAMINATION

A. Preconstruction Conference: A conference shall be held at the jobsite prior to start of construction of this portion of the work to review substrates, flashing conditions, work provided by preceding trades and work required by trades following this work. General Contractor, subcontractor(s) affected by the work of this section, and CO/COR shall be in attendance. If required, modifications shall be made to details and to specifications to address actual field conditions.

B. Verification of Conditions:
   1. Examine subsurfaces to receive Work and report detrimental conditions in writing to CO/COR.
   2. Failure to observe this requirement constitutes a waiver to subsequent claims to the contrary and holds Contractor responsible for correction(s) CO/COR may require.
   3. Commencement of Work will be construed as acceptance of subsurfaces.
   4. Verify, before proceeding with this Work that required inspections of existing conditions have been completed.

C. Coordination with other Work: Coordinate with other work which affects, connects with, or will be concealed by this Work.

3.2 PREPARATION

A. Protection: Protect sills, ledges, offsets and other projections from dropping of brown coat materials and mortar.

B. Establish lines, levels, and coursing. Protect from disturbance.

C. Clean manufactured stone veneer prior to erection. Do not use wire brushes or implements which will mark or damage exposed surfaces.

D. Lay out a minimum of 25 sq ft (2.3 m2) of stone veneer units at the jobsite so there is a variety of sizes, shapes, and colors to choose from to ensure a random appearance.

3.3 LATHING

A. Lathing: Apply metal lath taut, with long dimension perpendicular to supports.
   1. Install lath over concrete substrate.
   2. Overlap a minimum of 1 in. (25 mm) at the vertical seams and a minimum of 1/2 in. (13 mm) at the horizontal seams.
      a. Stagger vertical seams
   3. Lath should be wrapped around inside and outside corners a minimum of 12 in. (305 mm)
   4. Lath should be fastened every 7 in. (178 mm) vertically on each stud.

3.4 INSTALLATION

A. Scratch Coat:
   1. Apply a nominal 1/2 in. thick layer of mortar ensuring the lath is com pletely encapsulated with mortar.
   2. Apply mortar with sufficient pressure and thickness to fully embed the lath in mortar.
   3. Once the mortar is thumbprint hard, scratch (score) the surface horizontally to create the mortar scratch coat.
   4. Dampen surface prior to installing veneer stone.

B. Grouted:
   1. Install stone veneer units from the top down.
   2. Moisten surface of cured scratch coat.
   3. Apply mortar to back of each manufactured stone unit to a nominal thickness of 1/2 inch, ensuring entire surface is uniformly coated. Alternatively, trowel mortar onto scratch coat, completely covering scratch coat.
      a. The resulting thickness of the scratch coat and setting bed should be nominally 1 in. (25 mm) measured from the outer surface of the WRB to the back surface of the unit.
   4. Apply corner unit's first, alternating short and long legs of each course.
   5. Press buttered manufactured stone units firmly into position into scratch coat, joggle each piece slightly to bond firmly, causing mortar to extruded slightly around edges of units. Apply pressure to the manufactured stone unit to ensure a good bond and complete coverage between the mortar bed and back surface of the stone.
   6. Grouting of Joints:
      a. Fill joints to the desired depth, ensuring that mortar is forced into all voids.
      b. Grout should be "thumbprint hard" before tooling the joints.
      c. Neatly tool mortar joint surface to profile joint matching approved mock-ups.

C. Do not lay chipped, cracked or otherwise defective units in the wall where exposed to view. Units that are cut in field and therefore expose non-integrally colored portions of unit shall not be used and shall be considered defective. Remove and replace units that chipped, cracked, broken, or otherwise defective whether before or after setting.

D. Cutting of manufactured stone veneer: Plan work to minimize jobsite cutting. When required, exposed units shall be cut with a power driven Carborundum or diamond disc blade saw to provide uniform edges. When using "wet" cutting methods, clean water shall be used on exposed units. Take care to prevent breaking unit corner or edges.

E. Where fresh manufactured stone veneer joins manufactured stone veneer that is partially or totally set, the exposed surface of the set manufactured stone veneer shall be cleaned and lightly wetted so as to obtain the best possible bond with the new Work. Loose manufactured stone veneer and mortar shall be removed.

F. Coordinate sealant application as specified in Section 07 92 00 – Joint Sealants as detailed and as required to maintain waterproof integrity.

3.5 REPAIRS

A. Remove and replace manufactured stone veneer which has cracks, blisters, pitting, discoloration or other defects.

B. Repairing of defects will be permitted only when approved by the CO/COR.

C. Repairs shall match existing work.

3.6 CLEANING

A. Daily Cleaning: Keep walls clean. Soiled manufactured stone veneer from mortar spills which will be exposed to view at the completion of the Project shall be cleaned immediately with stiff fiber brushes until the wall is free of dropped or spattered mortar.

B. Remove scaffolding and equipment used in the Work.

C. Clean up debris, refuse and surplus material and remove from premises.

3.7 PROTECTION

A. Furnish temporary protection for exposed manufactured stone veneer corners subject to injury.

B. Carefully cover tops of walls left incomplete at the conclusion of the day's work with tarpaulins or other approved covering, securely held in place.

C. In hot and dry weather, protect manufactured stone veneer against too rapid drying.

D. Protect finished work against freezing for a period of not less than 48 hours by means of enclosures, artificial heat, or such other protective methods as may be required.

E. Allow no construction activity on opposite side of wall to which manufactured stone veneer work is being applied during and for 48 hours after completion of work.

END OF SECTION

SECTION 09 66 13

RUSTIC TERRAZZO FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes cementitious rustic terrazzo, monolithic.

B. Related Requirements:

1. Concrete slab, Section 033005 for float finish and expansion joints in concrete substrate slab.

1.02 DEFINITIONS

A. NTMA: National Terrazzo and Mosaic Association, Inc.

B. Marble: Metamorphic (recrystallized) limestone, composed predominantly of crystalline grains of calcite or dolomite or both, having interlocking or mosaic texture.

C. Aggregate: Material other than marble, used in the topping which may include granite, abrasive, quartz, or river gravel.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: The General Contractor shall conduct a conference at Project site before Terrazzo Contractor begins installation.

1. The General Contractor shall invite Terrazzo Contractor, the Architect, and representatives of the CO/COR.

2. Review methods and procedures related to terrazzo including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

c. Review terrazzo mixes and patterns.

d. Review custom terrazzo mixes, designs, and patterns.

a. Coordination with the Work of other Installers.

1.04 ACTION SUBMITTAL

A. Product Data: Terrazzo Contractor shall submit Product Data for each type of product required for installation including:

1. Strip materials.
2. Sealer.
3. Cement.

B. Shop Drawings: Terrazzo Contractor shall prepare and submit Shop Drawings that include plans, elevations, sections, component details, and attachments to other work. Include terrazzo installation requirements. Show layout of the following:

1. Divider strips.
2. Expansion-joint strips.
3. Accessory strips.
4. Abrasive strips.
5. Terrazzo patterns.

C. Samples for Initial Selection: Terrazzo Contractor shall submit NTMA “Color Palette Brochure” showing full range of colors and patterns available for each terrazzo type.

D. Samples for Verification: Terrazzo Contractor shall prepare and submit samples for each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Each terrazzo sample shall be labeled to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Each Sample shall be of same thickness and prepared from same material to be used for the Work, in size indicated below:

1. Terrazzo: 12 by 12 inch Samples with divider strips 4 inches from each edge.
2. Accessories: 6 inch long Samples of each type and kind of exposed strip item required.

1.05 INFORMATIONAL SUBMITTAL

A. Qualification Data: Terrazzo Contractor shall submit two copies of qualification data.

1. Include list of projects with photographs indicating name and location of Project, name of Owner, name and contact information for General Contractor, and name and contact information for Architect.
2. Include letter from NTMA with the name of the Project and name of member, stating current member status.

1.06 CLOSEOUT SUBMITTAL

A. Maintenance Literature: Submit two copies of maintenance recommendations of NTMA or maintenance product members of NTMA.

1.07 QUALITY ASSURANCE

A. Acceptable Suppliers: A firm experienced in manufacturing products in accordance with NTMA standards and with a record of successful in-service performance, as well as sufficient production capacity to produce required materials.

B. Acceptable Terrazzo Contractor: A Contractor Member of NTMA whose work has resulted in construction with a record of successful in service performance.

1. Installer shall have completed terrazzo installations within the past five years of scale and complexity similar to the proposed installation.

C. Source Limitations for Aggregates: Terrazzo Contractor shall obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

D. Mockups: Terrazzo Contractor shall construct mockup if required in bid or scope of work documents to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build 4'x4' mockup.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to Project site in supplier's original wrappings and containers, labeled with source or manufacturer's name, material or product brand name, and lot number if any.

B. Materials shall be stored in their original, undamaged packages and containers.

1. Cement materials shall be stored inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.09 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit terrazzo flooring to be installed according to NTMA standards.

1. Where existing and forecasted weather conditions do not comply with NTMA standards, the General Contractor shall provide enclosure with temporary heat maintained at a minimum of 50 deg F.

B. Terrazzo Contractor shall protect other adjacent work from water and dust generated by grinding operations.

1.10 GUARANTEE

A. One year from date of substantial completion of Terrazzo installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland cement: ASTM C 150, Type I, gray

B. Sand: Coarse, clean, washed, locally available sand.

C. Marble, Quartz, Granite or Gravel:

1. Size: Conform to NTMA standards.

2. Abrasion and Impact Resistance: Not more than 40 percent loss when tested in accordance with ASTM C 131

3. Chips shall contain no deleterious or foreign matter.

D. Colorant: Alkali-resistant color stable pigments

E. Strips:

1. Expansion joints: Zinc with a cap strip top with a depth of 1-1/4 inches.

a. Thickness: 1/4”

b. Color: Brass

2. Divider Strips:

a. Materials: Brass

b. Thickness: 1/4”.

F. Curing Materials: Water or polyethylene sheeting.

2.02 MISCELLANEOUS ACCESSORIES

A. Sealant: Polyurethane with appropriate backer rod.

B. Sealer: Terrazzo Contractor shall provide a penetrating, non-ambering, clear sealer that is chemically neutral; does not impair terrazzo aesthetics or physical properties; is specifically recommended for rustic terrazzo. Sealers shall comply with the following:

1. Solvent-Based Sealer Properties: Flashpoint at 95 deg. F according to ASTM D 56.

2.03 MIXES

A. Terrazzo Selection: Terrazzo Contractor shall provide terrazzo mix(es) according to the following:

1. Mix Color: As selected by the Architect from NTMA rustic-terrazzo. Contractor to provide samples for approval.

2. Custom Mix Color and Pattern: Color to match existing Hoover Dam Memorial Star pavement. Pattern see plans.

B. Proportions:

1. Terrazzo Topping: One 94-lb. bag of portland cement per 200 lb. of aggregate and sufficient potable water to produce a workable mix.

C. Mixing: Terrazzo Contractor shall mix underbed and topping as follows:

1. Terrazzo Topping:

a. Charge and mix aggregate and portland cement.

b. Add water and mix to a uniform workable consistency.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The General Contractor and CO/COR in coordination with the Architect shall examine substrates and areas, with Terrazzo Contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that concrete surfaces to receive **monolithic** terrazzo flooring are sound, free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil and other contaminants incompatible with terrazzo flooring materials. Concrete substrate shall have a float finish.

B. Terrazzo Contractor shall proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.02 PREPARATION

A. General Contractor shall broom clean area to receive terrazzo to remove loose chips and all foreign matter.

3.03 INSTALLATION

A. Placing Rustic Terrazzo Topping:

1. Place rustic terrazzo mixture in panels formed by divider strips and trowel mixture to top of strips.

2. Roll and compact surface until all excess cement and water has been extracted.

B. Finishing: Expose aggregate by hosing, absorbent rolling, or use of a retarder.

C. Curing: After completing placement of terrazzo and composition has sufficiently set, Terrazzo Contractor shall cure the terrazzo topping by flooding with clean water, or covering with polyethylene sheeting.

D. Cleaning: When topping is sufficiently cured, in the opinion of the Terrazzo Contractor, apply cleaner, scrub with a stiff broom to remove all laitance and rinse immediately with clean water to remove all traces of cleaner.

E. Sealing:

1. Rinse floor with clean water and allow to dry.

2. When floor is thoroughly dry, apply the sealer in accordance with manufacturer's directions for use on rustic terrazzo.

F. Joint Sealants: Place sealant in joints with backer rod as required.

3.04 REPAIR

A. Terrazzo Contractor shall repair terrazzo areas that evidence of lack of bond between topping and underbed according to NTMA's written recommendations.

3.05 PROTECTION

A. After application of the sealer, the Work shall be ready for final inspection and acceptance by the CO/COR.

B. The General Contractor shall protect the finished floor after the Terrazzo Contractor has completed final grinding and applied sealer to terrazzo surfaces.

END OF SECTION

SECTION 09 96 23

ANTI GRAFFITI COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Anti-graffiti coatings for masonry concrete wall substrates.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: The application shall leave the finished surfaces uniform in graffiti repellent and not alter the natural color and texture of the masonry units.
B. Provide anti-graffiti coating at all exterior exposed masonry and concrete walls, including service yards and enclosures.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data sheets on all products to be used for the work. Submit description for protection of surrounding areas and non-masonry surfaces, surface preparation, application, and final cleaning.

B. Submit samples and manufacturer's instructions to the CO/COR for approval prior to delivering materials to the site or commencing the work in this Section.
   1. Manufacturer shall procure and apply system to samples of the masonry units to be used in the structure which will be reviewed by the CO/COR in coordination with the Architect for both aesthetics and effectiveness.
   2. Manufacturer’s Instructions: Submit current method of installation stating the actual application rates required to meet the guarantee requirements.

C. Applicator Qualifications: Submit qualifications of applicator.
   1. Certification stating applicator is experienced in the application of the specified products.
   2. List of recently completed graffiti resistant coatings projects, including project name and location, names of Owner and Architect, and description of products used, substrates, applicable local environmental regulations, and application procedures.

D. Regulations: Submit applicable local environmental regulations.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications:
   1. Experienced in the application of the specified products.
   2. Employs persons trained for the application of the specified products.

B. Pre-Application Meeting: Convene a pre-application meeting 7 days before the start of application of graffiti resistant coatings. Require attendance of parties directly affecting work of this section, including the Contractor, CO/COR, Architect, applicator, and manufacturer representative. Review environmental regulations, test panel procedures, protection of surrounding areas and non-masonry surfaces, surface preparation, application, field quality control, final cleaning, and coordination with other work.

C. Regulatory Requirements: Comply with applicable federal, state, and local environmental regulations.

D. Field Samples:
   1. Before full-scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces. Apply each graffiti resistant coating to test panels to determine number of applications, coverage rates, compatibility, effectiveness, surface preparation, application procedures, and desired results.
   2. Apply graffiti resistant coatings to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Do not begin full-scale application until test panels are inspected and approved by the CO/COR in coordination with the Architect.
   3. Test Panel Requirements:
      a. Size: Minimum 4 feet by 4 feet each, or as determined by the CO/COR in coordination with the Architect.
      b. Locations: As determined by the CO/COR in coordination with the Architect.
      c. Number: As required to completely test each graffiti resistant coating with each type of substrate to be protected.
   4. Apply graffiti to test panel and remove graffiti from surfaces treated with graffiti coating using high pressure (500-1500 psi) hot water (180 degrees F minimum). Remove shadows/residues using compatible graffiti remover applied in accordance with manufacturer's written instructions.
   5. Retain and protect test panels approved by the CO/COR and Architect in undisturbed condition during the work of this section, to be used as a standard for judging the graffiti resistant coating work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling: Store containers upright in a cool, dry, well-ventilated place, out of the sun. Store away from all other chemicals and potential sources of contamination. Keep lights, fire, sparks, and heat away from containers. Do not drop containers or slide across sharp objects. Keep containers tightly closed when not in use. Store and handle materials in accordance with manufacturer's written instructions.

1.6 PROJECT CONDITIONS

A. Establish environmental limitations or criteria. Such conditions might include air and surface temperatures, weather, and wind required for proper application. When appropriate, describe condition of existing structures to receive graffiti resistant coatings.
B. Temperature Limitations:
   1. Do not apply at surface and air temperatures below 40°F or above 90°F, unless otherwise indicated by manufacturer's written instructions.
   2. Do not apply when surface and air temperatures are not expected to remain above 40°F for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.

C. Do not apply under windy conditions such that graffiti resistant coating may be blown to surfaces not intended to be treated.

D. Do not apply to frozen substrate. Allow adequate time for substrate to thaw if freezing conditions exist before application.

E. Do not apply earlier than 24 hours after rain or if rain is predicted for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Non-Sacrificial Anti Graffiti: A coating of RTV Silicone Rubber; solvent-based containing 15 percent solids or more by volume.
   1. Acceptable Product: Dur A Pell as manufactured by Chemprobe.Coating Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer.

B. Do not begin work until cementitious substrate has cured 28 days minimum, and measured moisture content is not greater than 16 percent.

3.2 PREPARATION

A. Clean surfaces, free of dust, dirt, grease, effloresce or any foreign substance that would hinder adhesion of the coating to be used.
B. Mask and protect adjacent surfaces and materials not receiving coating from over spray. Repair damage to surface to receive coating.
C. Preparation work must be inspected and approved by the CO/COR, before any further work is initiated.

3.3 APPLICATION

A. Apply graffiti coating on surfaces indicated for treatment using a low-pressure sprayer with a fan tip that allows for an application pressure of 20 to 40 psi.

B. Comply with manufacturer's written instructions, unless otherwise indicated.

C. Apply a second spray coating, repeating first application.

D. Comply with manufacturer's written instructions for limitations on drying time between coats.

E. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.4 CLEANING

A. Clean work as recommended by manufacturer.

B. Clean surfaces immediately of over spray, splatter and excess material.

END OF SECTION

SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.1 SCOPE

A. Furnish labor, material and equipment necessary for the installation of the furniture and amenities as shown on the drawings and as specified herein.

B. Work shall include but not limited to layout; excavation; backfill; provision of furniture and amenities and all associated parts and equipment; footings and foundations as required; and the erection and installation in accordance with manufacturer's specifications.

1.2 SUBMITTALS

A. Product Data: The Contractor shall submit within fifteen (15) calendar days after receipt of Notice to Proceed, five (5) complete sets of the material and equipment submittals, including manufacturer's name and address, specific trade names, catalog and model numbers, illustrations and descriptive material, clearly marked as to proposed items for approval by the CO/COR.

B. Approval of the submittals shall be the Contractor's authorization to order the required material. There will be no deviation from the approved submittals without the written authorization of the CO/COR in coordination with Architect.

1.3 MANUFACTURERS

A. If all of the parameters, specifications and design intent of the drawings are met, the following list of manufacturers with acceptable equipment model/series designation(s) would be acceptable for use. "Or Equal" substitutions are acceptable but must be submitted under the provisions of Section 01600.

B. Trash Receptacle:
   1. Quick Crete Products Corp.: (951) 737-6240.
   2. Wausau Tile: (800) 388-8728.

C. Bench:
   1. Quick Crete Products Corp.: (951) 737-6240.
   2. Wausau Tile: (800) 388-8728.

PART 2 - MATERIALS

2.1 PRODUCTS:

A. Trash Receptacle: Smooth stained concrete, quail hill red color, 30 gallon capacity, liner, steel funnel top lid. Epoxy to surface in locations directed. Quick Crete Model # QR-CAL2436W-A24, smooth stained concrete with standard gloss with Q-GL27 galvanized 26 gallon liner, 2" drain hole, steel lid, cable and bolts. Lid color: gray lid for trash (T) or blue lid for recycle (R)

B. Bench: Smooth texture concrete, quail hill red color. Quick Crete Model # Q1AV78B – Adenville.

C. Design and Fabrication: Equipment submitted for consideration shall be equivalent in design, size, type, style, appearance, color and construction detail of the equipment as specified in the drawings. Equipment, as specified, has been considered in the overall design intent of the Project. Reasonable variations in size +/- 10%, and manufacturer's standard colors will be allowed.

D. Modification: Any expense of modification, adjustment or revision required to ensure compliance of furnished equipment to specified equipment and design shall be the sole expense and responsibility of the Contractor.

PART 3 - EXECUTION

2.2 INSTALLATION

A. Install all equipment and components at locations shown on drawings; properly aligned and spaced; plumbed vertically; complete, and ready for use.

B. Install all equipment and components in accordance with manufacturer's specifications and instructions.

C. If anchoring or footing details are required or recommended by the manufacturer, the Contractor shall submit copies of detail to the CO/COR for review, prior to construction.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Copper building wire.
   2. Metal-clad cable, Type MC.
   3. Connectors and splices.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA.
   1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Alpha Wire Company.
   2. American Bare Conductor.
   3. Belden Inc.
   4. Cerro Wire LLC.
   5. Encore Wire Corporation.
   6. General Cable Technologies Corporation.

7. Okonite Company (The).
8. Service Wire Co.
9. Southwire Company.
10. WESCO.

C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Conductor Insulation:
1. Type THHN and Type THWN-2: Comply with UL 83.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Alpha Wire Company.
2. American Bare Conductor.
3. Atkore International (AFC Cable Systems).
4. Belden Inc.
5. Encore Wire Corporation.
6. General Cable Technologies Corporation.
7. Okonite Company (The).
8. Service Wire Co.
9. Southwire Company.
10. WESCO.

C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:
1. Single circuit.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

H. Armor: Steel, interlocked.

I. Jacket: PVC applied over armor.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. 3M Electrical Products.
2. ABB (Electrification Products Division).
3. Atkore International (AFC Cable Systems).
4. Emerson Electric Co. (Automation Solutions - Appleton - O-Z/Gedney).
5. Gardner Bender.
6. Ideal Industries, Inc.
7. ILSCO.
8. NSi Industries LLC.
9. Service Wire Co.
10. TE Connectivity Ltd.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
1. Material: Aluminum.
2. Type: Two hole with standard barrels.
3. Termination: Crimp.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:
1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:
1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

C. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway Metal-clad cable, Type MC.

D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway Metal-clad cable, Type MC.

E. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.4 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."

3.6 FIELD QUALITY CONTROL

A. Administrant for Tests and Inspections:
   1. Engage qualified testing agency to administer and perform tests and inspections.

2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:
   1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
   2. Perform each of the following visual and electrical tests:

      a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
      b. Test bolted connections for high resistance using one of the following:

         1) A low-resistance ohmmeter.
         2) Calibrated torque wrench.

      c. Inspect compression-applied connectors for correct cable match and indentation.
      d. Inspect for correct identification.
      e. Inspect cable jacket and condition.
      f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
      g. Continuity test on each conductor and cable.
      h. Uniform resistance of parallel conductors.

C. Cables will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports to record the following:
   1. Procedures used.
   2. Results that comply with requirements.
   3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Burndy; Part of Hubbell Electrical Systems.
   2. ERICO International Corporation.
   3. O-Z/Gedney; a brand of Emerson Industrial Automation.
   4. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   1. Solid Conductors: ASTM B3.
   2. Stranded Conductors: ASTM B8.
   3. Tinned Conductors: ASTM B33.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

D. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

E. Conduit Hubs: Mechanical type, terminal with threaded hub.

F. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

G. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

H. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

I. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.

J. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal one-piece clamp.

K. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Grounding Conductors: Green-colored insulation.

C. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
   3. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
   1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
   2. Make connections with clean, bare metal at points of contact.
   3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
   4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
   5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal conduits and fittings.
   2. Nonmetallic conduits and fittings.
   3. Boxes, enclosures, and cabinets.

B. Related Requirements:
   1. Section 07 84 13 "Penetration Firestopping" for firestopping at conduit and box entrances.

1.2 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      a. Allied Tube & Conduit; a part of Atkore International.
      b. Western Tube and Conduit Corporation.
      c. Wheatland Tube Company.

   2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   3. GRC: Comply with ANSI C80.1 and UL 6.
   4. IMC: Comply with ANSI C80.6 and UL 1242.
   5. EMT: Comply with ANSI C80.3 and UL 797.
   6. FMC: Comply with UL 1; zinc-coated steel.
   7. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      a. O-Z/Gedney; a brand of Emerson Industrial Automation.

b. Thomas & Betts Corporation; A Member of the ABB Group.

2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Fittings for EMT:

   a. Material: Steel.
   b. Type: Setscrew or compression.

6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Anamet Electrical, Inc.
   b. CANTEX INC.

2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
4. LFNC: Comply with UL 1660.

B. Nonmetallic Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anamet Electrical, Inc.
   b. CANTEX INC.

2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

   a. Fittings for LFNC: Comply with UL 514B.

4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Crouse-Hinds, an Eaton business.
   2. Erickson Electrical Equipment Company.
   3. Hoffman; a brand of Pentair Equipment Protection.
   4. Thomas & Betts Corporation; A Member of the ABB Group.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Metal Floor Boxes:
   1. Material: sheet metal.
   2. Type: Fully adjustable.
   3. Shape: Rectangular.
   4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

K. Gangable boxes are prohibited.

L. Cabinets:
   1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.
   6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed Conduit: GRC.
   2. Concealed Conduit, Aboveground: GRC.
   3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
   4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
   5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT.
   2. Exposed, Not Subject to Severe Physical Damage: EMT.
   3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
      a. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      b. Mechanical rooms.

   4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
   5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
   6. Damp or Wet Locations: GRC.
   7. Boxes and Enclosures: NEMA 250, Type 1.

C. Minimum Raceway Size: **3/4-inch]**trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
   2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
   3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
   4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter.

B. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

C. Do not fasten conduits onto the bottom side of a metal deck roof.

D. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

E. Complete raceway installation before starting conductor installation.

F. Arrange stub-ups so curved portions of bends are not visible above finished slab.

G. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

H. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

I. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

J. Support conduit within 12 inches of enclosures to which attached.

K. Raceways Embedded in Slabs:
   1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
   2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
   3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
   4. Do not embed threadless fittings in concrete unless specifically approved by CO/COR for each specific location.

L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

M. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

N. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

O. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

P. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

R. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

S. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

W. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

BB. Locate boxes so that cover or plate will not span different building finishes.

CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 20 00 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 31 20 00 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 20 00 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install 0sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1

1.2 SUMMARY

A. Section Includes:
   1. Color and legend requirements for raceways, conductors, and warning labels and signs.
   2. Labels.
   3. Bands and tubes.
   4. Tapes and stencils.
   5. Tags.
   6. Signs.
   7. Cable ties.
   8. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:
   1. Black letters on an orange field.
   2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
   1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
   2. Colors for 208/120-V Circuits:
      a. Phase A: Black.
      b. Phase B: Red.
      c. Phase C: Blue.
   3. Colors for 240-V Circuits:
      a. Phase A: Black.
      b. Phase B: Red.
   4. Colors for 480/277-V Circuits:
      a. Phase A: Brown.
      b. Phase B: Orange.
      c. Phase C: Yellow.
   5. Color for Neutral: White or gray.
   6. Color for Equipment Grounds: Green.
   7. Colors for Isolated Grounds: Green with white stripe.

C. Raceways and Cables Carrying Circuits at More Than 600 V:
   1. Black letters on an orange field.
   2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

D. Warning Label Colors:
   1. Identify system voltage with black letters on an orange background.

E. Warning labels and signs shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
   3. Arc-Flash category.

F. Equipment Identification Labels:
   1. Black letters on a white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- thick, polyester flexible label with acrylic pressure-sensitive adhesive.
   1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
   2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.
   3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
   1. Minimum Nominal Size:
      a. 1-1/2 by 6 inches for raceway and conductors
      b. 3-1/2 by 5 inches for equipment.
      c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

2.5 SIGNS

A. Baked-Enamel Signs:
   1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4-inch grommets in corners for mounting.
   3. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
   2. 1/4-inch grommets in corners for mounting.
   3. Nominal Size: 10 by 14 inches.

C. Laminated Acrylic or Melamine Plastic Signs:
   1. Engraved legend.

2. Thickness:

    a. For signs up to 20 sq. in., minimum 1/16 inch thick.
    b. For signs larger than 20 sq. in., 1/8 inch thick.
    c. Engraved legend with black letters on white face.
    d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
    e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
    1. Minimum Width: 3/16 inch.
    2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
    3. Temperature Range: Minus 40 to plus 185 deg F.
    4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
    1. Minimum Width: 3/16 inch.
    2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
    3. Temperature Range: Minus 40 to plus 185 deg F.
    4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
    1. Minimum Width: 3/16 inch.
    2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
    3. UL 94 Flame Rating: 94V-0.
    4. Temperature Range: Minus 50 to plus 284 deg F.
    5. Color: Black.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
   1. Secure tight to surface of conductor, cable, or raceway.

H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
   1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

K. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
   1. "POWER."
   2. “COMMUNICATIONS.”

L. Vinyl Wraparound Labels:
   1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
   2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

M. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

N. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Labels:
   1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.

2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.

P. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

Q. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

R. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

S. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

T. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

U. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

V. Underground Line Warning Tape:
1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
2. Limit use of underground-line warning tape to direct-buried cables.
3. Install underground-line warning tape for direct-buried cables and cables in raceways.

W. Baked-Enamel Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.

X. Metal-Backed Butyrate Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

Y. Laminated Acrylic or Melamine Plastic Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.

Z. Cable Ties: General purpose, for attaching tags, except as listed below:
1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
   1. "POWER."
   2. “COMMUNICATIONS.”

D. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.
   1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

E. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
   1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

F. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

G. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
   1. Apply to exterior of door, cover, or other access.
   2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

      a. Electrical Panels.

I. Arc Flash Warning Labeling: Self-adhesive labels – match existing.

J. Operating Instruction Signs: Self-adhesive labels.

K. Equipment Identification Labels:
   1. Indoor Equipment: Self-adhesive label.
   2. Outdoor Equipment: Stenciled legend 4 inches high.
   3. Equipment to Be Labeled:

      a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved, laminated acrylic or melamine label.
      b. Enclosures and electrical cabinets.
      c. Access doors and panels for concealed electrical items.

d. Switchboards.
e. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
f. Enclosed switches.
g. Enclosed circuit breakers.
h. Variable-speed controllers.
i. Push-button stations.
j. Contactors.

END OF SECTION

SECTION 26 05 73.13

SHORT-CIRCUIT STUDIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled. Existing to remain items shall remain functional throughout the construction period.

B. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.

C. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

D. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.

E. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.

F. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.

G. SCCR: Short-circuit current rating.

H. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

I. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data:

1. For computer software program to be used for studies.
2. Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.

a. Short-circuit study input data, including completed computer program input data sheets.
b. Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.

1) Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from CO/COR for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
2) Revised one-line diagram, reflecting field investigation results and results of short-circuit study.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
1. For overcurrent protective devices to include in emergency, operation, and maintenance manuals.
2. The following are from the Short-Circuit Study Report:

a. Final one-line diagram.
b. Final Short-Circuit Study Report.
c. Short-circuit study data files.
d. Power system data.

1.5 QUALITY ASSURANCE

A. Study shall be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms shall comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.
1. Power System Analysis Software Qualifications: Computer program shall be designed to perform short-circuit studies or have a function, component, or add-on module designed to perform short-circuit studies.
2. Computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

D. Power Systems Analysis Specialist Qualifications: Professional engineer licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

E. Short-Circuit Study Certification: Short-Circuit Study Report shall be signed and sealed by Power Systems Analysis Specialist.

F. Field Adjusting Agency Qualifications:
1. Employer of a NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification responsible for all field adjusting of the Work.
2. A member company of NETA.

3. Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE DEVELOPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. ESA Inc.
   2. Power Analytics, Corporation.
   3. SKM Systems Analysis, Inc.

B. Comply with IEEE 399 and IEEE 551.
   1. Analytical features of power systems analysis software program shall have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram of modeled power system, showing the following:
   1. Protective device designations and ampere ratings.
   2. Conductor types, sizes, and lengths.
   3. Transformer kilovolt ampere (kVA) and voltage ratings.
   4. Motor and generator designations and kVA ratings.
   5. Switchgear, switchboard, motor-control center, and panelboard designations and ratings.
   6. Derating factors and environmental conditions.
   7. Any revisions to electrical equipment required by the study.

D. Comments and recommendations for system improvements or revisions in a written document, separate from one-line diagram.

E. Protective Device Evaluation:
   1. Evaluate equipment and protective devices and compare to available short-circuit currents. Verify that equipment withstand ratings exceed available short-circuit current at equipment installation locations.
   2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
   3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
   4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in standards to 1/2-cycle symmetrical fault current.
   5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors

at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data:
1. One-line diagram of system being studied.
2. Power sources available.
3. Manufacturer, model, and interrupting rating of protective devices.
4. Conductors.
5. Transformer data.

G. Short-Circuit Study Output Reports:
1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

a. Voltage.
b. Calculated fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. Equivalent impedance.

2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

a. Voltage.
b. Calculated symmetrical fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. Calculated asymmetrical fault currents:

1) Based on fault-point X/R ratio.
2) Based on calculated symmetrical value multiplied by 1.6.
3) Based on calculated symmetrical value multiplied by 2.7.

3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

a. Voltage.
b. Calculated symmetrical fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. No AC Decrement (NACD) ratio.
e. Equivalent impedance.
f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

PART 3 - EXECUTION

3.1 POWER SYSTEM DATA

A. Obtain all data necessary for conduct of the study.
1. Verify completeness of data supplied on one-line diagram. Call any discrepancies to CO/COR's attention.
2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.

3. For equipment that or relocated equipment and that which is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. Qualifications of technicians and engineers shall be as defined by NFPA 70E.

B. Gather and tabulate the required input data to support the short-circuit study. Comply with requirements in Section 01 78 39 "Project Record Documents" for recording circuit protective device characteristics. Record data on a Record Document copy of one-line diagram. Comply with recommendations in IEEE 551 as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification. Data include, but are not limited to, the following:
1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Power sources and ties.
4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
5. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
6. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
7. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
8. Motor horsepower and NEMA MG 1 code letter designation.
9. Conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
10. Derating factors.

3.2 SHORT-CIRCUIT STUDY

A. Perform study following the general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on device characteristics supplied by device manufacturer.

D. Extent of electrical power system to be studied is indicated on Drawings.

E. Begin short-circuit current analysis at the service, extending down to system overcurrent protective devices as follows:
1. To normal system low-voltage load buses where fault current is 10 kA or less.
2. Exclude equipment rated 240 V ac or less when supplied by a single transformer rated less than 125 kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. Include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for the fault-current dc decrement to address asymmetrical requirements of interrupting equipment.

H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and a single line-to-ground fault at each equipment indicated on one-line diagram.
   1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.

I. Include in the report identification of any protective device applied outside its capacity.

END OF SECTION

SECTION 26 05 73.16

COORDINATION STUDIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.
   1. Study results shall be used to determine coordination of series-rated devices.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled. Existing to remain items shall remain functional throughout the construction period.

B. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.

C. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

D. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.

E. Power System Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.

F. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.

G. SCCR: Short-circuit current rating.

H. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

I. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data:
   1. For computer software program to be used for studies.
   2. Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.

a. Coordination-study input data, including completed computer program input data sheets.
b. Study and equipment evaluation reports.

3. Overcurrent protective device coordination study report; signed, dated, and sealed by a qualified professional engineer.

a. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from CO/COR for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For overcurrent protective devices to include in emergency, operation, and maintenance manuals.
1. The following are from the Coordination Study Report:

a. Final one-line diagram.
b. Final protective device coordination study.
c. Coordination study data files.
d. List of all protective device settings.
e. Time-current coordination curves.
f. Power system data.

1.5 QUALITY ASSURANCE

A. Studies shall be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms shall comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

D. Power System Analysis Software Qualifications:
1. Computer program shall be designed to perform coordination studies or have a function, component, or add-on module designed to perform coordination studies.
2. Computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

E. Power Systems Analysis Specialist Qualifications: Professional engineer licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

F. Field Adjusting Agency Qualifications:
1. Employer of a NETA ETT-Certified Technician Level III responsible for all field adjusting of the Work.
2. A member company of NETA.
3. Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE DEVELOPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. ESA Inc.
   2. Power Analytics, Corporation.
   3. SKM Systems Analysis, Inc.

B. Comply with IEEE 242 and IEEE 399.

C. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.
   1. Optional Features:

      a. Arcing faults.
      b. Simultaneous faults.
      c. Explicit negative sequence.
      d. Mutual coupling in zero sequence.

2.2 COORDINATION STUDY REPORT CONTENTS

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram of modeled power system, showing the following:
   1. Protective device designations and ampere ratings.
   2. Conductor types, sizes, and lengths.
   3. Transformer kilovolt ampere (kVA) and voltage ratings.
   4. Motor and generator designations and kVA ratings.
   5. Switchgear, switchboard, motor-control center, and panelboard designations.
   6. Any revisions to electrical equipment required by the study.
   7. Study Input Data: As described in "Power System Data" Article.

      a. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies."

D. Protective Device Coordination Study:
   1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.

a. Phase and Ground Relays:

1) Device tag.
2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
3) Recommendations on improved relaying systems, if applicable.

b. Circuit Breakers:

1) Adjustable pickups and time delays (long time, short time, and ground).
2) Adjustable time-current characteristic.
3) Adjustable instantaneous pickup.
4) Recommendations on improved trip systems, if applicable.

c. Fuses: Show current rating, voltage, and class.

E. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:

1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
4. Plot the following listed characteristic curves, as applicable:

a. Power utility's overcurrent protective device.
b. Medium-voltage equipment overcurrent relays.
c. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
d. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
e. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
f. Cables and conductors damage curves.
g. Ground-fault protective devices.
h. Motor-starting characteristics and motor damage points.
i. Generator short-circuit decrement curve and generator damage point.
j. The largest feeder circuit breaker in each motor-control center and panelboard.

5. Maintain selectivity for tripping currents caused by overloads.
6. Maintain maximum achievable selectivity for tripping currents caused by overloads on series-rated devices.
7. Provide adequate time margins between device characteristics such that selective operation is achieved.
8. Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance of the Work. Devices to be coordinated are indicated on Drawings.
   1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 POWER SYSTEM DATA

A. Obtain all data necessary for conduct of the overcurrent protective device study.
   1. Verify completeness of data supplied in one-line diagram on Drawings. Call any discrepancies to Architect's attention.
   2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
   3. For equipment that or relocated equipment and that which is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. Qualifications of technicians and engineers shall be as defined by NFPA 70E.

B. Gather and tabulate all required input data to support the coordination study. List below is a guide. Comply with recommendations in IEEE 551 for the amount of detail required to be acquired in the field. Field data gathering shall be under direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification. Data include, but are not limited to, the following:
   1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
   2. Electrical power utility impedance at the service.
   3. Power sources and ties.
   4. Short-circuit current at each system bus (three phase and line to ground).
   5. Full-load current of all loads.
   6. Voltage level at each bus.
   7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
   8. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
   9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
   10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
   11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
   12. Maximum demands from service meters.
   13. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
   14. Motor horsepower and NEMA MG 1 code letter designation.

15. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
16. Medium-voltage cable sizes, lengths, conductor material, cable construction, metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).
17. Data sheets to supplement electrical distribution system one-line diagram, cross-referenced with tag numbers on diagram, showing the following:

    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Generator thermal-damage curve.
    e. Ratings, types, and settings of utility company's overcurrent protective devices.
    f. Special overcurrent protective device settings or types stipulated by utility company.
    g. Time-current-characteristic curves of devices indicated to be coordinated.
    h. Manufacturer, frame size, interrupting rating in amperes root mean square (rms) symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
    i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
    j. Switchgear, switchboards, motor-control centers, and panelboards ampacity, and SCCR in amperes rms symmetrical.
    k. Identify series-rated interrupting devices for a condition where the available fault current is greater than the interrupting rating of downstream equipment. Obtain device data details to allow verification that series application of these devices complies with NFPA 70 and UL 489 requirements.

3.3 COORDINATION STUDY

A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.

B. Comply with IEEE 399 for general study procedures.

C. Base study on device characteristics supplied by device manufacturer.

D. Extent of electrical power system to be studied is indicated on Drawings.

E. Begin analysis at the service, extending down to system overcurrent protective devices as follows:
   1. To normal system low-voltage load buses where fault current is 10 kA or less.
   2. Exclude equipment rated 240 V ac or less when supplied by a single transformer rated less than 125 kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:

    a. Inrush current when first energized.
    b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
    c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

H. Motor Protection:
1. Select protection for low-voltage motors according to IEEE 242 and NFPA 70.
2. Select protection for motors served at voltages more than 600 V according to IEEE 620.

I. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

J. Include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for fault-current dc decrement, to address asymmetrical requirements of interrupting equipment.

K. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and a single line-to-ground fault at each equipment indicated on one-line diagram.
1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.

L. Protective Device Evaluation:
1. Evaluate equipment and protective devices and compare to short-circuit ratings.
2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.
3. Include in the report identification of any protective device applied outside its capacity.

3.4 LOAD-FLOW AND VOLTAGE-DROP STUDY

A. Perform a load-flow and voltage-drop study to determine the steady-state loading profile of the system. Analyze power system performance two times as follows:
1. Determine load flow and voltage drop based on full-load currents obtained in "Power System Data" Article.
2. Determine load flow and voltage drop based on 80 percent of the design capacity of load buses.
3. Prepare load-flow and voltage-drop analysis and report to show power system components that are overloaded, or might become overloaded; show bus voltages that are less than as prescribed by NFPA 70.

3.5 MOTOR-STARTING STUDY

A. Perform a motor-starting study to analyze the transient effect of system's voltage profile during motor starting. Calculate significant motor-starting voltage profiles and analyze the effects of motor starting on the power system stability.

B. Prepare the motor-starting study report, noting light flicker for limits proposed by IEEE 141, and voltage sags so as not to affect operation of other utilization equipment on system supplying the motor.

3.6 FIELD ADJUSTING

A. Adjust relay and protective device settings according to recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of equipment manufacturer under the "Startup and Acceptance Testing" contract portion.

B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.

C. Testing and adjusting shall be by a full-time employee of the Field Adjusting Agency, who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification.
   1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters. Perform NETA tests and inspections for all adjustable overcurrent protective devices.

3.7 DEMONSTRATION

A. Engage Power Systems Analysis Specialist to train Government’s maintenance personnel in the following:
   1. Acquaint personnel in fundamentals of operating the power system in normal and emergency modes.
   2. Hand-out and explain the coordination study objectives, study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpreting time-current coordination curves.
   3. For Government’s maintenance staff certified as NETA ETT-Certified Technicians Level III or NICET Electrical Power Testing Level III Technicians, teach how to adjust, operate, and maintain overcurrent protective device settings.

END OF SECTION

SECTION 26 05 73.19

ARC-FLASH HAZARD ANALYSIS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.

C. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

D. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.

E. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.

F. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

G. SCCR: Short-circuit current rating.

H. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

I. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form:
   1. Arc-flash study input data, including completed computer program input data sheets.
   2. Arc-flash study report; signed, dated, and sealed by Power Systems Analysis Specialist.

3. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from CO/COR for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
   1. Provide maintenance procedures in equipment manuals according to requirements in NFPA 70E.
   2. Operation and Maintenance Procedures: In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," provide maintenance procedures for use by Government's personnel that comply with requirements in NFPA 70E.

1.5 QUALITY ASSURANCE

A. Study shall be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms shall comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

D. Power System Analysis Software Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
   1. Computer program shall be designed to perform arc-flash analysis or have a function, component, or add-on module designed to perform arc-flash analysis.
   2. Computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

E. Power Systems Analysis Specialist Qualifications: Professional engineer in charge of performing the arc-flash study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

F. Arc-Flash Study Certification: Arc-Flash Study Report shall be signed and sealed by Power Systems Analysis Specialist.

G. Field Adjusting Agency Qualifications:
   1. Employer of a NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification responsible for all field adjusting of the Work.
   2. A member company of NETA.
   3. Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. ESA Inc.
   2. Power Analytics, Corporation.
   3. SKM Systems Analysis, Inc.

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

2.2 ARC-FLASH STUDY REPORT CONTENT

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram, showing the following:
   1. Protective device designations and ampere ratings.
   2. Conductor types, sizes, and lengths.
   3. Transformer kilovolt ampere (kVA) and voltage ratings, including derating factors and environmental conditions.
   4. Motor and generator designations and kVA ratings.
   5. Switchgear, switchboard, motor-control center, panelboard designations, and ratings.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output Data: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies."

F. Protective Device Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 05 73.16 "Coordination Studies."

G. Arc-Flash Study Output Reports:
   1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each equipment location included in the report:

      a. Voltage.
      b. Calculated symmetrical fault-current magnitude and angle.
      c. Fault-point X/R ratio.
      d. No AC Decrement (NACD) ratio.
      e. Equivalent impedance.
      f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
      g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

H. Incident Energy and Flash Protection Boundary Calculations:
   1. Arcing fault magnitude.
   2. Protective device clearing time.
   3. Duration of arc.
   4. Arc-flash boundary.
   5. Restricted approach boundary.
   6. Limited approach boundary.
   7. Working distance.
   8. Incident energy.
   9. Hazard risk category.
   10. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of computer printout.

2.3 ARC-FLASH WARNING LABELS

A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis.

B. Label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
   1. Location designation.
   2. Nominal voltage.
   3. Protection boundaries.
      a. Arc-flash boundary.
      b. Restricted approach boundary.
      c. Limited approach boundary.
   4. Arc flash PPE category.
   5. Required minimum arc rating of PPE in Cal/cm squared.
   6. Available incident energy.
   7. Working distance.
   8. Engineering report number, revision number, and issue date.

C. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Preparatory Studies: Perform the Short-Circuit and Protective Device Coordination studies prior to starting the Arc-Flash Hazard Analysis.
   1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies."
   2. Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 05 73.16 "Coordination Studies."

C. Calculate maximum and minimum contributions of fault-current size.
   1. Maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
   2. Calculate arc-flash energy at 85 percent of maximum short-circuit current according to IEEE 1584 recommendations.
   3. Calculate arc-flash energy at 38 percent of maximum short-circuit current according to NFPA 70E recommendations.
   4. Calculate arc-flash energy with the utility contribution at a minimum and assume no motor contribution.

D. Calculate the arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.

E. Include medium- and low-voltage equipment locations, except equipment rated 240 V ac or less fed from transformers less than 125 kVA.

F. Calculate the limited, restricted, and prohibited approach boundaries for each location.

G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:
   1. Fault contribution from induction motors shall not be considered beyond three to five cycles.
   2. Fault contribution from synchronous motors and generators shall be decayed to match the actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).

H. Arc-flash energy shall generally be reported for the maximum of line or load side of a circuit breaker. However, arc-flash computation shall be performed and reported for both line and load side of a circuit breaker as follows:
   1. When the circuit breaker is in a separate enclosure.
   2. When the line terminals of the circuit breaker are separate from the work location.

I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

A. Obtain all data necessary for conduct of the arc-flash hazard analysis.
   1. Verify completeness of data supplied on one-line diagram on Drawings. Call discrepancies to CO/COR's attention.
   2. For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.

3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys conducted by qualified technicians and engineers.

B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification. Data include, but are not limited to, the following:
1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance or available short circuit current at the service.
3. Power sources and ties.
4. Short-circuit current at each system bus (three phase and line to ground).
5. Full-load current of all loads.
6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
8. For reactors, provide manufacturer and model designation, voltage rating and impedance.
9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
10. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
11. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
12. Motor horsepower and NEMA MG 1 code letter designation.
13. Low-voltage conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
14. Medium-voltage conductor sizes, lengths, conductor material, conductor construction and metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).

3.4 LABELING

A. Apply one arc-flash label on the front cover of each section of the equipment and on side or rear covers with accessible live parts and hinged doors or removable plates for each equipment included in the study. Base arc-flash label data on highest values calculated at each location.

B. Each piece of equipment listed below shall have an arc-flash label applied to it:
1. Low-voltage switchboard.
2. Switchgear.
3. Low voltage transformers. Exclude transformers with high voltage side 240 V or less and less than 125 kVA.
4. Panelboard and safety switch over 250 V.
5. Applicable panelboard and safety switch under 250 V.
6. Control panel.

C. Note on record Drawings the location of equipment where the personnel could be exposed to arc-flash hazard during their work.
1. Indicate arc-flash energy.

2. Indicate protection level required.

3.5 APPLICATION OF WARNING LABELS

A. Install arc-flash warning labels under the direct supervision and control of Power System Analysis Specialist.

3.6 DEMONSTRATION

A. Engage Power Systems Analysis Specialist to train Government's maintenance personnel in potential arc-flash hazards associated with working on energized equipment and the significance of arc-flash warning labels.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Distribution panelboards.
   2. Lighting and appliance branch-circuit panelboards.
   3. Load centers.

1.2 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. HID: High-intensity discharge.

E. MCCB: Molded-case circuit breaker.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.
   1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
   2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details.
   2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
   3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
   4. Detail bus configuration, current, and voltage ratings.
   5. Short-circuit current rating of panelboards and overcurrent protective devices.
   6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   7. Include wiring diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
   1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
   2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Keys: Two spares for each type of panelboard cabinet lock.
   2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NECA 407.

1.8 FIELD CONDITIONS

A. Environmental Limitations:
   1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
   2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

      a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
      b. Altitude: Not exceeding 6600 feet.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Government or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
   1. Notify CO/COR no fewer than seven days in advance of proposed interruption of electric service.
   2. Do not proceed with interruption of electric service without CO/COR’s written permission.
   3. Comply with NFPA 70E.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
   1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

F. Enclosures: Surface-mounted, dead-front cabinets.
   1. Rated for environmental conditions at installed location.
      a. .
      b. Outdoor Locations: NEMA 250, Type 3R.
   2. Height: 84 inches maximum.
   3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
   4. Finishes:
      a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
      b. Back Boxes: Galvanized steel.

G. Incoming Mains:
   1. Location: As determined by the application.

H. Phase, Neutral, and Ground Buses:
   1. Material: Tin-plated aluminum.
      a. Plating shall run entire length of bus.
      b. Bus shall be fully rated the entire length.
   2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.

3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

I. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Tin-plated aluminum.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

J. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

K. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.
1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.3 POWER PANELBOARDS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Eaton.
3. General Electric Company; GE Energy Management - Electrical Distribution.
4. Siemens Industry, Inc., Energy Management Division.
5. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Mains: As indicated in the drawings.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers or Plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers or Plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

G. Branch Overcurrent Protective Devices: Fused switches.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; by Schneider Electric.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers:
    a. Inverse time-current element for low-level overloads.
    b. Instantaneous magnetic trip element for short circuits.
    c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers:
    a. RMS sensing.
    b. Field-replaceable rating plug or electronic trip.

c. Digital display of settings, trip targets, and indicated metering displays.
d. Multi-button keypad to access programmable functions and monitored data.
e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
f. Integral test jack for connection to portable test set or laptop computer.
g. Field-Adjustable Settings:

1) Instantaneous trip.
2) Long- and short-time pickup levels.
3) Long and short time adjustments.
4) Ground-fault pickup level, time delay, and I squared T response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
6. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Subfeed Circuit Breakers: Vertically mounted.
9. MCCB Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
e. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
f. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
g. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
h. Multipole units enclosed in a single housing with a single handle.
i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
1. Fuses and Spare-Fuse Cabinet: Comply with requirements specified in Section 26 28 13 "Fuses."
2. Fused Switch Features and Accessories:

a. Standard ampere ratings and number of poles.
b. Mechanical cover interlock with a manual interlock override, to prevent the opening of the cover when the switch is in the on position. The interlock shall prevent the switch from being turned on with the cover open. The operating handle shall have lock-off means with provisions for three padlocks.

2.6 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
   1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NECA 407.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NECA 407.

D. Equipment Mounting:
   1. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
   2. Attach panelboard to the vertical finished or structural surface behind the panelboard.
   3. Comply with requirements for seismic control devices specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Comply with mounting and anchoring requirements specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

G. Mount top of trim 90 inches above finished floor unless otherwise indicated.

H. Mount panelboard cabinet plumb and rigid without distortion of box.

I. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

J. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.

K. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field-adjustable, circuit-breaker trip ranges.
   2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

L. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

M. Install filler plates in unused spaces.

N. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

O. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

P. Mount spare fuse cabinet in accessible location.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 26 05 53 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Government's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

D. Install warning signs complying with requirements in Section 26 05 53 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Do not perform optional tests. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Perform the following infrared scan tests and inspections and prepare reports:

      a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
      b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
      c. Instruments and Equipment:

         1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Standard-grade receptacles, 125 V, 20 A.
   2. GFCI receptacles, 125 V, 20 A.
   3. Toggle switches, 120/277 V, 20 A.
   4. Wall plates.

1.2 DEFINITIONS

A. AFCI: Arc-fault circuit interrupter.

B. GFCI: Ground-fault circuit interrupter.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. Comply with NEMA WD 1.

D. Devices for -Government Furnished Equipment:
   1. Receptacles: Match plug configurations.
   2. Cord and Plug Sets: Match equipment requirements.

E. Device Color:
   1. Wiring Devices Connected to Normal Power System: As selected by CO/COR unless otherwise indicated or required by NFPA 70 or device listing.

F. Wall Plate Color: For plastic covers, match device color.

G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Eaton (Arrow Hart).
    b. Hubbell Incorporated; Wiring Device-Kellems.
    c. Leviton Manufacturing Co., Inc.
    d. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.

B. Weather-Resistant Duplex Receptacle, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Eaton (Arrow Hart).
    b. Hubbell Incorporated; Wiring Device-Kellems.
    c. Leviton Manufacturing Co., Inc.
    d. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

2.3 STANDARD-GRADE RECEPTACLES, 125 V, 15 A

A. Duplex Receptacles, 125 V, 15 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Eaton (Arrow Hart).
    b. Hubbell Incorporated; Wiring Device-Kellems.
    c. Leviton Manufacturing Co., Inc.
    d. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-15R.
4. Standards: Comply with UL 498 and FS W-C-596.

B. Weather-Resistant Duplex Receptacle, 125 V, 15 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Eaton (Arrow Hart).
    b. Hubbell Incorporated; Wiring Device-Kellems.
    c. Leviton Manufacturing Co., Inc.
    d. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-15R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

2.4 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A:
1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: Feed through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

2.5 TOGGLE SWITCHES, 120/277 V, 20 A

A. Single-Pole Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Eaton (Arrow Hart).
b. Hubbell Incorporated; Wiring Device-Kellems.
c. Leviton Manufacturing Co., Inc.
d. Pass & Seymour/Legrand (Pass & Seymour).

2. Standards: Comply with UL 20 and FS W-S-896.

2.6 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. Single and combination types shall match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.
1. Square D; by Schneider Electric.
2. Wiremold / Legrand.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:
   1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
   2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
   3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
   4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:
   1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
   2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
   3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.
   4. Existing Conductors:
      a. Cut back and pigtail, or replace all damaged conductors.
      b. Straighten conductors that remain and remove corrosion and foreign matter.
      c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:
   1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
   2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
   3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
   4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
   5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
   6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
   7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
   8. Tighten unused terminal screws on the device.
   9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:
   1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

3.2 GFCI RECEPTACLES

A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 26 05 53 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Perform the following tests and inspections:
   1. Test Instruments: Use instruments that comply with UL 1436.

C. Tests for Receptacles:
   1. Line Voltage: Acceptable range is 105 to 132 V.
   2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
   3. Ground Impedance: Values of up to 2 ohms are acceptable.
   4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
   5. Using the test plug, verify that the device and its outlet box are securely mounted.
   6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

D. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz.

E. Wiring device will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION

SECTION 26 56 13

LIGHTING POLES AND STANDARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Poles and accessories for support of luminaires.

1.2 DEFINITIONS

A. EPA: Equivalent projected area.

B. Luminaire: Complete luminaire.

C. Pole: Luminaire-supporting structure, including tower used for large-area illumination.

D. Standard: See "Pole."

1.3 ACTION SUBMITTALS

A. Product Data: For each pole, accessory, and luminaire-supporting and -lowering device, arranged as indicated.
   1. Include data on construction details, profiles, EPA, cable entrances, materials, dimensions, weight, rated design load, and ultimate strength of individual components.
   2. Include finishes for lighting poles and luminaire-supporting devices.
   3. Anchor bolts.

B. Shop Drawings:
   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Detail fabrication and assembly of poles and pole accessories.
   4. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of installation.
   5. Anchor bolt templates keyed to specific poles and certified by manufacturer.
   6. Method and procedure of pole installation. Include manufacturer's written installations.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For poles to include in emergency, operation, and maintenance manuals.
   1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include pole inspection and repair procedures.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for foundation testing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store poles on decay-resistant skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

B. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle poles with web fabric straps.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of pole(s) that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within a specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs from special warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
   2. Warranty Period for Corrosion Resistance: Five years from date of Substantial Completion.
   3. Warranty Period for Color Retention: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Foundation and pole shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified."
   2. Component Importance Factor: 1.5.

B. Structural Characteristics: Comply with AASHTO LTS-6-M.

C. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.

D. Live Load: Single load of 500 lbf distributed according to AASHTO LTS-6-M.

E. Wind Load: Pressure of wind on pole and luminaire, calculated and applied according to AASHTO LTS-6-M.

   1. Basic wind speed for calculating wind load for poles 50 feet high or less is 100 mph.
      a. Wind Importance Factor: 1.0.
      b. Minimum Design Life: 25 years.
      c. Velocity Conversion Factor: 1.0.

F. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.

G. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

2.2 STEEL POLES

A. Source Limitations: Obtain poles from single manufacturer or producer.

B. Poles: Comply with ASTM A500/A500M, Grade B carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 40 feet in height with access handhole in pole wall.
   1. Shape: As indicated in the drawings.
   2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

C. Brackets for Luminaires: Detachable, cantilever, without underbrace.
   1. Adaptor fitting welded to pole, allowing the bracket to be bolted to the pole-mounted adapter, then bolted together with galvanized-steel bolts.
   2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire. Match pole material and finish.

D. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.

E. Fasteners: Galvanized steel, size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
   1. Materials: Compatible with poles and standards as well as the substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
   2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.

F. Grounding and Bonding Lugs: Welded 1/2-inch threaded lug, complying with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size indicated, and accessible through handhole.

G. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws.

H. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
   1. Surface Preparation: Clean surfaces according to SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
   2. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
   3. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high gloss, high-build polyurethane enamel.
      a. Color: As selected by fCO/CORrom manufacturer's full range.

2.3 POLE ACCESSORIES

A. Base Covers: Manufacturers' standard metal units, finished same as pole, and arranged to cover pole's mounting bolts and nuts.

2.4 MOUNTING HARDWARE

A. Anchor Bolts: Manufactured to ASTM F1554, Grade 55, with a minimum yield strength of 55,000 psi.
   1. Galvanizing: Hot dip galvanized according to ASTM A153, Class C.
   2. Bent rods as recommended by structural requirements.
   3. Threading: Uniform National Coarse, Class 2A.

B. Nuts: ASTM A563, Grade A, Heavy-Hex.

1. Galvanizing: Hot dip galvanized according to ASTM A153, Class C.
2. Two nuts provided per anchor bolt, shipped with nuts pre-assembled to the anchor bolts.

C. Washers: ASTM F436, Type 1.
1. Galvanizing: Hot dip galvanized according to ASTM A153, Class C.
2. One washer(s) provided per anchor bolt.

2.5 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 IDENTIFICATION

A. Pole manufacturer shall provide an engraved identification tag for each pole securely attached to the base of the pole with the manufacturer’s name and pole catalog number. This tag shall also include the lighting fixture head manufacturer’s name and catalog number.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine poles, luminaire-mounting devices, and pole accessories before installation. Components that are scratched, dented, marred, wet, moisture damaged, or visibly damaged are considered defective.

C. Examine roughing-in for foundation and conduit to verify actual locations of installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 POLE FOUNDATION

A. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Structural steel complying with ASTM A36/A36M and hot-dip galvanized according to ASTM A123/A123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 03 30 00 "Cast-in-Place Concrete."

B. Anchor Bolts: Install plumb using manufacturer-supplied steel or plywood template, uniformly spaced.

3.3 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on drawing.
   1. Fire Hydrants and Water Piping: 60 inches.
   2. Water, Gas, Electric, Communications, and Sewer Lines: 10 feet.
   3. Trees: 15 feet from tree trunk.

C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

D. Foundation-Mounted Poles: Mount pole with leveling nuts and tighten top nuts to torque level according to pole manufacturer's written instructions.
   1. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
   2. Install base covers unless otherwise indicated.
   3. Use a short piece of 1/2 -inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

E. Poles and Pole Foundations Set in Concrete-Paved Areas: Install poles with a minimum 6-inch-wide, unpaved gap between the pole or pole foundation and the edge of the adjacent concrete slab. Fill unpaved ring with pea gravel. Insert material to a level 1 inch below top of concrete slab.

F. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.

3.4 CORROSION PREVENTION

A. Steel Conduits: Comply with requirements in Section 26 05 33 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50-percent overlap.

3.5 GROUNDING

A. Ground Metal Poles and Support Structures: Comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems."
   1. Install grounding electrode for each pole unless otherwise indicated.
   2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

END OF SECTION

SECTION 26 56 19

LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Luminaire types.
2. Materials.
3. Finishes.
4. Luminaire support components.

B. Related Requirements:
1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 26 56 13 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.
1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
5. Wiring diagrams for power, control, and signal wiring.
6. Photoelectric relays.
7. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

C. Delegated-Design Submittal: For luminaire supports.
1. Include design calculations for luminaire supports and seismic restraints.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and photoelectric relays to include in operation and maintenance manuals.
   1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
   2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
   2. Diffusers and Lenses: One for every 100of each type and rating installed. Furnish at least one of each type.
   3. Globes and Guards: One for every 20of each type and rating installed. Furnish at least one of each type.

1.6 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications:
   1. Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

D. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.8 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by CO/CORprior to the start of luminaire installation.

1.9 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including luminaire support components.
      b. Faulty operation of luminaires and accessories.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance:
1. Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
2. Luminaires and lamps shall be labeled vibration and shock resistant.
3. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified."

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. UL Compliance: Comply with UL 1598 and listed for wet location.

D. CRI as indicated in the drawings.

E. L70 lamp life of 50,000 hours.

F. Internal driver.

G. Nominal Operating Voltage: As indicated in the drawings.

H. Source Limitations:
1. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 LUMINAIRE TYPES

A. Area and Site:
1. Luminaire Shape: As indicated in the drawings.
2. Mounting: As indicated in the drawings.
3. Luminaire-Mounting Height: As indicated in the drawings.
4. Distribution: As indicated in the drawings.
5. Diffusers and Globes: As indicated in the drawings.
6. Housings:
a. As indicated in the drawings.

2.4 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: . Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:
   1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
   2. Lens Thickness: As indicated in the drawings.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
   1. White Surfaces: 85 percent.
   2. Specular Surfaces: 83 percent.
   3. Diffusing Specular Surfaces: 75 percent.

G. Housings:
   1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
   2. Provide filter/breather for enclosed luminaires.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
   1. Label shall include the following lamp characteristics:
      a. "USE ONLY" and include specific lamp type.
      b. Lamp diameter, shape, size, wattage and coating.
      c. CCT and CRI for all luminaires.

2.5 FINISHES

A. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

B. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
   2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
      a. Color:
         1) As selected from manufacturer's standard catalog of colors.
         2) Match CO/COR sample of manufacturer's standard color.
         3) As selected by CO/CORfrom manufacturer's full range.

2.6 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls, roofs, and canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the CO/COR, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Fasten luminaire to structural support.

C. Supports:
1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

D. Wall-Mounted Luminaire Support:
1. Attached to structural members in walls.

E. Wiring Method: Install cables in raceways. Conceal raceways and cables.

F. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.

G. Coordinate layout and installation of luminaires with other construction.

H. Adjust luminaires that require field adjustment or aiming.

I. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" and Section 26 05 33 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.4 CORROSION PREVENTION

A. Steel Conduits: Comply with Section 26 05 33 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections:
   1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

C. Illumination Tests:
   1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

D. Luminaire will be considered defective if it does not pass tests and inspections.

E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
   1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
   2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
   3. Adjust the aim of luminaires in the presence of the CO/COR.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

1.1 WORK INCLUDED

A. Perform site clearing, grubbing, excavation, trenching, hauling, backfilling, compaction of materials and sub-grade preparation required to construct the facilities indicated or shown on the Contract drawings. Contractor shall perform a site visit prior to bid to confirm that no additional dumping of material has occurred since the drawings were completed. If dumping has occurred, it will be the responsibility of the Contractor to notify the Government.

1. Preparation of sub grade for slabs, walks, and pavements is included as part of this work.
2. Preparation of building pad is included as part of this work.

B. Perform finished grading for areas shown.

C. Protect existing utilities and improvements that are designated to remain or be protected.

D. Dispose of unsuitable excavated material, including contaminated material off Government's property. Disposal to be performed per governing agency requirements and specifications.

1.2 RELATED SECTIONS

A. Section 31 22 00 - Grading.

B. Section 31 23 16 - Excavation.

C. Section 31 23 16.13 - Trenching.

D. Section 31 23 16.26 - Rock and Caliche Removal.

E. Section 31 23 23.13 - Backfill.

F. Section 32 11 23 – Aggregate Base Courses

G. Section 32 12 16 – Asphalt Paving

H. Section 32 13 13 - Portland Cement Concrete Paving.

1.3 REFERENCES

A. All work shall comply with the latest edition and supplements to the Uniform Standard Specifications for the Public Works' Construction, Off-Site Improvements, Clark County Area, Nevada, and the Uniform Standard Drawings for Public Works' Construction, Off-Site Improvements, Clark County Area, Nevada.

B. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

C. Uniform Standard Specifications for Public Works' Construction, Off-site Improvements, Clark County, Nevada, latest edition.

1. Materials and workmanship specified herein with reference to these Standard Specifications shall be in accordance with the referenced sections, articles and paragraphs except that contractual, measurement, and payment provisions do not apply.

D. Uniform Standard Drawings for Public Works' Construction Off-site Improvements, Clark County, Nevada, latest edition, and any addenda or supplement thereto.

E. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

F. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-cone Method.

G. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relationships of Soils and Soil-Aggregate Mixtures Using 10 pound Rammer and 18 inch Drop.

H. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

I. ASTM D3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

J. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.

1.4 PERMITS, ORDINANCES

A. Procure and pay for all necessary permits or certificates required by local authorities having jurisdiction over the work.

B. Comply with all applicable Federal, State, and Local ordinances.

C. Procure and pay for a dust permit that is to include the project site and the construction access to the project site. The Contractor will also be responsible for the installation and maintenance of a construction/security fence that will include the project site and the construction access road

1.5 LAYOUT

A. Layout of all work under this section, including all lines and levels, shall be made by a licensed surveyor or civil engineer licensed in the State of Nevada.

B. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation. If necessary to disturb existing benchmarks, a Professional Land Surveyor licensed in the State of Nevada shall be used to re-establish it in a safe place.

C. If any discrepancies are found by surveyor between drawings and actual conditions at the site, the Engineer shall be notified and reserves the right to make such minor adjustments in work specified as necessary to accomplish the intent of the contract documents, without increased cost to Government.

1.6 CODES AND STANDARDS

A. Apply the latest editions of the following codes and standards as indicated and applicable.

Sponsor	Title
Clark County	Uniform Standard Specifications for Public Works Construction Off-Site Improvements.
Clark County	Supplement to Uniform Standard Drawings and Specifications Occupational Safety & Health Standards.

1.7 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for Submittal requirements.

B. Submit in accordance with General Conditions of this Contract.

C. De-watering and Groundwater Control:
   1. Prior to starting any earthwork, submit a detailed proposed plan for construction de-watering and groundwater control. The submittal shall include schedule, plans, design and calculations for control of surface and sub-surface water, de-watering system and proposed equipment used.

D. Test Reports - Excavating: Submit the following reports directly to CO/COR from the testing services, with copy to Contractor.
   1. Test reports on borrow material.
   2. Verification of each footing sub-grade.
   3. Field density test reports.

E. Sieve analysis results submit under provisions of Section 01 33 00.

1.8 QUALITY ASSURANCE

A. Contractor shall provide sieve analysis for its stockpiles.

B. The Contractor will be responsible for performance of proctor and in-place density tests for backfilled material.

1.9 PROJECT CONDITIONS

A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Government, CO/COR or Engineer will not be responsible for interpretations or conclusions drawn there from by Contractor. Data are made available for convenience of Contractor.

B. Additional test borings and other exploratory operations may be made by Contractor at no cost to Government.

C. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations. Affected utility companies shall be notified at least two working days prior to start of construction.

D. Should un-charted, or incorrectly charted piping or other utilities be encountered during excavation, consult utility Government immediately for directions. Cooperate with Government and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of engineer and utility Government. Notify Engineer and Construction Manager of conflicts with proposed utilities.

E. Do not interrupt existing utilities serving facilities occupied and used by Government or others during occupied hours, except when permitted in writing by Construction Manager and then only after acceptable temporary utility services have been provided. Provide minimum of forty-eight (48) hours' notice to CO/COR and Construction Manager and receive written notice to proceed before interrupting any utility.

F. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

G. Use of Explosives: The use of explosives is not permitted

H. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

I. Operate warning lights as recommended by authorities having jurisdiction.

J. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

K. The Contractor shall be responsible for the preservation or re-establishment of all land survey monuments of record that are located within the limits of construction or disturbed as a result of the contractors operations. The Contractor shall be responsible for the protection or re-establishment of any monument of record shown on the plans or found during the course of construction in accordance with NRS 329. All re-established monuments shall be set under the direction of a Professional Land Surveyor licensed in the State of Nevada.

1.10 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Definitions
   1. Artificial Fill: As documented in the soils report.
   2. Satisfactory soil materials are defined as documented in the project soils report.
   3. Unsatisfactory soil materials are defined as documented in the project soils report.
   4. Sub-base Material: Natural soils processed and compacted as documented in the project soils report.
   5. Base Material: (Under building slabs) Type II aggregate base course (ASTM C136) compacted per soils report recommendations. Material to conform to requirements of Uniform Standard Specification Section 704, for 1-inch maximum size material.
   6. Drainage Fill: Washed, evenly graded mixture of crushed stone or crushed or uncrushed gravel, with one hundred (100) percent passing a 1 ½ inch sieve, and not more than five (5) percent passing a No. 4 sieve.

7. Backfill and Fill Materials: On-site soils conforming to the requirements set forth in the project soils report and minus any debris or organic matter, may be used in required fills. Imported material should be compatible with on-site soils in addition to being suitable for its intended use. All imported materials and backfill materials shall be tested and approved by Soils Engineer prior to importing. Backfill and fill materials should not contain material greater than 6-inches in diameter including oversized material generated by the excavation of cemented soil if encountered during construction. Said material should be selectively hauled off the site, crushed to an acceptable size, or placed in deep fill areas outside of the elementary school building area at depths of at least 5 feet below finished grade as recommended in the project Geotechnical Investigation. Contractor to confirm and provide documentation to the A/E that the import material meets or exceeds the minimum R-value provided in the geotechnical report. Select granular materials (per soils report) should be used as backfill behind retaining walls.
8. Type/gravel base material conforming to requirements of Uniform Standard Specifications, Section 704, for 3-inch maximum size material.

PART 3 EXECUTION

3.1 PROTECTION

A. Actual soils encountered during construction may necessitate that slopes of temporary excavations and trenches be flatter than those indicated on the Drawings. The Contractor shall flatten slopes of temporary excavations and trenches as required for slope stability and safe execution of the work at its own expense.

B. The Contractor shall be fully responsible for construction of facilities required for diversion of storm water drainage around or through the construction area.

C. The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other measures for the removal or exclusion of water, including taking care of storm water and wastewater reaching the site of the work from any source so as to prevent damage to the work or adjoining property. The Contractor shall be responsible for any damage to persons or property due to interruption or diversion of such storm water or wastewater on account of its operations.

D. Slopes on the sides of excavations shall be such as to insure safe execution of the work. Excavations shall be in accordance with applicable requirements of the Standard Specifications, requirements of NOSHA, and with the requirements of the rules, orders, and regulations specified in these Specifications.

E. Utilities: It shall be the Contractor’s responsibility to contact “CALL BEFORE YOU DIG” not less than forty-eight (48) hours prior to starting excavation.

F. Protection and Restoration of Surfaces: Protect newly graded areas from traffic, erosion, and settlement. Repair and reestablish damaged eroded slopes, elevations or grades, and restore surface construction prior to acceptance.

3.2 EXCAVATION

A. Excavation is unclassified and includes excavation to sub-grade elevations indicated, regardless of character of materials and obstructions encountered.

B. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions without specific direction of Soils Engineer. Unauthorized excavation,

as well as remedial work directed by Soils Engineer or Construction Manager, shall be at Contractor's expense.

C. Under footings, foundation bases, or retaining walls, fill unauthorized excavation areas by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete (two sack mix) fill may be used to bring elevations to proper position, when acceptable to Soils Engineer or Construction Manager.

D. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Soils Engineer or Construction Manager.

E. If unsuitable bearing materials are encountered at required sub-grade elevations, carry excavations deeper and replace excavated material as directed by Soils Engineer or Construction Manager.

F. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

G. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

H. Shoring and Bracing: Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

I. Dust Control: Contractor shall dampen the area of grading and take other measures as required to prevent raising of dust and transportation of same into buildings onto adjacent properties during the duration of the contract in accordance with Clark County codes and regulations.

J. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, shape, and protect stockpiles to ensure proper drainage and avoid erosion.

K. Locate and retain soil materials away from edge of excavations.

L. Dispose of excess soil material and waste materials as herein specified.

M. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

N. In excavating for footings and foundations, take care not to disturb bottom of excavation. Trim bottoms to required lines and grades to leave solid base to receive other work.

O. Perform in accordance with Section 203 of the Uniform Standard Specifications and this Section.

P. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations, and grades as shown. Refer to Project Geotechnical Exploration Report for additional information.

1. Pavement Section (On-Site):

Material Depth (inches)	Requirements:
Automobile Area:	
Type III Asphaltic Concrete	2.5 - inches Placed in accordance with Section 401 of the USSPWC*.
Type II Gravel Base	6.0 - inches Placed in accordance with Section 704.03.04 and Section 302 of the USSPWC*.
Sub-Grade	Per soils report recommendation.

* "Uniform Standard Specifications for Public Works Construction, Off-Site Improvements, Clark County Area, Nevada," 1986 Edition, revised/amended.

Main Corridors and Truck Access Area:	
Type III Asphaltic Concrete	3.5 - inches Placed in accordance with Section 401 of the USSPWC*.
Type II Gravel Base	12.0 - inches Placed in accordance with Section 704.03.04 and Section 302 of the USSPWC*.
Sub-Grade	Per soils report recommendation.

* "Uniform Standard Specifications for Public Works Construction, Off-Site Improvements, Clark County Area, Nevada," 1986 Edition, revised/amended.

2. Pavement Section (Off-Site):
   a. Per the Civil off-site drawings and the Geotechnical Evaluations. Prior to sub-grade placement an R-value will be performed to confirm pavement section per Clark County standards.

3.3 COMPACTION

A. Control soil compaction during construction providing minimum percentage of density specified in the Project Geotechnical Exploration Report.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the percentages of Maximum Dry Density in accordance with ASTM D1557 as specified in this section and in the project soils report.
   1. Structures, Building Slabs, and Paved Areas: Compact the sub-grade (Type II) and each layer of backfill or fill material (Type I) per soils report recommended maximum density for cohesive material or recommended relative compaction for cohesionless material.
   2. Lawn or Unpaved Areas: Compact top 6 inches of sub-grade and each layer of backfill or fill material at recommended maximum density for cohesive materials and recommended relative compaction for cohesion less soils. (85-90%)
   3. Walkways: Compact top 4 inches of sub-grade (Type II) and each layer of backfill or fill material at recommended maximum density for cohesive material or recommended relative compaction for cohesion less material

C. Moisture Control: Where sub-grade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of sub-grade, or layer of soil material. Apply water in manner to prevent free water appearing on surface during or after subsequent compaction operations.

D. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3.4 GROUND SURFACE PREPARATION

A. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills.

B. All on-site loose, porous, or dry soils will require removal prior to the placement of fill.

C. Following removal of un-compacted soils and prior to the placement of fill, scarify the upper 12 inches of the approved ground surface, water, or dry as necessary and re-compact in compliance with Geotechnical Report. Scarification may be terminated at a shallower depth or omitted if moderately or strongly cemented soil is encountered at the discretion of the Geotechnical Engineer.

D. All soil and fill material approved by Soils Engineer may be reused in compacted fills.

E. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 5 horizontal so that fill material will bond with existing surface. Bench and key in accordance with Soils Engineer.

F. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact depth required in accordance with Soils Report.

G. Placement and Compaction: Place backfill and fill materials, per Soils Report, in layers not more than 9 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

H. Before compaction, moisten or aerate each layer, as per Soils Report, to provide optimum moisture content. Compact each layer per Soils Report recommendations. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

I. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

3.5 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

C. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 feet above or below required sub-grade elevations.
2. Walks: Shape surface of areas under walks to line, grade, and cross section, with finish surface not more than 0.10 feet above or below required sub-grade elevation.
3. Pavements: Shape surface of areas under pavement to line, grade, and cross section, with finish surface not more than ½ inch above or below required sub-grade elevation.
4. Embankments: Imported soils for use in embankment construction shall be granular in nature, saline free and exhibit an expansive potential not greater than 4.0 percent

D. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of ½ inch when tested with a 10-foot straightedge.

E. Compaction: After grading, compact sub-grade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.6 PAVEMENT SUBBASE COURSE

A. General sub-base course consists of placing structural fill (sub-base) material, in layers of specified thickness, over sub-grade surface to support a pavement base course. Refer to pavement section in this section and the Project Geotechnical Exploration Report. See other Division 2 sections for paving specifications.

B. Grade Control: During construction, maintain lines and grades including crown and cross slope of sub-base course.

C. Placing: Place sub-base course material on prepared sub-grade in layers of uniform thickness, conforming to indicated cross section and thickness. Maintain optimum moisture content for compacting sub-base material during placement operations as per the project's soils report.

D. When a compacted sub-base course is shown to be 6 inches thick or less, place material in a single layer. When shown to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.7 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing lab/Soils Engineer to inspect and approve sub-grades and fill layers before further construction work is performed.
1. Testing Agency: Shall perform field density tests in accordance with ASTM D1556 (sand cone method) or ASTM D2922 or D3017 (nuclear method), as applicable.
2. Footing Sub-grade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing sub-grade may be based on a visual comparison of each sub-grade with related tested strata, when acceptable to Soils Engineer.
3. Paved Areas and Building Slab Sub-grade: Make at least one field density test of sub-grade for every 2,000 square feet of paved area or building slab, but in no case less than three tests. In each compacted fill layer, make one field density test for every 2,000 square feet of overlaying building slab or paved area, but in no case less than three tests.
4. Foundation Wall Backfill: Take at least two field density tests, at locations and elevations as directed.

B. If, in opinion of Soils Engineer, based on testing service reports and observation, sub-grade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

C. Contractor shall provide sieve analysis from its stockpiles prior to construction activities.

D. Field inspection and testing will be performed under provisions of Section 01 45 00.

3.8 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.9 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal to Designated Areas on Government's Property: Transport acceptable excess excavated material to designated soil storage areas on Government's property. Stockpile soil or spread as directed by Soils Engineer or Construction Manager.

B. Removal from Government's Property: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off Government's property at no cost to Government.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of surface debris.

B. Clear and grub the entire site of plant life, grass, trees, and all related deleterious materials.

C. Disposal of all “cleared” materials to an approved disposal facility.

D. Removal of concrete and asphalt within existing site.

E. Removal of all existing buildings, underground utilities and appurtenances as shown on the demolition plan of the civil improvement plan set.

F. Rock and Caliche removal shall be included in the Base Bid.

1.2 REFERENCES

A. Uniform Standard Specifications for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Specifications.

B. Uniform Standard Drawings for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Drawings.

C. International Building Code (IBC) 2018 Edition with Southern Nevada Amendments.

1.3 QUALITY CONTROL

A. A Quality Assurance Testing Laboratory (Soils Engineer) will be retained by the Government to observe performance of work in connection with clearing, grading, excavation, backfilling and trenching.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable local code for disposal of all debris (cleared materials) and the abandonment of existing wells in accordance with State of Nevada Statutory Regulations.

B. Coordinate clearing work with utility companies

C. Burning on-site is not allowed.

D. All Work of this Project in the Public Right-Of-Way shall be in accordance with the applicable sections of the Uniform Standard Drawings and Specifications except for provisions for payment. All Work shall be included in the Base Bid.

E. Obtain necessary permits and comply with the requirements of local agencies for dust and air quality controls.

3.1 PREPARATION

A. Prior to construction activities, the Contractor shall verify if existing plant life is to remain and if they have been tagged or identified by the Government.

3.2 PROTECTION

A. Locate, identify, and protect all utilities from damage. Notify the CO/COR of any conflicts with existing utilities and the proposed work.

B. Protect existing structures from damage or displacement.

C. The Contractor shall be responsible for the preservation or re-establishment of all land survey monuments of record that are located within the limits of construction or disturbed as a result of the contractors operations.

D. The Contractor shall be responsible for the protection or re-establishment of any monument of record shown on the plans or found during the course of construction in accordance with NRS 329.

E. All re-established monuments shall be set under the direction of a Professional Land Surveyor Licensed in the State of Nevada.

3.3 CLEARING

A. Clear areas required for access to the site and for the execution of work.

B. Remove trash, debris, trees, shrubs and all organic material. Remove stumps, root system to a depth of 18 inches. Remove all man-made fill.

C. Clear undergrowth and deadwood without disturbing subsoil.

D. Remove concrete, asphalt, curbs, gutters, and other site work designated to be removed or required to be removed for completion of work. Where partial removal of concrete or asphalt is required, saw cut concrete of asphalt on straight line.

E. Conduct clearing operations to minimize interference with adjacent structures and occupancies.

F. Notify Government of unexpected subsurface conditions or unmarked utility lines and discontinue affected Work in area until notified to resume work.

3.4 REMOVAL

A. Remove all debris and otherwise deleterious materials in accordance with all Local Municipal and State of Nevada Statutory Regulations.

END OF SECTION

SECTION 31 22 00

GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of topsoil and subsoil.

B. Cutting, grading, filling, and rough contouring the site.

C. Rock and Caliche removal shall be included in the Base Bid.

1.2 RELATED SECTIONS

A. Section 31 23 16 – Excavation

B. Section 31 23 23.13 - Backfill

1.3 REFERENCES

A. Uniform Standard Specifications for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Specifications.

B. Uniform Standard Drawings for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Drawings.

C. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

D. International Building Code (IBC) 2018 Edition with Southern Nevada Amendments.

E. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

F. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 pound Rammer and 12 inch Drop.

G. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

H. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 pound Rammer and 18 inch Drop.

I. ASTM/ D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

J. ASTM D3017 - Test Method for Water content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.4 QUALITY ASSURANCE

A. A Quality Assurance Testing Laboratory (Soils Engineer) will be retained by the Government to observe performance of work in connection with clearing, grading, excavation, backfilling and trenching.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of utilities remaining by horizontal dimension, elevations and/or inverts, and slope gradients and provide “redlined” mark-up plans of the as-built conditions differing from as shown on the contract plans to the CO/COR.

1.6 REGULATORY REQUIREMENTS

A. Conform to local ordinances for handling and disposal of debris.

B. Coordinate excavation Work with utility companies.

C. All Work of this Project in the Public Right-Of-Way shall be in accordance with the applicable sections of the Uniform Standard Drawings and Specifications except for provisions for payment. All Work shall be included in the Base Bid.

D. Obtain necessary permits and comply with the requirements of local agencies for dust and air quality controls.

3.1 EXAMINATION

A. Verify that survey benchmark and intended elevations for the work are as indicated on drawings.

B. The Contractor shall be responsible for the preservation or re-establishment of all land survey monuments of record that are located within the limits of construction or disturbed as a result of the contractors operations. The Contractor shall be responsible for the protection or re-establishment of any monument of record shown on the plans or found during the course of construction in accordance with NRS 329. All re-established monuments shall be set under the direction of a Professional Land Surveyor Licensed in the State of Nevada.

C. The Contractor shall be responsible for the protection or re-establishment of any monument of record shown on the plans or found during the course of construction in accordance with NRS 329.

D. All re-established monuments shall be set under the direction of a Professional Land Surveyor Licensed in the State of Nevada.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground and aerial utilities. Stake and flag locations.

C. Protect above and below grade utilities which are to remain.

D. Protect benchmarks from any disturbance whatsoever.

E. Provide dust control as required to comply with the Permit and Local Agency Requirements.

F. Coordinate start of work with Government's soils engineer.

G. Should the Contractor encounter a Desert Tortoise or Tortoise burrow, the Contractor shall stop work and contact the Government’s project manager or project CO/COR. The Government will

request the proper authorized personnel to remove the tortoise. Removal of tortoises from the site, other than by U.S. Department of Wildlife authorized personnel, can be constituted as a "take" action.

3.3 SUBSOIL EXCAVATION

A. Excavate subsoil at proposed structure, exterior slab, and pavement as required per Section 31 23 16 - Excavation.

B. Excavate proposed site areas to grades shown on drawings.

C. Stockpile material acceptable for re-use in area designated on or near site acceptable to Government. Remove excess subsoil not being reused from site.

D. Stockpile subsoil to depth not exceeding 8 feet. Cover to protect from erosion.

E. Conduct grading operations to minimize interference with adjacent structures and occupancies.

3.4 FILL/EMBANKMENT

A. Fill areas to contours and elevations shown on drawings with an allowance for the thickness of required base courses or topsoil.

B. Fill and compact subsoil in accordance with Section 31 23 23.13 - Backfill.

C. Make grade changes gradual. Blend slope into level areas.

3.5 TOLERANCES

A. Top Surface of Subgrade in site areas: Plus or minus 1/10-foot.

B. Top Surface of Subgrade under building pad and paved areas: Plus or minus 0.05-foot.

3.6 FIELD QUALITY CONTROL

A. Field Quality Assurance testing and inspection will be performed by an independent Testing Laboratory under the direction of a Professional Geotechnical Engineer under contract with the Government.

B. Retesting as a result of inferior work shall be at no additional cost to the Government.

END OF SECTION

SECTION 31 22 13

ROUGH GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of topsoil and subsoil.

B. Cutting, grading, filling, and rough contouring the site.

1.2 RELATED SECTIONS

A. Section 31 10 00 – Site Clearing.

B. Section 31 23 16 – Excavation.

C. Section 31 23 16.13 – Trenching.

D. Section 31 23 16.26 – Rock and Caliche Removal.

E. Section 31 23 23.13 – Backfill.

1.3 REFERENCES

A. Uniform Standard Specifications for Public Works' Construction, Off-site Improvements, Clark County Area, Nevada, latest edition and supplements. Materials and workmanship specified herein with reference to these Standard Specifications shall be in accordance with the referenced sections, articles and paragraphs except that contractual, measurement, and payment provisions do not apply.

B. Uniform Standard Drawings for Public Works' Construction, Off-site Improvements Clark County Area, Nevada, latest edition and any addenda or supplements thereto.

C. ANSI/ASTM C 136 – Method for Sieve Analysis of Fine and Coarse Aggregates.

D. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound Rammer and 12-inch Drop.

E. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

F. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-pound Rammer and 18-inch Drop.

G. ASTM/ D 2922 – Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

H. ASTM D3017 – Test Method for Water content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

I. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 70 00 – Execution and Closeout Requirements.

B. Accurately record actual locations of utilities remaining, by horizontal dimension, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: See Landscape Specifications.

B. Subsoil: As defined in the Project Soil and Foundation Investigation.

PART 3 - EXECUTION

3.1 PROTECTION

A. Verify site conditions.

B. Verify that survey benchmark and intended elevations for the work are as indicated on drawings.

C. The Contractor shall be responsible for the preservation or re-establishment of all land survey monuments of record that are located within the limits of construction or disturbed as a result of the contractors' operations. The Contractor shall be responsible for the protection or re-establishment of any monument of record shown on the plans or found during the course of construction in accordance with NRS 329. All re-established monuments shall be set under the direction of a Professional Land Surveyor licensed in the State of Nevada.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.

C. Protect above and below grade utilities which are to remain.

D. Protect benchmarks from any disturbance whatsoever.

E. Should the Contractor encounter a Desert Tortoise or Tortoise burrow, the Contractor shall stop work and contact the Government's project manager or CO/COR. The Government will request the proper authorized personnel to remove the tortoise. Removal of tortoises from the site, other than by U.S. Department of Wildlife authorized personnel, can be constituted as a "take" action.

F. Provide dust control as required per governing agency requirements.

3.3 TOPSOIL EXCAVATION

A. Excavate topsoil as per Site Grading Section in the Soil and Foundation Investigation.

B. Stockpile topsoil to depth not exceeding 8 feet. Cover to protect from erosion.

3.4 SUBSOIL EXCAVATION

A. Excavate subsoil as per Site Preparation and Earthwork Section in the Soil and Foundation Investigation.

B. Stockpile subsoil to depth not exceeding 8 feet. Cover to protect from erosion.

3.5 FILL

A. Fill areas to contours and elevations with unfrozen materials.

B. Granular Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth, compacted per soils report recommendation.

C. Subsoil and Topsoil Fill: Place and compact material in continuous layers not exceeding 6 inches compacted depth, compacted per soils report recommendations.

D. Maintain soil moisture to within optimum moisture content of fill materials as stated in soils report to attain required compaction density in accordance with soils report.

E. General: Except as otherwise specified herein, construction of fill shall be in accordance with Section 203 of the Uniform Standard Specifications. Fill and embankment slopes for all construction shall be within the limits indicted by the lines and grades shown on the Drawings, and/or as staked in the field. Prior to filling structural or paved areas, scarify and re-compact in accordance with Exploration Report. Fill areas to contours and elevations with unfrozen materials. Structural and General Site Fill: Place and compact materials in accordance with Document 00200 and the Project Geotechnical Exploration Report. Maintain optimum moisture content of fill materials to attain required compaction density. Slope grade away from building as indicated on drawings. Make grade changes gradual. Blend slope into level areas.

F. Scarification of Existing Ground Surface: Areas upon which fill material is to be placed shall first be cleared of all materials required to be removed under Article 3.02 and shall then be loosened by appropriate means to a minimum depth, processed and moistened, and re-compacted per the recommendations called out in the project Geotechnical Investigation.

G. Compacting of Existing Ground Surface: Following scarification, the loosened material shall be compacted as per Soil and Foundation Investigation.

H. Fills and embankments shall be built up full width from the bottom in successive layers not exceeding 8 inches in thickness before compaction, and shall be compacted per the Project Soil and Foundation Investigation recommendations, except as otherwise provided herein. Places inaccessible to mobile power compacting equipment shall be hand compacted by mechanical means to the above specified densities. Upon completion, the sub-grade shall be firm, hard, and unyielding with a true and uniform surface conforming to the grade and cross section as shown or ordered.

I. Remove surplus fill materials from site.

J. In all areas to be landscaped, the base bid shall require grade to be held to 8 inches below elevations shown on the civil drawings to allow for top soil by landscape installers for grass areas. All areas outside building envelope are to be 3 inches below curbs and sidewalks. For additional information and confirmation of these requirements reference Landscape Plans and Specifications for all areas.

3.6 TOLERANCES

A. Top Surface of Sub-grade: Plus or minus 1/10 foot.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by an independent Geotechnical Engineer under contract with the Government.

B. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Government.

C. Frequency of Tests: Per the Geotechnical Engineer's requirements. Notify Government's representative when work is ready for testing.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation for building foundations.

B. Excavation for slabs-on-grade, landscaping, and utilities.

C. Excavation for site structures.

D. Rock and Caliche removal shall be included in the Base Bid.

1.2 RELATED SECTIONS

A. Section 31 22 00 - Grading.

B. Section 31 23 16.26 – Rock and Caliche Removal.

C. Section 31 23 23.13 - Backfill.

1.3 REFERENCES

A. Uniform Standard Specifications for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Specifications.

B. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

C. Uniform Standard Drawings for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Drawings.

D. International Building Code (IBC) 2018 Edition with Southern Nevada Amendments.

1.4 QUALITY ASSURANCE

A. A Quality Assurance Testing Laboratory (Soils Engineer) will be retained by the Government to observe performance of work in connection with clearing, grading, excavation, backfilling, and trenching.

1.5 REGULATORY REQUIREMENTS

A. All Work of this Project in the Public Right-Of-Way shall be in accordance with the applicable sections of the Uniform Standard Drawings and Specifications except for provisions for payment. All Work shall be included in the Base Bid.

B. Conform to local ordinances for handling and disposal of debris.

C. Coordinate excavation Work with utility companies.

D. Obtain necessary permits and comply with requirements of local agencies for dust and air quality controls.

PART 2 PRODUCTS - NOT USED

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey benchmark and intended elevations for the work are as indicated.

B. The Contractor shall be responsible for the preservation or re-establishment of all land survey monuments of record that are located within the limits of construction or disturbed as a result of the contractors operations. The Contractor shall be responsible for the protection or re-establishment of any monument of record shown on the plans or found during the course of construction in accordance with NRS 329. All re-established monuments shall be set under the direction of a Professional Land Surveyor Licensed in the State of Nevada.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground and aerial utilities. Stake and flag locations.

C. Notify utility company if required to remove or relocate utilities.

D. Protect above and below grade utilities that are to remain.

E. Protect benchmarks from excavation and vehicular traffic.

F. Coordinate start of work with the Government’s Soils Engineer.

3.3 EXCAVATION

A. Excavate subsoil at proposed structure, exterior slab, pavement, and other construction included as part of the Project as required by the earthwork portions of the Geotechnical Report

B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving and site structures, construction operations, and miscellaneous surface features.

C. Underpin adjacent structures that may be damaged by excavation work, including utilities and pipe chases.

D. All on-site man-made fills that are not properly placed, observed, tested and recorded shall be excavated as undocumented fill.

E. Machine slope banks to angle of repose or less, until shored.

F. Excavated soil line and grade shall not interfere with normal forty-five (45) degree bearing splay of foundation.

G. Grade and provide temporary slopes as required at the top perimeter of excavation to prevent surface water flows from draining into excavation.

H. Hand trim excavation. Remove loose matter.

I. Correct unauthorized excavation or areas over-excavated by error in accordance with Section 31 23 23.13 - Backfill.

J. Stockpile acceptable material and remove excess materials in accordance with Section 31 22 00 - Grading.

K. Conduct excavation operations to minimize interference with adjacent structures.

L. Notify Government of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

M. Rock/caliche removal shall be in accordance with Section 31 23 16.26 – Rock and Caliche Removal.

3.4 FIELD QUALITY CONTROL

A. Field Quality Assurance testing and inspection will be performed by an independent Testing Laboratory under the direction of a Professional Geotechnical Engineer under contract with the Government.

B. Retesting as a result of inferior work shall be at no additional cost to the Government.

END OF SECTION

SECTION 31 23 16.13

TRENCHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavation trenches for utilities from 5 feet outside building to connection point.

B. Compacted bedding under fill over utilities to sub-grade elevations.

C. Backfilling and compaction.

1.2 RELATED SECTIONS

A. Section 31 00 00 - Earthwork.

B. Section 31 22 13 – Rough Grading.

C. Section 31 23 16 – Excavation.

D. Section 31 23 16.26 – Rock and Caliche Removal.

E. Section 31 23 23.13 – Backfill.

1.3 REFERENCES:

A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound Rammer and 12-inch Drop.

C. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-pound Rammer and 18-inch Drop.

E. ASTM D2922 - Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth).

F. ASTM D3017 - Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth).

G. Uniform Standard Specifications for Public Works Construction, Off-site Improvements Clark County Area, Nevada, latest edition and supplements.

H. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

1.4 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. All imported fill material shall be in accordance with the specifications stated in the Project Soil and Foundation Investigation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify with the Geotechnical Engineer that excavated materials to be reused for fill are acceptable.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Cut out soft areas of sub-grade not capable of in-situ compaction. Backfill with Type II fill and compact to density equal or greater than requirements for subsequent backfill material.

3.3 EXCAVATION

A. Excavate subsoil required for all underground utilities.

B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.

C. Excavation shall not interfere with normal forty-five (45) degree bearing splay of foundation.

D. Excavation shall be trimmed and loose matter removed.

E. Correct unauthorized excavation at no extra cost to Government.

F. Correct areas over-excavated by error in accordance with Section 31 23 16 - Excavation.

3.4 BEDDING

A. Support pipe and conduit during placement and compaction of bedding fill.

3.5 FIELD QUALITY CONTROL

A. Field inspection will be performed by an independent Geotechnical Engineer under contract with the Government.

3.6 BACKFILLING

A. Backfill trenches to contours and elevations with approved materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy sub-grade surfaces.

C. Type I and Type II Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.

D. Structural Fill: Place and compact material as defined in the Project Geotechnical Exploration Report.

E. Employ a placement method that does not disturb or damage conduit or duct in trench.

F. Maintain optimum moisture content as defined in the project's soils report.

3.7 TOLERANCES

A. Top Surface of Backfilling under Paved Areas: Plus or minus one inch from required elevations.

B. Top Surface of General Backfilling: Plus or minus one inch from required elevations.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by an independent Geotechnical Engineer under contract with the Government.

B. Compaction testing will be performed by an independent Geotechnical Engineer under contract with the Government.

C. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Government.

D. Frequency of Tests: Per Government's requirements. Notify Government's representative when work is ready for testing.

3.9 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01 50 00.

B. Fills subjected to vehicular traffic shall be re-compacted to achieve the required densities as specified by Geotechnical Engineer.

END OF SECTION

SECTION 31 23 16.26

ROCK AND CALICHE REMOVAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of discovered rock and caliche during excavation.

B. Clear site of plant and grass.

1.2 RELATED SECTIONS

A. Section 31 22 13 – Rough Grading.

B. Section 31 23 16 – Excavation.

C. Section 31 23 16.13 – Trenching.

D. Section 31 23 23.13 – Backfill.

1.3 REFERENCES

A. Uniform Standard Specifications for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Specifications.

B. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

C. Uniform Standard Drawings for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Drawings.

D. International Building Code (IBC) 2018 Edition with Southern Nevada Amendments.

1.4 DEFINITIONS

A. Rock: Solid mineral material of a size that cannot be removed with a ¾ cubic yard power shovel.

B. Caliche: As defined by the project soils report.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01 00 00 – General Requirements.

B. Verify site conditions and note subsurface irregularities affecting work of this section. See soils report.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.3 ROCK REMOVAL – MECHANICAL METHOD

A. Excavate and remove rock and caliche as referenced in the Project Soil and Foundation Investigation.

B. Cut away rock and caliche at bottom of excavation to form level bearing.

C. Remove layers to provide sound and un-shattered base for footings and foundations.

D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

E. Remove unacceptable excavated rocks and caliche from site, as recommended by Soils Engineer.

F. Correct unauthorized rock and caliche removal in accordance with backfilling and compaction requirements of Section 31 23 23.13 - Backfill.

G. Should the Contractor encounter a Desert Tortoise or Tortoise burrow, the Contractor shall stop work and contact the Government's project manager or architect. The Government will request the proper authorized personnel to remove the tortoise. Removal of tortoises from the site, other than by U.S. Department of Wildlife authorized personnel, can be constituted as a "take" action.

H. Explosives shall not be used in the removal of rock.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 40 00 – Quality Requirements and 01 45 29 – Testing Laboratory Services.

B. Provide for visual inspection by Government-appointed inspector of foundation bearing surfaces and cavities formed by removed material in accordance with Section 01 40 00.

END OF SECTION

SECTION 31 23 23.13

BACKFILL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building perimeter and site structure backfilling to sub-grade elevations.

B. Site filling and backfilling.

C. Fill under slabs-on-grade, paving, landscaping, and utilities.

D. Consolidation and compaction.

E. Fill for over-excavation.

1.2 RELATED SECTIONS

A. Section 31 00 00 - Earthwork.

B. Section 31 23 16 – Excavation.

C. Section 31 23 16.13 – Trenching.

D. Section 32 13 13 – Portland Cement Concrete Paving.

1.3 REFERENCES

A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 pound Rammer and 12 inch Drop.

C. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 pound Rammer and 18 inch Drop.

E. ASTM D2922 - Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth).

F. ASTM D3017 - Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth).

G. Uniform Standard Specifications for Public Works' Construction, Off-site Improvements, Clark County Area, Nevada, latest edition and supplements. Materials and workmanship specified herein with reference to these Standard Specifications shall be in accordance with the referenced sections, articles and paragraphs except that contractual, measurement, and payment provisions do not apply.

H. Uniform Standard Drawings for Public Works' Construction, Off-site Improvements Clark County Area, Nevada, latest edition, and any addenda or supplements thereto.

I. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

1.4 SUBMITTALS

A. Submittal under provisions of Section 01 33 00 – Submittal Procedures.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. All imported fill material shall be in accordance with the specifications stated in the Geotechnical Report per Part 1.03 of this section.

B. Type I - Pit run, natural stone; free of shale, clay, friable material, sand, debris; graded in accordance with ASTM C136 and as specified in the Uniform Standard Specifications, Clark County, Nevada.

C. Type II - Natural stone; free of clay, shale, organic matter; graded in accordance with ASTM C136.

D. Type C Sand - Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ASTM C136.

E. Type F - Structural Fill: As approved by Soils Engineer.

F. Subsoil: Reused, imported, free of gravel larger than 3-inch size, and debris, as approved by Soils Engineer.

G. Type II Aggregate Base: As specified in Uniform Standard Specifications Section 704.03.04.

H. Type I Aggregate Base: As specified in Uniform Standard Specifications Section 704.03.02.

I. Drain Backfill: As specified in Uniform Standard Specifications Section 704.03.01.

J. Selected Backfill: As specified in Uniform Standard Specifications Section 207.02.01.

K. Granular Backfill: As specified in Uniform Standard Specifications Section 207.02.02.

L. Structural Fill: As specified as specified in the Project Soil and Foundation Investigation.

M. Site Concrete: As specified in Section 32 13 13 – Concrete Paving.

N. Concrete: As specified in Section 32 13 13 – Concrete Paving.

O. Fill Material in Landscape Areas: Clean soils free of vegetation, debris and organic contaminates with:

1. No refuse, roots, heavy clay, gravel, sticks, brush, litter and other deleterious substances.
2. Less than ten percent clay content and more than 50 percent sand content.
3. No fragment larger than 1 inch in size.
4. 100 percent passing a 1-inch sieve.
5. 90 to 100 percent passing No. 4 sieve.
6. 5 to 60 percent passing No. 16 sieve.
7. 0 to 10 percent passing no. 100 sieve.
8. Any plant pit filled with water must be able to drain within a 24-hour period.
9. Landscape fill requirements only apply to the top four (4) feet of fill. Fill areas deeper that four (4) feet may use other fill materials below the landscape fill in accordance with these specifications.
10. Refer to Section 32 91 19 – Landscape Grading for additional requirements and specifications. The Landscape grading specifications and improvement plans shall control the fill requirements in the landscape areas. For additional information also refer to Landscape Improvement plans.

PART 3 - - EXECUTION

3.1 EXAMINATION

A. All field testing will be performed by an independent Geotechnical Engineer under contract with the Government. Verify with the Geotechnical Engineer if excavated materials to be re-used as fill meet the specifications as stated in the Geotechnical Evaluation.

3.2 PREPARATION

A. Generally, compact sub-grade to density requirements for subsequent backfill materials.

B. Prior to placement of aggregate base course material at paved areas, compact subsoil per soils report.

C. Provide dust control as required.

3.3 BACKFILLING

A. Backfill areas to contours and elevations with approved materials.

B. Do not backfill over porous, wet, frozen, or spongy sub-grade surfaces.

C. Place and compact materials in continuous layers not exceeding 6 inches compacted depth.

D. Maintain optimum moisture content of backfill materials to attain required compaction requirements per soils report.

E. During backfilling operations, do not use heavy equipment within 5 feet of retaining walls.

F. The Sub-Grading Contractor is to coordinate with the Landscape Contractor that the sub-grade cuts and sub-grade fill areas have been completed as described within this section and Section 32 91 19 - Landscape Grading and Landscape Improvement Plans.

G. Soil requirements in the landscape areas:

1. Non-raised planting beds outside the building envelope with a thickness of 16-inches (installed by Grading Contractor). Soil requirements for 1-inch minus soils gravel content to be no greater than 10-percent of the soil volume. The minus material no. 4 sieve shall allow 90-percent passing The clay content shall be no greater than 10-percent of the soil volume. The noted materials are for planting beds outside of the building envelope. If existing soil is used refer to part 2.2 “using existing soils” for additional requirements.
2. Turf area fill conditions where turf is proposed, the landscape contractor shall provide 16-inches of soil that meets the following requirements:
   a. 8-inch bottom layer of soil that matches the landscape topsoil requirements (no soil amendments). See section 32 91 19, 2.1 Imported Topsoil for soil vendors that are approved by CCSD.
   b. Topsoil top layer (finish grade) 8-inches of 1/16 inch minus topsoil with the required soil amendments. See section 32 91 19, 2.1 Imported Topsoil for soil vendors that are approved by CCSD.
3. Raised Planters and planters within the buildings envelope provide pre-mixed soils at a minimum depth of 36” (Completed by the landscape contractor).

H. Rough Grades for the landscape areas are to be free of clay, rock and debris. See soil requirements for all sub-soils used in landscape areas (Section 32 91 19 Landscape Grading, 2.2 USING EXISTING SOIL MATERIALS). It is the landscape contractor’s responsibility to verify that the requirements are provided by the General Contractor or the Grading Contractor.

I. Rough grades for planting beds:

1. Areas planned for 3/8” minus shall be 3 inches below all hardscape surfaces. (prior to crushed rock installation).
2. Areas planned for 8-14” rip rap shall be 12-14 inches below all hardscape surfaces. (prior to crushed rock installation).
3. Grass Areas: Finish grade is to be flush to the concrete edge where pedestrian traffic occurs, or where water flows from the grass over the concrete curbing. Confirm with the Government’s Representative on all grade issues.

3.4 TOLERANCES

A. Top Surface of Backfilling under Paved Areas: Plus or minus 1/10 foot from required elevations.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by an independent Geotechnical Engineer under contract with the Government.

B. Compaction testing will be performed by an independent Geotechnical Engineer under contract with the Government.

C. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Government.

D. Frequency of Tests: Per Government's requirements.

E. Field inspection and testing will be performed under provisions of Section 01 40 00 – Quality Requirements.

3.6 COMPACTION REQUIREMENTS

A. Definitions:
   1. Building areas: Areas within the building perimeter.
   2. Site areas: Areas outside of the building line but within Contract limit lines.

B. Moisture – Density
   1. Compact fill and backfill materials to not less than the minimum percentage of density and moisture content for each area as indicated in the soils report.

C. Tests made as a result of non-compliance shall be at the Contractor's expense.

3.7 COMPACTION TESTS

A. Tests for compliance will be made by a representative of the Government, at the expense of the Government, using the test procedures specified in Section 111 of the Uniform Standard Specifications and ASTM D1557.

B. Field density tests shall be performed in accordance with the test procedures specified in ASTM D1556, ASTM D2922 and ASTM D3017.

C. The location and frequency of field tests shall be at the discretion of the Engineer. Sufficient time shall be allotted to the Engineer for performing the necessary control test for acceptance of a compacted layer, before attempting to place new fill material. Any layer, or portion thereof, that does not meet density requirements, shall be reworked and re-compacted until it meets the specified density requirements as determined by the Engineer.

D. Tests made as a result of non-compliance shall be at the Contractor's expense.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01 50 00 – Temporary Facilities and Controls.

B. Re-compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 31 23 39
DISPOSAL OF EXCAVATED MATERIALS

PART 1 GENERAL

1.01 MEASUREMENT AND PAYMENT

A. Cost:

1. [1][Except as provided elsewhere for payment for overhaul,] Include in prices offered in the Price Schedule for excavation.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 DISPOSAL OF EXCAVATED MATERIALS

A. Waste material from required excavation which is not suitable or required for [2][backfill, embankment, topsoil, __].

B. Deposit waste excavated material in waste banks on rights-of-way controlled by the Government.

C. Waste areas for excavated materials [3][{are shown on the drawings} {shall be as directed by the COR}].

D. [4][{The haul limit for wasting excavated material will be ___ feet.} {Overhaul required for wasting excavated material shall be in accordance with Section 31___ - Overhaul.}]

E. Do not place waste material in wetlands, within 12 feet of drainage channels, [5][within 20 feet of edge of prescribed or actual canal cut; within 12 feet of edge of prescribed or actual cuts for laterals, wasteways, or drains].

F. [6][The COR will designate waste areas for excavated materials in the reservoir area below elevation ____.

---

1 Include only when overhaul is a pay item.

2 Revise list as appropriate for work.

3 Select appropriate statement.

4 Include when haul of waste material would be of concern, ex. canals. Include first option when there is not an overhaul item. Include second option when there is an overhaul item.

5 Include as appropriate.

6 Include when appropriate for work in reservoirs.

1. Place waste banks so they will not:
    a. Impede or alter natural flow of streams or cross drainage.
    b. Interfere with flow to spillway or outlet works.
    c. Interfere with operation of the reservoir.
    d. Restrict accessibility of completed structures.
    e. Detract from appearance of completed project.]

G. Do not waste material by dumping from top of slope.

H. Grade waste banks to reasonably even and uniform surfaces that blend with natural terrain.
    1. Minimum slope: 2 percent.
    2. Maximum slope: 4H:1V.

I. [7][{Leave surface in a condition that will facilitate natural revegetation} {Seed surface in accordance with Section 32 92 20 –Seeding and Soil Supplements.]

END OF SECTION

[7] Select appropriate statement.

SECTION 32 00 00

OFF-SITE IMPROVEMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Paving of Streets.

B. Curb and Gutter.

C. Sidewalk.

D. Valley Gutters.

E. Street Signage.

F. Driveways and Approaches.

G. Striping.

H. Traffic Markers.

I. Off-Site Water.

J. Off-Site Sewer.

1.2 RELATED SECTIONS

A. Section 31 22 00 - Grading.

B. Section 31 23 16 - Excavation.

C. Section 31 23 16.13 - Trenching.

D. Section 31 23 16.26 - Rock and Caliche Removal.

E. Section 31 23 23 - Backfill.

F. Section 32 11 23 - Aggregate Base Courses.

G. Section 32 12 16 - Asphalt Paving.

H. Section 32 13 13 - Portland Cement Concrete Paving.

1.3 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.4 REFERENCES

A. All work shall comply with the latest edition and supplements to the Uniform Standard Specifications for the Public Works' Construction, Off-site Improvements, Clark County Area and the Uniform Standard drawings for Public Works' Construction Off-site Improvements, Clark County Area, Nevada. Copies of the reference standards may be obtained from the Department of Public Works, Clark County, Nevada. Off-site work shall comply with the Clark County Standards and Specifications.

B. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

C. International Building Code (IBC) 2018 Edition with Southern Nevada Amendments

D. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.

1.5 SPECIAL REQUIREMENTS

A. Prior to commencement of any off-site work, the Contractor shall obtain written approval of the asphaltic concrete paving and concrete mix designs, from the Public Works Department of the entity having jurisdiction.

B. No off-site work will be allowed to start until a copy of such approved mix designs are on file with the Government. Following completion of all offsite work, the contractor shall furnish to the Government, a copy of a letter of acceptance of the completed off-site improvements signed by the Public Works Department of the entity having jurisdiction.

C. Upon reaching sub-grade elevation in the off-site right-of-way, the Contractor shall notify, in writing, the Geotechnical Engineer of Record so that an R-value test can be performed and a structural AC section be calculated. AC section to be submitted by the Geotechnical Engineer to Clark County Department of Public Works for review and approval.

D. Contractor to obtain off-site approvals from Clark County and the Nevada Department of Transportation (NDOT). Final Payment will not be released until an approval letter for the off-sites is provided.

1.6 WARRANTY

A. Provide one (1) year warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Asphaltic Concrete Paving: per Clark County Standards and NDOT Standards.

B. Concrete: per Clark County Standards and Specifications. Design mix shall be submitted for approval prior to start of off-site improvements.

C. Striping: per Clark County Standards and NDOT Standards.

D. Traffic Markers: per Clark County Standards and NDOT Standards.

E. Off-Site Water: per Uniform Design and Construction Standards for Water Distribution.

F. Off Site Sanitary Sewer: per Design and Construction Standards for Wastewater Collection Systems.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. The Contractor shall furnish and install all items of this section in accordance with all local codes and ordinances and requirements of Clark County and NDOT.

B. All construction shall be completed in accordance with the following standards and specifications:
   1. Paving of Streets:
      a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
      b. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
      c. Per supplement to Uniform Standard Drawings and Specifications, Department of Public Works, Clark County.
      d. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
   2. Curb and Gutter:
      a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
      b. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
      c. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
   3. Sidewalks:
      a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
      b. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
      c. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
   4. Street Lighting:
      a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
      b. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
      c. Per supplement to Uniform Standard Drawings and Specifications, Department of Public Works, Clark County.
      d. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
   5. Valley Gutter:
      a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
      b. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
      c. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.

6. Street Signage:
   a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
   b. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
   c. Per Manual on Uniform Traffic Control Devices, latest edition.
   d. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
7. Driveways and Approaches:
   a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
   b. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
   c. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
8. Striping:
   a. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
9. Traffic Markers:
   a. Per Uniform Standard Drawings for Public Works, Construction Off-Site Improvements, Clark County, Nevada.
   b. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
10. Off-Site Water:
   a. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
   b. Per Uniform Design and Construction Standards for Water Distribution Systems.
   c. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.
11. Off-Site Sewer:
   a. Per Uniform Standard Specifications for Public Works, Construction Off-Site Improvements as amended.
   b. Per Design and Construction Standards for Wastewater Collection Systems.
   c. Nevada Department of Transportation - Standard Plans for Road and Bridge Construction, latest edition.

3.2 PATCHING

A. Should the pavement be damaged and patching of the surfaces be necessary, the Contractor shall repair and/or patch in accordance with Clark County Standards and Specifications and NDOT Standards and Specifications. It should be noted that the final patching limits will be determined by the governing agency field inspector.

3.3 PROTECTION AND CLEAN-UP

A. The Contractor shall carefully protect all adjacent areas from damage during this work.

B. Clean and finish surfaces and leave free of imperfections.

C. All debris created by the Contractor shall be removed and disposed of legally.

END OF SECTION

SECTION 32 01 90

TREE AND SHRUB PRESERVATION

PART 1 – GENERAL

1.1 SUMMARY

A. Provide for the preservation and protection of existing trees and shrubs during construction. Existing trees and shrubs designated as remaining and protected in place are noted on the plans and shall be maintained in good health and vigor during construction.

B. Circumstances which jeopardize the health of a designated tree or shrub shall be detailed in writing and submitted to the CO/COR. The CO/COR in coordination with the Architect will determine alternate protection methods and feasibility of preserving an existing tree or plant. All direction will be given in writing.

C. The Contractor is to follow all applicable local codes, ordinances or guidelines pertaining to the preservation of existing plant material.

D. Failure to protect and preserve any existing plant material specifically designated as remaining will result in a penalty to the Contractor as outlined in this section. Circumstances beyond the Contractor's control will not constitute failure on the Contractor's part to protect and preserve existing plant material providing the Contractor has taken every feasible precaution.

1.2 DETERMINATION OF PLANT VALUE

A. Prior to construction, the Contractor will have a certified, unbiased third party, arborist visit the site and determine the value of the existing plant material to be preserved as noted on the project improvement plans. The value determination shall be made in accordance with the current standards and guidelines of the National Arborists Association and the Council for Tree and Landscape Appraisers Guide to Plant Appraisal.

B. Information pertaining to the plant value will be used to determine retribution in the event that damages are incurred by the Contractor for failure to protect and preserve the existing plant material which is marked to remain.

1.3 PLANT VALUE DAMAGES

A. Damage to existing plant material designated as remaining that does not cause immediate death to the plant but does cause a decrease in plant health or appearance will result in a damage payment by the Contractor to the government.

B. Damage to existing plant material which causes death to the plant will result in a damage payment by the Contractor to the government.

C. The arborist who determined the initial plant value shall provide an on-site inspection and determine a value for the damaged plant.
   1. The damage payment will be determined by subtracting the new assessed value from the original value of the plant. The decrease in value shall reduce the Contract Amount due the Contractor by change order. Should the difference in value exceed the amount of

monies remaining in the Contract, the Contractor shall forfeit remaining monies and reimburse the government prior to release of any bonds or liens.

2. The Contractor may replace dead or damaged plant material with new plant material of equal type, size, shape, appearance and value as approved by the CO/COR in coordination with the Architect.
   a. Prior to installation, the Contractor shall submit photos of the replacement plant material as part of the request to replace dead or damaged plant material.
   b. Prior to installation, the Contractor shall provide documentation noting the dimensions of the replacement plant material.

1.4 LIQUIDATED DAMAGES

A. In addition to the plant value damages, the Contractor shall be assessed liquidated damages of one hundred dollars per day for each affected tree that meets the failures listed in this section.

B. The Contractor and CO/COR agree that the failures described in this section have the potential to damage a tree in ways that may not be apparent at the time the Contractor completes his work and warranty obligations. In addition, the value of lost tree shade and aesthetics to the public over subsequent years resulting from such failures may be difficult to ascertain. The parties agree that liquidating these damages while the Contractor is still present provides a reasonable means of resolving these damage claims.

C. The liquidated damages may be cumulative should multiple concurrent failures be witnessed by the CO/COR for the same tree on the same day. For example, a tree that has not received adequate irrigation, and has unapproved equipment working within the drip line, and a portion of the barrier removed or placed at grade will be assessed liquidated damages of $300 for each day that such concurrent failure activity occurs. Overlapping tree drip lines may result in a single spot violation's impact and liquidated damage assessment on multiple trees.

D. The causes for liquidated damages in this section include:
   1. Failure to adequately and deeply irrigate each remaining tree. Excepting trees that would be damaged from such over watering, the minimum watering frequency shall be weekly, and daily when the high temperature for the day is above 100 degrees F.
   2. Failure to provide and maintain the required temporary barriers.
   3. Failure to limit the construction activity within the drip line to hand powered work.

1.5 PRE-CONSTRUCTION MEETING

A. Parties involved, including the CO/COR, Architect, Contractor, and Subcontractors, shall attend a pre-construction meeting prior to the start of construction to clearly define all pertinent specifications regarding tree or landscape preservation.

1.6 TREE MARKING

PART 2 - PRODUCTS

2.1 SCHEDULE/PRODUCT DATA SHEET

A. The Contractor shall follow the landscape improvement plans for plant material to remain or to be removed as noted in the demolition and construction plans and specifications. Any discrepancies shall immediately be brought to the attention of the CO/COR.

B. The Contractor shall prominently mark all trees within the scope of work as preserved or removed as outlined below.
   1. Mark trees to be preserved with blue color tree flagging ribbon at waist height.
   2. Mark trees to be removed with red color tree flagging ribbon at waist height.

PART 3 - EXECUTION

3.1 SITE CLEARING

A. All tree, shrubs or landscape features which are to be removed shall be removed prior to the start of any other work. The actual trees to be removed shall be reviewed by the Contractor, CO/COR and the Architect prior to removal.

3.2 TREE PROTECTION

A. All trees which are to be preserved shall receive a protective barrier. The area of each enclosure shall be determined by the drip line of each tree preserved. Locate barrier supports and bracing outside the drip line to minimize damage to roots.
   1. Construction of the barriers shall be one of the following:
      a. Rough lumber 4x4's for vertical posts and 2x4's for horizontal members nailed together to create a stout enclosure.
      b. Minimum four-foot-high chain link fence mounted on 2-inch diameter galvanized posts, driven into the ground to a depth of at least 2-feet at no more than 10-foot spacing.
      c. Minimum four-foot-high, highly visible plastic mesh fencing on steel posts at no more than 5-foot spacing. Should the Contractor allow this fencing to sag to less than 4-feet in height, liquidated damages will be assessed. No allowances will be made for the instability of this type of fence.
      d. Contractor requests for alternative barrier construction must be pre-approved by the CO/COR in writing, which approval may be revoked at any time for any reason.
   2. With any of the preceding construction options, movable barrier fencing secured to cement blocks can be substituted for "fixed" fencing if the CO/COR agrees that the fencing must be moved to accommodate certain phases of construction.
   3. Provide brightly colored flagging on the barriers.
   4. Install prominently located 8.5 by 11-inch durable warning signs on each protective barrier stating:
      a. Tree Protection Zone
      b. This Fence Shall Not Be Removed
      c. Hand Work Only

B. If an existing condition prevents compliance with this specification, contact the CO/COR immediately. Do not extend protective barriers into the public way but complete barrier enclosures along the property line.

C. All trees shall be protected from compaction or damage to root systems.
   1. Trees which cannot be protected from on-site vehicular traffic with barriers shall be protected with two (2) layers of double thickness plywood or steel plates laid on top of railroad ties.
   2. Additionally, apply a 4-inch layer of organic mulch to cover the area within the drip line. Keep mulch 12 inches from the trunk. The mulch shall be maintained and remain in place during construction and removed from the site after completion of the Project.

D. Temporary barriers shall be erected and approved by the CO/COR at least 24 hours before demolition, grading, or construction begins and remain in place until Substantial Completion. Any damaged barriers shall be promptly repaired or replaced.

3.3 STRIPPING AND TURF REMOVAL

A. The stripping of vegetation, topsoil or turf around preserved trees is not permissible. Vegetation around existing trees requiring removal shall be cut at ground level to avoid damage to roots.
   1. Do not apply herbicides within the drip line of any tree to remove plant material.

B. Turf grass to be removed shall be cut to ground level to avoid damage to tree roots.
   1. Do not strip or power rake turf grass within the drip line of preserved trees.
   2. Do not apply herbicides within the drip line of any tree to remove turf grass

3.4 STORAGE

A. No storage of construction materials, fuel, solvents or toxic waste is to occur under or near plant material.

3.5 HAND WORK

A. All construction activity within the protective barriers shall be performed by hand. Hand digging, hydraulic, or pneumatic excavation are permitted methods for excavation and tunneling. The use of electric, gas, or similar power tools or equipment to be used within the drip line of preserved trees shall be requested by the Contractor in writing, demonstrated to the CO/COR's satisfaction, and granted permission by the CO/COR in writing prior to any such activity. The CO/COR may refuse to grant such permission or may revoke previously granted permission for any reason.

PART 4 - TRENCHING

4.1 TRENCHING

A. Utility installation shall be routed around existing trees and roots wherever possible.
   1. Roots less than 2 inches in diameter must be cut cleanly and not left crushed or torn.
   2. Roots greater than 2 inches in diameter shall not be cut. The Contractor shall tunnel under the roots and exercise extreme care to protect as large a root area as possible.
   3. Roots shall not be exposed to the air. Trenches and tunnels shall be filled as soon as possible. Roots exposed or damaged during operations shall be cut off cleanly and topsoil placed over the exposed root area immediately.

PART 5 - TREE CARE

5.1 PRUNING

A. Pruning required including the removal of damaged or interfering limbs shall be accomplished by an approved Arborist or tree care professional. Under no circumstances shall the contractor attempt any pruning or other tree care.

B. In the event construction damage has caused deadwood within the canopy, only deadwood shall be removed. All living limbs shall be retained. Do not remove above-ground tissue to compensate for root loss or damage.

5.2 IRRIGATION

A. All preserved trees shall be provided with adequate supplemental irrigation during construction.
   1. The use of water trucks is permissible and shall comply with all precautions to prevent root damage or compaction as outlined in this section.

B. The Contractor shall prevent water logging conditions. Protect all trees from standing water due to compaction or damming.

5.3 VERTICAL MULCHING

A. Trees which have received substantial compaction shall receive vertical mulching as prescribed by a certified Arborist.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork.

B. Section 31 22 13 – Rough Grading.

C. Section 31 23 16.13 – Trenching.

D. Section 31 23 23.13 – Backfill.

E. Section 32 12 16 - Asphalt Paving.

1.3 REFERENCES

A. AASHTO M147-65 - Materials for Aggregate and Soil-Aggregate.

B. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound Rammer and 12-inch Drop.

D. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-pound Rammer and 18-inch Drop.

E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

F. Type I per Uniform Standard Specifications Section 704.

G. Type II per Uniform Standard Specifications Section 704.

H. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Coarse Aggregate: As specified in Section 31 23 23.13 - Backfill, Part 2.01, A and B.

B. Fine Aggregate: As specified in Section 31 23 23.13 - Backfill, Part 2.01.C.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify sub grade has been inspected and that grades and elevations are correct.

3.2 AGGREGATE PLACEMENT

A. Spread coarse aggregate over prepared base in areas shown on plans.

B. Place coarse aggregate in 4-inch layers and compact as specified.

C. Level and contour surfaces to elevations and grades indicated.

D. Add quantities of fine aggregate to coarse aggregate as required to obtain compaction specified by Soils Engineer.

E. Use mechanical vibrating and tamping equipment in areas inaccessible to compaction equipment.

3.3 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from True Elevation: Within 1/2 inch.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 40 00 – Quality Requirements.

B. Gradation of Aggregate: In accordance with ASTM C136.

C. Compaction testing will be performed in accordance with ASTM D698.

D. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Government.

E. Frequency of Tests: Per Government's requirements.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Asphaltic Concrete Paving: All on-site and off-site asphalt concrete paving work as shown on drawings and as specified herein.

B. Aggregate Base Course: The work shall consist of one or more courses of bituminous mixtures constructed on the prepared foundation in accordance with these specifications and in conformity with the lines, grades, thicknesses and typical cross sections shown on the plans.

C. Prime and tack coating and surface sealers.

1.2 RELATED SECTIONS

A. Section 31 23 23.13 – Backfill.

B. Section 32 17 23 - Pavement Markings.

1.3 REFERENCES

A. TAI - (The Asphalt Institute) - MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.

B. TAI - (The Asphalt Institute) - MS-3 Asphalt Plant Manual.

C. TAI - (The Asphalt Institute) - MS-8 Asphalt Paving Manual.

D. TAI - (The Asphalt Institute) - MS-19 Basic Asphalt Emulsion Manual.

E. TAI - (The Asphalt Institute) - Manual MS-4 - The Asphalt Handbook.

F. TAI - (The Asphalt Institute) - Manual MS-13 - Asphalt Surface Treatments and Asphalt Penetration Macadam.

G. Any state highway department specifications sections referred to or noted on the drawings which pertain to asphaltic concrete paving design, materials, preparation, and/or execution of this product shall supersede this section. All materials shall be as indicated on Drawings and shall comply with applicable state highway specification regarding source, quality, gradation, and mix design proportioning.

H. Uniform Standard Specifications for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Specifications.

I. Uniform Standard Drawings for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Drawings.

J. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

K. International Building Code (IBC) 2018 Edition with Southern Nevada Amendments.

L. ASTM D946 - Penetration - Grades Asphalt Cement for Use in Pavement Construction.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for Submittal requirements.

B. Product data: For each product specified. Include technical data and tested physical and performance properties.

C. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate dedicated handicapped spaces with international graphics symbol.

D. Mix Design: Submit proposed mix design of each type of asphalt to the Government for review prior to commencement of Work.
   1. All mix designs shall bear the project name and the location where the asphalt mix is to be used.
   2. All mix designs shall bear the name of the supplier who is providing the asphalt mix.

1.5 QUALITY ASSURANCE

A. A Quality Assurance Testing Laboratory (Soils Engineer) will be retained by the Government to observe performance of work in connection with clearing, grading, excavation, backfilling and trenching.

B. Obtain materials from same source throughout.

C. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicted for this Project and with a record of successful in-service performance.

D. Manufacturers Qualifications: Engage a firm experienced in manufacturing hot-mix asphaltic similar to that indicated for this Project and with a record of successful in - service performance.

1.6 REGULATORY REQUIREMENTS

A. All Work of this Project in the Public Right-Of-Way shall be in accordance with the applicable sections of the Uniform Standard Drawings and Specifications except for provisions for payment. All Work shall be included in the Base Bid.

B. Coordinate paving Work with utility companies.

C. Obtain necessary permits and comply with requirements of local agencies for dust and air quality controls.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when ambient air, base surface or asphaltic mixture temperature does not conform to Applicable Portions of Section 401 of Standard Specifications or when surface is wet or frozen.
   1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
   2. Slurry Coat: Comply with weather limitations of ASTM D 3910.

3. Asphalt Base Course: Minimum surface temperature of 40 deg. F. and rising at time of placement.
4. Asphalt Surface Coarse: Minimum surface temperature of 60 deg. F at time of placement.

B. Pavement Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 PRODUCTS

2.1 MATERIALS

A. Asphalt Cement: Applicable Portions of Sections 401 and 403 of Standard Specifications. Meeting ASTM D946.

B. Aggregate for Open Grade Asphaltic Concrete: Applicable Portions of Section 705.03.03 of Standard Specifications.

C. Tack Coat: Emulsified asphalt applied to an existing concrete or bituminous surface in accordance with Applicable Portions of Section 405 of Standard Specifications.

D. Primer Coat: MC-70 liquid asphalt applied to an aggregate base in accordance with Applicable Portions of Section 406 of Standard Specifications.

E. Seal Coat: SS-1h or CCS-1h, emulsified asphalt; Applicable Portions of Section 407 of Standard Specifications. Do not apply to tennis courts.

F. Water: Potable

2.2 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by Environmental Protection Agency (EPA). Provide granular, liquid, or wet able powder form.

B. Sand: ASTM D 1073, Grade Nos. 2 or 3.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that compacted sub-grade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Proof-roll sub-base using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

D. Verify gradients and slopes at all handicapped parking stalls do not exceed IBC requirements.

3.2 SURFACE PREPARATION

A. Herbicide Treatment: Apply herbicide according to manufacturers recommended rates and written application instructions. Apply to dry, prepared sub-grade or surface of compacted-aggregate base before applying paving materials.

3.3 BASE COURSE

A. In accordance with Geotechnical Report, Section 31 23 23.13 - Backfill, and Civil Drawings.

3.4 PREPARATION - PRIMER

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.

B. Sweep loose granular particles from surface of unbound-aggregate base course.

C. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

D. Ensure that prepared sub-grade is ready to receive paving

E. Apply primer in accordance with Applicable Portions of Section 406 of Standard Specifications.

F. Apply primer on aggregate and to contact surfaces of curbs, gutters and valley gutters.

G. Use clean sand to blot excess primer.

H. Apply uniformly over surface of compacted - aggregate base. Apply enough material to penetrate and seal, but not flood, surface.

I. Allow prime coat to cure for 24 hours minimum.

J. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use just enough sand to prevent pickup under traffic.

K. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.

3.5 PREPARATION - TACK COAT

A. Apply tack coat in accordance with Applicable Portions of Section 405 of Standard Specifications.

B. Apply tack coat to contact surfaces of curbs, gutters and existing pavement.

C. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.6 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with Applicable Portions of Sections 401 and 403 of Standard Specifications.

B. Install manhole frames and valve boxes in correct position and elevation.

C. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off.

D. Place asphalt mix by hand to areas inaccessible to equipment and in a manner that prevents segregation of mix.

E. Place each course to required grade, cross section, and thickness, when compacted.

F. Place asphalt within twenty-four (24) hours of applying primer or tack coat.

G. Place paving in accordance with Uniform Standard Specifications to thicknesses as indicated on Civil Drawings.

H. Spread mix at minimum temperature of 250 deg. F.

I. Begin applying mix along centerline of crown for crowed sections and on high side of one-way slopes, unless noted otherwise.

J. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

K. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

L. Perform rolling with consecutive passes not less than 10 feet wide, except where infill edge strips of a lesser width are required, to achieve even and smooth finish without roller marks.

M. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

N. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots.

O. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
   1. Clean contract surfaces and apply tack coat.
   2. Offset longitudinal joints in successive courses a minimum of 6 in.
   3. Offset transverse joints in successive courses a minimum of 24 in.
   4. Construction transverse joints by bulkhead method or sawed vertical face method as described in AI's 'The Asphalt Handbook'.
   5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
   6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.8 COMPACTION

A. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement.

B. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

C. Complete compaction before mix temperature cools to 185 deg. F.

D. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge.
   1. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness.
   2. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and re-rolling to required elevations.

E. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density.
   1. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
   2. Place to density requirements of Uniform Standard Specifications.

F. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

G. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment.
   1. Bevel edges whiles still hot, with back of rake or smooth iron.
   2. Compact thoroughly using tamper or other satisfactory method.

H. Repairs: Remove paved areas that are defective or contaminated with foreign materials.
   1. Remove paving course over area affected and replace with fresh, hot-mix asphalt.
   2. Compact by rolling to specified density and surface smoothness.

I. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

J. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 TOLERANCES

A. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
   1. Base Course: 1/4 inch. (0.02-foot)
   2. Surface Course: 1/8 inch. (0.01-foot)
   3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch. (0.02-foot)

B. Variation from True Elevation: Within +/-0-.05 feet.

3.10 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq.yd. (0.45 to 0.70 L/sq. M) to existing asphalt pavement and allow to cure. Lightly dust areas receiving excess fog seal with a fine sand.

3.11 PAVEMENT MARKING

A. Apply pavement markings per Section 32 17 23 - Pavement Markings.

3.12 FIELD QUALITY CONTROL

A. Field Quality Assurance testing and inspection will be performed by an independent Testing Laboratory under the direction of a Professional Geotechnical Engineer under contract with the Government.

B. Retesting as a result of inferior work shall be at no additional cost to the Government.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASDTM D979.
   1. Reference laboratory density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 1559, and compacted according to job-mix specifications.
   2. Reference maximum theoretical density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
   3. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.13 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for seventy-two (72) hours or until surface temperature is less than 140 degrees F (60 degrees C).

END OF SECTION

SECTION 32 14 00

CONCRETE PAVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interlocking Concrete Paver Units (manually installed).
   2. Bedding and Joint Sand.
   3. Edge Restraints.
   4. Cleaner, Sealers, and Joint sand stabilizers.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM C 33, Standard Specification for Concrete Aggregates.
   2. C 67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile, Section 8, Freezing and Thawing.
   3. ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   4. ASTM C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   5. ASTM C 144, Standard Specification for Aggregate for Masonry Mortar.
   6. ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
   7. ASTM C 979, Standard Specification for Pigments for Integrally Colored Concrete.
   8. ASTM D 698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft3 (600 kN-m/m3)).
   9. ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   10. ASTM D 2940, Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.

B. Interlocking Concrete Pavement Institute (ICPI):
   1. ICPI Tech Spec Technical Bulletins

1.3 SUBMITTALS

A. In accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Manufacturer's drawings and details: Indicate perimeter conditions, relationship to adjoining materials and assemblies, concrete paver layout, patterns, installation and setting details.

C. Sieve analysis per ASTM C 136 for grading of bedding and joint sand.

D. Concrete pavers:
   1. Four representative full-size samples of each paver type, thickness, color, finish that indicate the range of color variation and texture expected in the finished installation. Color per plans.
   2. Accepted samples become the standard of acceptance for the work.
   3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.

4. Manufacturer's certification of concrete pavers by ICPI as having met applicable ASTM standards.
5. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

E. Paver Installation Subcontractor
1. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.
2. Job references from projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.4 QUALITY ASSURANCE

A. Paving Subcontractor Qualifications:
1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.
2. Utilize an installer holding a current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

B. Regulatory Requirements and Approvals: Specify applicable licensing and bonding.

C. Mock-Ups:
1. Install a 7 ft x 7 ft (2 x 2 m) paver area.
2. Use this area to determine surcharge of the bedding sand layer, joint sizes, lines, laying pattern(s), color(s) and texture of the job.
3. This area will be used as the standard by which the work will be judged.
4. Subject to acceptance by CO/COR in coordination with the Architect, mock-up may be retained as part of finished work.
5. If mock-up is not retained, remove and properly dispose of mock-up.

1.5 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.
1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
2. Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
3. Unload pavers at job site in such a manner that no damage occurs to the product.

C. Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials. Store concrete paver cleaners and sealers per manufacturer's instructions.
1. Cover bedding sand and joint sand with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements:
1. Do not install sand or pavers during heavy rain or snowfall.

2. Do not install sand and pavers over frozen base materials.
3. Do not install frozen sand or saturated sand.
4. Do not install concrete pavers on frozen or saturated sand.

1.7 MAINTENANCE

A. Extra Materials: Provide 20% additional material for use by government for maintenance and repair.

B. Pavers shall be from the same production run as installed materials.

PART 2 - PRODUCTS

2.1 INTERLOCKING CONCRETE PAVERS

A. Manufacturer: If all of the parameters, specifications and design intent of the drawings are met, the following list of manufacturers with acceptable equipment model/series designation(s) would be acceptable for use. “Or Equal” substitutions are acceptable but must be submitted under the provisions of Section 01600.
   1. Pavestone Co.: (702)221-2700.

B. Interlocking Concrete Pavers:
   1. Paver Type: Holland Stone
      a. Material Standard: Comply with material standards set forth in ASTM C 936.
      b. Color: Antique Pewter.
      c. Color Pigment Material Standard: Comply with ASTM C 979.
      d. Size: 7.87 inches x 3.94 inches, 45 mm thick.
      e. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
      f. Average Water Absorption (ASTM C 140): 5% with no unit greater than 7%.
      g. Freeze/Thaw Resistance (ASTM C 67): Resistant to 50 freeze/thaw cycles with no greater than 1% loss of material. Freeze-thaw testing requirements shall be waived for applications not exposed to freezing conditions.

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

2.3 BEDDING AND JOINT SAND

A. Provide bedding and joint sand as follows:
   1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
   2. Do not use limestone screenings, stone dust, or sand for the bedding sand material that does not conform to conform to the grading requirements of ASTM C 33.
   3. Do not use mason sand or sand conforming to ASTM C 144 for the bedding sand.
   4. Where concrete pavers are subject to vehicular traffic, utilize sands that are as hard as practically available.
   5. Sieve according to ASTM C 136.
   6. Bedding Sand Material Requirements: Conform to the grading requirements of ASTM C 33 with modifications as shown in Table 1.

Table 1
Grading Requirements for Bedding Sand

ASTM C 33	
Sieve Size	Percent Passing
3/8 in.(9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075 mm)	0 to 1

7. Joint Sand Material Requirements: Conform to the grading requirements of ASTM C 144 as shown with modifications in Table 2 below:

Table 2

Grading Requirements for Joint Sand

	ASTM C 144 Natural Sand	ASTM C 144 Manufactured Sand
Sieve Size	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 100
No. 50 (0.300 mm)	10 to 35	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075 mm)	0 to 1	0 to 10

2.4 EDGE RESTRAINTS

A. Provide edge restraints installed around the perimeter of all interlocking concrete paving unit areas as follows:
   1. Material: 6” wide concrete band.

2.5 ACCESSORIES

A. Provide accessory materials as follows:
   1. Geotextile Fabric:
      a. Material Type and Description: As required per manufacturer.
      b. Material Standard: Per paver manufacturer.
      c. Manufacturer: Acceptable to interlocking concrete paver manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Site Verification of Conditions:
   1. General Contractor shall inspect, accept and certify in writing to the paver installation subcontractor that site conditions meet specifications for the following items prior to installation of interlocking concrete pavers.
      a. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.

b. Verify that geotextiles, if applicable, have been placed according to drawings and specifications.
c. Verify that Aggregate base materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
d. Provide written density test results for soil subgrade base materials to the CO/COR, General Contractor and paver installation subcontractor.
e. Verify location, type, and elevations of edge restraints, concrete collars around utility structures, and drainage inlets.

2. Do not proceed with installation of bedding sand and interlocking concrete pavers until subgrade soil and base conditions are corrected by the General Contractor or designated subcontractor.

3.2 PREPARATION

A. Verify base is dry, certified by General Contractor as meeting material, installation and grade specifications.

B. Verify that base and geotextile is ready to support sand, edge restraints, and, pavers and imposed loads.

C. Edge Restraint Preparation:
1. Install edge restraints per the drawings at the indicated elevations on grading plans.

3.3 INSTALLATION

A. Spread bedding sand evenly over the base course and screed to a nominal 1 in. (25 mm) thickness, not exceeding 11/2 in. (40 mm) thickness. Spread bedding sand evenly over the base course and screed rails, using the rails and/or edge restraints to produce a nominal 1 in. (25 mm) thickness, allowing for specified variation in the base surface.
1. Do not disturb screeded sand.
2. Screeded area shall not substantially exceed that which is covered by pavers in one day.
3. Do not use bedding sand to fill depressions in the base surface.

B. Lay pavers in pattern(s) shown on drawings. Place units hand tight without using hammers. Make horizontal adjustments to placement of laid pavers with rubber hammers and pry bars as required.

C. Provide joints between pavers between 1/16 in. 2 and 5 mm wide. No more than 5% of the joints shall exceed 1/4 in. (6 mm] wide to achieve straight bond lines.

D. Joint lines shall not deviate more than ±1/2 in. (±15 mm) over 50 ft. (15 m) from string lines.

E. Fill gaps at the edges of the paved area with cut pavers or edge units.

F. Cut pavers to be placed along the edge with a masonry saw.

G. Adjust bond pattern at pavement edges such that cutting of edge pavers is minimized. All cut pavers exposed to vehicular tires shall be no smaller than one-third of a whole paver.

H. Keep skid steer and forklift equipment off newly laid pavers that have not received initial compaction and joint sand.

I. Use a low-amplitude plate compactor capable of at least minimum of 4,000 lbf (18 kN) at a frequency of 75 to 100 Hz to vibrate the pavers into the sand. Remove any cracked or damaged pavers and replace with new units.

J. Simultaneously spread, sweep and compact dry joint sand into joints continuously until full. This will require at least 4 to 6 passes with a plate compactor. Do not compact within 6 ft (2 m) of unrestrained edges of paving units.

K. All work within 6 ft. (2 m) of the laying face must shall be left fully compacted with sand-filled joints at the end of each day or compacted upon acceptance of the work. Cover the laying face or any incomplete areas with plastic sheets overnight if not closed with cut and compacted pavers with joint sand to prevent exposed bedding sand from becoming saturated from rainfall.

L. Allow excess joint sand to remain on surface to protect pavers from damage from other trades. Remove excess sand when construction completed.

N. Surface shall be broom clean after removal of excess joint sand.

3.4 FIELD QUALITY CONTROL

A. The final surface tolerance from grade elevations shall not deviate more than ±3/8 in. (±10 mm) under a 10 ft (3 m) straightedge.

B. Check final surface elevations for conformance to drawings.

C. The surface elevation of pavers shall be 1/8 in. to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

D. Lippage: No greater than 1/8 in. (3 mm) difference in height between adjacent pavers.

3.5 CLEANING, SEALING, JOINT SAND STABILIZATION

A. Clean, Seal, and Apply joint sand stabilization materials between concrete pavers in accordance with the manufacturer’s written recommendations.

3.6 PROTECTION

A. After work in this section is complete, the General Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 32 84 00

LANDSCAPE IRRIGATION

PART 1- GENERAL

1.1 SUMMARY

A. Section includes
   1. Procurement of all applicable licenses, permits, and fees.
   2. Coordination of Utility Locates ("Call Before You Dig"). Telephone 811 or 800.227.2600.
   3. Pipe and fittings, low voltage wire, valves, sprinkler heads, emitters and accessories.
   4. Control system.
   5. Fertilizer Injection System
   6. Preparation of Record Drawings.
   7. Warranty and Maintenance period.

1.2 RELATED SECTIONS

A. Division 01 – General Requirements

B. Division 26 - Electrical

C. Division 31 - Earthwork

D. Division 32
   1. 32 90 00 Planting

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM), D1785 Standard Specifications for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

B. American Society for Testing and Materials (ASTM). D 2241 Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR).

C. American National Standards Institute / American Society for testing and Materials (ANSI / ASTM). D 2564 Solvent Cement for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings.

D. American National Standards Institute / American Society for testing and Materials (ANSI / ASTM). D 2672 Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement.

E. American Society for Testing and Materials (ASTM). D 2855 Standard Practice for Making Solvent-Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings.

F. American National Standards Institute / American Society for testing and Materials (ANSI / ASTM). F 656 Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and fittings.

G. American Society for Testing and Materials (ASTM), F 1498 Standard Specifications for Taper Pipe Threads 60º for Thermoplastic Pipe and Fittings.

H. Federal Specifications O-F-506 Flux, Soldering; Paste and Liquid.

I. Federal Specifications A-A-58092 Tape, Antiseize, Polytetrafluorethylene.

J. National Electric Manufacturer's Association (NEMA).

K. Landscape Irrigation Auditor Manual (current edition) – The Irrigation Association.

L. Underwriters Laboratory (UL)

M. National Electric Code (NEC)

N. International Plumbing Code (IPC)

1.4 QUALITY ASSURANCE

A. Regulatory Requirements, Codes, and Standards:
   1. Comply with requirements of utility supplying water for cross-connection protection and prevention of backflow and back siphonage.
   2. It is the intent of these plans and specifications that the equipment installed for the irrigation system will be new, complete and fully functional prior to final acceptance. It is the Contractor's responsibility to confirm that new equipment furnished is compatible and adheres to BOR standards. Any discrepancies should be noted immediately and should be reported to the BOR Construction Manager for clarification.

B. Installer Qualifications: Installer having minimum 5 years documented experience in irrigation systems using two-wire decoder technology similar in material, design, and extent of work indicated and having a successful record of service performance. Licensed in the state of Nevada with a C-10 license.

C. Listing/Approval stamp, label, or other marking on equipment, specialties, and accessories must meet requirements of construction documents.

D. Equipment and manufacturer listed on the plans is intended to represent specific performance characteristics and operational parameters based on irrigation design. Alternative equipment submitted by contractor will require approval by COR prior to installation. If alternative equipment or manufacturer is submitted and approved, the contractor takes full responsibility for confirming system performance and operational parameters match those of specified equipment.

1.5 SYSTEM DESCRIPTION

A. Provide labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, and guarantee/warranty as shown on the drawings, the installation details, and as specified herein.

1.6 SUBMITTALS

A. Submit to COR one PDF copy of shop drawings or manufacturer's "cut sheet" for each type of pipe and tubing, controller and enclosure, valve, emitter, valve box, flow sensor, master valve, wire, wire connector, fitting type, primer and solvent and other equipment to be installed. Highlight specific equipment that is intended to be installed on this project and Include manufacturer name and model number for each proposed item on Table of Contents sheet. Re-submit any rejected items until approvals are obtained. Resubmit only those items that were previously rejected or missing.

B. Submit specified shop drawings with dimensions, elevations, construction details, arrangements, and capacity of equipment, as well as manufacturer's installation recommendations.

C. Submit certificate that the independent third-party irrigation water auditor is certified, current, and in good standing with the Irrigation Association.

1.7 PROJECT RECORD DOCUMENTS

A. Project Record Drawing:
   1. Document changes to design. Maintain on-site and separate from documents used for construction, one complete set of contract documents as Project Documents. Keep documents current. Do not permanently cover work until accurate “as-built” information is recorded.
   2. At end of every day, revise prints of work accomplished that day in red ink. Record drawings shall be brought up to date at close of working day on every Friday by a qualified draftsperson and submitted in pdf format to COR on Monday of each week. An additional print of current record drawings shall be available at Project Site.
   3. Dimension from two permanent points of reference (building corners, sidewalk, road intersections or permanent structures), location of following items:
      a. Connection to existing water lines.
      b. Pressurized mainline and low voltage wire routing (dimension every 50 feet along routing, and at all directional changes greater than 30-degrees).
      c. Sleeves (both ends).
      d. Irrigation valves: including control valves, gate valves and quick coupling valves.
      e. Air release valves.
      f. Flow Meters and Master Valves.
      g. Wire splices.
      h. Communication cable routing.
      i. Concealed components.
      j. Other related equipment as directed by CO/COR.
      k. Changes in lateral piping.
      4. COR will not certify any pay request submitted by the Contractor if the weekly record drawings are not current, and processing of pay request will not occur until record drawings are updated.

B. Controller Charts:
   1. Do not prepare charts until record drawings have been approved by COR.
   2. Provide two controller charts per controller.

3. Chart may be a reproduction of the Record Drawing, if the scale permits fitting the controller door. If photo reduction prints are required, keep reduction to maximum size possible to retain full legibility. Coordinate with staff.
4. Chart shall be black line print of the actual system, showing the area covered by that controller.
5. Identify the area of coverage of each remote control valve, using a distinctly different pastel color, drawn over the entire area of coverage.
6. Following approval of charts by the CO/COR, they shall be hermetically sealed between two layers of 20 mil thick plastic sheet.

C. CO/COR to review for approval all completed “as-built” record drawings prior to seeding or sodding of play fields.

D. Submit Final Record Drawings and Controller Charts in hardcopy and electronic format to CO/COR prior to substantial completion and system operational review.

1.8 OPERATION AND MAINTENANCE DOCUMENTATION

A. Provide three individually bound manuals, and one flash drive in PDF format, detailing operating and maintenance requirements for irrigation system and fertilizer injection system. Manuals shall be delivered to CO/COR no later than ten (10) days prior to acceptance of work and the start of the maintenance period. Project acceptance and start of maintenance period will not occur until operating and maintenance manuals and equipment training has occurred.

B. Provide the following in each manual:
1. Index sheet, stating Irrigation Contractor's name, address, telephone number and name of person to contact.
2. Duration of guarantee period.
3. Equipment list providing the following for each item:
    a. Manufacturer's name
    b. Make and model number
    c. Name and address of local manufacturer's representative
    d. Spare parts list in detail
    e. Detailed operating and maintenance instructions of major equipment.
4. Sources of parts for each piece of equipment provided on the project.

C. Provide descriptions of all installed materials and systems in sufficient detail to permit maintenance personnel to understand, operate and maintain the equipment, including:
1. Backflow prevention devices
2. Controllers and sensors
3. Fertilizer Injection Equipment
4. Valves, including automatic control valves
5. Emitters

D. Provide the BOR maintenance personnel with training to operate major equipment and provide written documentation, at conclusion, that training took place. Provide a minimum of four (4) training sessions for BOR maintenance personnel over one year following conclusion of maintenance and warranty period. Coordinate training with BOR maintenance personnel at no additional cost to Government.

E. Contractor to provide water audit documentation and controller programming schedule with Operation and Maintenance documentation as required by these specifications.

1.9 REGULATORY REQUIREMENTS

A. Provide work and materials in accordance with latest edition of National Electric Code (NEC), local and International Plumbing Codes (IPC), Federal security requirements, and applicable laws, regulations and codes of governing authorities.

B. When contract documents call for materials or construction of better quality or larger size than required by above-mentioned rules and regulations, provide quality and size required by contract documents.

1.10 FIELD MEASUREMENTS AND VERIFICATIONS

A. If quantities are furnished either in specifications or on drawings, quantities are furnished for information only. It is Contractor's responsibility to determine actual quantities of material, equipment, and supplies required by the project and to complete independent estimate of quantities and wastage.

B. Current water pressure is to be verified at the meter or point of connection for the irrigation system and reported to CO/COR prior to construction.

C. Notify CO/COR in writing prior to construction about discrepancies between contract documents and existing site conditions or manufacturer’s specific recommendations for use of their product.

1.11 DELIVER, STORAGE, and HANDLING

A. Deliver, unload, store, and handle materials, packaging, bundling, and products, in dry, weatherproof condition to prevent damage, breakage, deterioration, intrusion, ignition, and vandalism. Deliver in original unopened packaging containers prominently displaying manufacturer name, volume, quantity, contents, instructions, and conformance to local, state, and federal law. Remove and replace cracked, broken, or contaminated items or elements prematurely exposed to moisture, inclement weather, snow, ice, temperature extremes, fire, or jobsite damage.

B. Handling of PVC Pipe: Exercise care in handling, loading and storing of PVC pipe. All PVC pipe shall be transported in a vehicle that allows length of pipe to lie flat so as not to subject it to undue bending of concentrated external loads. All sections of pipe that have been dropped, dented, or damaged shall be discarded, and if installed, shall be removed and replaced with new piping.

1.12 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Verify irrigation system piping may be installed in compliance with original design and referenced standards.

B. Protection of Property:
   1. Preserve and protect all trees, monuments, structures, and paved areas from damage due to work of this Section, In the event damage does occur, damage to inanimate items shall be completely repaired or replaced to satisfaction of Government. Injury to trees, shrubs, and ground covers shall be repaired by Contractor, and costs of such repairs shall be charged to and paid by Contractor.
   2. Protect buildings, walks, walls, landscaping, irrigation system, and other property from damage. Flare and barricade open ditches. Damage caused to asphalt, concrete, landscaping, irrigation system, or other building materials surfaces shall be repaired or replaced at no cost to Government. Restore disturbed areas to original condition.

C. Existing Trees
   1. Trenching or other work under limb spread of any and all evergreens or low branching deciduous material shall be done by hand or by other methods so as to prevent damage to limbs or branches.
   2. Where it is necessary to excavate adjacent to existing trees, use best possible care to avoid injury to trees and tree roots. Excavation, in areas where 2-inch and larger roots occur, shall be done by hand. Roots 2-inches or larger in diameter, except directly in the path of pipe of conduit, shall be tunneled under and shall be heavily wrapped with burlap to prevent scarring or excessive drying. Where a trenching machine is operated close to trees having roots smaller than 2-inches in diameter, a wall or trench adjacent to tree shall be hand trimmed, making clean cuts through roots. Roots 1-inch and larger in diameter shall be painted with two coats of “Tree Seal”. Trenches adjacent to trees shall be closed within 24 hours, and when this is not possible, side of trench adjacent to tree shall be kept shaded with moistened burlap or canvas.

D. Protection and Repair of Underground Lines: Coordinate for appropriate utility company to stake exact location (including depth) of all underground water, sewer. electric, gas, fiber optic, cable and telephone lines. Take whatever precautions are necessary to protect these underground lines from damage. In the event damage does occur, all damage shall be repaired by Contractor, and all costs of such repairs shall be paid by Contractor unless other arrangements have been made.

E. Replacement of Paving and Curbs: Where trenches and lines cross existing roadways, paths, curbing, etc., damage to these shall be kept to a minimum and shall be restored to original condition.

F. Cleaning: Maintain continuous cleaning operation throughout duration of Work. Dispose of, off-site at no additional cost to Government, all trash or debris generated by installation of irrigation system.

1.13 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building and existing site amenities during normal working hours. Arrange for temporary water shutoff with Government.

B. Coordinate work with site backfilling, landscape grading, and delivery of plant material.

1.14 EXTRA MATERIALS

A. Provide the following extra components prior to substantial completion of project work:
   1. Two (2) quick coupler valves with matching quick coupler keys and swivel-hose elbows.
   2. Fifty (50) each emitter type of each gallonage output, each type installed, and same manufacturer installed.
   3. Fifty (50) feet for every 1,000 feet of Inline drip tubing used.
   4. One (1) tool for flow meter adjustment (if required for adjustment).
   5. Provide one (1) tool to open each type of valve box.
   6. Provide one (1) key for each size of gate valve nut. Provide proper length to access valve, gate valve handle is to extend three (3) feet above finish grade.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Products: Use specified equipment, or pre-approved equal. Alternative equipment must be approved by COR prior to bidding. Changes and associated design costs to accommodate alternative equipment are Contractor's responsibility.

2.2 MATERIALS

A. General Piping:
   1. Pressure Supply Lines (downstream of backflow prevention units)
      a. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, purple in color to signify non-potable water source, extruded from material meeting requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with integral belled end.
      b. For pipe 2.5-inch and smaller; use Schedule 40 conforming to dimensions and tolerances established by ASTM Standard D1785.
      c. Use solvent weld pipe for mainline pipe with nominal diameter less than 3-inches. Use Schedule 80, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784. Use primer approved by pipe manufacturer. Use solvent cement conforming to ASTM Standard D2564.
      d. All PVC pipe shall bear the following markings
         1) Manufacturer's name
         2) Nominal pipe size
         3) Schedule or class
         4) Pressure rating in psi
         5) National Sanitation Foundation (NSF) approval.
         6) Date of extrusion
      e. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable IPS schedule and NSF seal of approval.
      f. Mainline pipe within sleeves: Use solvent weld pipe for mainline pipe with nominal diameter 3-inches and smaller installed within sleeves.
   2. Lateral Piping:
      a. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, purple in color to signify non-potable water source, extruded from material meeting requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with integral belled end suitable for solvent welding.

b. Use Schedule 40 conforming to dimensions and tolerances established by ASTM Standard D1785.
c. Use solvent weld pipe for lateral pipe. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for PVC pipe. Use primer approved by pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of type approved by pipe manufacturer.

3. Sleeving:
   a. Provide PVC pipe as presented on plans. Use Class 200, SDR-21, rated at 200 PSI, conforming to dimensions and tolerances established by ASTM Standard D2241.
   b. Provide sleeve beneath hardscape for irrigation pipe. Provide separate sleeve beneath hardscape for wiring bundle.
   c. Sleeve sizing: A minimum of twice the nominal diameter of solvent-welded pipe or wiring bundle, or as indicated on drawings.
4. Copper Tracing Wire over Mainline Pipe
   a. Use American Wire Gauge (AWG) No. 12-1 solid copper, 600 volt, Type UF or PE cable, UL approved for direct underground burial.
   b. Color: Tracing wire must be of color different from that of any active low voltage cable, control wire, or common wire. Wire color shall be continuous over entire length.
   c. Splices: Use Northstar Suresplice SK 14-12G or approved equal wire splices with wire nuts.

B. Copper Pipe and Fittings:
1. Copper Pipe - Type K, hard tempered, in accordance with ASTM B4284.
2. Joints - Soldered with solder, 45% silver, 15% copper, 16% zinc, and 24% cadmium.
3. Copper tube fittings: ASME B16.22, wrought copper or cast-brass, solder joint, pressure type.
4. Copper Unions: ASME B16.18, cast-copper-alloy body, hexagonal stock, with ball- and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded or solder-joint, and threaded ends.
5. Threaded Ends: Threads conforming to ASME B1.20.1.
6. Cast-Bronze Flanges: ASME B16.24, Class 150, raised ground face, bolt holes spot faced.

C. Bronze and Brass Pipe and Fittings:
1. All brass pipe shall be rated Schedule 40 or greater in accordance with ASTM B-43. Brass pipe nipples will be in accordance with ASTM B-687.
2. Threaded fittings for bronze pipe will be Schedule 40 in accordance with ASTM B-62-90.

D. Steel Pipe and Fittings:
1. Steel Pipe and Fittings: Use Schedule 40 steel pipe and fittings with Class 150 flanges.
2. Use stainless steel fasteners and rubber gaskets for flanged connections.

E. Nipples and Threaded Fittings:
1. Use PVC Schedule 80 nipples and PVC Schedule 40 or 80 threaded fittings for threaded pipe connections unless noted otherwise on drawings and details.
2. Joint sealant: Use non-hardening, nontoxic pipe thread sealant formulated for use on threaded connections and approved by pipe fitting or valve manufacturer.

2.3 VALVES

A. Master Valve Assembly: as presented in drawings and installation details.

B. Gate Valves: as presented in drawings and installation details.

C. Quick Coupling Valves: as presented in drawings and installation details.

D. Air-Vacuum Relief Valve Assembly: as presented in drawings and installation details.

E. Plastic Ball Valves: PVC with 235 psi minimum working pressure rating, ends compatible with piping where valve is to be installed. Spears or approved equal.

F. Valve Box and Cover: Oldcastle concrete heavy duty valve box, with steel cover, use extension when depths are greater than the box and the valve being covered. Install jumbo boxes for all drip valves. If any of the equipment is too tight, enlarge the box size. Confirm selection with CO/COR prior to installation.

2.4 DRIP IRRIGATION

A. Remote Control Valve/Filter Assembly for Drip Laterals: as presented in drawings and installation details.

B. Drip Emitter Assembly: as presented in drawings and installation details. Refer to legend for make, model and flow rate for emitters.

C. Flush Cap Assembly: as presented in drawings and installation details.

2.5 AUTOMATIC CONTROLS

A. Irrigation Controller:
   1. Install new Baseline Controls BaseStation 3200 irrigation controller assembly with conventional low voltage wire and two-wire decoder technology and wifi communications capability as specified on the drawings and installation details.
   2. Lightning protection: As presented in drawings and installation details.

B. Irrigation Controller Enclosure:
   1. As presented conceptually in installation details.
   2. Constructed of stainless steel with free-flow ventilation. Prepare shop drawings with authorized Baseline representative to show exact placement of all components housed in enclosure.
   3. Coordinate with Baseline Controls representative, Tracy Shields (970.939.6143, tshields@baselinesystems.com) for ordering, assembly and testing procedures for the irrigation controller components including communications, BIM interface (if applicable), system grounding and flow sensor interface.

C. Power Wire**:**
   1. Use AWG #12, solid or stranded copper, Type UF single-conductor cable or multi-conductor with ground cable, UL approved for direct underground burial from power source to Controller Assembly.
   2. Splices: Use 3M #82-A2 Series or approved equal with Split Bolts or Butt Connectors for inline splices and 82-B1 or 90-B1 Series or approved equal for wye splices.
   3. Electrical conduit: Use PVC Schedule 40 conduit conforming to dimensions and tolerances established by ASTM Standard D-1785. Use Schedule 40, Type 1, PVC solvent weld sweep fittings for PVC conduit conforming to ASTM Standards D2466 and D1784 for buried installations. Use rigid metallic conduit with sweep elbows for above grade installations.
   4. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored red, and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW."

D. Control System Wire and Cable:
   1. Communication Cable: Use required cable as recommended by control system manufacturer and as indicated in the drawings.
   2. Sensor Cable and Two-wire Decoder Cable: Use #14-2 AWG two-conductor, solid copper, 600 volt, Type UF or PE cable, UL approved for direct underground burial, as recommended by control system manufacturer and as indicated in the drawings.
   3. Splices: Use 3M #SLiC with 3M “Insulation Displacement Connectors” (316IR or UR-2), Ranger Serviseal Connectors, or approved equal, as recommended by central control system manufacturer.
   4. Electrical conduit: Use PVC Schedule 40 conduit conforming to dimensions and tolerances established by ASTM Standard D-1785. Use Schedule 40, Type 1, PVC solvent weld sweep fittings for PVC conduit conforming to ASTM Standards D2466 and D1784 for buried installations. Use rigid metallic conduit with sweep elbows for above grade installations.
   5. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored red, and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW."

2.6 FLOW SENSOR

A. Manufacturer: as presented in drawings and installation details.

2.7 OTHER COMPONENTS

A. Tools and Spare Parts: Furnish operating keys, servicing tools, test equipment, spare parts and other items indicated in drawings and specifications.

B. Other Materials: Provide other materials or equipment shown on drawings or installation details that are part of irrigation system, even though items may not have been referenced in specifications.

PART 3- EXECUTION

3.1 INSTALLERS

A. Nevada licensed irrigation contractor shall have C-10 license. See Section 1.04, B.

B. Irrigation landscape Water Auditor shall be certified, current and good standing by the Irrigation Association.

C. The contractor shall maintain a copy of related specifications and plans on site.

3.2 EXAMINATION

A. Verify construction site conditions and note irregularities affecting work of this section. Report irregularities in writing to CO/COR prior to beginning work. Commencement of work implies acceptance of existing site conditions.

B. Arrange and coordinate Utility Locates with local authorities prior to construction. Repair underground utilities that are damaged during construction. Make repairs at no additional cost to contract price.

C. Verify that required utilities and services are available, in proper location and ready for use. If discrepancies exist bring them to the attention of CO/COR immediately.

D. Obtain all necessary permits.

E. Prior to irrigation installation all landscape grades are to be established and approved by the CO/COR and Construction Inspector/Manager.

F. Verify existing water pressure and submit verification to CO/COR prior to ordering booster pump equipment.

3.3 PREPARATION

A. Prior to the installation of sleeves, review layout requirements with other affected Work. Coordinate locations of sleeves under paving to accommodate system. Install sleeving under asphalt paving and concrete walks, prior to concrete and paving operation, to accommodate piping and wiring. Separate sleeves must be installed for the mainline, lateral pipes, and control wiring.

B. Stake out irrigation system prior to installation. Items staked include: sprinklers, pipe, sleeves, control valves, quick coupling valves, air/vacuum relief valves, controller assemblies, and isolation valves.

C. Irrigation System Layout Review: Irrigation system layout review will occur after staking has been completed. Notify CO/COR one week in advance of review. Modifications will be identified by CO/COR at this review.

D. Install irrigation components inside of project property lines.

3.4 TRENCHING

A. Trenching: Trench excavation shall follow, as much as possible, layout shown on drawing. Dig trenches straight and support pipe continuously on bottom of trench. Trench bottom shall be clean and smooth with all rock and organic debris removed. Pressure supply line trenches shall be over-excavated as required to allow for bedding material. Trench depth shall be uniform as required to meet minimum depth requirement for type of piping.

1. Horizontal Clearances:
   a. Make trenches of sufficient width to properly assemble and position pipe in trench.
   b. Trenches shall have a minimum width of 10-inches.
   c. Line Clearance – Provide not less than 6-inches of clearance between each line in a common trench, and not less than 12-inches of clearance between lines of other trades.
2. Pipe and Wire Depth (minimum):
   a. Mainline pipe: 24-inches to top of pipe.
   b. Lateral pipe: 12-inches to top of pipe.
   c. Control wire: 2-inches offset from bottom of mainline pipe.
   d. Communication and Sensor cable: 2-inches offset from bottom of mainline pipe.
   e. Tracing wire: Install along top of mainline pipe.
   f. Electrical conduit: 24-inches to top of pipe.
3. Trenches to accommodate grade changes. Maintain at least 8-feet clearance from centerline of trees.

B. Backfilling: Do not begin backfilling operations until required system tests have been completed and approved. Backfill shall not be done in freezing weather except with prior approval by CO/COR.
   1. All constant-pressure supply lines shall be bedded with a 4-inch envelope of construction grade sand throughout the width of trench.
   2. Materials – Excavated material is generally considered satisfactory for backfill purposes after completing bedding requirements. Backfill material shall be free of rubbish, vegetable matter, frozen materials, and stones larger than 1/2-inches in maximum diameter. Use backfill free of sharp objects next to pipe. Do not mix subsoil with topsoil. Material not suitable for backfill shall be hauled away. Contractor shall be responsible for providing suitable backfill if excavated material is unacceptable or not sufficient to meet backfill, compaction, and final grade requirements.
   3. Open excavations shall be protected in accordance with OSHA regulations.
   4. Compact backfill to 90% Standard Proctor Density, ASTM D698-78. in 6-inch lifts, determined in accordance with ASTM D1557 using manual or mechanical tamping devices

C. Sleeving Under Paving or Hard Surface areas:
   1. Provide sleeves at a minimum cover of 30-inches for pressure piping and 24-inches for non-pressure piping between top of sleeve and bottom of aggregate base for piping installed under asphaltic concrete or concrete paving.
   2. Extend sleeve ends twelve inches beyond edge of hardscape. Cap sleeve ends and mark with stakes. Provide rope or wire through sleeve and secure to stake at surface grade at each end for future sleeve location.
   3. Sleeving shall be bedded with construction grade sand or squeegee – 6-inches below pipe to 6-inches above pipe and width of excavation.
   4. Compact backfill material in 6-inch lifts at 95% Standard Proctor Density, ASTM D698-78 using manual or mechanical tamping devices.
   5. Set in place, cap, and pressure test all piping within sleeves, in presence of CO/COR prior to backfilling.
   6. Sleeving under existing walks or concrete pavement shall be done by jacking, boring, or hydraulic driving, but where cutting or breaking of walks and/or concrete is necessary, it shall be done and replaced at no cost to BOR. Obtain prior written approval to cut or break walks and/or concrete from COR.

D. Dress backfilled areas to original grade. Incorporate excess backfill into existing site grades.

E. Contact CO/COR for trench depth or alignment adjustments where utilities conflict with irrigation trenching and pipe work.

3.5 INSTALLATION

A. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions and applicable codes.

B. Water Supply Point of Connection and Backflow Prevention Assembly: Refer to civil engineering plans for these items.

C. Install pre-manufactured three (3) elbows, double O-ring, Swing Joint Assembly for quick coupling valve assemblies as detailed. Manufactured by Lasco, Spears, Dura Plastics, or approved equal.

D. Assembling Pipe and Fittings:
   1. General:
      a. Keep pipe free from dirt and debris. Cut pipe ends square, debur and clean as recommended by manufacturer.
      b. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.
      c. Trenches may be curved to change direction or avoid obstructions within limits of the curvature of pipe. Curvature results from bending of pipe lengths. Do not exceed pipe and fitting manufacturer's allowable deflection at joints. Minimum radius of curvature and offset per 20-foot length of pipe-by-pipe size are shown in following table.

SIZE	RADIUS	OFFSET PER 20' LENGTH
1 ½"	25'	7'-8"
2"	25'	7'8"
2 ½"	100'	1'-11"
3"	100'	1'-11"
4"	100'	1'-11"
6"	150'	1'-4"

   2. Mainline and Lateral Pipe and Fittings:
      a. Use only strap-type friction wrenches for threaded plastic pipe.
      b. PVC Solvent Weld Pipe:
         1) Use primer and solvent cement. Join pipe in manner recommended by manufacturer and in accordance with accepted industry practices.

2) Cure for 30 minutes before handling and 24 hours before allowing water in pipe.
3) Snake pipe from side to side within trench.
4) Fittings: Use of cross type fittings is not permitted.

c. PVC Threaded Connections:
1) Use only factory-formed threads. Field-cut threads are not permitted.
2) Apply thread sealant in manner recommended by component, pipe and sealant manufacturers and in accordance with accepted industry practices.
3) Use plastic components with male threads and metal components with female threads where connection is plastic-to-metal.

3. Specialized Pipe and Fittings:
a. Steel Pipe: Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
b. Flanged connections: Install fittings, fasteners and gaskets in manner recommended by manufacturer and in accordance with accepted industry practices.

E. Valve Boxes
1. Install one valve box for each type of valve installed as detailed. Install Terra Bond Fabric around the outside of the valve box by taping. Extend fabric 12 inches beyond base of valve box, then backfill around the valve box and compact. Install gravel sump after compaction of all trenches. Place final portion of gravel inside valve box after valve box is backfilled and compacted. Valve boxes shall have locking equipment provided, use extension where depths are greater than the box and the valve being covered.
2. All electric control valves will be identified with an I.D tag installed on each electric control valve noting the controller I.D. and station number.
3. Brand all valve box lids. Letter and number size shall be no smaller than 1-inch and no greater in size than 1 ½-inches. Depth of branding shall be no more than ⅜-inches into valve box lid as follows:
a. Control valves – Brand controller letter and station number on lid of each control valve box (example “B4”).
b. Quick Coupling Valves – Brand quick coupling valve box lids with letters “QC”.
c. Wire splices – Brand all wire splice box lids with letters “WS”.
d. Drip Lateral Flush Cap – Brand controller letter and station number on lid of each drip tubing blow out box lid (example “B5FV”).
e. Isolation Gate Valves – Brand all isolation gate valve box lids with letters “GV”.
f. Air Release Valves – Brand all air release valve box lids with word “AIR”.
4. Standard 12 inches deep rectangular valve boxes with extension, when required, are to be used for electric solenoid valves and wire splices.
5. Jumbo 12 inches deep rectangular valve boxes with extension, when required, are to be used for all drip control valves.
6. 10-inch round valve box is required for all gate valves, quick coupler valves, manual control valves, and drip flush valves.
7. Valve boxes installed near any hard surface shall be parallel to the hard surface.
8. All valve boxes shall have bricks under each corner of a rectangular valve box and minimum of three (3) under round valve boxes.

F. Control Wiring:
1. Power wire for automatic controllers:
a. Provide 120-volt electrical service connection to automatic controllers.

b. Route power wire as directed on plans. Install with minimum number of field splices. If power wire must be spliced, make splice with recommended connector, installed per manufacturer's recommendations. Locate splices in jumbo rectangular valve box. Coil 3-feet of wire in valve box.
c. Install power wire within conduit using open trenches. Use of a vibratory plow is not permitted.
d. Use green wire as common ground wire from power source to controller assembly.
e. Carefully backfill around conduit for power wire to avoid damage to wire insulation or wire connectors.
f. Install wire parallel with and below mainline pipe unless noted otherwise on plans. Install wire at depth required by local codes.
g. Provide continuous run of warning tape above power wire. Install warning tape six inches above wire.

2. Control System and Sensor Cable:
a. Install in accordance with controller manufacturer’s specifications and details.
b. Splices to occur only at controller pedestals unless approved by CO/COR prior to installation.
c. Provide 4G modem interface as required to enable communications between on-site control system and BOR maintenance staff approved mobile devices.
d. All sensor cable between controller and field sensors shall be installed in 1 ½-inch PVC electrical conduit laid to bottom and side of pressure supply line trench opposite of control wire. Separate wire trenches will not be allowed unless approved by CO/COR prior to installation.
e. Bury two-wire decoder cable between controller and electric valves in pressure supply line trenches, with wires consistently located below and to one side of pipe, on top of initial pipe bedding. Separate wire trenches will not be allowed unless approved by CO/COR prior to installation.
f. Provide an expansion loop at pressure supply line angle fittings, every electric control valve location (in valve box), and at minimum 100 feet intervals. Form expansion loop by wrapping wire at least 8 times around a ¾-inch pipe and withdrawing pipe.
g. Encase wiring within electrical conduit where installed above grade.
h. Protect wire not installed with PVC mainline pipe with continuous run of warning tape placed in backfill six inches above wiring.
i. Test for leaks to ground per manufacturer's recommendations. Test results must meet or exceed manufacturer's guidelines for acceptance.
j. Test cable for continuity if cable is being installed for future expansion of the irrigation system.
k. Replace defective wire, underground splices, or appurtenances. Repeat test until manufacturer's guidelines are met.

G. Mainline Valves and Components
1. Master Valve Assembly: Provide where indicated on drawings.
2. Flow Sensor Assembly: Provide where indicated on drawings.
3. Isolation Gate Valve Assembly: Provide where indicated on drawings. Install at least 12-inches from and align with adjacent walls or edges of paved areas.
4. Quick Coupling Valve Assembly: Provide where indicated on drawings.
5. Air-Vacuum Relief Valve Assembly: Install where indicated on drawings or nearest high point, not closer than 2-feet from nearest fitting. Brand “AV” on valve box lid in 2-inch high letters.

H. Drip Irrigation Components
   1. Remote Control Valve (RCV) Assembly for Drip Laterals:
      a. Flush mainline pipe until water runs clear without sediment or debris before installation of RCV assembly.
      b. Provide where indicated on drawings. Use wire connectors and waterproof sealant to connect control wires to remote control valve wires. Provide connectors and sealant per manufacturer's recommendations.
      c. Provide only one RCV to a valve box. Locate valve box at least 12-inches from and align with nearby walls or edges of paved areas. Group RCV assemblies together where practical. Align grouped valve boxes in uniform patterns. Allow at least 12-inches between valve boxes.
      d. Adjust RCV assembly to regulate downstream operating pressure.
      e. Attach ID tag with controller station number to control wiring.
   2. Drip Emitter Assembly:
      a. Locate as shown on drawings and installation details.
      b. Flush lateral pipe until water runs clear without sediment or debris before installing emitter assembly.
      c. Cut emitter outlet distribution tubing square.
      d. Provide access sleeve as part of each multiple-outlet emitter assembly for emitters located in turf areas.
      e. Use tools manufactured, and techniques recommended, by emitter manufacturer.
   3. Drip Lateral Flush Cap Assembly:
      a. Provide at end of each drip irrigation lateral pipe as shown and directed on drawings and installation details. Install at least 12-inches from and align with adjacent walls or edges of paved areas.

I. Automatic Control System
   1. Install controller assembly according to manufacturer's written instructions and as indicated.
   2. Location of controller assembly as depicted on drawings are approximate; CO/COR will determine exact site location during sprinkler layout review.
   3. Ground controller according to the American Society of Irrigation Consultants grounding guidelines (http://asic.org/asic_grounding_guideline.htm) and the details on the drawings. Grounding components and installation must meet NEC Code.
   4. Coordinate and provide installation of electrical service in accordance with local codes. Provide primary surge protection arrestors on incoming power lines in accordance with controller manufacturer recommendations.
   5. Connect control wire, communication cable, and sensor cable to corresponding controller terminals. Attach wire markers to ends of control wires inside controller assembly housing. Label wires with identification number (see drawings) of remote control valve to which control wire is connected.

J. The entire irrigation system, when audited, shall be fully operational. The irrigation control system shall be approved by the manufacturer’s service agent before audit is conducted.

3.6 FIELD QUALITY CONTROL

A. Testing - Conduct tests in presence of CO/COR. Schedule testing with CO/COR a minimum of seven (7) days in advance of testing. A review will occur at completion of irrigation system installation and Project Record Drawing submittal.

B. Failure of initial testing reviews will require additional review. Payment of costs, including travel expenses and site visits, for additional reviews that may be required due to non-compliance with the Construction Documents will be Contractor's responsibility.

C. Allow irrigation pipe jointed with solvent-welded PVC joints to cure at least 24-hours before testing.

D. Subsections of mainline pipe may be tested independently, subject to review by CO/COR.

E. Provide clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or retests.

F. Hydrostatic Pressure Test:
1. Subject mainline pipe to hydrostatic pressure equal to 140 PSI for two hours. Test with mainline components installed.
2. Backfill to prevent pipe from moving under pressure. Expose couplings and fittings.
3. Purge air from mainline pipe before test. Attach pressure gauge to mainline pipe in test section.
4. Observe pressure loss on pressure gauge. If pressure loss is greater than 5 PSI, identify reason for pressure loss. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pressure loss is equal to or less than 5 PSI.
5. Visually inspect irrigation pipe for leakage and replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pipe passes test.
6. Cement or caulking to seal leaks is prohibited.
7. CO/COR reserves the right to require re-testing of the irrigation main line before the end of the warranty/maintenance period.

G. Operational Test:
1. Activate each remote control valve in sequence from controller using handheld remote. Manually activating remote control valve using manual bleed mechanism at remote control valve is not an acceptable method of activation. CO/COR will visually observe operation, water application patterns, and leakage.
2. Replace defective remote control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
3. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.
4. Replace defective pipe, fitting, joint, valve, emitter, and appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
5. Repeat tests until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to Government.

H. Control System Acceptance Test:
1. Coordinate with Horizon Technical Services representative, Pat Johnston (602.768.1287) to provide control system manufacturer authorized system review including ground testing, communication interface authentication and system operational review prior to commencement of Control System Acceptance testing.
2. Upon completion of construction, CO/CORs will administer a Control System Acceptance Test, including confirmation that on-site controller effectively communicate with BOR maintenance staff authorized mobile devices.
3. The control system manufacturer's authorized distributor or representative must test for proper grounding. Test for proper grounding of control system per manufacturer's recommendations. Test results must meet or exceed manufacturer's guidelines for

acceptance. Provide documentation and registration to qualify for 5-year control system manufacturer's warranty extension (10-year warranty total).

4. Following construction completion and review by CO/COR, an evaluation period will begin. After 30 days of continuous service without major system problems, system will be accepted and guarantee/warranty period will begin. If at any time during 30-day evaluation period a major system problem occurs, the source of problem will be determined and corrected and 30-day evaluation period will start again. Equipment will not be accepted until System Acceptance Test is passed.
5. If successful completion of Control System Acceptance Test is not attained within 90-days following commencement of evaluation period, COR has the option to request replacement of equipment, terminate the order or portions thereof, or continue with Control System Acceptance Test. These options will remain in effect until Control System Acceptance Test is successfully completed.

3.7 WATER AUDIT

A. All new landscape areas shall have a Landscape Irrigation Audit performed by an independent third-party Landscape Irrigation Auditor, certified and in good standing by the Irrigation Association, and meeting the qualifications set forth by the Irrigation Association (IA) for performing Landscape Irrigation Audits.
   1. The minimum lower quarter distribution uniformity (DU) for drip irrigation is 85% DU with less than a 15% pressure loss from the valve to the last drip emission device.

B. If the minimum distribution uniformity is not met, the auditor is to determine whether the problem is design or installation error. If the irrigation system was installed per the design standards the auditor shall contact the CO/COR with recommended corrections. If the error is due to installations, the contractor shall make the corrections and re-audit the areas that failed. All changes are to be approved in writing by the COR prior to installation.

C. Before the irrigation system is tested, the following must be completed:
   1. All Irrigation equipment shall be installed per the irrigation drawing and specifications. Discrepancies are to be brought to the attention of the Government prior to construction.
   2. Irrigation system is to be in proper working condition and controller connected to the valves.
   3. Irrigation system must operate to the specified pressure requirements as designed.

D. The Auditor shall provide the following information to the CO/COR for review and approval.
   1. A schedule of all irrigation stations noting distribution uniformity, application rates, soil type and type of plant material serviced within the hydrozone.
   2. Copy of scaled irrigation design plans, with all the catch devise volumes and pressure readings from the beginning, middle and end of each lateral.
   3. Irrigation schedule based on a potential root zone depth of six-inches. The irrigation schedule is to be based on historical evapotranspiration rates and landscape coefficients supplied from the Nevada Cooperative Extension. The irrigation schedule will be developed for a twelve-month period, showing the number of days per week to irrigate, and total minutes of run time per station.

E. Qualified Landscape Irrigation Auditor requirements:
   1. Certified and current status with the Irrigation Association.
   2. Have completed a minimum of five irrigation audits on drip irrigated landscape areas more than one acre in size. Submit references and verifications to CO/COR prior to execution of work.

3.8 DEMONSTRATION

A. Demonstrate to CO/COR and landscape maintenance personnel that the system meets coverage requirements, the automatic controls function properly, operation of equipment, sprinklers specialties, and accessories Review operating and maintenance information. Provide seven (7) days written notice in advance of demonstration.

3.9 MAINTENANCE

A. Maintain irrigation system for a duration of thirty (30) calendar days from formal written acceptance by COR. Make periodic examinations and adjustments to irrigation system components in order to achieve the most desirable application of water.

B. Following completion of Contractor's maintenance period, Government will be responsible for maintaining system in working order during remainder of guarantee/warranty period, for performing necessary minor maintenance, for protecting against vandalism, and for preventing damage after landscape maintenance operation.

3.10 WARRANTY

A. Provide prime quality materials matching the originally installed equipment.

B. Guarantee/warranty irrigation materials, equipment, and workmanship against defects for period of one (1) year from formal written acceptance by COR.
   1. Fill and repair depressions.
   2. Restore landscape, utilities, structures and site features damaged by settlement of irrigation trenches or excavations.
   3. Repair damage to premises caused by defective components.
   4. Make repairs within 24 hours of notification from COR. If no response is made to the requested repair, the contractor(s) will be back-charged for costs that occur.
   5. Any work performed on the irrigation system during the warranty period is to be documented and extended with a full one (1) year warranty.

C. The Contract Documents govern replacement materials, labor, and workmanship identically as with new work. Make replacements at no additional cost to Government.
   1. The warranty applies to originally installed materials and equipment and replacements made during the warranty period.
   2. Expensed due to vandalism, before substantial completion and during maintenance period, shall be borne by Contractor.

3.11 CLEANUP

A. Remove from site machinery, tools, excess materials, and rubbish upon completion of work.

END OF SECTION

SECTION 32 91 19

LANDSCAPE GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Import Soil.

B. Soil Amendments

C. Place, level, and compact import soil.

1.2 RELATED SECTIONS

A. Division 31

B. Section 32 84 00 – Landscape Irrigation

C. Section 32 93 00 – Landscape Plants

D. Section 32 96 10 – Landscape Demolition

E. Section 32 96 40 – Tree & Shrub Protection

1.3 DEFINITIONS:

A. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or import soil material.

B. Sub-base: Layer of soil between the sub-grade and the base soils.

C. Fill: Soil materials used to raise existing grades.

D. Base Soils: Layer of soil placed beneath.

E. Import Soil: Layer of soil placed where existing soil has been removed in new non-turf planting areas.

F. Subsoil: Existing soils to be overexcited.

G. Landscape Area: Areas programmed for plants and soil.

H. Planter: Landscape areas not programmed for turf.

1.4 PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, roads, sidewalks, paving, and curbs.

1.5 SUBMITTALS

A. Submit fill material samples under provisions of Section 01 33 00.
   1. Agronomy tests shall have been conducted within the last six (6) months of the submittal date unless noted otherwise.
B. Submit five-pound container of the fill for use within the landscape areas (planters) to testing laboratory. Provide test results for clay content and sieve analysis.

C. Soil submittals:
   1. Submit five-pound random composite sample of imported soil to testing laboratory, in clean containers. Testing to be performed by an independent testing lab for complete agronomy testing and fertilizer recommendation. Verification will be mandated to prove that the material on-site is the same as the material used for the soil test presented and approved with the submittal package.
   2. CO/COR has right to test any soil on site intended to be used on Project. Any soil not meeting the approved analysis will be rejected, removed from the site at no cost to the Government, and shall not constitute just reason for delay of the project.

D. Soil Tests: Provide an agricultural soils test for import to be used for planting. Recommendations from the soil test is to be used to determine amendments needed for the backfill mix for plants.

E. Submit a (2) two-pound random composite of organic soil amendment. Soil amendment samples are not to be mixed with soil or other products for the submittal.

F. Submit list of equipment and procedures for grading landscape areas. All finish grades in the grass areas are to be laser graded.

G. Submit delivery tags or receipts for the following:
   1. Organic soil amendment
   2. Imported soil
   3. Gro-Power-Plus or approved equal
   4. Soil Sulfur
   5. Pre-emergent
   6. All Fertilizers and Herbicides

1.6 QUALITY ASSURANCE

A. Subcontractor license requirements are as noted in Section 32 93 00, 1.7 Quality Assurance, under Installer.

PART 2 - PRODUCTS

2.1 IMPORTED SOIL

A. Provide new imported soil: submit a five-pound composite sample to an independent testing lab for a complete agronomy test and fertilizer and amendment application recommendations. Provide an additional agronomy test of the on-site soil, complete with amendment recommendations. All soil used for planting, must meet the following requirements:
   Sandy soil from well-drained sites.
   Free from refuse, roots, heavy clay, stones larger that one-fourth (1/4) inch in largest direction, gravel, sticks, brush, litter and other deleterious substances.
   Less than ten (10) percent clay content and more that 75 percent sand content.
   Salinity – Ece no greater than four (4) mmhos/cm.

Boron – Less than one (1) ppm.
pH – Less than 8.5
Percolation rate – greater than 2-inches per hour.

B. Possible Products (Soil from any pit meeting the preceding specifications will be acceptable):
Impact Sand and Gravel (702) 407-1642: “Clean Washed Sand”
Southwest Rock (702) 614-0010: “Reject Sand”
Approved equal: Written approval by the CO/COR in coordination with the Architect are required. Submit soil report and sample with submittal review for the substitution approval process. The approval process shall not constitute just reason for delay of the project.

2.2 SOIL AMENDMENTS

A. Organic Soil amendment, shredded, loose, organic mulch; free of lumps, roots, inorganic material or acidic materials. Compost used, as soil additives, shall meet the following specifications. Mixing rates are to be a minimum four yards per 1,000 square foot.
1. Gradation: a minimum 95% of material by weight, shall pass a ¼” screen.
2. Organic content: minimum 40% based on dry weight as determined by ash method.
3. pH: 6.0-8.5
4. Conductivity of saturated extract shall not exceed 4 ds/m. Soluble sodium in saturation extract shall not exceed 15 meg/l.
5. Heavy metals: shall meet EPA part 503 exceptional quality concentration limits.
6. Contaminants: finished compost shall be free of contaminants both visible and non-visible.
7. Maturity: finished characteristic suggestive of maturity include:
   - Color: dark brown to black
   - Odor: acceptable = none, soil-like, musty or moldy
   - Unacceptable = sour, ammonia, or putrid
8. Agricultural soil analysis of product must be current (within 6 months of bid date).

B. Soil Sulphur: In quantities necessary to eliminate any deficiencies of soil as indicated in the soil analysis.

C. Conditioning Fertilizer: “Gro-Power Plus” humus with soil penetrant added, providing five percent nitrogen, three percent phosphorous, and one percent potassium, or approved equal.

D. Iron Sulfate: In quantities necessary to eliminate any deficiencies in the soil as indicated in the soil analysis.

PART 3 – EXECUTION

3.1 INSPECTION

A. Verify site conditions and note irregularities affecting work of this Section. All sub-base soils installation should have been coordinated and reviewed for acceptance prior to the import soil installation.

B. Beginning work of this Section means acceptance of existing conditions.

3.2 SUBSOIL PREPARATION

A. Eliminate uneven areas and low spots. Remove debris, roots, branches, and stones, in excess of 2-inch in size. Remove subsoil contaminated with petroleum products and other harmful products.

B. All rough grades are to be reviewed and approved by the CO/COR in coordination with the Architect.

C. Rough Grades for the landscape areas are to meet the following:
All fill material under landscape areas should be subsoil classified as free of clay, debris, waste, frozen material, vegetations, asphalt, concrete, and other deleterious matter.
1. Fill material for non-turf landscape areas:
   a. Sub-base fill using 2-inch minus soils and free of clay (10 percent of less)

3.3 PLACING IMPORT SOIL

A. Use fill in relatively dry state. Place imported soil during dry weather. Laser equipment is to be used for obtaining the finish grades.

B. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.

C. Remove surplus subsoil and soil from site.

D. Leave stockpile area and site clean and raked, ready to receive landscaping.

E. Depth of topsoil and amendments are to be pre-mixed prior to installation.

1. Rough grades for planting beds that are not over excavated are to be 3 inches below all hardscape surfaces.

F. All landscape grades are to be approved by the CO/COR in coordination with the Architect prior to planting.

3.4 COMPACTION FOR LANDSCAPE AREAS

A. Planter Landscape Areas – 85% compaction of the relative moisture density curve may be used for the upper 2 feet of subgrade soil in planter landscape areas. Planter landscape areas in the building pad envelope may utilize a compaction of 85% for the upper 1 foot only. Any deeper fill soils will need to be placed at 95% compaction of the relative moisture density curve for both areas.

3.5 TOLERANCE

A. Top of fill: Plus or minus ½ inch in 10 feet.

END OF SECTION

SECTION 32 93 00

PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Trees.
   2. Shrubs.
   3. Plants.
   4. Ground cover.
   5. Soil amendments.
   6. Initial maintenance of landscape materials.
   7. Accessories required for a complete installation.

B. Related Work:
   1. Division 31 – Earthwork.

1.2 REFERENCES

A. Arizona Nursery Association (ANA) Guidelines.

B. Federal Specifications O-F-241 - Fertilizers, Mixed, Commercial.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements, Codes, and Standards:
   1. Comply with appropriate regulatory agencies for fertilizer and herbicide composition.

B. Source Quality Control:
   1. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
   2. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to CO/COR, together with proposal for use of equivalent material.
   3. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
   4. Topsoil: Before delivery of topsoil, furnish CO/COR with written statement giving location from which topsoil is to be obtained and an agricultural analysis of the topsoil to be used.
   5. Trees, Shrubs and Plants: Provide trees, shrubs, and plants of quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 American Standard for Nursery Stock. Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, or disfigurement
   6. Label at least ten percent of trees and shrubs of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
      a. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.

7. Inspection: Trees and Shrubs: The CO/COR and Architect may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, and quality. CO/COR and Architect retains right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

C. Subcontract landscape work to firms specializing in landscape work. Licensed in the state in which work is to be performed.
   1. Nursery: Firm specializing in growing and cultivating plants with minimum 5 years documented experience.
   2. Tree, Plant, Ground Cover Installer: Firm specializing in installing and planting the plants with minimum 5 years documented experience.

D. Coordinate with installation of underground sprinkler system piping and watering heads.

1.4 SUBMITTALS

A. Plant and Material Certifications:
   1. Certificates of inspection required by governmental authorities.
   2. Manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials.
   3. Label data substantiating that plants, trees, shrubs and planting materials comply with specified requirements.

B. Planting Schedule: Proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

C. Maintenance Instructions: Typewritten instructions recommending procedures to be established by government for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period.

D. Submit copies of all invoices or receipts for materials used on the project which cannot be visually verified. These include, but are not limited to, backfill mix material, fertilizer, fertilizer tablets, mulches, seed, soil stabilizers, water holding agents, herbicides, etc. All invoices or receipts must list the item, quantity, job location, date and the supplier.

E. Agricultural Soil Analysis: Contractor is to obtain an agricultural soil analysis of both the import and the on-site soil from a lab specializing in agricultural soil analysis. The analysis is to recommend specific soil amendments and fertilizer applications. Submit the results to the Landscape Architect for review. The soil mix noted on the plans will be changed or altered according to the recommendations of the soil lab and the instructions of the Landscape Architect at no additional cost.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by the CO/COR in coordination with Architect. Do not bend or bind-tie trees

or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

C. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 24 hours after delivery, store trees in same condition as existed in the nursery from where they originated.

D. Do not remove container grown stock from containers until planting time.

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify CO/COR before planting.

1.7 SEQUENCING AND SCHEDULING

A. Planting Time: Proceed with, and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.
   1. Plant or install materials during normal planting seasons for each type of plant material required.
   2. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

1.8 WARRANTY

A. Warranty all plant material and related landscape work for a period of twelve (12) months after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by government, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.

B. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of CO/COR in coordination with Architect, it is advisable to extend warranty period for a full growing season.
   1. **Another warranty inspection will be conducted at end of extended warranty period, if any, to determine** acceptance or rejection. Only one replacement (per tree, shrub or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

1.9 MAINTENANCE SERVICE

A. Maintain plant life for twelve (12) months after Date of Substantial Completion.

B. Maintenance to include (but not limited to):
   1. Cultivation and weeding plant beds and tree pits.
   2. Fertilizing trees and shrubs every 90 days.
   3. Applying herbicides for weed control in accordance with manufacturer's instructions. Remedy damage resulting from use of herbicides.
   4. Remedy damage from use of insecticides.

5. Irrigating sufficient to saturate root system.
6. Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
7. Disease control.
8. Maintaining wrapping, guys, and stakes. Repair or replace accessories when required.

PART 2 – PRODUCTS

2.1 TOPSOIL

A. Topsoil for landscape work is to be loamy sand.
   1. Sandy or Loamy Sand from well drained sites.
   2. Free from refuse, roots, heavy clay, stones larger than one-quarter inch in largest direction, gravel, sticks, brush, litter and other deleterious substances.
   3. Less than ten percent clay content and more than 75 percent sand content.
   4. Salinity - ECe no greater than four mmhos/cm.
   5. Water holding capacity between 40 percent and 55 percent.
   6. Boron - Less than one ppm.
   7. pH - Less than 8.5

2.2 SOIL AMENDMENTS

A. Fertilizer: FS O-F-241, Type I, Grade A; with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil as indicated in the soil analysis.

B. Organic soil conditioner: Gro-Power, Nutri-Mulch, Nevada Forest Products, Bio-Rem Or Equal: Submit under the provisions of Section 01600 for product substitutions.

C. Soil Sulphur: In quantities necessary to eliminate any deficiencies of topsoil as indicated in the soil analysis.

D. Iron Sulfate: In quantities necessary to eliminate any deficiencies of topsoil as indicated in the soil analysis or as shown on the soil mix details.

E. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.

F. Herbicide: As needed.

G. Pesticide: As needed.

2.3 PLANT MATERIALS

A. Quality: Provide trees, shrubs, and other plants of size, genus, species, and variety shown and scheduled for landscape work, grown in climatic conditions similar to those in locality of the work.

B. Ground Covers: Provide plants established and well rooted in removable containers or integral peat pots.

2.4 MISCELLANEOUS LANDSCAPE MATERIALS

A. Gravel Ground Cover: Water worn, hard, durable gravel, washed free of loam, sand, clay, and other foreign substances. Size, color and type as specified on the drawings.

B. Stakes and Guys: Provide stakes and deadmen of sound new hardwood, treated softwood, or redwood, free of knot holes and other defects. Provide wire ties and guys as shown on the planting details.

PART 3 - EXECUTION

3.1 PREPARATION

A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure CO/COR in coordination with Architect acceptance before start of planting work. Make minor adjustments as may be required.

3.2 PREPARATION OF PLANTING SOIL

A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials over 2 inch diameter, and other materials harmful or toxic to plant growth.

B. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.

C. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at site.

D. For planting beds, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

3.3 EXCAVATION FOR TREES AND SHRUBS

A. Excavate pits, beds, and trenches with sloped sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.

B. Dispose of excess subsoil removed from planting excavations.

C. Fill excavations for trees and shrubs with water and allow water to percolate out prior to planting.

3.4 PLANTING TREES AND SHRUBS

A. Place plants for best appearance.

B. Set top of existing rootball flush with or slightly above finish grade.

C. Set plants vertical unless otherwise specified.

D. Remove non-biodegradable root containers.

E. Set plants in pits or beds, partially filled with prepared backfill mixture, at a minimum depth as indicated on drawings under each plant. Remove burlap, ropes, and wires from the root ball.

F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

G. Guy and stake trees immediately after planting, as indicated. Install stakes in pits prior to backfilling.

3.5 PLANTING GROUND COVER

A. Space ground cover plants as indicated or scheduled.

B. Dig holes large enough to allow for spreading of roots and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover crowns of plants with wet soils.

3.6 MISCELLANEOUS LANDSCAPE WORK

A. Place decomposed granite or crushed rock as specified under all trees and shrubs. Do not allow decomposed granite or crushed rock to pile against trunks of plants.

3.7 MAINTENANCE

A. Begin maintenance immediately after planting.

B. Maintain trees, shrubs, and other plants until final acceptance.

C. Maintain trees, shrubs, and other plants by pruning, cultivating, and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease.

3.8 CLEANUP AND PROTECTION

A. During landscape work, keep pavements clean and work area in an orderly condition.

B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.9 INSPECTION AND ACCEPTANCE

A. When landscape work is completed, including maintenance, CO/COR will, upon request, make an inspection with Architect to determine acceptability.
   1. Landscape work may be inspected for acceptance in portions as agreeable to CO/COR in coordination with Architect, provided each portion of work offered for inspection is complete, including maintenance.

B. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by CO/COR and Architect and found to be acceptable. Remove rejected plants and materials promptly from project site.

END OF SECTION

SECTION 32 96 10
LANDSCAPE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tree and Shrub Protection

B. Landscape Removal and Salvage

C. Grass Removal

D. Irrigation Removal and Salvage

1.2 RELATED SECTIONS

E. Section 02 41 00 – Demolition

F. Section 32 84 00 – Landscape Irrigation.

G. Section 32 91 19 – Landscape Grading.

H. Section 32 93 00 – Landscape Plants.

I. Section 32 98 01 – Landscape Maintenance.

1.3 REGULATORY REQUIREMENTS

A. Dispose of debris and surplus soil in accordance with governing regulatory agencies.

B. Comply with applicable air pollution control regulations.

C. Obtain permits for transportation of debris and surplus soil to disposal site, and dust permits.

1.4 SUBMITTALS

A. Landscape Demolition Schedule: Proposed landscape demolition schedule indicating dates for each type and area of demolition for approval by CO/COR in coordination with Architect. Once accepted, revise dates only as approved in writing, after documentation for reasons for changes or delays.

B. Submit any temporary irrigation systems or water methods and their schedule necessary for irrigating existing plants that are to remain during demolition and construction for approval by CO/COR in coordination with Architect.

C. Submit all MSDS sheets for herbicides, pre-emergent & post-emergent products that are used for this project. The types of herbicides to be used and the methods of application shall confirm with the Environmental Protection Agency Policies.

D. Provide notice seven (7) days before the application of herbicides, pre-emergent & post-emergent products, etc. to CO/COR.

1.5 PROJECT CONDITIONS

A. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Perform site survey, research public utility records, and verify existing utility locations. Hand excavate, as required. Determine and verify locations of irrigation system piping and components. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

B. When demolition or conditions detrimental to plant growth or existing irrigation components that are to remain are encountered, notify CO/COR before continuing demolition. Notify CO/COR of any discrepancies prior to commencing work.

1.6 SEQUENCING AND SCHEDULING

A. Attend a pre-landscape meeting with the CO/COR, Landscape Architect, Architect and General Contractor prior to any work in this section.

B. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff with CO/COR.

C. Provide temporary irrigation system, hand watering or other method of delivering water to existing plant material that is to remain during demolition and construction.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment necessary for the landscape demolition specified within and on the construction drawings.

B. Post-Emergent products. Application rates as per manufacture recommendations.
1. Post-Emergent, Round Up
2. Post-Emergent, Fusilade
3. Post-Emergent, Poast
4. Post-Emergent, Diquat
5. Or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify location of existing utilities, existing sleeves, existing irrigation components and plants. Drawings indicate general location and arrangement of existing piping systems.

B. Verify required utilities are available, in proper location, and ready for use.

C. Verify available water supply water.

3.2 PREPARATION

A. Mark trees within limit of work at waist height. Mark trees to remain with blue or green tree flagging ribbon. Mark trees to be removed with red or orange tree flagging ribbon. Contractor shall acknowledge color determination. Obtain approval from CO/COR in coordination with Architect prior to removal of trees.

B. Mark all shrub and grass areas to be removed in an approved method. Areas are to be approved by CO/COR in coordination with Architect prior to removal. Identify shrubs to remain with blue or green flagging ribbon.

C. Adjust irrigation controller to accommodate irrigation plan and schedule during demolition and construction.

D. No storage of construction materials, fuel, solvents or toxic waste is to occur under or near plant material.

3.3 TREE AND SHRUB PROTECTION

A. The contractor is to follow any and all industry standards and guidelines pertaining to the preservation of existing plant material.

B. Failure to protect and preserve any existing plant material specifically designated as remaining on the site will result in the Contractor replacing damaged or dead plant with a plant of the same genus, species, size and form. Trees existing as a size greater than 48” box size, that are damaged, shall be replaced with trees with a minimum 60” box size.

C. All trees and shrubs which are to be preserved shall be prominently signed to denote the intention of preservation during demolition.

D. All Work under limb spread of any and all evergreens or low branching deciduous material shall be done by hand or by other methods so as to prevent damage to limbs or branches.

E. Where it is necessary to excavate adjacent to existing trees, use all possible care to avoid injury to trees and tree roots. Excavation, in areas where 2-inch and larger roots occur, shall be done by hand. Roots 2-inches or larger in diameter, shall be tunneled under and shall be heavily wrapped with burlap to prevent scarring or excessive drying. Roots 1-inch and larger in diameter shall be painted with two coats of “Tree Seal”. Exposed roots shall be covered to prevent undue desiccation.

F. The stripping topsoil from around preserved trees shall not be allowed. Vegetation around existing trees requiring removal shall be cut at ground level rather than pulling out to avoid damage to roots.

G. Avoid waterlogging situations. Protect all trees from situations in which standing water occurs due to compaction or damming of site due to structures or other situations.

3.4 LANDSCAPE REMOVAL

A. Remove trees, shrubs and grass as identified to be removed, clear undergrowth and dead plant material.

B. Remove shrubs in their entirety to a depth of 18 inches.

C. Trees shall be removed including stumps and all roots greater than 2 inches to a minimum depth of 18”.

D. Remove existing decorative rock and dispose of off-site in legal manner. Existing decorative rock mulch salvage and stockpile for re-use may be approved by CO/COR in coordination with Architect if color blends seamlessly with the new decorative rock mulch color to be installed.

E. Remove, salvage and stockpile for re-use existing boulders as identified on construction drawings.

F. Topsoil is historic and must be reused on-site. Stockpile topsoil and soil from site grading activities for re-use on site. Remove all grass and roots prior to re-use.

3.5 GRASS REMOVAL

A. Preparation
   1. Bermuda grass must be growing vigorously with nighttime temperatures consistently above 65 degrees Fahrenheit.
   2. Water Bermuda grass regularly to promote growth.
   3. Bermuda must be growing sufficiently to be mowed two times prior to herbicide application.
   4. Notify the CO/COR seven (7) days prior to the use of any herbicide on the site.

B. Herbicide Application
   1. Stop watering of Bermuda grass.
   2. Apply initial application of herbicide per manufacturer's written instructions.
      a. Protect existing trees, shrubs and other plant material scheduled to remain from damage caused by the use of the herbicide on the Bermuda grass.
      b. Use heaviest recommended application rate.
      c. Thoroughly cover all green leaf blade surfaces of the Bermuda grass.
   3. Do not water Bermuda grass for two (2) weeks after initial application of herbicide.
   4. Two weeks from initial application of herbicide, begin a regular watering schedule on the Bermuda and continue watering for two (2) more weeks.
   5. Apply a second application of herbicide per manufacturer's written instructions.
      a. Protect existing trees, shrubs and other plant material scheduled to remain from damage caused by the use of the herbicide on the Bermuda grass.
      b. Use heaviest recommended application rate.
      c. Thoroughly cover all green leaf blade surfaces of the Bermuda grass.
   6. Discontinue all water on Bermuda grass after second application of herbicide.
   7. Two weeks after second application of herbicide apply herbicide as needed to Bermuda grass which is still growing.
      a. Spot spray Bermuda once a week as needed for four (4) weeks.
      b. Protect existing trees, shrubs and other plant material scheduled to remain from damage caused by the use of the herbicide on the Bermuda grass.
      c. Use heaviest recommended application rate.
      d. Thoroughly cover all green leaf blade surfaces of the Bermuda grass.

C. Turf and Soil Removal
   1. At the end of the four (4) week spot application of herbicide remove the turf base, roots and approximately 6"-7" of soil below the turf base depending on the thickness of the turf base for a total of 8" of material removed from the site.
   2. All removed Bermuda grass and soil is to be disposed of in a legal manner off site.
   3. Clean up all spillage, debris, roots, grass and other deleterious materials from the immediate working area and the surrounding site.

D. Protection
   1. All trenching, digging, scraping or other work under limb spread of any and all evergreens or low branching deciduous material shall be done by hand or by other methods so as to prevent damage to limbs or branches.
   2. Where it is necessary to excavate adjacent to existing trees, use all possible care to avoid injury to trees and tree roots. Excavation, in areas where 2-inch and larger roots occur, shall be done by hand. Roots 2-inches or larger in diameter, except directly in the path of pipe of conduit, shall be tunneled under and shall be heavily wrapped with burlap

to prevent scarring or excessive drying. Where a trenching machine is operated close to trees having roots smaller than 2-inches in diameter, a wall or trench adjacent to tree shall be hand trimmed, making clean cuts through roots. Roots 1-inch and larger in diameter shall be painted with two coats of “Tree Seal”. Trenches adjacent to trees shall be closed within 24 hours, and when this is not possible, side of trench adjacent to tree shall be kept shaded with moistened burlap or canvas.

3. Protect existing irrigation lines, wires, valves and other appurtenances that are to remain. Repair, replace or adjust any damaged irrigation equipment which is scheduled to remain in place. Make all repairs, replacements or adjustments immediately.
4. Maintain continuous operation of existing irrigation system that is scheduled to remain during the entire duration of the scope of work. Immediately notify the CO/COR of any temporary water shut down or accidental damage.

3.6 IRRIGATION REMOVAL

A. All preserved plants shall be provided with adequate supplemental irrigation if required. This includes the use of temporary irrigation systems, hand watering, watering trucks or other approved methods. Irrigation methods must be approved by CO/COR in coordination with Architect prior to the beginning of demolition work.

B. Stub and cap irrigation lines where existing portions are being removed to prevent dirt and debris from entering the piping to remain.

C. Remove and salvage existing irrigation components as directed on construction drawings. Preserve and protect existing irrigation components necessary for existing and proposed irrigation and irrigation connections.

3.7 CLEANING AND ADJUSTING

A. During demolition work, keep public access areas and work areas in clean and orderly conditions.

B. Maintain designated site access for vehicle and pedestrian traffic.

C. Protect existing structures and hardscapes to remain and work and materials from damage due to landscape demolition operations, operations by other contractors and trades, and trespassers. Maintain protection during demolition periods. Treat, repair, or replace damaged areas as directed by CO/COR.

D. Protect areas to receive future planting, and other features remaining as part of final landscaping.

E. Immediately upon discovery, remove and dispose of contaminated, vermin infested or dangerous materials by safe means so as not to endanger health of workers and public.

F. Backfill open pits and holes caused by demolition

G. Remove demolished materials, tools and equipment upon completion of work. Leave site in acceptable condition, approved by CO/COR in coordination with Architect.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 98 01

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Traffic Control
   2. Pruning
   3. Staking
   4. Disease and Insect Control
   5. Weed Control
   6. Fertilizing
   7. Trash Pick-up
   8. Plant Replacement
   9. Soil/Salt Leaching
   10. Irrigation System Maintenance
   11. Inspection and Final Acceptance

1.2 REFERENCES

A. Johnsons Guide to Gardening, Plants for the Arid West, Pruning, Planting and Care, c. 1997, Ironwood Press, Tucson, AZ. (abbreviated in these specifications as Pruning, Planting and Care)

1.3 QUALITY ASSURANCE

A. Regulatory Requirements, Codes, and Standards:
   1. Comply with all regulatory agencies for fertilizer, insecticide and herbicide application and composition.

1.4 SUBMITTALS

A. Contractor licensing and credentials: Contractor shall be licensed as a landscape contractor and have on staff or employ a certified arborist. Submit verification and names of the landscape contractor and certified arborist.

B. Contractor previous work experience: The Contractor shall submit evidence of having satisfactorily performed maintenance services for a minimum of 3 years on a minimum of 3 projects which surpass 100,000 square feet of landscape area each.

C. The Contractor shall have a certified pest control operator on staff for application of pesticides, herbicides and disease control agents.

D. Submit copies of all invoices or receipts for materials used on the project which cannot be visually verified. These include, but are not limited to, fertilizers, herbicides and insecticides. All invoices or receipts must list the item, quantity, job location, date and the supplier.

1.5 PROJECT CONDITIONS

A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required.

B. Weather Conditions:
   1. Do not spray chemical disease control on plants when detrimental conditions exist.
   2. Do not spray plants when wind velocity exceeds safe limits.

C. Vehicular and Pedestrian Traffic:
   1. Provide all means necessary to ensure the safety of workers and public vehicular and pedestrian traffic that occurs in and around the Project Site in the performance of the specified work.

1.6 SEQUENCING AND SCHEDULING

A. Follow best maintenance practices for performing various tasks in seasons as outlined in these specifications and Pruning, Planting and Care.

1.7 WARRANTY

A. Warranty period for landscape work and irrigation work of three hundred sixty (360) days applies to this work.

1.8 MAINTENANCE SERVICE LENGTH

A. Maintain plant life, landscape work and irrigation system for 360 calendar days after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHEMICALS

A. Fertilizer: Granular, Synthetic, Homogeneous with micronutrients.

B. Herbicides:
   1. Pre-emergent: Surflan, Treflan, Bensumec 4LF, or equal
   2. Contact Herbicide: As required, approved for use by all regulatory agencies.
   3. Systemic Herbicide: Round-up or equal

C. Pesticides, Fungicides, Disease Control agents:
   1. As required, approved for use by all regulatory agencies.
   2. Integrated Pest Management: encouraged, but not required unless necessary.
   3. Insecticidal Soaps: encouraged, but not required unless necessary.

2.2 PLANT MATERIALS

A. Provide replacement plant material of size, species and quality called for in Contract Documents. Replace all dead, dying or declining plant materials, as determined by the Construction Manager, 10 days prior to the end of the Maintenance Period.

2.3 MISCELLANEOUS LANDSCAPE MATERIALS

A. Rock Mulch: Size, color and type as used on the project.

B. Stakes and Guys: As shown in section 32 93 00 and the contract drawings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Traffic Control: provide traffic control as required by all governing agencies including the Nevada Department of Transportation, if needed, during the performance of this work.

3.2 TREE PRUNING

A. General:
   1. Use the three-step pruning technique shown in Pruning, Planting and Care.
   2. Prune no more than 20% of a trees canopy at one time. Allow 2 months minimum between pruning. If possible, do not prune in summer.
   3. Keep lower branches in place to develop caliper of main trunk(s). If these short-term branches start to become dominant, remove them.
   4. Prune to develop form: remove crossing branches and water-sprouts.
   5. Prune to remove narrow branching patterns. Ten o-clock and two o-clock angles are preferred.
   6. Do not top trees.
   7. Prune to remove off-balance growth.
   8. Avoid heavy pruning during summer.
   9. Thin or ”lace-out” trees from late August to late September and from early February to mid-March to reduce wind damage.
   10. Pruning shall be performed in Late-Winter whenever possible, just prior to Spring growth surges.
   11. Remove all branches that present a hazard immediately.

3.3 SHRUB PRUNING

A. General:
   1. Shrubs are not to be trimmed except when there is damage, grow too large for an area where they are located, block vehicular line of sight, become rangy or woody, have dead flower stalks and block or hamper access to sidewalks, pathways, curb areas and utilities.
   2. When required, pruning shall be done by hand using bypass pruner, shears, snips, or loppers. Electric or gas-powered hedge trimmers are not permitted.
   3. When required, prune shrubs to maintain natural form. Do not hedge or shear shrubs into geometric shapes.
   4. Prune back shrubs that freeze to ground in winter after coldest part of winter has passed. Such as Caesalpinia spp. and Salvia spp.
   5. Prune back frost damaged plants in later winter just before dormancy breaks such as Lantana spp. and Verbena spp.
   6. Prune back shrubs that will flower on this year=s growth just prior to breaking winter dormancy.
   7. Prune back shrubs that flower on last year=s growth after they bloom, such as Cassia spp. and Sophora spp.
   8. When in doubt about flowering sequence prune after flowering.
   9. Do not prune plants prior to flowering unless necessary to remove a hazardous condition.
   10. Whenever possible prune in Late Winter to remove off-balance growth.
   11. A late winter Aclean-up≅ of deciduous and frost-damaged shrubs shall be performed by the Contractor.

3.4 TREE STAKES AND GUYS

A. Check ties and stakes for over-tightened condition. Loosen if necessary, to prevent cutting of tree trunks or branches.

B. Tighten ties and stakes if necessary.

C. Add stakes and ties in a orderly fashion if necessary for wind protection.

D. Replace broken stakes and ties.

E. Remove stakes and ties if tree can stand on it own in severe winds.

3.5 DISEASE AND INSECT CONTROL

A. Chemical, Integrated Pest Management, or use of insecticidal soaps are acceptable methods providing all methods used meet all regulatory requirements.

B. Use of chemical methods require the applications by a Certified Pest Control Operator.

C. All damage to plants must be repaired or plants replaced.

D. Follow all regulatory requirements for the application of chemicals.

E. Follow all safety regulations for the application of all methods.

3.6 WEED CONTROL

A. Chemical or Hand-Labor Methods are acceptable.

B. Use of chemical methods require the applications by a Certified Herbicide Applicator.

C. All unintended damage to plants must be repaired or plants replaced.

D. Use of systemic herbicide is indicated for Bermuda grass and Nut grass.

E. Contact herbicides may be used on annual weeds.

F. Follow all regulatory requirements for the application of chemicals

3.7 FERTILIZING

A. Fertilizing is required for plant health when required after visual inspection and diagnosis up to 4 times per year.

B. Major nutrients, Nitrogen, Phosphorus and Potassium may be applied to the root zone soil or as a foliar spray, a maximum of twice per year as a part of this work

C. Micro-nutrients, such as Manganese, Magnesium, Zinc, Iron, etc. are best applied as a foliar spray during Spring growing season in morning hours. Applications are required a maximum of 4 times per year as a part of this work.

D. Surface applications of fertilizers must be watered in with sufficient water from a quick coupler and hose to incorporate the nutrients into the plant root zone

E. All unintended damage to plants must be repaired or plants replaced

F. Follow all regulatory requirements for the application of chemicals.

G. Follow all safety requirements for workers, public pedestrian and vehicular traffic.

3.8 SOIL LEACHING

A. In and July and August of each year apply extra water through irrigation system to soil to leach salts below root zones of plants.

3.9 TRASH PICK-UP

A. Gather all debris that accumulates in the landscape project and dispose of in a legal manner.

B. Perform trash pick-up daily for the duration of the maintenance period, including removing filled trash bags and replacing with new trash bags in trash receptacles.

C. Follow all safety requirements for workers, public pedestrian and vehicular traffic.

D. Bags of debris shall be removed from the site by the end of each work day.

3.10 SITE CLEAN-UP

A. Perform restroom cleaning daily for the duration of the maintenance period. Restroom cleaning includes cleaning the following: toilets, urinals, sinks, drains, floors, restroom appurtenances and partitions and walls; emptying trash, stocking toilet paper, and directing (with squeegee) remaining water off of floor.

B. Perform graffiti removal weekly during the duration of the maintenance period.

C. Remove dog feces and stock dog waste bags as needed.

D. Follow all safety requirements for workers, public pedestrian and vehicular traffic.

E. Bags of debris shall be removed from the site by the end of the workday.

3.11 PLANT REPLACEMENT

A. Provide and install replacement plants in accordance with the requirements of the original Contract drawings for all declining or dead plants during the warranty period. Determination of dead or declining plants shall be at the sole determination of the Construction Manager.

B. Follow all safety requirements for workers, public pedestrian and vehicular traffic.

C. Remove dead or declining plants and legally dispose of.

D. Repair rock mulches and irrigation system to original or better condition.

3.12 IRRIGATION SYSTEM MAINTENANCE

A. Visually inspect the system at emitters and valves 4 times during growing seasons. Repair and replace damaged and non-functioning parts immediately.

B. Adjust controller scheduling as weather patterns change, verify sufficient water is applied to all plant for vigorous growth. Adjust the controllers a minimum of once a month.

C. Flush and clean filters as necessary.

D. Unplug or replace clogged emitters immediately upon recognition.

E. Repair broken pipes including mainlines within twenty-four hours of notification or recognition, whichever occurs first.

F. Repair settling of trenches.

3.13 CLEANUP AND PROTECTION

A. During landscape maintenance work, keep pavements clean and work area in an orderly condition.

3.14 INSPECTION AND FINAL ACCEPTANCE

A. Three weeks prior to end of maintenance period notify the Construction Manager for a final inspection of the project. Give 72 hours advance notice.

B. Prior to the inspection have all work of maintenance complete for that time of year.

C. Perform a final trash pick-up prior to the inspection.

D. Replace all plants deemed dead or declining.

E. If there are incomplete items of maintenance work, the Construction Manager will write a punchlist of work to be completed. This work shall be complete within two weeks and prior to a second final inspection.

END OF SECTION

SECTION 33 05 01

UTILITY IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Buried Utility Locator Ribbon.
   2. Pipe Locator Marker Balls.
   3. Paint.
   4. Metal Tags and Chains.

1.2 RELATED SECTIONS

A. Section 09 96 00 – Protective Coatings.

1.3 REFERENCES

A. Federal Standard 595B – Colors Used in Government Procurement.

PART 2 - PRODUCTS

2.1 BURIED UTILITY LOCATOR RIBBON

A. Three inch wide polyethylene detectable tape clearly marked with a minimum of 1-inch lettering:
   1. Minimum thickness: 5 mils.
   2. Aluminum Core Minimum thickness: 0.35 mils.

B. Color and legend in accordance with APWA uniform color code and as follows:
   1. Waterline: Blue, “CAUTION: BURIED WATERLINE.”
   2. Storm drain ties: Green, “CAUTION: BURIED STORM DRAIN DISCHARGE LINE.”
   3. Reclaimed or recycled water: Purple, “CAUTION: BURIED RECYCLED/ RECLAIMED WATERLINE.”
   4. Raw water: Green, “CAUTION: BURIED RAW WATERLINE.”
   5. Restrained sections of water main: Regular or self-adhering ribbon, Yellow with black lettering, “CAUTION: RESTRAINED PIPE.”
   6. Fiber optic conduit: Orange, "CAUTION: BURIED FIBER OPTIC CONDUIT."
   7. Cathodic protection test wires: Blue, "CAUTION: BURIED CATHODIC PROTECTION WIRE."
   8. Electrical conduit: Red, “CAUTION: BURIED ELECTRICAL CABLES.”

C. Manufacturer:
   1. Northtown Company.
   2. Pro-Line Safety Products.
   3. Government approved equal.

2.2 PIPE LOCATOR MARKER BALLS

A. Provide marker balls for water lines that may be located with Goldak Inc. or 3M scotch marker brand locators and meet the following requirements:
   1. Color: Blue.
   2. Range: Minimum 5 foot bury depth.
   3. Signal frequency: 145.7 kHz.

B. Manufactured by:
   1. 3M Company, Scotchmark, Model 1403-XR.
   2. Industrial Technology Inc., Omni Marker Ball, Model 161.
   3. Government approved equal.

2.3 PAINT

A. In accordance with Section 09 96 00.

2.4 METAL TAGS AND CHAINS

A. Aluminum or stainless steel, stamped-in identifying letters.

PART 3 - EXECUTION

3.1 EXPOSED PIPE IDENTIFICATION

A. Location of identification:
   1. Lettering and flow direction arrows:
      a. Near equipment served.
      b. Adjacent to valves.
      c. At each branch or tee.
      d. At intervals of not more than 50 feet on straight runs, unless otherwise indicated by Engineer.
   2. Metal tags:
      a. Installed in lieu of lettering on pipe 5/8 inch or smaller (including covering) outside diameter.
      b. Color code as specified.
   3. Lettering:
      a. Paint or stencil.
      b. Letter size as follows:

Outside Diameter of Pipe or Covering	Minimum Height of Letters
5/8 inch or smaller	1/4 inch - Metal tags
3/4 inch through 4 inches	3/4 inch
5 inches or larger	2 inches

B. Scheduled color coding:
   1. All pipe painted as specified in ANSI 13.1 and scheduled below.
   2. Paint as scheduled.

C. Piping not scheduled:
   1. Paint to match wall or ceiling, unless otherwise directed by Engineer.
   2. Identify and place flow arrows.
   3. Un-insulated stainless steel and PVC: Natural finish.

3.2 EXPOSED PIPE SCHEDULES

A. Waterlines:

Piping Type	Piping Color	Federal Standard 595B
Raw	Olive Green	14255

Piping Type	Piping Color	Federal Standard 595B
Settled or Clarified	Aqua	15200
Potable or Finished	White	17925
Sample Discharge	Dark Brown	10059
Reclaimed	Purple	17155

B. Chemical lines:

Piping Type	Piping Color	Federal Standard 595B
Alum or Primary Coagulant	Orange	12473
Ammonia	White	17925
Carbon Slurry	Black	17038
Caustic	Yellow with Green Band	13591 with 14090
Chlorine	Yellow	13591
Hypochlorite Liquid	Yellow with Blue Band	13591 with 15095
Fluoride	Blue with Red Band	15095 with 11120
Lime Slurry	Light Green	14449
Ozone	Yellow with Orange Band	13591 with 12473
Phosphate Compounds	Light Green with Red Band	14449 with 11120
Polymers or Coagulant Aids	Orange with Green Band	12473 with 14090
Potassium Permanganate	Violet with Orange Band	17142 with 12473
Soda Ash	Light Green with Orange Band	14449 with 12473
Sulfuric Acid	Yellow with Red Band	13591 with 11120
Sulfur Dioxide	Light Green with Yellow Band	14449 with 13591

C. Other:

Piping Type	Piping Color	Federal Standard 595B
Compressed Air	Dark Green	14062
Natural Gas	Yellow	13591
Other Lines	Light Gray	16492

D. Paint electrical conduit aluminum or to match adjacent ceiling or wall surfaces as directed by Engineer.

E. Paint vent lines to match adjoining surfaces:

Exception: Paint chlorine vent pipes as indicated in schedule.

F. Specially paint the following items:

Item	Color

Item	Color
Valve Hand Wheels and Levers	Red
Hoist Hooks and Blocks	Yellow and Black Stripes

END OF SECTION

SECTION 33 10 00

WATER DISTRIBUTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. On-site domestic water.

B. Meters.

C. Fire Hydrants.

D. Connections to main and to building water-piping systems.

E. Control valves and fittings.

F. Disinfection, inspection and testing.

1.2 REFERENCES

A. Uniform Standard Specifications for Public Works' Construction, Offsite Improvements, Clark County Area, Nevada (Latest Edition) herein referred to as Uniform Standard Specifications.

B. Uniform Design and Construction Standards for Water Distribution Systems, latest edition.

C. Geotechnical Exploration Report prepared by Angle Engineering dated April 29, 2019, Project No.:32037-1.

D. Uniform Plumbing Code, latest edition.

E. Reference Standards:

1. AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches, for Water.
2. ANSI/AWWA C110/A21.10 - American National Standards for Ductile-Iron and Gray-Iron Pipefittings 3 inches through 48 inches, for Water and Other Liquids.
3. ANSI/AWWA C1041A21.4 - American National Standard for Cement - Mortar Lining for Ductile-Iron and Gray Iron Pipe and Fittings for Water.
4. AWWA Manual M23.
5. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
6. ANSI/AWWA C651 - Standard for Disinfecting Water Mains.
7. All products must be on the governing agency’s approved products list.

1.3 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for Submittal requirements.

B. Product data: For each product specified. Include technical data and tested physical and performance properties. Submit one (1) (electronic) copy of product data and installation instructions for each product specified.

C. Shop drawings shall be furnished for all meters, DCDA's, backflow preventers, detector checks, reduced pressure principle devices, enclosures, valves and fabricated steel pipe and fittings.

D. Disinfection of Water System Report
   1. Submit name of treatment firm and evidence of qualifications.
   2. Submit name of testing laboratory and evidence of qualification.
   3. Submit three (3) copies of reports.

1.4 PROJECT RECORD DOCUMENTS

A. Record location of pipe runs, connections, and valves.

B. Identify and describe unexpected variations to subsoil conditions or discovery of unmapped utilities.

C. Verify that field measurements and elevations are as indicated on drawings. Notify the Engineer of any discrepancies.

D. All field quality control inspections and tests shall be recorded and become record documents.

1.5 QUALITY ASSURANCE

A. Reference Standard Specifications: All work shall conform with Section 629 of the Uniform Standard Specifications for Public Works Construction, Off-Site Improvements, Clark County Area, Nevada, latest edition, shall be in accordance with the referenced articles, sections and paragraphs of the Standard Specifications except that contractual, measurement, and payment provisions do not apply.

B. All piping, fittings and components/accessories shall be domestic manufacture.

1.6 REGULATORY REQUIREMENTS

A. Coordinate work with utility companies.

B. All Work of this Project in the Public Right-Of-Way shall be in accordance with the applicable sections of the Uniform Standard Drawings and Specifications except for provisions for payment. All Work shall be included in the Base Bid.

C. Obtain necessary permits and comply with the requirements of local agencies.

1.7 DELIVERY; STORAGE AND HANDLING

A. Store Polyvinyl Chloride (PVC) pressure pipe at the job site in a unit package provided by the manufacturer. Do not store pipe close to a source of heat. Keep gaskets free of dirt, foreign matter and exposure to heat, sunlight, ozone, oil and grease.

B. Protect valves from weather. Store valves indoors and maintain temperature higher than ambient dew point temperature. Support valves off ground or pavement in watertight enclosures when outdoor storage is necessary.

PART 2 PRODUCTS

2.1 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS:

A. Polyvinyl Chloride (PVC) Pressure Pipe shall be Class 150 DR 18 and shall conform to the Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inches through 12-inches, for Water" (AWWA C900) and be approved by Underwriters Laboratory (UL).

B. PVC pressure pipe shall have been manufactured within the eighteen- (18) month period prior to installation.

C. PVC pressure pipe shall be date coded by the manufacturer with the Government being provided the manufacturer's code for installation.

D. Rubber rings shall conform to the "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe" (ASTM F477).

E. Unless otherwise specified or shown on the Drawings, all fittings to be used with PVC pressure pipe shall conform to the quality and wall thickness specified in the "American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 inches through 48 inches for Water and Other Liquids" (ANSI/AWWA CIIO/A21.10), provided, however, that the ends shall be designed for "Ring-Tite" joints as manufactured by J-M Manufacturing Company, Inc., or "Fluid-Tite" joints as manufactured by CertainTeed Products Corporation, or an approved equal.

F. All gray iron and ductile iron fittings shall be lined with cement mortar in accordance with the requirements of the "American National Standard for Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water" (ANSI/AWWA C1O4/A21.4).

G. All buried fittings and flanged joints shall be thoroughly cleaned and coated or wrapped.

H. The Contractor may use a flange adapter designed for AWWA C900 when connecting PVC pressure pipe to flanged fittings or flanged valves. Uni-flange Series 900, EB.AA Iron Series 3500, or an approved equal. Product must be on governing agency approved products listing.
   1. Pipe ends must be cut smooth and square with no bevel.
   2. All flange adapters shall be thoroughly cleaned and coated or wrapped.

I. Gate Valves: AWWA C509 with counter clockwise operating nut and adjustable valve box (traffic rated for H-20 loading in all areas).

J. Fire Water Lines: As noted on Drawings

2.2 POLYETHYLENE (PE) TUBING

A. All polyethylene tubing shall conform to AWWA Standard C901 "Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. through 3 In., for Water Service" and ASTM D2737 "Standard Specification for Polyethylene (PE) Plastic Tubing".

2.3 FIRE HYDRANTS

A. As specified in the Uniform Design Standards for Water Distribution System: Furnish hydrants with breakaway safety flanges.

2.4 THRUST BLOCKS AND ANCHORAGES

A. Provide 2,000 psi (Type V cement) concrete blocks and anchorage's for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants per the Uniform Design and Construction Standards for Water Distribution Systems latest edition, with a minimum bearing area increased by a factor of 1.2.

2.5 PIPE LOCATOR RIBBON

A. Pipe locator ribbon shall be 3-inch wide plastic coated aluminum and shall be clearly marked "CAUTION BURIED WATER LINE" continuously along the length of the ribbon with minimum 1 1/4-inch letters.

B. The ribbon shall be blue in color and shall be "AIarmatape" pipe locator ribbon as manufactured by Paul Potter Associates, "Terra Tape" as manufactured by Griffolyn Company, Inc., "Detectatape" as manufactured by Allen Systems, Inc., or Engineer approved equal. Tape shall comply with governing agency requirements and specifications.

2.6 BEDDING

A. All materials used for bedding shall be in accordance with the Geotechnical Report and, where noted in the report, shall comply with the requirements of the Standard Specifications.

B. All bedding material shall be approved by the Soils Engineer.

2.7 POLYETHYLENE WATER SERVICE PIPING

A. Polyethylene water service tubing shall be classified as Type III, Grade PE 34 high density polyethylene plastic material ½ inch through 3 inches conforming to AWWA C901.

B. The polyethylene pipe or tubing shall be marked with C901 or ASTM D2737 for CTS tubing sizes. It shall meet the requirements of the National Sanitation Foundation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location and invert are as indicated.

3.2 COORDINATION

A. Coordinate the work with termination of sanitary sewer connection outside building, connection to existing sewer utility service, and trenching.

B. Obtain all encroachment permits with agency having jurisdiction.

C. Verification of elevations of all existing sanitary sewer pipes or manholes shall be made prior to installation of new sanitary sewer pipes. Any discrepancies shall be reported to the Engineer immediately.

3.3 PREPARATION

A. The Contractor shall notify the Government at least seventy-two (72) hours in advance of when he intends to commence construction operations for installation of new water distribution facilities and shall not proceed with any phase of the work until approved by the Government.

B. Ream pipe and tube ends to remove burrs.

C. Remove scale and dirt, on inside and outside, before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

3.4 TRENCHING

A. Excavate subsoil required for water pipes.

B. Excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

C. In addition to other specified requirements, cut trenches sufficiently wide to enable installation of utilities and allow inspection.

D. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

3.5 PREPARATION FOR BEDDING AND BACKFILLING

A. Exposed natural fine-grained soils shall be scarified to a depth of 6 inches, moistened to two (2) percent above the optimum moisture and compacted to ninety (90) percent of maximum dry density as tested utilizing ASTM D1557.

B. Exposed natural granular soils shall be scarified to a depth of 6-inches moistened to two (2) percent above or below the optimum moisture content and compacted to a minimum of ninety-five (95) percent of maximum dry density as tested utilizing ASTM D1557.

C. Cut out soft areas of subgrade. Backfill and compact to density equal to or greater than requirements for subsequent backfill material.

3.6 BEDDING

A. Excavate pipe trench in accordance with Section 31 23 33 for the work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level fill materials in one continuous layer.

C. Support pipe and conduit during placement and compaction of bedding fill.

D. Bedding shall comply with Section 208.03.02 of the Uniform Standards and with the individual Sections of these Specifications.

3.7 INSTALLATION - POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

A. Install PVC pressure pipe in accordance with the AWWA Manual M23 and the manufacturer’s recommendations except as otherwise provided herein or shown.

B. Prior to installation all PVC pressure pipe, couplings, and rubber rings shall be inspected by the Contractor for damage and defects in material and workmanship.
   1. All damaged or defective materials shall be rejected and removed from the job site, by the Contractor at no expense to the Government.

C. PVC pressure pipe showing signs of physical damage or unacceptable ultraviolet exposure as determined through visual inspection by the Government may be rejected and then must be removed from the job site.
   1. Material so rejected will be approved for installation, if the Contractor at his sole cost and expense provides the Government documented test results prepared by a certified testing laboratory showing the rejected pipe to be in conformance with AWWA C900.
   2. All material showing signs of sun fading or discoloration shall be placed in the trench with the faded or discolored portion in the downward position.

D. Use the manufacturer's recommended pipe lubricant when making pipe connections.
   1. Lubricate only the spigot end up, including the reference mark.
   2. The reference mark on the spigot end must be flush with the end of the bell.
   3. Follow AWWA Manual M23 and the manufacturer's recommendations

E. Take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, assume full responsibility for any damage due to this cause, and restore and replace the pipe to its specified condition and grade if it is displaced due to floating.
   1. Maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance.
   2. Adequately support all exposed piping with devices of appropriate design.

F. Trenches shall be in a reasonably dry condition when the pipe is laid.

G. Necessary facilities shall be provided for lowering and properly placing the pipe sections in the trench without damage.
   1. The Contractor must use heavily padded straps or harnesses to handle PVC pressure pipe.
   2. The pipe shall be laid carefully to the lines and grades shown or to the minimum depths shown on the Drawings and the Uniform Design and Construction Standards for Water
   3. Distribution Systems and the sections shall be closely jointed to form a smooth flow line.
   4. Exceptional care shall be taken in placing the pipe and making the field joints.
   5. Concrete thrust blocks shall be provided at the locations and of the sizes shown on the Drawings.

H. PVC pressure pipe showing signs of physical damage or unacceptable ultraviolet exposure as determined through visual inspections by the Engineer may be rejected and then must be removed from the job site.
   1. Material so rejected will be approved for installation, if the Contractor at its sole cost and expense provides the Engineer documented test results prepared by a certified testing laboratory showing the rejected pipe to be in conformance with AWWA C900.
   2. All material showing signs of sun fading or discoloration shall be placed in the trench with the faded or discolored portion in the downward position.

I. PVC pressure pipe shall be deflected at the fitting and pipe joints only. Deflection shall be accomplished by staking the pipe on both sides of the joint so that deflection at the joint is minimized. The maximum allowable joint deflection shall be 1.0 degree(s). The maximum pipe end offset for 20-foot lengths shall be 4.187-inches. The minimum radius of curvature shall be 1,150-feet.

J. Install pipe locator ribbon over all PVC pressure pipe.

K. Backfill trench in accordance with Section 31 23 23.

3.8 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set valve box cover flush with finished grade.

C. Set hydrants plumb and locate pumper nozzle perpendicular to roadway.

3.9 PATCHING

A. After backfilling work is complete, prepare base course and provide concrete patch of existing concrete work and hot asphalt patch at existing paving.

B. Clean edges of existing concrete or asphalt paving prior to patching. If saw cut edges of concrete or asphalt paving are damaged during utility work, saw cut and remove damaged portions to provide clean, straight edges.

C. Concrete Patching:
1. Provide base course of Type II aggregate equal to original base course thickness. Compact base course to ninety-five (95) percent (standard proctor) density. Provide a minimum of 4 inches of base.
2. Place 3,000 or 4,500 - pound Type V ready-mix concrete in all areas to be patched. Provide light broom finish at asphalt patches. Finish concrete at concrete patching to match adjacent concrete finish.
3. Provide thickness of patching concrete to match thickness of adjacent concrete. Match finish grade of adjacent surfaces.

D. Pavement Patching:
1. Provide base course of Type II aggregate equal to original base course thickness. Compact base course to ninety-five (95) percent (standard proctor) density. Provide a minimum of 4 inches of base.
2. Provide hot patch of a minimum of 2 inches of asphalt, or match existing asphalt section, whichever is greater.
3. Compact pavement by rolling to requirements of Uniform Standard Specifications 401.03.12. Do not displace or extrude pavement form position. Hand compact in areas inaccessible to rolling equipment.

3.10 FIELD QUALITY CONTROL

A. Testing:
1. The Contractor shall test the piping in sections prior to making connections to the existing distribution system.
2. After the line or section thereof has been completely filled, it shall be allowed to stand under a slight pressure for a sufficient length of time to allow the pipe to absorb what water it will and to allow the escape of air from air pockets, but not less than forty-eight (48) hours.
3. The test shall consist of holding the test pressure on each section of the line for a period of four (4) hours.
4. The test pressure at the lowest point in the line or section of line being tested shall be 200 psi.

5. The water necessary to maintain the pressure shall be measured through a meter or by other means satisfactory to Engineer.
6. The leakage shall not exceed 30-gallons per inch of diameter per mile per twenty-four (24) hours.
7. Any noticeable leaks shall be stopped and any defective pipe or equipment shall be replaced with new pipe or equipment and the pipe retested until the leakage is reduce to permissible limits.

3.11 CLEANING AND DISINFECTING SYSTEM

A. Inspected and pressure test piping system.

B. Perform scheduling and disinfecting activity with startup, testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

C. Clean and disinfect water distribution piping:
1. Purge new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired prior to use.
2. Use purging and disinfecting procedure prescribed by authority having jurisdiction or, if method is not prescribed by that authority, use procedure described in AWWA C651 or as described below:
3. Comply with NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
4. Fill system or part of system with water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) system or part thereof and allow to stand for 24 hours.
5. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 parts per million of chlorine; isolate and allow to stand for 3 hours.
6. Following allowed standing time, flush system with clean, potable water until chlorine does not remain in water coming from system.
7. Submit water samples in sterile bottles to authority having jurisdiction. Repeat procedure if biological examination made by authority shows evidence of contamination.

D. Prepare reports for purging and disinfecting activities.

END OF SECTION

SECTION 33 13 00

DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Disinfection of potable water distribution system.

B. Testing and reporting results.

1.2 REFERENCES

A. ANSI/AWWA B300 - Standard for Hypochlorites.

B. ANSI/AWWA B301 - Standard for Liquid Chlorine.

C. ANSI/AWWA B302 - Standard for Ammonium Sulfate.

D. ANSI/AWWA B303 - Standard for Sodium Chlorite.

E. ANSI/AWWA C651 - Standards for Disinfecting Water Mains.

1.3 SUBMITTALS

A. Submit name of treatment firm and evidence of approval to perform water treatment work by authority having jurisdiction.

B. Submit name of testing laboratory and evidence of approval to perform examination of drinking water by authority having jurisdiction.

C. Test Reports: Indicate results comparative to specified requirements. Provide five (5) copies.

D. Certificate: Certify that cleanliness of water distribution system meets or exceeds requirements of the Las Vegas Valley Water District.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 32 00 Construction Progress Documents.

B. Disinfection report; record:
1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.
3. Test locations.
4. Initial and twenty-four (24) hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
5. Date and time of flushing start and completion.
6. Disinfectant residual after flushing in ppm for each outlet tested.

C. Bacteriological report; record:
1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.

4. Test locations.
5. Initial and twenty-four (24) hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacterial test results for each outlet tested.
7. Certification that water conforms, or fails to conform, to bacterial standards of the Las Vegas Valley Water District.
8. Bacteriologist's signature and authority.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with ANSI/AWWA C651.

1.6 QUALIFICATIONS

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section, certified and approved by authority having jurisdiction.

B. Testing Firm: Company specializing in testing potable water systems, certified and approved by authority having jurisdiction.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code or regulation for performing the work of this Section.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of water system.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Chemicals: ANSO/AWWA B300, Hypochlorite.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping system has been cleaned, inspected and pressure tested.

B. Perform scheduling and disinfection activity with start-up, testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.2 EXECUTION

A. Provide and attach required equipment to perform the work of this Section.

B. Disinfectant tablets shall be placed in pipe prior to pipe installation.

C. Maintain disinfectant in system for twenty-four (24) hours.

D. Flush circulate and clean until required cleanliness is achieved; use municipal domestic water.

E. Replace permanent system devices removed for disinfection.

F. Pressure test system to 200 psi. Repair leaks and re-test.

G. Disinfecting:
   1. Disinfection may be accomplished by chlorination either at the same time or after the pipe has been tested and shall be completed before the pipe has been connected to the existing distribution system.
   2. Prior to chlorination, the piping shall be thoroughly flushed.
   3. The chlorine solution shall be applied in such manner that as the pipeline is filled with water, the dosage within the pipe shall not exceed 50 ppm. Care shall be taken to prevent the chlorine solution from flowing back into the public line supplying the water.
   4. Chlorinated water shall be retained in the pipeline long enough to destroy all non-spore-forming bacteria, but not less than twenty-five (25) hours. The chlorine residual at the pipe extremities and at other representative points shall be not less than 25 ppm.
   5. During the process of chlorinating the piping, all valves and other appurtenances, except those valves serving as connections to the existing system, shall be operated.
   6. Subsequently, the chlorine solution shall be thoroughly flushed from the pipe and pipelines at their extremities.
   7. The Contractor shall be responsible for providing connections and apparatus necessary to obtain samples of water from the pipeline after flushing, but before the pipeline is placed into service. Bacteriological analyses will be performed by the Southern Nevada Health District. Should the initial treatment fail to produce satisfactory bacteriological test results, the chlorination procedure shall be repeated until acceptable results are obtained, and costs associated with the retesting shall be paid for by the contractor.

3.3 QUALITY CONTROL

A. Provide analysis and testing of treated water under provisions of Section 01 40 00.

B. Test samples in accordance with ANSI/AWWA C651.

END OF SECTION

LGA
ARCHITECTURE

241 West Charleston Blvd, Suite 107
Las Vegas, Nevada 89102
702 263 7111
lgainc.com

Appendix B

US Department of the Interior, Bureau of Reclamation, “Consultation under Section 106 of the National Historic Preservation Act for Revisions to Landscaping at the Administration Building and Conferencing and Training Center, Bureau of Reclamation Lower Colorado Region, Boulder City, Clark County, Nevada”, letter dated November 21, 2022, from Reclamation to the Nevada State Historic Preservation Officer.

United States Department of the Interior

BUREAU OF RECLAMATION
P.O. Box 61470
Boulder City, NV 89006-1470

IN REPLY REFER TO:

LC-2631
ENV-3.00

November 21, 2022

CERTIFIED MAIL – RETURN RECEIPT

Ms. Rebecca Palmer
State Historic Preservation Officer
Historic Preservation Office
901 South Stewart Street, Suite 5004
Carson, City, Nevada 89701

Subject: Consultation under Section 106 of the National Historic Preservation Act for Revisions to Landscaping at the Administration Building and Conferencing and Training Center, Bureau of Reclamation Lower Colorado Region, Boulder City, Clark County, Nevada

Dear Ms. Palmer:

The Bureau of Reclamation (Reclamation), Lower Colorado Dams Office (LCDO) is proposing to remove existing turf and trees from the south and west slopes of "Government Hill" south of the Administration Building, located at 1200 Park Street, and to remove turf in front of the main (east) façade of the Conferencing and Training Center (formerly the Bureau of Reclamation Engineering Laboratory and hereinafter to be referred to as the "Training Center"), located at 500 Date Street. Both properties are located in Boulder City, Clark County, Nevada. This undertaking is a response to Nevada Legislature Assembly Bill No. 356 stating that waters of the Colorado River can no longer be used to irrigate non-functional lawns outside of single-family residences starting January 1st, 2027.

The project is within the Boulder City Historic District (NRIS 83001107) (Figure 8; Figure 9). In compliance with Title 54 USC 306108, commonly known as the National Historic Preservation Act (NHPA), as implemented through the Code of Federal Regulations Part 800 (36 CFR 800), Reclamation is consulting on our finding of Adverse Effect for the undertaking.

Project Description

Administration Building
The proposed work will involve removal of existing turf and replacement with new xeriscape (where turf is extant), and enhanced xeriscape (where xeriscape is extant) landscaping with modern, zoned drip irrigation system to provide greater efficiency. The new system will include

a deep root drip system for watering mature and new trees. This drip system will have "smart" irrigation monitoring and a control system to optimize the irrigation schedule and water usage which would reduce or eliminate water losses and improve the health of plants. The project also includes hardscape improvements such as graded concrete pathways with retaining walls across Government Hill, bench seating areas and pavers, and a new sidewalk along Nevada Way with an accessible pedestrian entry at the southeast corner of Nevada Way and Denver Street. The project will also incorporate artifacts, boulders, lighting, directional signage, and interpretive displays that discuss the history of Hoover Dam, Reclamation, and the City of Boulder City. A complete list is below (see also Attachment 1: Proposed Design Plans):

1. Add northwest pedestrian entry to Administration Building garden.
2. Construct new 8 ft. wide sidewalk along Nevada Way from Park St. to Denver St. Preserve and protect the existing sidewalk along Park St.
3. Using three turbine-ring artifacts from the Hoover Dam to repurpose as planters and other design elements throughout the landscape
4. Facilitate hand watering and install soil moisture sensors
5. Define public use and official use zones through the use of signage
6. Remove existing, non-historic, retaining wall and unhealthy mulberry trees along the area south of Denver Street.
7. Install new light bollards along walkway and designated areas.
8. Construct retaining walls and switchbacks and adjust entry plaza at the northeast corner of Nevada Way and Park St. to facilitate access. This would involve using cast-in-place concrete walls with stone veneer finish along walkway and designated areas to match existing rock walls at Hoover Dam.
9. Install interpretive and educational experience throughout xeriscape landscaping
10. Investigate and evaluate existing buried utility service connections, location, and conditions. Service connections in poor condition will be repaired or replaced.
11. Transfer deed of the sidewalk along Park Street and Nevada Way to the City of Boulder City.
12. Install new bench seating areas (see 30% design plans for locations).
13. Install pavers in seating areas.
14. Provide additional planting on existing xeriscape consistent with the new xeriscape.
15. Install decorative rocks and boulders that can be field selected from Hoover Dam stockpiles or local quarries.
16. Install decorative rock mulch for ground cover. All planter areas to receive 2" – 3" as indicated in the plans.
17. Install decorative rock riprap as indicated in the plans.
18. Salvage topsoil and re-use for backfilling during plant installation

<u>Training Center</u>

The proposed work will involve removal of existing turf and replacement with xeriscape landscaping with modern, zoned drip irrigation system to provide greater efficiency, similar to the work proposed for Government Hill at the Administration Building. Other improvements

include signage with lighting, and pavers. A complete list is below (see also Attachment 1: Proposed Design Plans):

1. Install pavers around flagpole.
2. Install drought resistant plants and shrubs with a low-profile to preserve the historic streetscape surrounding the building.
3. Construct new 4'-0" x 6'-0" metal sign with spotlight to replace in-kind with existing sign.
4. Install new light bollards.
5. Protect existing sidewalk during construction.
6. Keeping existing ash tree in place.

Methodology Employed for the Identification of Historic Properties

A file and record search for the undertaking using the Nevada Cultural Resource Information System (NVCRIS) was conducted by North Wind Resource Consulting, LLC (North Wind). Additionally, North Wind examined Janus Associates, Inc.'s 1983 National Register of Historic Places (NRHP) nomination for the Boulder City Historic District and the *Updated Architectural Survey and Inventory of the Boulder City Historic District*, completed in 2021, to obtain information on early landscape design efforts within the City and to better understand the role that designed landscapes played in the community's overall development.[1] Historic photographs obtained from the Bureau of Reclamation (Reclamation) and the University of Nevada Las Vegas (UNLV) digital collections were reviewed to identify changes to the landscape that may have occurred over time. Supplementary research on the City's historic landscape was conducted through Historicaerials.com, which included aerial photographs of Boulder City for the years 1980 through 2015 and topographic maps for the years 1959, 1961, 1965, 1978, 1976, 1983, 2012, 2015, and 2018.

Location and Description of the Area of Potential Effect for the Training Center

The Area of Potential Effect (APE) was determined by field observation completed on November 10 by Reclamation's regional archaeologist and a qualified architectural historian contracted by Reclamation to consult on this undertaking. The APE was determined based on the visibility of the Training Center's grassy court on the east end of the property from the Training Center and from nearby residential, commercial, and public properties (Figure 10; Photographs 1 – 13).

The APE is generally bounded by Reclamation Building 200 (just north of the Training Center) and a City-owned storage yard (511 Date Street) on the north; the north parking lot of the Best Western Hotel (704 Nevada Way), and three residential properties (517, 521, and 525 Date Street) on the east; and three residential properties (516, 528, and 532 Date Street) on the west. The APE is found within T22S, R64E, Section 8, Boulder City Quadrangle.

[1] James Woodward, Cindy Myers, and Terre Sitter, Volume I Boulder City Historic District Nomination to the National Register of Historic Places. 1983. Janus Associates, Inc. Phoenix, Arizona; Courtney Mooney, Greta Rayle, Harris Abernathy, and Kasey Fulwood, *Updated Architectural Survey and Inventory of the Boulder City Historic District, Boulder City, Clark County, Nevada*. 2021. North Wind Resource Consulting, Phoenix, Arizona.

Description of the Training Center Court

The Training Center court is a 3,500-square-foot (.08 acre) pie-shaped open area located west of the main (south and east) facades of the Training Center. The area consists of turf with one ash tree located at the south end, and building signage is located at the north end. A flagpole is located in the center of the open space. A six-foot strip of decomposed granite with steel-reinforced masonry bollards lines the eastern boundary of the open space area. A small grouping of lantana shrubs is located at the northeast corner of the turf area. Parking and a concrete sidewalk are located along Date Street east of the Training Center. A polygonal section of decomposed granite with a drought-tolerant shrub is located north of the pie-shaped turf area. This section is separated from the turf area by a sidewalk connecting the City sidewalk with the building. This polygonal section is not a part of the proposed project.

Character Defining Features

The setting, which includes the grassy court area, is a character defining feature of the Training Center property, as well as the Boulder City Historic District, as a largely unobstructed open space covered in turf as encouraged by the DeBoer plan for the development of Boulder City that promoted grassy open spaces throughout the town.[2] The Training Center was recommended individually eligible for listing in the National Register in 2021 under Criterion A as part of the 2021 *Updated Architectural Survey and Inventory of the Boulder City Historic District*.[3] The recommendation stated that the property retains its integrity of setting, as well as location, design, feeling and association. The existing ash tree is not original to the property, having been planted during the rehabilitation of the building in 2013; however, it is purportedly a propagation of a long-standing tree originally located closer to the building façade at the south end of the open space. Otherwise, the court area is largely unchanged from its original construction.

History of the Training Center

The Reclamation Training Center, located at 500 Date Street, was originally constructed by the Bureau of Mines in 1941 for use as an engineering laboratory. The property consists of a masonry structure with a tile roof and a T-shaped plan. The building was originally constructed with an L-shaped plan by Boulder City contractor Paul S. Webb.[4] The western ell was constructed in 1945. Between 2006 and 2010, the roof was removed, not to be replaced until the building was rehabilitated in 2013.

Following its construction, landscaping around the Training Center was minimal and was primarily confined to a landscaped court located on the property's southeast corner. Plantings largely consisted of a row of evergreen shrubs located along verandas on the building's southeast and northwest façades and a single ash tree located west of the parking lot. The remaining ground cover in the landscaped area was comprised of rye grass (Figure 1).

Historic photographs indicate that a gravel bed was constructed around the shrubs on the building's southeast façade sometime between 1990 and 1998 (Figure 2). Between 2012 and 2014, the Training Center was rehabilitated, and all original landscaping was removed (Figure 3). By the spring of 2014, the turf in the landscaped had been replaced and a gravel bed

[2] Mooney, et al, *Updated Architectural Survey and Inventory of the Boulder City Historic District.*
[3] Mooney, et al, *Updated Architectural Survey and Inventory of the Boulder City Historic District.*
[4] Papa, *Boulder City: The Town that Built the Hoover Dam.*

with drought tolerant shrubs was constructed on the west side of the sidewalk. A cutting from the original ash tree was replanted as part of the 2014 landscape redesign.

Figure 1. Photograph of landscaping on the southeast side of the Training Center shortly after construction, ca. 1940s (Image courtesy of the Boulder City Review, June 18, 2014).

Figure 2. Photograph of landscaped area at the Reclamation Training Center, ca. 1990s (Image courtesy of Historic American Buildings Survey [HABS], Library of Congress, Call No. HABS NV-35-A).

Figure 3. Aerial photograph showing landscape removal at the Training Center in 2013 (Image courtesy of the Clark County Assessor, Las Vegas).

The Training Center was included as a contributing property to the Boulder City Historic District in Janus Associates Inc.'s 1983 National NRHP nomination but was not determined to be individually eligible for listing at that time. The *Updated Architectural Survey and Inventory of the Boulder City Historic District*, completed in 2021, concurred that the Training Center was eligible as contributing resource of the Boulder City Historic District, and also recommended that the building was individually eligible for designation in the NRHP under Criterion A for its association with Community Planning and Development and Engineering in Boulder City.

Identification of Historic Properties and Evaluation of Historical Significance

The file and record search focused on the historic facilities within the APE, which is located entirely within the Boulder City Historic District boundary. There are five contributing resources and one non-contributing resource within the APE for the Reclamation Training Center (Table 1). Of these resources, only two—the Boulder City Historic District and the Training Center—will be directly affected by the proposed undertaking (Figure 11; Figure 12).

Table 1. Previously Documented Historic Resources Intersecting the Training Center's APE

Facility	Resource Documentation	NRHP Eligibility	Direct Effect
Boulder City Historic District	NRIS 83001107	NRHP eligible under Criteria A for Community Planning and Development and under Criterion C for Architecture	Direct effect

Training Center	B18607	Individually Eligible; Contributing resource to the Boulder City Historic District	Direct effect
500 Date Street-Bureau of Reclamation Metallurgical Laboratory	B18608	Contributing resource to the Boulder City Historic District	Visual effect
521-525 Date Street	B18602	Contributing resource to the Boulder City Historic District	Visual effect
529-533 Date Street	B18603	Contributing resource to the Boulder City Historic District	Visual effect
517 Date Street	B18457	Non-contributing resource to the Boulder City Historic District	Visual effect

Location and Description of the Area of Potential Effect for the Administration Building

The Area of Potential Effect (APE) was determined by field observation completed on November 10 by Reclamation's regional archaeologist and a qualified architectural historian contracted by Reclamation to consult on this undertaking. The APE was determined based on the visibility of Government Hill from the Administration Building's front (south) façade, and from nearby residential, commercial, and public properties (Figure 13; Photographs 14 – 54).

The APE is generally bounded by the Administration Building property and residential properties along both sides of Denver Street (beginning 200 feet east of Ash Street and ending at Nevada Way) and Park Street (between Utah Street and Park Place) on the north; residential and public properties along Utah Street (between Park and Arizona Streets) on the east; religious and public properties along Arizona Street (between Utah Street and Nevada Way) on the south; and commercial, public, and residential properties along Nevada Way (between Mountain View Place and Arizona Street) on the west. The APE is found within T22S, R64E, Sections 4 and 9, Boulder City Quadrangle.

Description of Government Hill at the Administration Building

Government Hill is a landscaped open space located south of the main (south) façade of the Administration Building. The open space is approximately 2.34 acres and consists of a relatively flat area (approximately .4 acre) with xeriscape located directly in front of the Administration Building, an additional xeriscape area (approximately .57 acre) at the southwest corner of the open space area, and a large expanse of turf. Xeriscape areas consist of decomposed granite with drought tolerant trees, shrubs, and plants. An approximately 18-foot-deep landscape buffer is located at the south and east facades of the Administration Building.[5] A concrete sidewalk

[5] This area is not a part of the proposed landscape revisions.

separates the landscape buffer from the xeriscape area immediately to the south. The sidewalk begins at the west end of the property (Nevada Way), extends east across the façade of the Administration Building, and continues to wrap around the building to the north and west. Two sets of concrete steps descend from the west boundary of the landscape buffer to the sidewalk leading to Nevada Way. The sidewalk widens in a stepped pattern at the entrance to the Administration Building. A 12-foot-wide sidewalk extends north-south, beginning at the southern edge and bottom slope of Government Hill, and terminating at the concrete steps leading to the entrance to the Administration Building. The sidewalk contains two sets of concrete steps with metal handrailing and interpretive and other signage. The south terminus of the sidewalk is aligned with the concrete steps and sidewalk at the north entrance to Wilbur Square/Bi-Centennial Park (Wilbur Square), located to the south of the Administration Building. A right-of-way sidewalk runs along the southern edge of the property. An approximately 177-foot-long segment of Denver Street is located to the west of the Administration Building. The street terminates at the west vehicular entrance to the Administration Building. This entrance is delineated by a low stone wall extending from the north sidewalk approximately 30 feet north, leaving an approximately 10-foot opening for vehicles on the north. Two homes (1256 and 1260 Denver Street) are located on the north side of the street. A parking area, the Annex Building, and an access road from Nevada Way on the north are located to the west and north of the Administration Building.

The xeriscape area located just south of the entrance to the Administration Building is bounded by a concrete curb with a scalloped pattern on the southern boundary. A low stone retaining wall extends south approximately 40 feet from the northwest corner of the xeriscape area before turning southeast for approximately 20 feet and finally extending eastward across the xeriscape area for approximately 205 feet. South of the retaining wall the xeriscape area slopes slightly toward the south. A similar xeriscape area is located at the southeast corner of the property with a sliver extending north at the eastern boundary. This area is bounded by the parking area for the Administration building, residential properties, Park Street, and the turf portion of Government Hill on the north, east, south, and west, respectively. A narrow strip of decomposed granite is located at the northern boundary of the turf area southwest of the Administration Building. The strip is bordered on the south by a curving concrete curb and contains three mulberry trees. The remainder of the open space is landscaped with turf, and juniper, ash, Chinese elm, mulberry, and palo verde trees. Sidewalks line the turf area along the northern and southern edges. A narrow strip of riprap with a low concrete curb, signage, and streetlights, lines the western boundary of the turf area.

Character Defining Features

The setting, including Government Hill, is a character defining feature of the Administration Building property, as well as the Boulder City Historic District, as a broad open space originally designed, along with the Administration Building, as a visual termination of California Street on the north. Government Hill was included in the DeBoer plan for the development of Boulder City as a large, grassy open space with orthogonal pathways and minimal plantings.[6] The hill itself is a symbolic pedestal supporting the seat of the federal presence within Boulder City. The Administration Building was recommended individually eligible for listing in the National Register in 2021 under Criterion A as part of the 2021 *Updated Architectural Survey and*

[6] Mooney, et al, *Updated Architectural Survey and Inventory of the Boulder City Historic District.*

Inventory of the Boulder City Historic District.[7] The recommendation stated that the property retains its integrity of setting, as well as location, design, workmanship, materials, feeling and association. The character defining features of the Government Hill itself include its location in front of the Administration Building; the sloping topography; minimal, orthogonal, concrete pathways; and existing historic tree species such as ash, mulberry, and elm trees. The historic setting has been compromised slightly by the introduction of xeriscape to portions of the hill; however, the hill retains the ability to convey the sense of a large, mostly unobstructed open space viewable from the west, south, and east. The ability to view the Boulder City Historic District from Government Hill is also retained.

History of the Administration Building

The Administration Building was among the first buildings constructed by Reclamation in Boulder City. The building was constructed in a "modified Spanish style" based on a design by Los Angeles-based architect Gordon B. Kaufmann.[8] A contract for the construction of the building was awarded to B. O. Siegfus of Salt Lake City in the summer of 1931.[9] In accordance with the city plan for Boulder City devised by S.R. DeBoer, the Administration Building was constructed in a prominent position on a hilltop north of the Boulder City townsite.

Soon after construction of the Administration Building got underway, Reclamation officials set about developing a well-planned landscape for the community. While extensive landscaping was a key component in DeBoer's original plan for the City, Reclamation officials had initially balked at using non-native vegetation which they felt would be too costly for the government to maintain. Instead, Reclamation officials suggested that the landscaping within the community should consist of plantings that were native to the desert, including cactus, mesquite, and creosote. While Reclamation remained concerned about the cost of DeBoer's recommendations, Secretary of the Interior Ray L. Wilbur understood that expansive lawns and abundant shade trees would mitigate the heat and make the community more attractive to prospective residents. For this reason, in late 1931, Wilbur persuaded Congress to release more funding so that a professional landscape architect could be hired, and trees and shrubs could be purchased to plant along the city's streets.[10] In December 1931, Wilbur W. Weed, a landscape architect from Oregon arrived to oversee the landscaping in Boulder City. Following a series of soil surveys, Weed concluded that species such as black locust, Arizona ash, Chinese elm, Carolina poplar, European sycamore, Guadalupe cypress, and incense cedar would be most resistant to the region's intense heat.[11]

Landscaping around the Administration Building was completed in early 1932 and consisted of broad-leaved evergreen shrubs, elms, Guadalupe cypresses, and rye grass.[12] On the south side of the building, a set of concrete stairs were constructed from Park Street to the top of Government Hill. At the hilltop, a concrete sidewalk extended to the building's front (south) entrance (Figure 4). Additional sidewalks encircled the building on the north, south, and west façades.

---

[7] Mooney, et al, *Updated Architectural Survey and Inventory of the Boulder City Historic District.*
[8] Paul W. Papa, *Boulder City: The Town that Built the Hoover Dam*. (Charleston: The History Press, 2017).
[9] Ibid.
[10] Dennis McBride, *In the Beginning: A History of Boulder City, Nevada*. (Boulder City: Boulder City/Hoover Dam Museum, 1992).
[11] Papa, *Boulder City: The Town that Built the Hoover Dam*.
[12] McBride, *In the Beginning: A History of Boulder City, Nevada*.

Plantings originally consisted of cypress trees and shrubs, with wide, grassy lawns extending from Park Street to the building's front entrance. A row of elm trees was planted on the far eastern and western portions of the south façade, partially screening the building from the street (Figure 5). A cluster of low shrubs were planted along the hillslope in front of the building, and a few were also spaced at wide intervals along either side of the sidewalk from Park Street.

The landscaping surrounding the Administration Building has changed significantly since its initial development in the early 1930s. According to historic aerial photographs, the original plantings near the building were removed and replaced with a gravel aggregate between 1993 and 1994 (Figure 6). Between 1998 and 1999, the front sidewalk was modified to a stepped design and the original plantings near the building were replaced with drought tolerant plant species. At the same time, a stepped gravel bed, containing drought tolerant plants and large decorative boulders, was constructed on the south side of the sidewalk. In 2001, a stone retaining wall was constructed from the southwest corner of the Administration Building to the parking lot on the building's east side. In 2006, the turf that was enclosed by the retaining wall was removed and replaced with gravel, and an additional gravel bed, with an undulating concrete curb, was constructed on the south side of the retaining wall (Figure 7).

Figure 4. Photograph of the landscaping around the front entrance to the Bureau of Reclamation Administration Building, ca. 1932 (Image courtesy of the Manis Collection, UNLV, Las Vegas).

Figure 5. Photograph of lawns and elm trees on the south side of the Administration Building, ca. 1933 (Image courtesy of the Manis Collection, UNLV, Las Vegas).

Figure 6. Aerial photograph showing the landscaping surrounding the Administration Building as it appeared in 1998 (Image courtesy of the Clark County Assessor, Las Vegas).

Figure 7. Aerial photograph showing the landscaping surrounding the Administration Building as it appeared in 2006 (Image courtesy of the Clark County Assessor, Las Vegas).

The Administration Building was listed as a contributing property to the Boulder City Historic District in Janus Associates Inc.'s 1983 National NRHP nomination. At that time, the building was not determined to be individually eligible for listing in the NRHP. The *Updated Architectural Survey and Inventory of the Boulder City Historic District*, completed in 2021, concurred with the previous determination that the Administration Building was eligible as contributing resource of the Boulder City Historic District, and recommended that the building was also individually eligible for listing in the NRHP under Criterion A for its association with Community Planning and Development in Boulder City. Although the planned landscape was recognized for its important contributions to the contemporary identity of Boulder City, the landscape was not included as a separate, distinct contributing property to the Boulder City Historic District in Janus Associates Inc.'s 1983 National NRHP nomination.

Identification of Historic Properties and Evaluation of Historical Significance

The file and record search focused on the historic facilities within the APE, which is located entirely within the Boulder City Historic District boundary. There are 60 previously recorded resources located entirely or partially within the APE for the Administration Building. Of these resources, 24 are considered contributing resources to the Boulder City Historic District, while the remaining 36 are considered non-contributing. Only two resources—the Boulder City Historic District and the Administration Building—will be directly affected by the proposed undertaking (Table 2). There are five contributing resources and one non-contributing resource within the APE for the Reclamation Training Center. Of these resources, only two—the Boulder City Historic District and the Training Center—will be directly affected by the proposed undertaking. No prehistoric archaeological resources have been recorded in the immediate vicinity of the APE (Figure 14; Figure 15).

Table 2. Previously Documented Historic Resources Intersecting the Administration Building's APE

Facility	Resource Documentation	NRHP Eligibility	Direct Effect
Boulder City Historic District	NRIS 83001107	NRHP eligible under Criteria A for Community Planning and Development and under Criterion C for Architecture	Direct effect
Administration Building	B18782	Individually Eligible; Contributing resource to the Boulder City Historic District	Direct effect
1342 Denver Street	B18629	Contributing resource to the Boulder City Historic District	Visual effect
1301 Denver Street	B18612	Contributing resource to the Boulder City Historic District	Visual effect
1300 Denver Street	B18611	Contributing resource to the Boulder City Historic District	Visual effect
1260 Denver Street	B18610	Contributing resource to the Boulder City Historic District	Visual effect
1256 Denver Street	B18609	Contributing resource to the Boulder City Historic District	Visual effect
1322 Denver Street	B18619	Individually Eligible; Contributing resource to the Boulder City Historic District	Visual effect
1330 Denver Street	B18623	Individually Eligible; Contributing resource to the Boulder City Historic District	Visual effect
1338 Denver Street	B18627	Individually Eligible; Contributing resource to the Boulder City Historic District	Visual effect
1306 Denver Street	B18613	Non-contributing resource to the Boulder City Historic District	Visual effect
1309 Denver Street	B18614	Non-contributing resource to the Boulder	Visual effect

		City Historic District	
1314 Denver Street	B18615	Non-contributing resource to the Boulder City Historic District	Visual effect
1317 Denver Street	B18616	Non-contributing resource to the Boulder City Historic District	Visual effect
1318 Denver Street	B18617	Non-contributing resource to the Boulder City Historic District	Visual effect
1321 Denver Street	B18618	Non-contributing resource to the Boulder City Historic District	Visual effect
1325 Denver Street	B18620	Non-contributing resource to the Boulder City Historic District	Visual effect
1326 Denver Street	B18621	Non-contributing resource to the Boulder City Historic District	Visual effect
1329 Denver Street	B18622	Non-contributing resource to the Boulder City Historic District	Visual effect
1333 Denver Street	B18624	Non-contributing resource to the Boulder City Historic District	Visual effect
1334 Denver Street	B18625	Non-contributing resource to the Boulder City Historic District	Visual effect
1337 Denver Street	B18626	Non-contributing resource to the Boulder City Historic District	Visual effect
1341 Denver Street	B18628	Non-contributing resource to the Boulder City Historic District	Visual effect
1345 Denver Street	B18630	Non-contributing resource to the Boulder City Historic District	Visual effect
304 Nevada Way	B18721	Contributing resource to the Boulder City Historic District	Visual effect
312 Nevada Way	B18723	Contributing resource to the Boulder City Historic District	Visual effect
308 Nevada Way	B18722	Individually Eligible; Contributing resource to the Boulder City	Visual effect

		Historic District	
324 Nevada Way	B18725	Individually Eligible; Contributing resource to the Boulder City Historic District	Visual effect
400-406 Nevada Way	B18754	Non-contributing resource to the Boulder City Historic District	Visual effect
410 Nevada Way	B18726	Non-contributing resource to the Boulder City Historic District	Visual effect
412 Nevada Way	B18727	Non-contributing resource to the Boulder City Historic District	Visual effect
415 Nevada Way	B18728	Non-contributing resource to the Boulder City Historic District	Visual effect
416 Nevada Way	B18729	Non-contributing resource to the Boulder City Historic District	Visual effect
441 Nevada Way	B18730	Non-contributing resource to the Boulder City Historic District	Visual effect
453 Nevada Way	B18731	Non-contributing resource to the Boulder City Historic District	Visual effect
1101 Colorado Street	B18549	Non-contributing resource to the Boulder City Historic District	Visual effect
900 Arizona Street	B18345	Non-contributing resource to the Boulder City Historic District	Visual effect
311 Utah Street	B18791	Contributing resource to the Boulder City Historic District	Visual effect
315 Utah Street	B18792	Contributing resource to the Boulder City Historic District	Visual effect
307 Utah Street	B18970NV-19-10012	Non-contributing resource to the Boulder City Historic District	Visual effect
400 Utah Street	B18793	Non-contributing resource to the Boulder City Historic District	Visual effect
401 Utah Street	B18794	Non-contributing resource to the Boulder	Visual effect

		City Historic District	
405 Utah Street	B18795	Non-contributing resource to the Boulder City Historic District	Visual effect
409 Utah Street	B18796	Non-contributing resource to the Boulder City Historic District	Visual effect
413 Utah Street	B18797	Non-contributing resource to the Boulder City Historic District	Visual effect
722 Park Street	B18777	Contributing resource to the Boulder City Historic District	Visual effect
730 Park Street	B18779	Contributing resource to the Boulder City Historic District	Visual effect
734 Park Street	B18780	Contributing resource to the Boulder City Historic District	Visual effect
1200 Park Street-Dormitory/Annex	B18783	Contributing resource to the Boulder City Historic District	Visual effect
706 Park Street	B18773	Individually Eligible; Contributing resource to the Boulder City Historic District	Visual effect
726 Park Street	B18778	Individually Eligible; Contributing resource to the Boulder City Historic District	Visual effect
710 Park Street	B18774	Non-contributing resource to the Boulder City Historic District	Visual effect
714 Park Street	B18775	Non-contributing resource to the Boulder City Historic District	Visual effect
718 Park Street	B18776	Non-contributing resource to the Boulder City Historic District	Visual effect
738 Park Street	B18781	Non-contributing resource to the Boulder City Historic District	Visual effect
401 California Avenue	B18484	Individually Eligible; Contributing resource to the Boulder City Historic District	Visual effect

708 Park Place	B18770	Non-contributing resource to the Boulder City Historic District	Visual effect
721 Park Place	B18771	Non-contributing resource to the Boulder City Historic District	Visual effect
812 Arizona Street	B18343	Contributing resource to the Boulder City Historic District	Visual effect
4 Hillside Drive	B18690	Non-contributing resource to the Boulder City Historic District	Visual effect

Tribal and Public Outreach

Reclamation has provided information about this undertaking to the Las Vegas Paiute Tribe**,** Moapa Band of Paiutes, Chemehuevi Indian Tribe, and Colorado River Indian Tribes, and has requested consultation about the effect of this project to significant cultural or religious areas. There has been no response at the time of this letter; however, if these tribes do respond with information pertaining to areas of tribal concern affected by the undertaking, Reclamation will inform the Nevada SHPO of newly acquired information and consultation will take place accordingly.

Reclamation has and is continuing to conduct an extensive public outreach effort to the local community of Boulder City. The goal of this effort is to solicit comments on the project in hopes of gathering concerns and incorporating ideas for alternative design considerations and mitigation for the effects this project has to the Boulder City Historic District. This outreach began with a meeting that Reclamation management had with the Boulder City Mayor, Kiernan McManus, and the city manager, Taylour Tedder, on 9/8/2022. The main concern that the mayor had with the project was with the surrounding viewshed and suggested that the view of the Administration Building not be blocked by any obstacles so that it can be seen from the surrounding street level. Reclamation's design team has incorporated this comment into the design plan and has removed any large vegetation in front of the building that was initially in the plan.

A public meeting was held at the Administration Building on 11/10/2022 where Reclamation provided an open house for members of the community to submit comments on the project and talk to the Reclamation design team directly. An email address for comments was provided to guests at the meeting and as of the time of this submittal there were two comments submitted. One had the history of the lawn as a concern and suggested to deed the lawn over to Boulder City so that the local community could take control of it and make decisions about its property. The other comment suggested that only native vegetation should be used instead of just general desert-adapted plants.

A meeting with the Boulder City Historic Committee is scheduled for December 7th, 2022. Some members of the committee were at the public meeting on 11/10/2022 and had an opportunity to

get details of the plans and discuss the project with Reclamation staff, but the December 7th meeting will be a specific meeting for entire committee to provide feedback. Reclamation will inform the SHPO of the input received from this meeting in a follow-up email to your office after it has taken place.

Effects Determination

Reclamation has reviewed the proposed undertaking and its potential for affecting historic properties in the APE. Although the proposed work will not significantly alter any of the characteristics of either property, as well as the Boulder City Historic District as a whole, such that either property could not be considered for inclusion in the National Register, the work will diminish the integrity of setting for both properties, as well as the District. The setting for both properties has been identified as character-defining features. The work is not considered to be compliant with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR part 68(b) Rehabilitation), as it does not retain and preserve the historic character of a property due to the removal and alteration of distinctive materials, features, spaces, and spatial relationships that characterize the properties and the District. Therefore, Reclamation seeks your concurrence with our finding of Adverse Effect in accordance with 36 CFR Part 800.5.

Alternatives and Design Changes Considered

Reclamation has contacted your office with information with details and updates about the project beginning on 8/25/2022 as informal consultation to get any feedback for the initial design plans. In an email on 9/6/2022, it was asked of Reclamation to provide any alternatives or modifications that have been considered that could avoid, minimize, or mitigate these effects. An email response was given on 10/24/2022 that listed some of those ideas up until that point, however there have been some additions and changes, so a discussion of these efforts can be found below.

Three alternatives were considered prior to deciding on the full xeriscape design. The first was a previous idea that went through consultation with your office and received concurrence on June 30, 2021. This was to change the irrigation system to use less water but keep the lawn and preserve the viewshed. Although it received concurrence, this alternative was abandoned by Reclamation after the AB356 mandate was announced in 2021 that waters of the Colorado River could no longer be used to irrigate non-functional lawns outside of single-family residences. Fake grass was another alternative that was discussed but abandoned for multiple reasons. Although this is the most similar in appearance, fake grass generates refractive heat and creates a heat island and also could cause a safety concern of slips, trips, and falls on the slope of the hill if it gets wet. The final alternative considered is turning off the irrigation completely to abide by the water usage mandate. This would result in the grass dying and changing the viewshed of a green lawn to a dead lawn, losing its historic integrity as well as being an eyesore for the local community.

Design considerations that Reclamation has incorporated into the plan for the purposes of historic preservation and addressing the concerns of the community include keeping elements of the historic built environment such as the historic staircase, the central sidewalk, existing curb, gutter, and street lights. As discussed in the previous section, the front-view design was altered to

incorporate Mayor McManus' comment of keeping the view of the building unobscured from street view. An interpretive designer will be hired to assist in creating an experience throughout the new landscape that tells the history of the building, lawn, and Boulder City. The general public as well as Reclamation employees will have access to this interpretive walkway that will use interpretive panels and installations to discuss the history, as well as using artifacts from the Hoover Dam "boneyard" to add to the historic feel of the environment. At the Training Center, the single tree will be kept and only low-lying, native vegetation will be used to retain the historic front-view of the building and surrounding streetscape of the historic district.

Reclamation hopes that these design changes can be agreed upon as a substantial mitigation effort for the adverse effect to the historic district and, if your office concurs, looks forward to resolving the adverse effect through a Memorandum of Agreement.

Conclusion

This consultation is only for the undertaking APE identified in this consultation letter. If the impact/effects area of the undertaking changes during the course of the project, Reclamation will reinitiate consultation under 36 CFR Part 800 and will not allow any land-disturbing activities or modifications to historic facilities to proceed before Section 106 of the NHPA is satisfied.

If during the course of any activities associated with this undertaking, any districts, sites, buildings, structures, or objects not included in this consultation are discovered, activities will cease in the vicinity of the resource. Reclamation shall ensure that the stipulations of 36 CFR Part 800.11 are satisfied before activities in the vicinity of the previously unidentified property resume.

In accordance with 36 CFR Part 800.3(c)(4) Reclamation is requesting your response within 30 days of receiving this consultation request. Please contact Regional Archaeologist Justin DeMaio at 702-293-8359 or jdemaio@usbr.gov if you have any questions or concerns regarding this undertaking. Individuals in the United States, who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunication relay services.

Sincerely,

Shonna Dooman
Chief, Resource Management Office
Lower Colorado Basin Region

enclosures:

LCD-1000; LC-2630

Report Maps

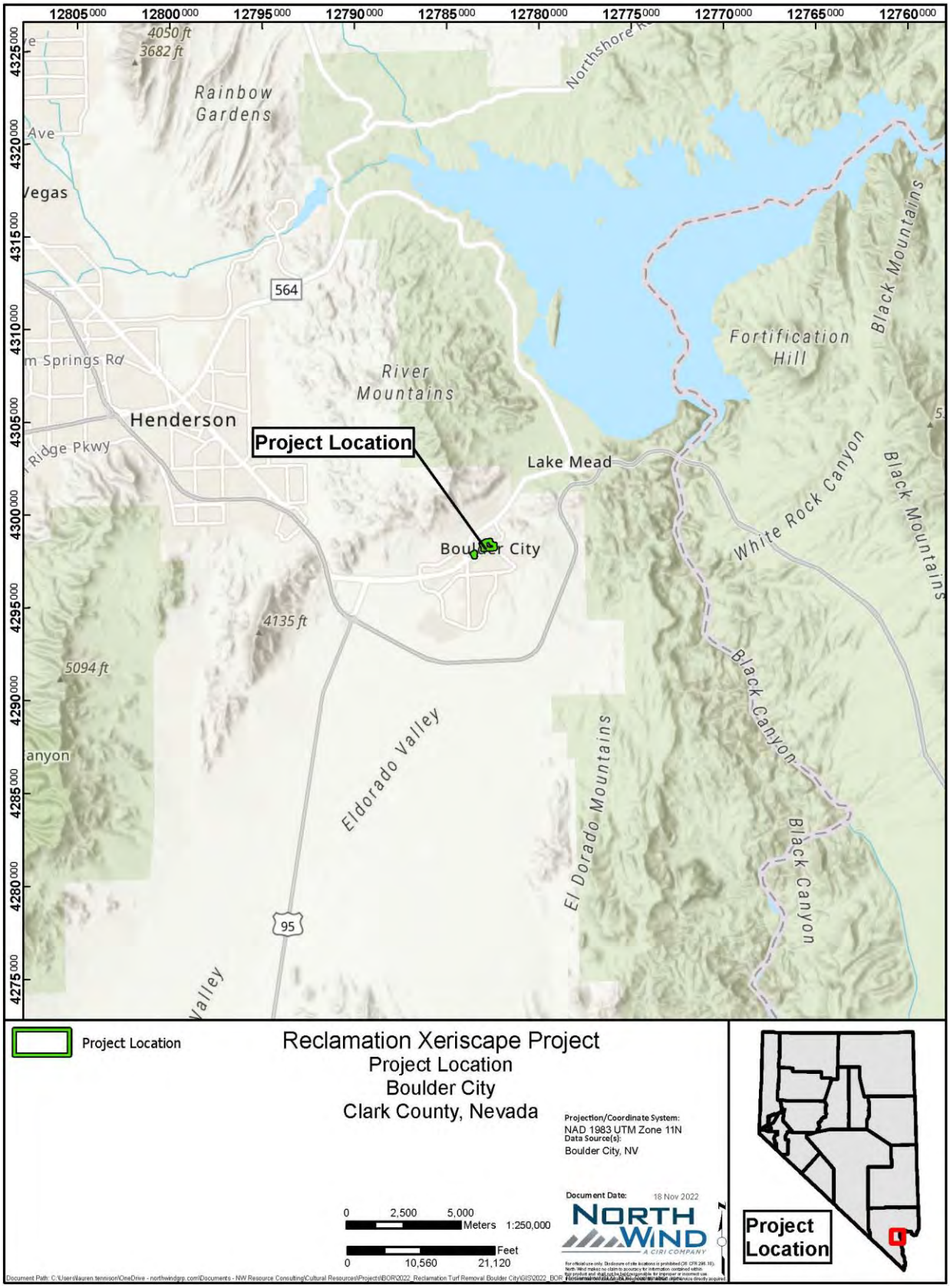


Figure 8. Project Location Map.

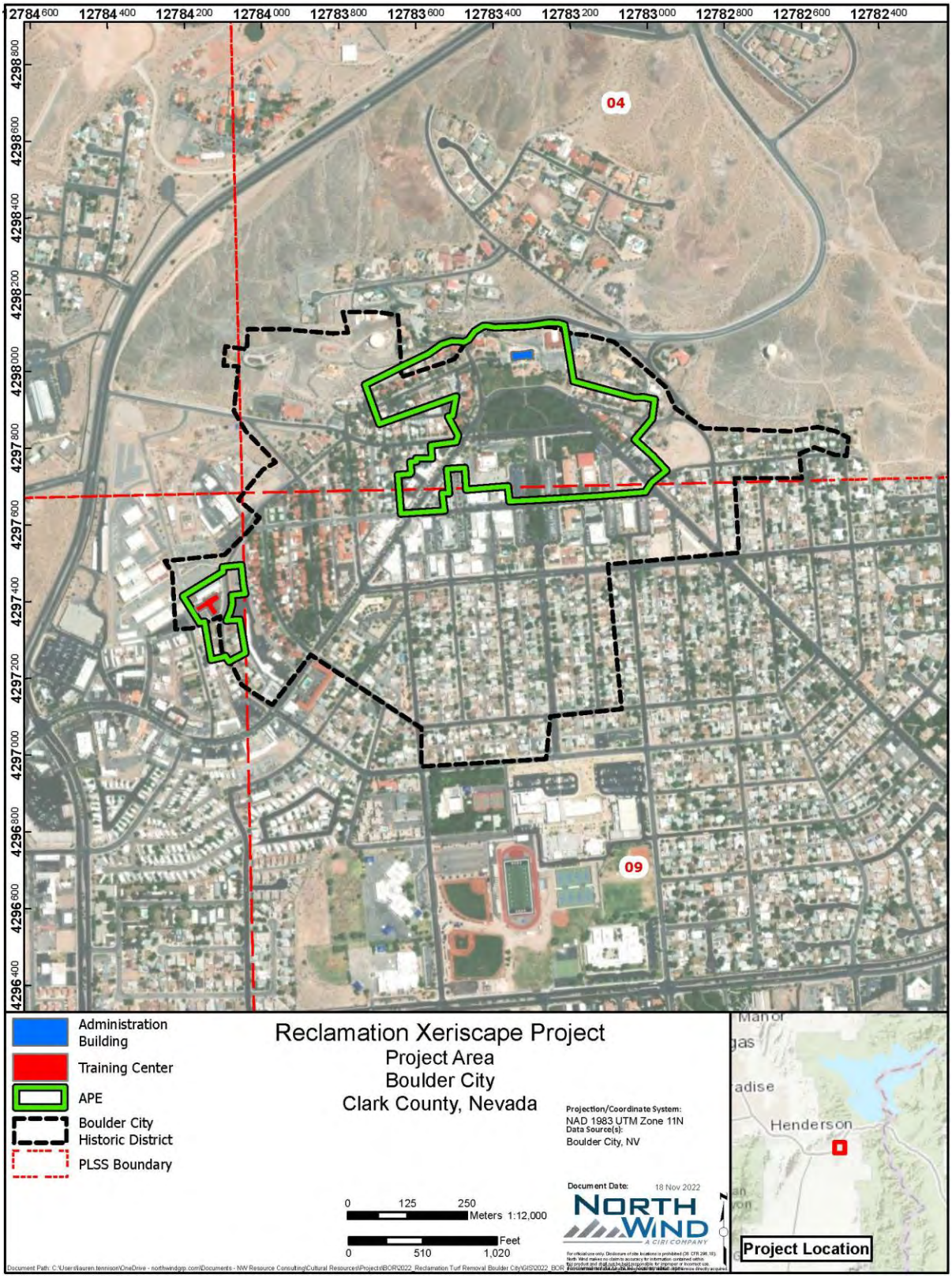


Figure 9. Project Area Map showing location of undertaking in bright green, and recommended APE in red.

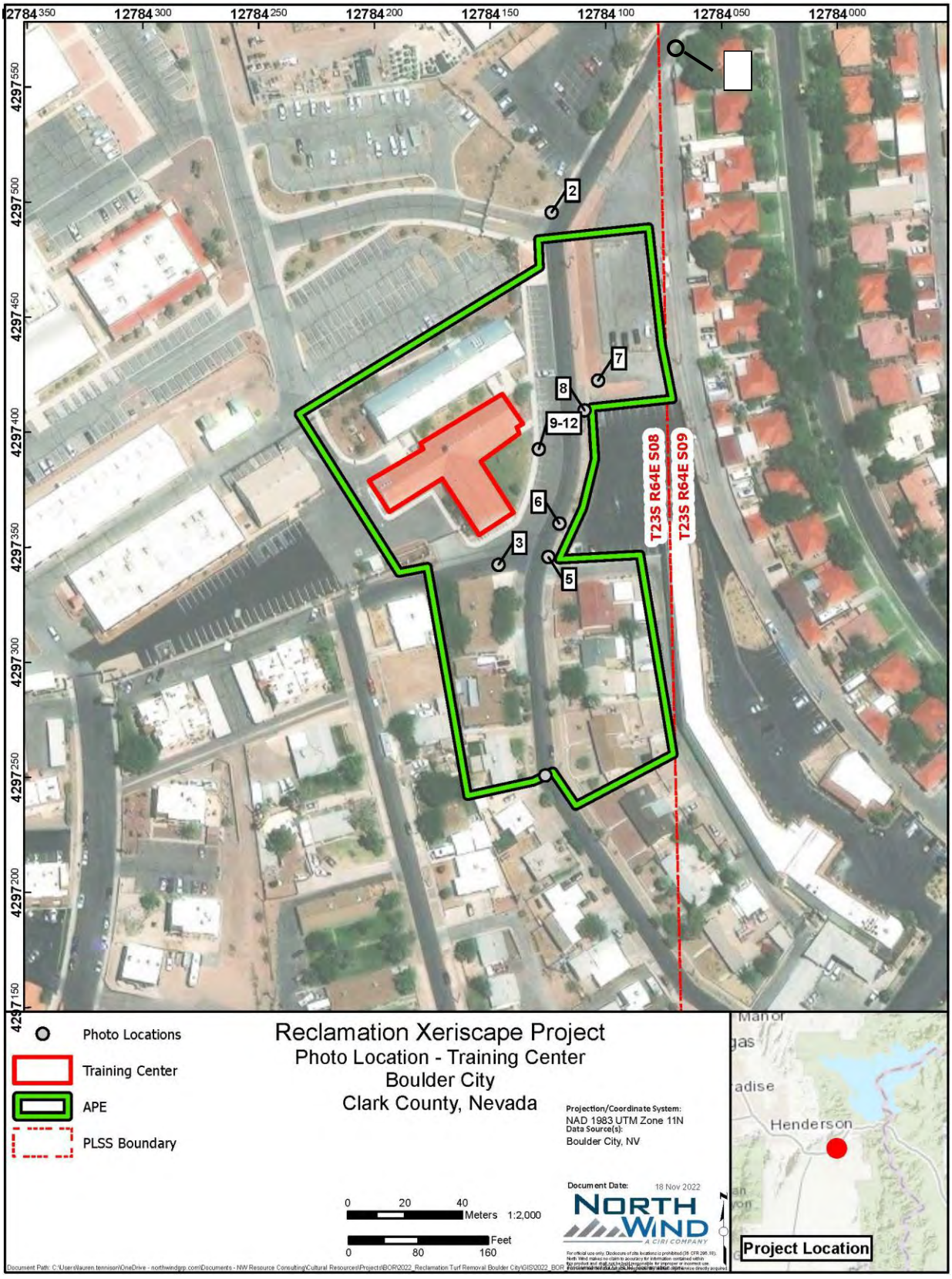


Figure 10. Recommended APE with photograph locations (see Photographs 1-12 in Photographs of the Training Center and Recommended APE section).

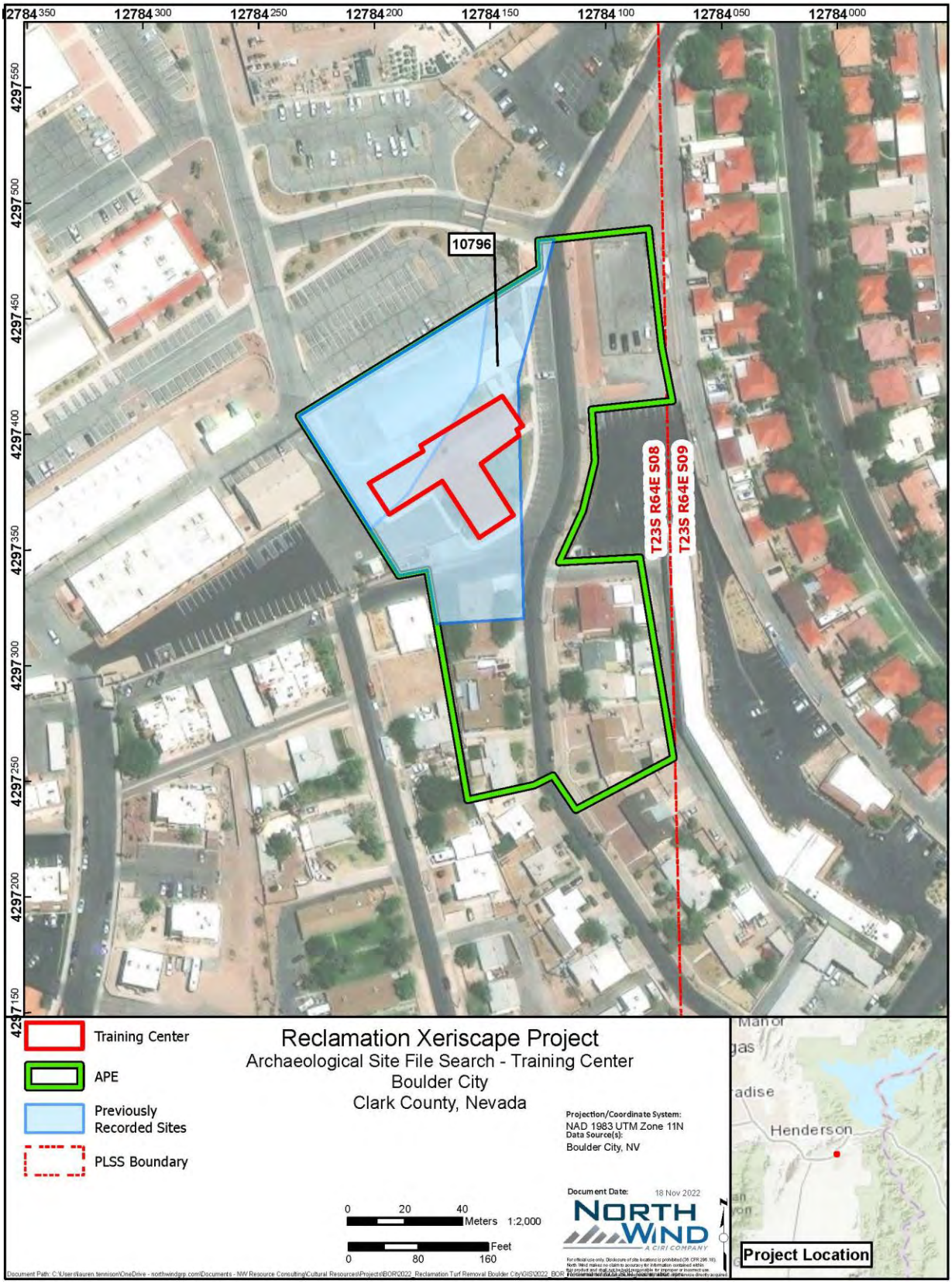


Figure 11. Site File Search map of archeological resources intersecting the recommended APE for the Training Center.

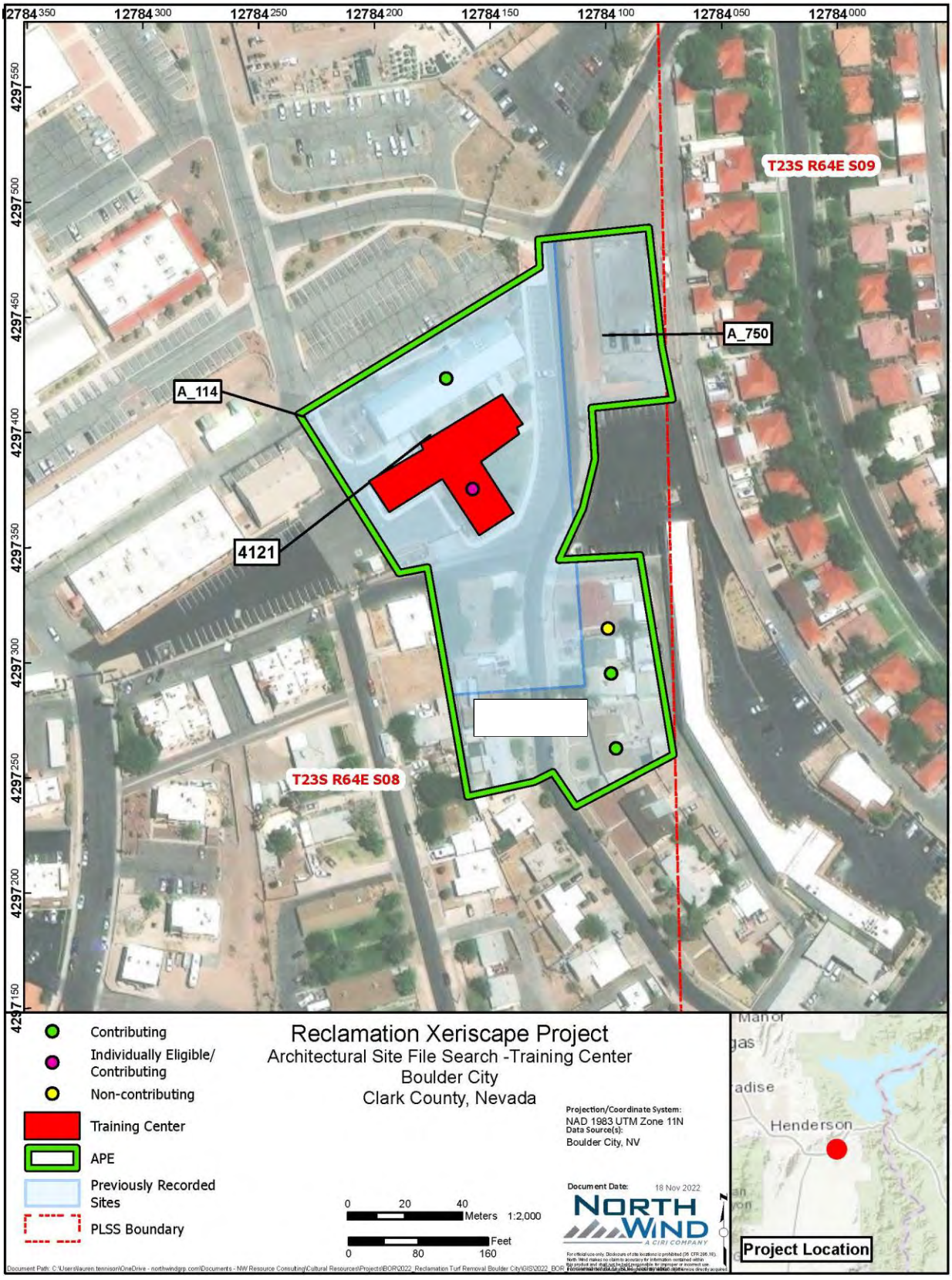


Figure 12. Site File Search map of architectural resources intersecting the recommended APE for the Training Center.

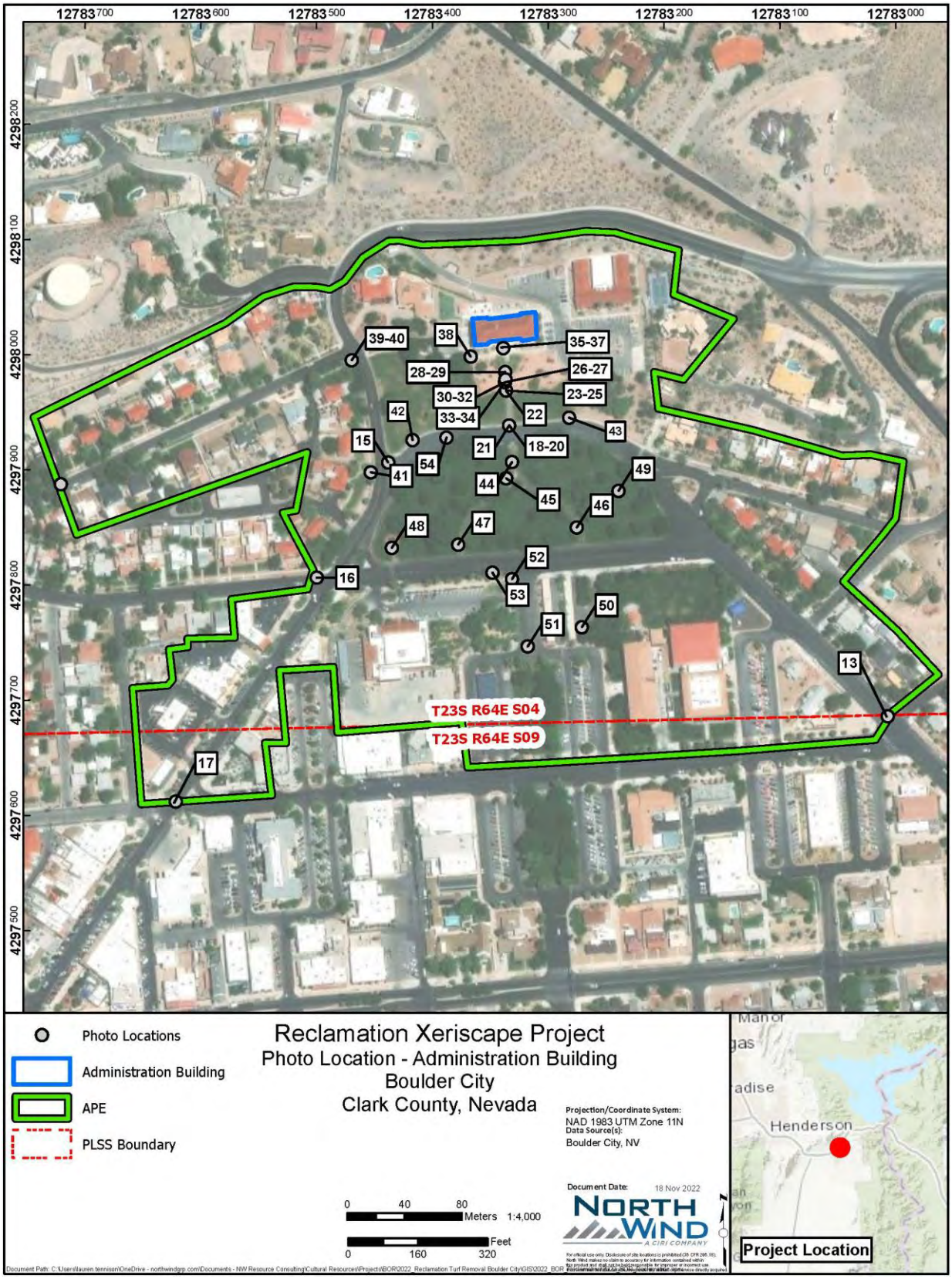


Figure 13. Recommended APE with photograph locations (see Photographs 13-54 in Photographs of the Training Center and Recommended APE

Photograph 1. View of the Training Center from Railroad Avenue and Arizona Street, facing southwest. Red arrow denotes the court area (Google Streetview 2016).

Photograph 2. View of the Training Center and court from Railroad Avenue and Hoover Drive, facing southwest. Red arrow denotes the court area.

Photograph 3. View of southeast corner of Training Center and court, facing north. Red arrow denotes the court area.

Photograph 4. View of east border of the Training Center court, facing north. Red arrow denotes the court area.

Photograph 5. View of southeast façade of the Training Center and court, facing northwest.

Photograph 6. View of Training Center and court, facing northwest.

Photograph 7. View of Training Center and court, facing southwest.

Photograph 8. View of Training Center and court, facing southwest.

Photograph 9. View of Date Street from Training Center parking, facing north. City-owned storage area is background right. North corner of Training Center court is visible at left.

Photograph 10. View of City-owned storage area (raised area with steps at left), and north end of rear parking lot of Best Western Motel (walled area center and right of photo) from Training Center parking area, facing northeast.

Photograph 11. View of north parking lot of Best Western Motel, directly across from Training Center, facing east.

Photograph 12. View of north end of Best Western motel across street from Training Center, taken from Training Center parking area, facing southeast.

Photographs of the Administration Building and Recommended APE section).

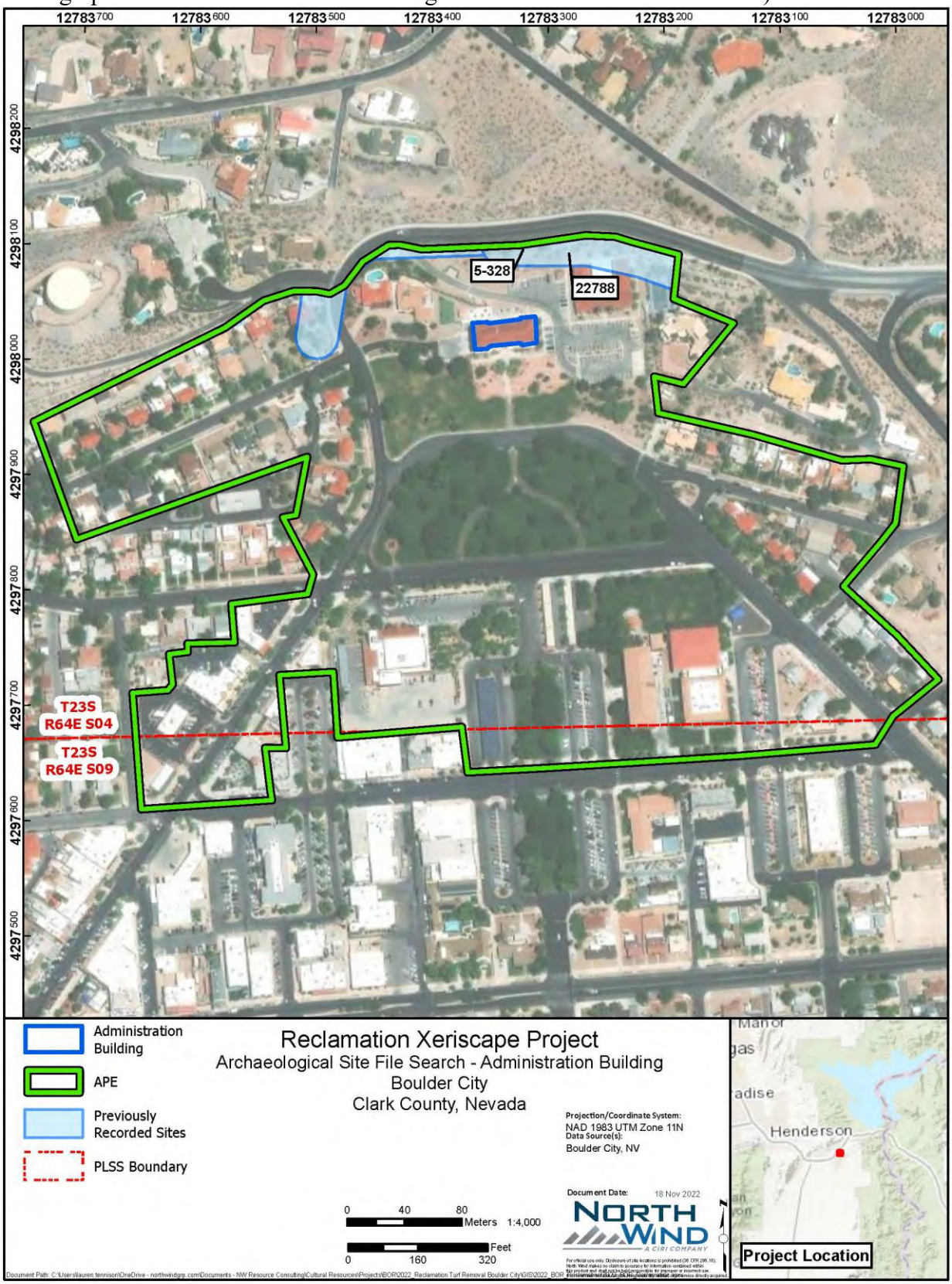


Figure 14. Site File Search Map of archaeological resources intersecting the recommended APE for the Administration Building.

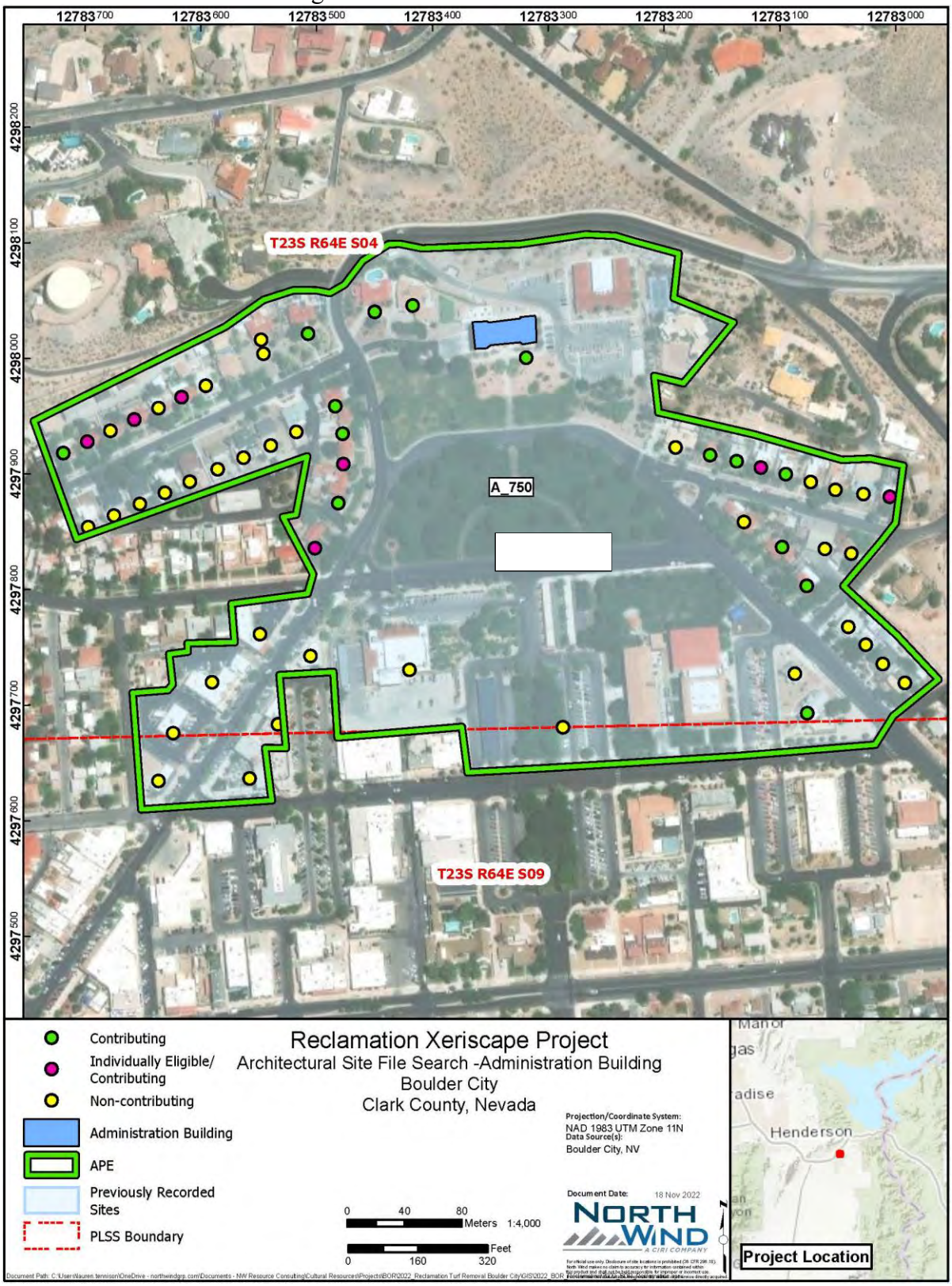


Figure 15. Site File Search map of architectural resources intersecting the recommended APE for the Administration Building.

Photographs of the Training Center and Recommended APE

Photograph 1. View of the Training Center from Railroad Avenue and Arizona Street, facing southwest. Red arrow denotes the court area (Google Streetview 2016).

Photograph 2. View of the Training Center and court from Railroad Avenue and Hoover Drive, facing southwest. Red arrow denotes the court area.

Photograph 3. View of southeast corner of Training Center and court, facing north. Red arrow denotes the court area.

Photograph 4. View of east border of the Training Center court, facing north. Red arrow denotes the court area.

Photograph 5. View of southeast façade of the Training Center and court, facing northwest.

Photograph 6. View of Training Center and court, facing northwest.

Photograph 7. View of Training Center and court, facing southwest.

Photograph 8. View of Training Center and court, facing southwest.

Photograph 9. View of Date Street from Training Center parking, facing north. City-owned storage area is background right. North corner of Training Center court is visible at left.

Photograph 10. View of City-owned storage area (raised area with steps at left), and north end of rear parking lot of Best Western Motel (walled area center and right of photo) from Training Center parking area, facing northeast.

Photograph 11. View of north parking lot of Best Western Motel, directly across from Training Center, facing east.

Photograph 12. View of north end of Best Western motel across street from Training Center, taken from Training Center parking area, facing southeast.

Photographs of the Administration Building and Recommended APE

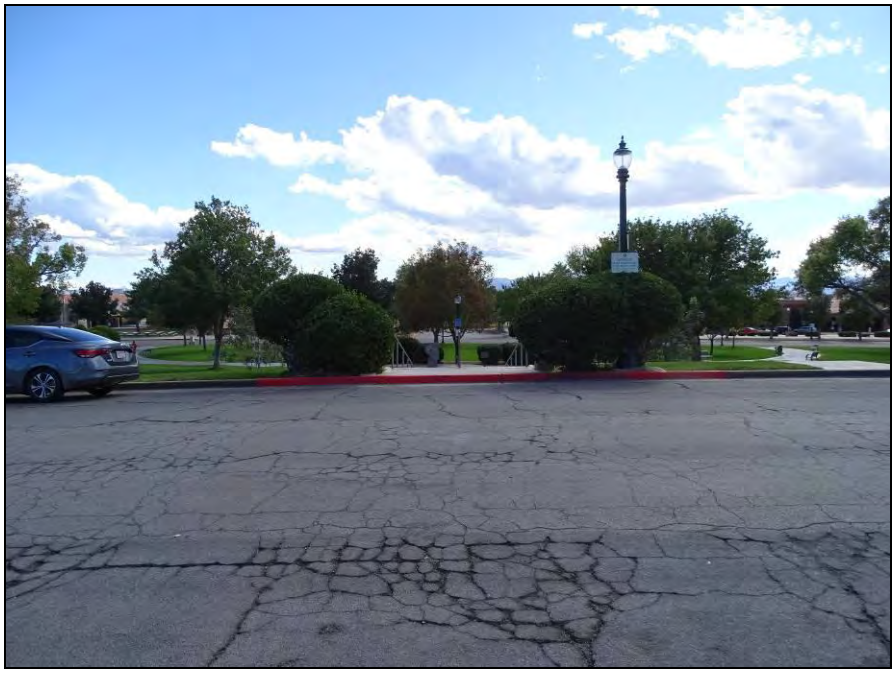
Photograph 13. View of Administration Building and Government Hill (denoted by red arrow) from the intersection of Utah and Arizona Streets, facing northwest.

Photograph 14. View of Government Hill (denoted by red arrow) from Denver Street, approximately 200 feet east of the intersection of Denver and Ash Streets, facing northeast.

Photograph 15. View of southwest corner of Government Hill from the intersection of Park Street and Nevada Way, facing north.

Photograph 16. View of southwest corner of Wilbur Square and Government Hill (denoted by red arrow) from the intersection of Colorado Street and Nevada Way, facing northeast.

Photograph 17. View of Administration Building and Government Hill (denoted by red arrow) from the intersection of Nevada Way and Arizona Street, facing northeast.



Photograph 18. View of north entrance to Wilbur Square from the south entrance to the Administration Building on Park Street, facing south.

Photograph 19. View of the north entrance and northwest boundary of Wilbur Square from the south entrance to the Administration Building on Park Street, facing southwest.

Photograph 20. View of northeast boundary of Wilbur Square from the south entrance to the Administration Building on Park Street, facing southeast.

Photograph 21. View of Administration Building and Government Hill steps from the south entrance to the property from Park Street, facing north.


Photograph 22. View of Administration Building, Government Hill steps, and center xeriscape area from the north-south path, facing north.

Photograph 23. View of grassy slope of Government Hill and Wilbur Square (across Park Street) from north-south path leading to the Administration Building, facing south.

Photograph 24. View of grassy slope of Government Hill and Wilbur Square (across Park Street) from north-south path leading to the Administration Building, facing southwest.

Photograph 25. View of grassy slope of Government Hill and Wilbur Square (across Park Street) from north-south path leading to the Administration Building, facing southeast.

Photograph 26. View of center xeriscape area on Government Hill from bottom of upper steps on path leading to the Administration Building, facing northwest. Note: stone retaining wall added ca. 2001.

Photograph 27. View of center xeriscape area on Government Hill from bottom of upper steps on path leading to the Administration Building, facing northeast. Note: Annex Building in right background, also on the Administration Building property. Note: stone retaining wall added ca. 2001.

Photograph 28. View of center xeriscape area on Government Hill from top of upper steps on path leading to the Administration Building, facing northeast. Note: Annex Building in right background, also on the Administration Building property.

Photograph 29. View of center xeriscape area on Government Hill from top of upper steps on path leading to the Administration Building, facing northwest.

Photograph 30. View of Wilbur Square and center xeriscape area on Government Hill from top of upper steps on path leading to the Administration Building, facing southwest.

Photograph 31. View of Wilbur Square and center xeriscape area on Government Hill from top of upper steps on path leading to the Administration Building, facing southeast.

Photograph 32. View of Wilbur Square and center xeriscape area on Government Hill from top of upper steps on path leading to the Administration Building, facing south.

Photograph 33. View of center xeriscape area on Government Hill from top of upper steps on path leading to the Administration Building, facing east. Note: Annex Building in left background, and 4 Hillside Drive left of center background.

Photograph 34. View of center xeriscape area on Government Hill from top of upper steps on path leading to the Administration Building, facing west. Note: residential properties on west side of Nevada Way in background.

Photograph 35. View of center xeriscape area of Government Hill, and Wilbur Square, from main (south) entrance to Administration Building, facing south.

Photograph 36. View of center xeriscape area of Government Hill, and Wilbur Square, from main (south) entrance to Administration Building, facing southwest. Note: sandy colored concrete squares added ca. 1999.

Photograph 37. View of center xeriscape area of Government Hill, and Wilbur Square, from main (south) entrance to Administration Building, facing southeast. Note: sandy colored concrete squares added ca. 1999.

Photograph 38. View of sidewalk, steps, and modern retaining wall at north boundary of turf area, southwest of the Administration Building, facing west.

Photograph 39. View of north sidewalk, west façade of Administration Building, and Government Hill from Nevada Way, facing east.

Photograph 40. View of west boundary of Government Hill from Nevada Way and Denver Street, facing south.

Photograph 41. View of southwest corner of Government Hill (center), Nevada Way (left), and Park Street (right), facing northeast.

Photograph 42. View of southwest corner of Government Hill from Park Street, facing northeast.

Photograph 43. View of east side of Government Hill from modern xeriscape area at southeast corner of the hill, facing northwest.

Photograph 44. View of Administration Building (center) and Government Hill from bottom of north entrance steps to Wilbur Park, facing north.

Photograph 45. View of Administration Building, Government Hill, and north entrance steps to Wilbur Park from the fork in the paths, facing northeast.

Photograph 46. View of Administration Building, Government Hill, and north entrance steps to Wilbur Park from the east fork in the path, facing northwest.

Photograph 47. View of Administration Building, Government Hill, and north entrance steps to Wilbur Park from the west fork in the path, facing northeast.

Photograph 48. View of Government Hill (denoted by red arrow) from southwest corner of Wilbur Square, facing northeast.

Photograph 49. View of Government Hill from west boundary of Wilbur Square, facing northwest. Note: modern xeriscape area at southeast corner of Government Hill at right, just beyond the two automobiles.

Photograph 50. View of Wilbur Square and Government Hill (denoted by red arrow) from parking area south of Colorado Street, northwest of City Hall, 400 California Street, facing north.

Photograph 51. View of Administration Building, Government Hill (denoted by red arrow), and Wilbur Square from California Avenue at North Escalante Park, facing north.

Photograph 52. View of Government Hill from intersection of Colorado Street and California Avenue, facing northeast toward modern xeriscape area at southeast corner of Government Hill.

Photograph 53. View toward Wilbur Park and Government Hill from intersection of Colorado Street and California Avenue, facing northwest.

Photograph 54. View east on Park Street toward modern xeriscape area at southeast corner of Government Hill from approximately 150 feet east of Nevada Way.

Attachment 1: Proposed Design Plans

Appendix C

Nevada State Historic Preservation Office, “NHPA Section 106 consultation for Landscaping Revisions, Administration Building and Conference and Training Center, Bureau of Reclamation Lower Colorado Region, Boulder City, dark County, Nevada; LC-2631; ENV-3.00; UT 2021-6765; 29880, letter dated December 21, 2022”, from the Nevada State Historic Preservation Officer to Reclamation.

NEVADA
STATE HISTORIC PRESERVATION OFFICE

STATE OF NEVADA
Department of Conservation & Natural Resources
Steve Sisolak, *Governor*
James R. Lawrence, *Acting Director*
Rebecca Palmer, *Administrator*

December 21, 2022

Shonna Dooman
Chief, Resource Management Office
Lower Colorado Basin Region
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

RE: NHPA Section 106 consultation for Landscaping Revisions, Administration Building and Conference and Training Center, Bureau of Reclamation Lower Colorado Region, Boulder City, Clark County, Nevada; LC-2631; ENV-3.00; UT 2021-6765; 29880

Dear Ms. Dooman:

The Nevada State Historic Preservation Office (SHPO) has reviewed the subject documents received November 22, 2022 in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended.

Project Description
The Bureau of Reclamation (BREC) has provided the SHPO with a revised design proposal for the proposed landscaping changes at the Administration Building (1200 Park Street) and the Conference and Training Center (500 Date Street) in Boulder City. These landscaping changes are a response to Nevada Legislature Assembly Bill No. 356 "AN ACT relating to water; prohibiting, with certain exceptions, the use of water from the Colorado River to irrigate nonfunctional turf on certain property…"

The proposed 30% design drawings include the following:

At the Administration Building, the existing turf lawn will be entirely removed and replaced with new xeriscaping. The proposed new landscape design will include a deep root drip system with "smart" irrigation monitoring and a control system as well as hardscape improvements such as graded concrete pathways with retaining walls, bench seating areas and pavers, as well as a new sidewalk with an accessible pedestrian entry at the southeast corner of Nevada Way and Denver Street. Interpretive and directional signage as well as lighting, boulders, and artifacts will be incorporated into the design.

At the Training Center, the existing turf will be removed and replaced with xeriscaping and a modern, zoned drip irrigation system to increase efficiency. New signage, lighting, paving, light bollards and drought resistant plants will also be incorporated into the design. The ash tree will remain.

Area of Potential Effect (APE)
The BREC has defined two distinct APEs: one for the Administration Building and one for the Training Center. For the Administration Building, the APE is defined as the subject property as well as the adjacent properties, extending roughly one block in each direction away from the Administration Building. For the Training Center, the APE is defined as the subject property and the immediately adjacent properties to the east and south. The SHPO **agrees** with the entire APE as defined.

Identification and Evaluation of Historic Properties
BREC notes that the APE for this undertaking is within the Boulder City Historic District (83001107) which was listed in the National Register of Historic Places (NRHP) in 1983 under Criteria A and C. The nomination form states this historic district meets the criteria of 14 areas of significance and "holds **national significance** for its place in the history of American City Planning as the first full-developed experiment in new town planning as promoted by the Community Planning Movement…"

The SHPO concurred in our letter of August 25, 2021 that the Administration Building (B18782) is individually eligible for listing in the NRHP and is a contributing resource to the Boulder City Historic District. The lawn of the Administration Building is a contributing feature to this resource. The SHPO also concurred on August 25, 2021 that the Training Center (B18607 and B18608) is individually eligible as well as a contributing resource to the historic district. The BREC performed an inventory of properties within the APE and identified several individually eligible and contributing resources to the historic district. These properties are listed in the agency's letter.

Native American Consultation
The SHPO understands that consultation with the affected Native American tribes has been initiated per 36 CFR §800.3(f)(2). If consultation results in the identification of properties of religious and/or cultural significance that could be affected by the undertaking, the BREC must consult with this office concerning the National Register eligibility of historic properties and possible effects of the undertaking per 36 CFR §800.4(c) and 36 CFR §800.4(d). Please provide our office with any comments that are received for the SHPO administrative record.

Consultation with Interested Parties
The SHPO acknowledges receipt of documentation that consultation with the public and representatives of organizations that have a demonstrated interest in historic properties has been concluded per 36 CFR §800.2(c)(5) and 36 CFR §800.2(d). Comments provided by the Boulder City administration, the Boulder City Historic Preservation Commission (Boulder City is a Certified Local Government (CLG)), and the public have been received by the BREC and shared with the SHPO. For our administrative record, please forward a copy of the Commission's December 7, 2022 agenda and meeting minutes to supplement BREC's "12/7/2022 Meeting Notes". If additional public comments are received by BREC, please forward to our office for our administrative record.

Finding of Effect
As this undertaking is not consistent with *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, the SHPO **concurs** with BREC's finding of **Adverse Effect** for this undertaking.

The agency letter discusses alternatives that have been considered for this project. To clarify, the SHPO's September 6, 2022 email requested "e.g. alternatives for other conceptual landscape designs" that were considered for this project. The current 30% design submittal illustrates an extensive proposed planting plan on drawings L2.01, L2.02, and L3.01. Although the grass lawn will be removed, considerable vegetation will be replanted in its place. Please clarify for the public if this proposed planting plan fully meets the intent of Nevada Legislature Assembly Bill No. 356 and will also use substantially less water than the grass turf lawn presently does.

Please also clarify for the administrative record which comments from the 12/7/2022 meeting minutes of the Boulder City Historic Preservation Commission will be incorporated into this project.

The SHPO looks forward to continued consultation to determine adequate mitigation and the development of a Memorandum of Agreement for this undertaking.

BREC states that the agency will be incorporating interpretive information and materials into this project to highlight the history of the building, lawn, and Boulder City.

As these individually NRHP eligible buildings and historic district are nationally significant, HALS documentation of the existing landscape may also be an appropriate mitigation stipulation for this undertaking. This suggestion should be explored in consultation with the National Park Service for their input and guidance. HALS documentation photos will need to include the entire setting of the Administration Building's front lawn e.g., especially its relationship to Wilbur Square etc. If there are other BREC owned landscape features within the Boulder City Historic District that will also need to be changed to meet AB 356, it might be helpful to document those features as part of this HALS documentation effort.

The draft MOA word document should be emailed to our SHPO, Rebecca Palmer at rlpalmer@shpo.nv.gov

Should you have questions concerning this correspondence, please contact me at (775) 684-3437 or via email at rreed@shpo.nv.gov

Sincerely,

Robin K. Reed

Robin K. Reed
Deputy State Historic Preservation Officer

Appendix D

Memorandum of Agreement Between the Bureau of Reclamation and the Nevada State Historic Preservation Officer for Proposed Revisions to Landscaping at the Administration Building and the Training Center of the Date Street Complex, Bureau of Reclamation Lower Colorado Basin Region, Boulder City, Clark County, Nevada,
Dated February 13, 2023.

NEVADA
STATE HISTORIC PRESERVATION OFFICE

STATE OF NEVADA
Department of Conservation and Natural Resources

Joe Lombardo, *Governor*
James A. Settelmeyer, *Director*
Rebecca L. Palmer, *Administrator*

February 13, 2023

Shonna Dooman
Chief, Resource Management Office
Lower Colorado Basin Region
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

RE: Signed Memorandum of Agreement (MOA) for the Landscaping Revisions, Administration Building and Conference and Training Center, Bureau of Reclamation Lower Colorado Region, Boulder City, Clark County, Nevada; LC-2631; ENV-3.00; UT 2021-6765; 34183

Dear Ms. Dooman:

The Nevada State Historic Preservation Office (SHPO) has signed the MOA titled *Memorandum of Agreement Between the Bureau of Reclamation and The Nevada State Historic Preservation Officer For Proposed Revisions to Landscaping at The Administration Building And The Training Center Of The Date Street Complex, Bureau Of Reclamation Lower Colorado Basin Region, Boulder City, Clark County, Nevada.*

Once the Concurring Party has signed this document if they wish, please submit this document for filing to the Advisory Council on Historic Preservation and provide my office with a good quality scan or a hard copy in good quality.

We will post the executed document on our website here: https://shpo.nv.gov/agreements

If you have any questions concerning this correspondence, please do not hesitate to contact me at rlpalmer@shpo.nv.gov or by phone at 775-684-3443.

Sincerely,

Rebecca Lynn Palmer
Nevada State Historic Preservation Officer, Administrator

MEMORANDUM OF AGREEMENT
BETWEEN
THE BUREAU OF RECLAMATION
AND
THE NEVADA STATE HISTORIC PRESERVATION OFFICER
FOR PROPOSED REVISIONS TO LANDSCAPING AT THE ADMINISTRATION BUILDING AND THE TRAINING CENTER OF THE DATE STREET COMPLEX, BUREAU OF RECLAMATION LOWER COLORADO BASIN REGION, BOULDER CITY, CLARK COUNTY, NEVADA

WHEREAS, the Bureau of Reclamation (Reclamation), Lower Colorado Basin Regional Office (LCBRO) is proposing to remove existing turf and trees from the south and west slopes of "Government Hill" south of the Administration Building, located at 1200 Park Street, and to remove turf in front of the main façade of Building 100 of the Date Street Complex (formerly the Bureau of Reclamation Engineering Laboratory and also commonly known as, hereinafter to be referred to as the "Training Center"), located at 500 Date Street (the undertaking) in response to the requirements of the 2021 Statutes of Nevada, Chapter 364, regarding water usage on non-functional lawns thereby making the undertaking subject to review under 54 U.S.C. § 306108 and its implementing regulations found at 36 CFR Part 800; and

WHEREAS, Reclamation, in consultation with the SHPO, determined that the undertaking's Area of Potential Effects (APE) is defined by two discontiguous locations. The Training Center portion is generally bounded by Reclamation Building 200 and a City-owned storage yard (511 Date Street) on the north, the north parking lot of the Best Western Hotel (704 Nevada Way), and three residential properties (517, 521, and 525 Date Street) on the east, and three residential properties (516, 528, and 532 Date Street) on the west. The Administration Building portion is bounded by the Administration Building property and residential properties along both sides of Denver Street (beginning 200 feet east of Ash Street and ending at Nevada Way) and Park Street (between Utah Street and Park Place) on the north, residential and public properties along Utah Street (between Park and Arizona Streets) on the east, religious and public properties along Arizona Street (between Utah Street and Nevada Way) on the south, and commercial, public, and residential properties along Nevada Way (between Mountain View Place and Arizona Street) on the west (Appendix A, Figure A.2); and

WHEREAS, Reclamation, in consultation with the SHPO, has determined that four historic properties are present in the APE for the undertaking, the Boulder City Historic District (NRIS 83001107), the Administration Building (B18782), the Training Center (B18607), and the designed landscaping in front of the Administration Building which is a contributing element to the Boulder City Historic District; and

WHEREAS, Reclamation, in consultation with the SHPO, has applied the criteria of adverse effect in accordance with 36 CFR § 800.5(a) and found that the undertaking will have an adverse effect on the Boulder City Historic District and the designed landscaping in front of the Administrative Building; and

WHEREAS, Reclamation presented the undertaking to Boulder City's Historic Preservation

Commission (HPC) on December 7, 2022 and the HPC requested the use of solely native Mojave vegetation, the installation of interpretive signage to identify the plant species, the preservation of the "patina" of the historic central steps at the Administration Building site, the preservation of the unimpeded view of the main (south) entrance of the Administration Building as seen from the bottom of the historic steps at Park Street, and editorial review of interpretive markers with historic content; and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1) Reclamation has notified the Advisory Council on Historic Preservation (ACHP) of its adverse effect finding and provided the ACHP with the documentation specified at 36 CFR § 800.11(e); and

WHEREAS, in accordance with 36 CFR § 800.2, Reclamation has consulted with Las Vegas Paiute Tribe, the Moapa Band of Paiutes, the Chemehuevi Indian Tribe, and the Colorado River Indian Tribes that may have an interest in the undertaking and received no comments; and

WHEREAS, the Signatories agree that this Memorandum of Agreement (MOA) may be signed in counterparts with digital signatures being acceptable and the executed MOA, and each signature, will be effective and binding as if all the Signatories had signed the same document; and

NOW, THEREFORE, Reclamation and the SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

Stipulations

Reclamation shall ensure the following stipulations are carried out:

1. Reclamation will prepare an Historic American Landscape Survey (HALS) document for the landscaped areas of the Training Center and Administration Building

    A. Reclamation shall contact with the regional Historic American Building Survey/Historic American Engineering Record/Historic American Landscape Survey (HABS/HAER/HALS) coordinator at the National Park Service Interior Regions 8, 9, 10, and 12 Regional Office (NPS) to request that NPS stipulate the level and procedures for completing the documentation prior to any construction or ground disturbance associated with the undertaking. Reclamation will submit an electronic copy to the SHPO within ten (10) days of receiving the NPS stipulation letter. The NPS stipulation letter will be labelled as Appendix B and attached to the MOA.

    B. Reclamation, through a cultural resource management (hereafter "CRM") firm meeting the Secretary of the Interior's Professional Qualifications standards, will complete the HALS draft documentation. The CRM firm will prepare the draft HALS narrative report format documentation to include, but not be limited to, a location map, measured site plan, and high quality large-format photographs of the property.

C. Reclamation, upon completion of the photo documentation phase, shall submit draft images to the NPS and the SHPO for a concurrent review and comment period. The SHPO will provide comments within fifteen (15) calendar days of receipt of the draft materials.

D. Reclamation, through the CRM firm, shall revise the draft images to address all NPS and SHPO comments.

E. Following the review and acceptance of the photos by the NPS, Reclamation may begin construction of the xeriscape project.

F. Reclamation shall submit the narrative report draft HALS documentation to NPS and the SHPO. The SHPO will provide comment on the revised draft documentation within thirty (30) calendar days of receipt. If the SHPO does not respond within the thirty (30) calendar day comment period, Reclamation may finalize the documentation and images in consultation with the NPS HALS Program Administrator.

G. Reclamation, upon receipt of comments on the draft HALS documentation from NPS and the SHPO, and through their CRM firm, shall revise the draft documentation to address the NPS and the SHPO comments and provide the revised HALS documentation to NPS and the SHPO.

H. Reclamation shall provide the final HALS documents to NPS in accordance with their direction in the comment letter (Appendix B).

2. Interpretative Materials.

A. Reclamation will develop a draft interpretive display of suitable size and in an accessible location that will convey historical information regarding the Training Center and Administration Building. The display will present relevant information about Reclamation, Hoover Dam, the original plan for Boulder City as designed by city planner S. R. DeBoer that encouraged lush landscaping throughout Boulder City, and Reclamation's landscape architect Wilbur W. Weed's planting plan for Reclamation properties and Boulder City.

B. Reclamation shall submit the draft layout and text information to the SHPO and the HPC for review and comment. The draft exhibit submission will include photographs (historic as well as high quality modern images), narrative text, and information regarding specific plant species and their locations in the proposed planting plan for the Administration Building.

C. The SHPO will review the draft interpretive display submission within thirty (30) calendar days of receipt. The SHPO will send its comments to Reclamation. Reclamation will address all SHPO and HPC comments in the development of the

final documents or other deliverables. If the SHPO does not provide comment within thirty (30) days of receipt, Reclamation may finalize the interpretive materials and construct the interpretive display.

3. Retention of historic view of the Administration Building and the Training Center from the public right-of-way.

   A. Reclamation will retain the historic, unimpeded view of the main (south) entrance of the Administration Building from Park Street, when viewing from the bottom of the historic steps, through the use of low-lying vegetation adjacent to the historic concrete steps.

   B. Reclamation will preserve the historic setting of the Training Center and the Date Street streetscape through the use of low-lying vegetation throughout the specified project area that will not diminish the prominence of the single ash tree or impact the view of the Training Center from the public right-of-way or from the adjacent Reclamation properties located on the Date Street campus.

4. Retention of historic materials of the Administration Building.

   A. Reclamation will retain the historic Government Hill concrete steps and landings in front of the main (south) entrance of the Administration Building in their entirety, as well as historic curbs and gutters at the perimeter of the Administration Building property and adjacent to the specified project area.

5. Duration

This MOA will expire if its stipulations are not carried out within five (5) years from the date of its execution. At such time, and prior to work continuing the Undertaking, Reclamation shall either (a) execute a MOA pursuant to 36 CFR § 800.6, or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. Prior to such time, Reclamation may consult with the SHPO to reconsider the terms of the MOA and amend it in accordance with Stipulation 4 below. Reclamation shall notify the SHPO as to the course of action it will pursue.

6. Dispute Resolution

Should any Signatory to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, Reclamation shall consult with such party to resolve the objection. If Reclamation determines that such objection cannot be resolved, Reclamation will:

   A. Forward all documentation relevant to the dispute, including Reclamation's proposed resolution, to the ACHP. The ACHP shall provide Reclamation with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, Reclamation shall

prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, the SHPO, and other consulting parties, and provide them with a copy of this written response. Reclamation will then proceed according to its final decision.

B. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, Reclamation may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, Reclamation shall prepare a written response that takes into account any timely comments regarding the dispute from the SHPO and other consulting parties to the MOA and provide them and the ACHP with a copy of such written response.

C. Reclamation's responsibilities to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged.

7. Amendment

This MOA may be amended when such an amendment is agreed to in writing by all Signatories. The amendment will be effective on the date a copy signed by all the Signatories is filed with the ACHP.

8. Termination

If any Signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other party to attempt to develop an amendment per Stipulation 5, above. If within thirty (30) days an amendment cannot be reached, any Signatory may terminate the MOA upon written notification to the other Signatory.

Once the MOA is terminated, and prior to work continuing on the Undertaking, Reclamation must either (a) execute a MOA pursuant to 36 CFR § 800.6, or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. Reclamation shall notify the NSHPO as to the course of action it will pursue.

EXECUTION of this MOA by Reclamation and the SHPO, and the implementation of its terms, will evidence that Reclamation has afforded the ACHP an opportunity to comment on the Undertaking and that Reclamation has taken into account the effects of the Undertaking on historic properties.

[Remainder of page intentionally blank]

SIGNATORY PARTIES

BUREAU OF RECLAMATION

By: Michael J. Boyles Date: 2-13-23

Acting for Shonna Dooman, Chief, Resource Management Office, Lower Colorado Basin Regional Office

NEVADA STATE HISTORIC PRESERVATION OFFICER

By: Rebecca L. Palmer Date: 02/13/2023

Rebecca L. Palmer, Nevada Historic Preservation Officer

CONCURRING PARTY

BOULDER CITY HISTORIC PRESERVATION COMMISSION

By: _____ Date: _____

Blair Davenport, Chair

Appendix A
Exhibits

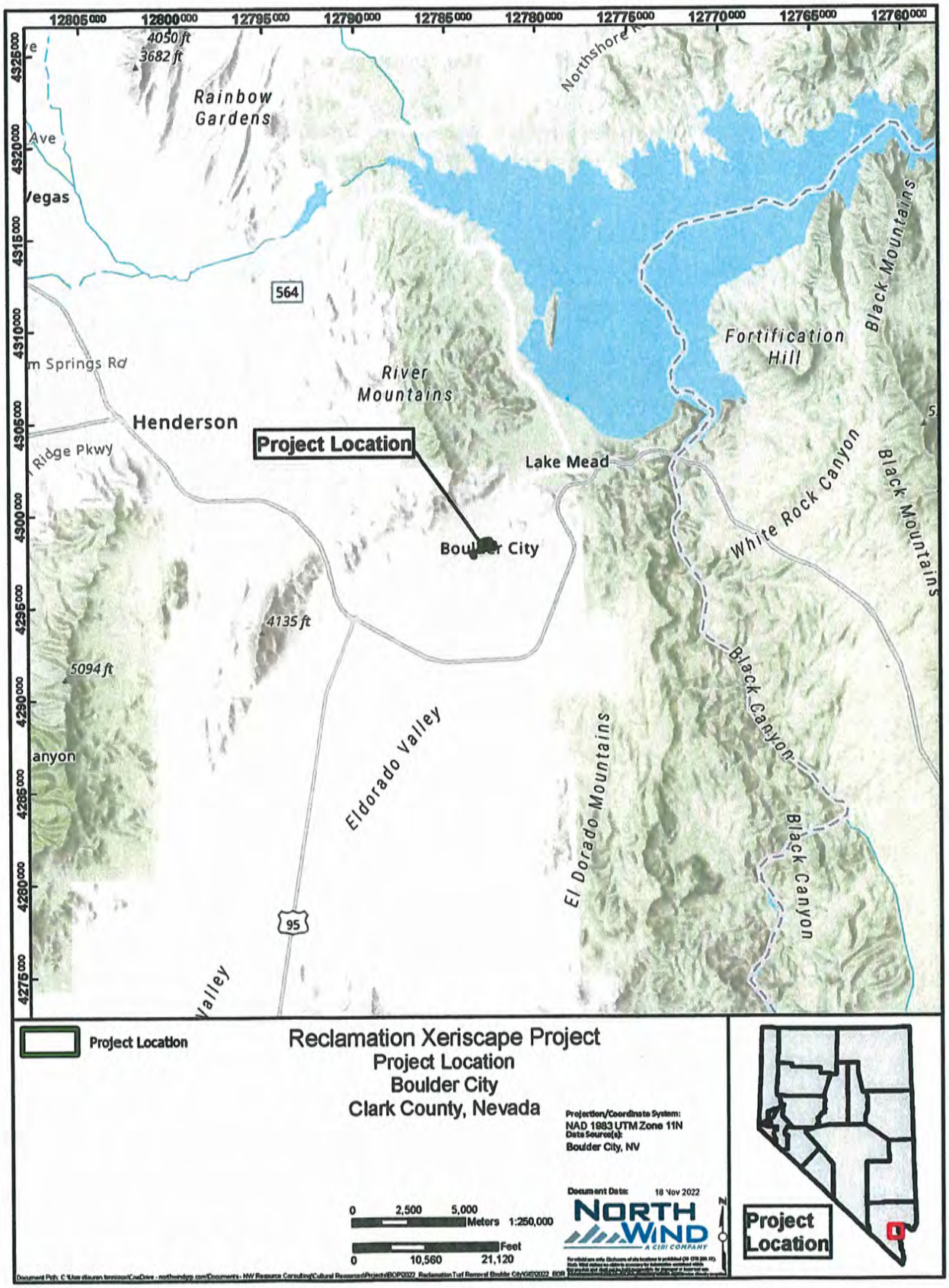


Figure A.1. Project Location Map.

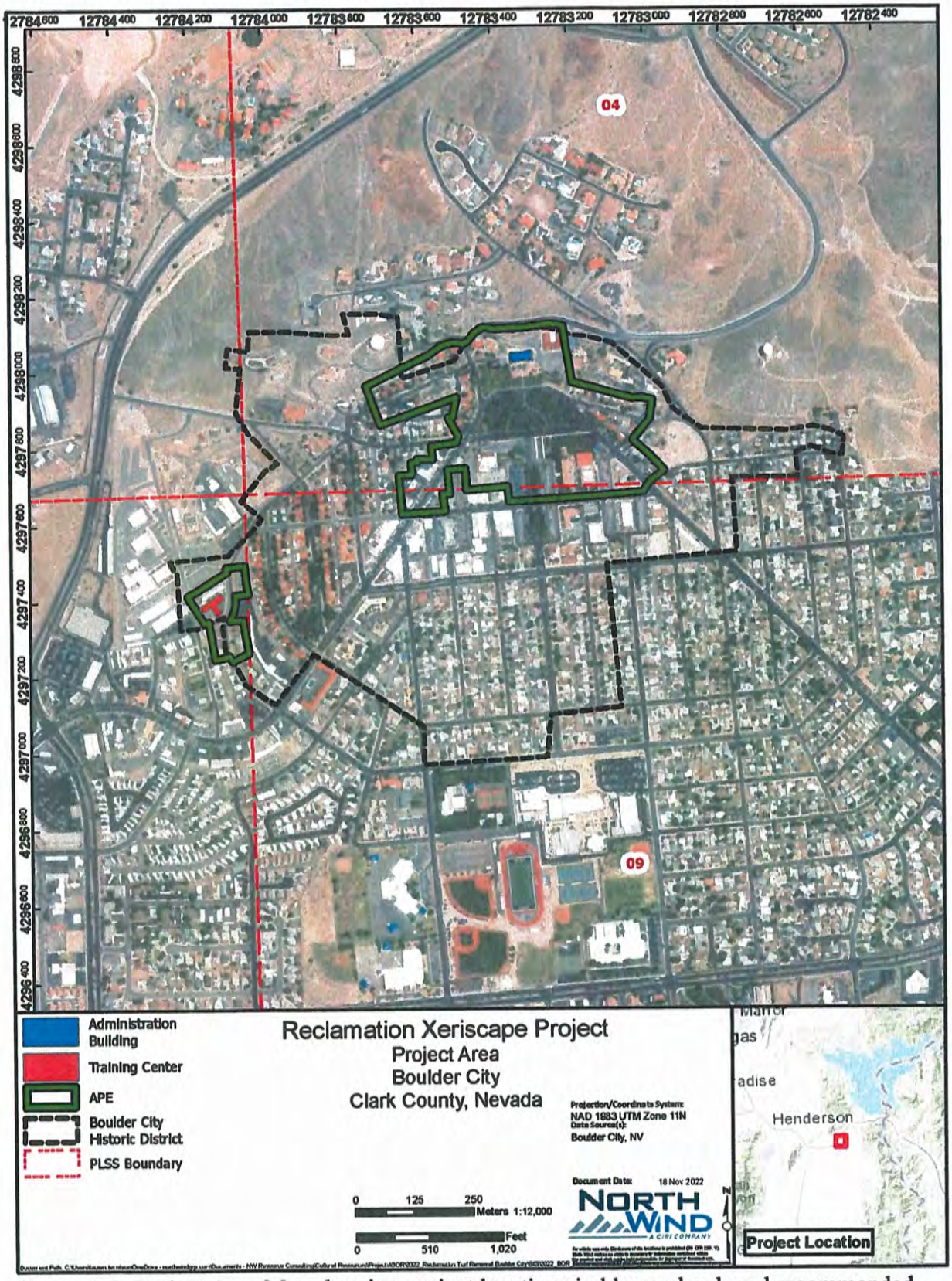


Figure A.2. Project Area Map showing project locations in blue and red, and recommended APEs in green.

Figure A.3. View of Administration Building and Government Hill from Park Street, facing north.

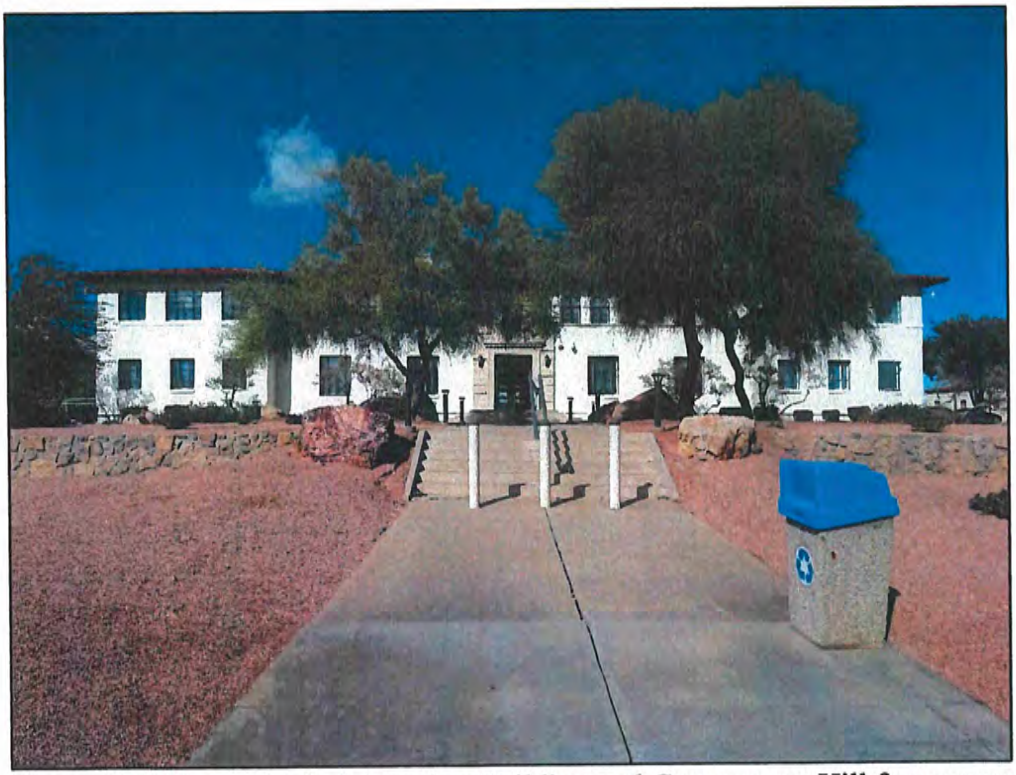


Figure A.4. View of Administration Building and Government Hill from concrete landing on central walkway, facing north.

Figure A.5. View of Administration Building and Government Hill from Nevada Way and Park Street, facing northeast.

Figure A.6. View of the Training Center from Date Street, facing southwest.

Appendix B

National Park Service's Historic American Landscapes (HALS) Survey Guidance

United States Department of the Interior

NATIONAL PARK SERVICE
Interior Regions 8, 9, 10, and 12
909 First Ave., Fifth Floor
Seattle, WA 98104

8.A.4 (SF-CR) (H40)

February 14, 2023

Justin DeMaio
Regional Archaeologist
Interior Region 8, Lower Colorado Basin
Bureau of Reclamation
500 Date Street
Boulder City, NV 89005

Re: Stipulation for HALS documentation of the Bureau of Reclamation Administration Building and Date Street Complex Training Center

Dear Mr. DeMaio,

Thank you for providing a copy of the Memorandum of Agreement (MOA) between the Bureau of Reclamation (Reclamation) and the Nevada State Historic Preservation Officer (SHPO) for Proposed Revisions to Landscaping at the Administration Building and the Training Center of the Date Street Complex, Bureau of Reclamation Lower Colorado Basin Region, Boulder City, Clark County, Nevada. The MOA stipulates that Reclamation shall contact the regional HABS/HAER/HALS coordinator at the National Park Service regional office to stipulate the level and procedures for completing the documentation. This letter is in response to your request for stipulation.

HALS recordation will consist of two submissions: one for the Administration Building/Government Hill and one for the Bureau of Reclamation Engineering Laboratory/Training Center Court. Documentation for the Administration Building will consist of photographs, written historical and descriptive data, and reduced copies of measured drawings. The drawing set will consist of a site plan, section drawings, and any other drawings necessary to capture landscape characteristics and features not easily conveyed through written description or photography. Documentation for the Training Center will consist of photographs and written historical and descriptive data, with a site plan or sketch plan included as a figure at the end of the written report.

Please note that the historic name is used as the primary name in HALS documentation. This is typically the original name for the property, given at the time of construction. Also note that Historic American Buildings Survey (HABS) documentation already exists for the Bureau of Mines (BOM) Boulder City Experimentation Station (Date Street Complex) (HABS NV-35) within which the Training Center is located. The Training Center building is documented in a sub-report (HABS NV-35-A) under the name "Bureau of Mines Boulder City Experimentation Station, Administrative Offices and Laboratory Building." The same name can be used for the HALS documentation. Secondary names can be included in the title block in parentheses under the historic name.

At this time, we suggest treating the HALS documentation for the Administration Building and Training Center Court as sub-reports in anticipation of a potential future overview HALS report for the Boulder City Historic District. An overview and additional sub-reports are recommended if expected future landscape changes under [state law] AB 356 are considerable.

For additional guidance on naming conventions, refer to the HALS History Guidelines (pg. 9-10) at: https://www.nps.gov/hdp/standards/HALS/HALSHistoryGuidelines.pdf.

Written Historical and Descriptive Data

For both resources, please use the outline format for HALS documentation as described in the HALS historical report guidelines: https://www.nps.gov/hdp/standards/HALS/HALSHistoryGuidelines.pdf. Categories that are not applicable can be deleted or marked with N/A.

Bureau of Reclamation Administration Building and Government Hill

The written report will describe the history and significance of the Administration Building and its associated designed landscape in the context of the planning, development, and use of Boulder City as a federal "model city" built in support of the Hoover Dam and Boulder Canyon projects. The report will include discussion of the historic and current function of the property, as well as the design intent and public use of the landscaped lawn area over time. Please include description of the property's importance as a focal point of the Boulder City Historic District and its relationship to the adjacent Wilbur Square. The report will describe the existing conditions and physical characteristics of the landscape, as well as alterations over time. Please include description of all significant landscape characteristics and features including topography, buildings and structures, natural systems and features, spatial organization, vegetation, circulation, views and vistas, and small-scale features. The description of the Administration Building itself need not contain the level of detail required for HABS recordation; however, it must include description of the building's siting, style, form, massing, and other architectural details that contribute to the character of the cultural landscape.

Please also include reproductions of select historic photographs and plans as figures at the end of the written report. These should depict the historic character of the landscape and how it has changed over time. If legible at a reduced scale of 8 ½" x 11", reproductions of historic plans, including plans by S. R. DeBoer, can also be included as figures. Aerials and other photos that demonstrate the importance of the property as a visual focal point of the surrounding historic

district are also encouraged. Please note that all historic photographs, maps, and plans reproduced in HABS/HAER/HALS surveys must be in the public domain or released into the public domain via our copyright release form (copyright release form-pdf).

Bureau of Mines Boulder City Experimentation Station, Administrative Offices and Laboratory Building (Training Center)

The written report will describe the history and significance of the building and its associated designed landscape in the context of the development and use of the BOM Boulder City Experimental Station (Date Street Complex) as a complex within the Boulder City Historic District. The report will describe the historic and current use, design intent, existing conditions, and physical characteristics of the landscape, as well as alterations over time. Please include description of all significant landscape characteristics and features, including the resource's relationship to the surrounding Date Street Complex and the larger Boulder City Historic District. The description of the laboratory building itself need not contain the level of detail required for HABS recordation; however, it must include summary description of the building's siting, style, form, massing, and other architectural details that contribute to the character of the cultural landscape.

Please include reference to the existing HABS sub-report (HABS NV-35-A) for more specific information on the building. The HALS report also does not need to repeat the entire background history and context from the existing HABS overview for the BOM Boulder City Experimental Station (HABS NV-35). This information can be summarized with reference to the existing HABS documentation, but the HALS report must still be understandable as a stand-alone report.

Please include select historic photographs demonstrating the character of the landscape prior to alterations in the 1990s and 2000s. If legible at a reduced scale of 8 ½" x 11", reproductions of historic plans, including plans by S. R. DeBoer, can also be included as figures. Provide a signed copyright release form for any images that are not in the public domain.

Please also include a location map and site plan/sketch plan depicting the Training Center and associated lawn area as figures at the end of the written report. Clearly depict and label character-defining features and plantings, including species names, on the site plan.

Photographs

A full set of large format 4x5, 5x7, or 8 x10 inch black and white photographs are required for each report.

Follow the Photography Guidelines on the HDP website: https://www.nps.gov/hdp/standards/PhotoGuidelines.pdf. Two sets of photographs are required for the final submissions: one for the Library of Congress and one for the Nevada SHPO.

Please include a simple sketch plan or map as figures for each Index to Photographs marking the locations of the photographs.

The photographs must depict the landscape context and setting, significant views and vistas, and other character-defining features of the cultural landscapes.

For the Administration Building and Government Hill, please include views depicting the landscape as the visual termination for California Ave. Views from other approaches that reveal the topography and character of the landscape as a visual focal point of the district should also be included. Circulation features within the landscape as well as those that connect with adjacent streets and properties, Wilbur Square in particular, should also be photographed. Include photos of views and vistas both from and toward Government Hill that demonstrate its relationship to Wilbur Square. The photo set should also include close-up views of character-defining spaces and plantings within the landscape including lawn areas, trees, and shrubs. Please include elevation and oblique views of the administration building showing its siting and massing within the landscape.

The photo set for the Training Center Court should include views of the landscape from approaches on Date Street; elevation and oblique views of the building showing its siting and massing within the landscape; and close-up views of the lawn and other character-defining small-scale features and plantings, including the ash tree.

Reduced Copies of Measured Drawings

Due to the scale and significance of the landscape, HALS documentation of the Administration Building and Government Hill will include select drawings that depict the location and existing conditions of the designed landscape. The drawing set will consist of the following:

- Title sheet with location map, existing conditions plan, and significance statement. Existing conditions plan can be divided onto separate sheets if necessary. Contributing plantings including species names should be identified.
- Select representative section drawings depicting landscape characteristics and features not easily captured with photography or written description. The drawings should illustrate topography, spacing of plantings, the form and siting of the building, and characteristics of contributing tree species.

The following submissions offer examples of comparable drawing sets:

- Rancho Los Alamitos: Search Results: "Drawing: ca4055" - Prints & Photographs Online Catalog (Library of Congress) (loc.gov)
- Piedmont Way and the Berkeley Property Tract: Search Results: "Drawing: ca3441" - Prints & Photographs Online Catalog (Library of Congress) (loc.gov)
- Pond Farm Pottery, Sonoma County, CA: Pond Farm Pottery, 17000 Armstrong Woods Road, Guerneville, Sonoma County, CA (loc.gov)

The recommended sheet size will be 24” x 36” (usable drawing space of 21-¾” x 32”). We will send you the digital title block sheet after we have reviewed the draft documentation, which should include scans of the sheets proposed for reproduction. For the final submission, each full-size drawing set must also be accompanied by one set of reduced 8-1/2” x 11” copies on archival bond.

Finally, please include digital scans of the field notes used to produce any new drawings, as well as a statement describing where any original drawings are located which were used to produce drawings. All drawings should conform to HALS Drawing Guidelines, CAD Guidelines, and Transmittal Guidelines, available at HALS Guidelines | HABS/HAER/HALS (nps.gov). **Please note that while the posted HALS guidelines call for drawings to be reproduced on Mylar, the Library of Congress currently requires printing on Vellum.**

Submitting Draft Documentation

Please submit draft copies of the documentation electronically in Word format to our office for review. Please also include copies or scans of the large format photographs and drawings. We will review, assign HALS numbers, and return the draft with instructions for final preparation.

Once we have received and accepted the final documentation, we will submit it to the HABS/HAER/HALS Collection in the Library of Congress. A second copy should also be submitted that we will transmit to the California SHPO. You are responsible for distributing copies to any other parties if specified in the MOA.

Should you have any questions regarding this documentation, please contact me by email at christopher_e_johnson@nps.gov.

Sincerely,

Christopher E. Johnson, Ph.D.
Historian, Preservation Partnerships
National Park Service
Interior Regions 8, 9, 10 and 12