LAKE MEAD NATIONAL RECREATION AREA
ARIZONA - LAKE

SOLICITATION # TBD
NEW LAUNCH RAMP
PMIS NO. 238897

PROJECT SPECIFICATIONS
FINAL

NATIONAL PARK SERVICE
August 2023

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DIVISION 01

GENERAL REQUIREMENTS

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Work covered by Contract Documents.
2. Codes, Standards and Director's Orders.
3. Government Furnished Items.
4. Public Use of Site.
5. Contractor Use of Site.
6. Work Restrictions.
7. Special Construction Requirements.
8. Construction Materials.
9. Permits.
10. Verification of Earth Moving Quantities
11. Excess Excavation Placement Location

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The project is located at Pearce Ferry (PF) within Lake Mead National Recreation Area, Arizona.

B. The work of this contract consists of generally reconstructing the existing boat launch ramp (PMIS# 238897). The work to construct this facility includes excavation, grading, placement of aggregate base, construction of cast-in-place concrete, and placement of riprap. The Contractor will be responsible for removing and reusing existing precast panels and pipe mat at the launch ramp.

C. The contractor shall field verify all existing conditions affecting the work in this contract before providing pricing or ordering materials. The scheduling of field verification site visit(s) shall be coordinated with the Contracting Officer's Representative (COR).

D. Period of Performance: 85 calendar days from Notice to Proceed.

1.3 GOVERNMENT-FURNISHED ITEMS

A. The Government may furnish products and materials for incorporation into the work.

1. The government will arrange and pay for delivery of government furnished items to the project site based on the contractor's approved construction schedule.

2. After delivery, the government will inspect delivered items for damage. If items are damaged, defective, or missing, the government will arrange for replacement.
3. The contractor is responsible for receiving, unloading, and handling government furnished items at project site for use in the work.
4. The contractor is responsible for protecting government furnished items during storage, handling, and the work, including damage from exposure to the elements.
5. If government furnished items are damaged as a result of the contractor's operations, the contractor shall repair or replace the items in-kind.

B. Government-Furnished Items: The government will furnish the following products or materials for use on this contract:

5 Ton Capacity Lifting Beam – The government will furnish, for Contractor's use, a 5 Ton Capacity Lifting Beam for moving precast concrete panels.

1.4 PUBLIC USE OF THE SITE

A. General: Contractor shall at all times conduct his operations to ensure the least inconvenience to the public.

B. Commercial rafting season runs from May 1 to October 1 of each year. The intent is to construct this project outside of the commercial rafting season so that the launch ramp can be fully closed during construction.

1.5 CONTRACTOR USE OF SITE

A. General: Limit use of the site during the construction period to the project area limits and traffic control plans as outlined on the construction drawings. Do not disturb portions of the site beyond the project area limits.

B. Park Entry: Vehicles associated with the contractor shall be waived entrance fee upon entering in a marked company vehicle or by providing the names of employees entering in personal vehicles. The entrance fee is waived only for the purpose of reporting directly to a specific work location. Any deviation for recreational purposes is subject to payment of required entrance fees.

C. Site Access: The contractor shall access the project site via established roads and access routes. Do not drive vehicles off road or access non-project areas without permission from the Contracting Officer, COR or Park Superintendent.

D. Park Regulations: Ensure all personnel (contractors, subcontractors, and vendors) entering or working in the park are

familiar with and obey all park regulations. Law enforcement rangers will intervene if they perceive any unsafe or unlawful activity.

E. Working Hours: Regular work hours shall be from Dawn to Dusk, Monday through Friday, excluding government holidays. Work outside regular hours requires approval from the Contracting Officer or COR.

1. January 1, New Year's Day
   i. January 1 on Saturday, New Year's Day observed on Friday
   ii. January 1 on Sunday, New Year's Day observed on Monday
2. 3rd Monday in January, Martin Luther King, Jr Birthday
3. 3rd Monday in February, Washington's Birthday (Presidents' Day)
4. 4th Monday in May, Memorial Day
5. June 19, Juneteenth
   i. June 19 on Saturday, Juneteenth observed on Friday
   ii. June 19 on Sunday, Juneteenth observed on Monday
6. July 4, Independence Day
   i. July 4 on Saturday, Independence Day observed on Friday
   ii. July 4 on Sunday, Independence Day observed on Monday
7. 1st Monday in September, Labor Day
8. 2nd Monday in October, Columbus Day
9. November 11, Veterans Day
   i. November 11 on Saturday, Veterans Day observed on Friday
   ii. November 11 on Sunday, Veterans Day observed on Monday
10. 4th Thursday in November, Thanksgiving Day
11. December 25, Christmas Day
   i. December 25 on Saturday, Christmas observed on Friday
   ii. December 25 on Sunday, Christmas observed on Monday

F. No Smoking Policy: Smoking is prohibited inside or outside within 25 feet of any buildings in the park. This applies to existing buildings, buildings under construction, and buildings under renovation. Discarding of tobacco products or debris anywhere other than into designated tobacco receptacles is considered littering and subject to fines.

G. Staging and Storage: Confine storage of equipment and materials to the staging / lay-down / storage areas identified in the construction drawings or as established at the preconstruction meeting. **All staging areas and vehicle maintenance areas shall be at least 100 feet from the water's edge.**

H. Parking: The contractor shall park vehicles and heavy equipment in designated areas for contractor use or as established at the preconstruction meeting. Vehicles are not permitted within long-term or overnight parking along roads or in associated overlooks / pull-outs.

I. Driveways and Entrances: The contractor shall keep driveways and entrances serving the premises clear and available to the government, government employees, and emergency vehicles at all times.

J. Preservation of Natural Features: Prevent damage to natural surroundings. Restored damaged areas and replace damaged trees, vegetation, and grass at no expense to the government.

K. Refer also to Section 01 11 40 Work Restrictions and Section 01 50 00 Temporary Facilities & Controls.

1.6 Special Construction Requirements.

A. Clean and wash all construction equipment of any debris prior to entering the park property.
   i. Equipment washing is required to preclude entry of the seeds of non-native plants and weed species.
   ii. Therefore, all equipment that will be used off surfaced roadways shall be thoroughly pressure washed and cleaned outside of the Park before entering the Park.
   iii. Equipment leaving the park for any reason must be re-washed before re-entering the Park.

B. The Contractor shall clean all equipment that will be used off surfaced roadways, or approved roads, prior to the equipment entering Lake Mead National Recreation Area.
   i. Cleaning shall be accomplished by pressure washing using water only.
   ii. All equipment surfaces shall be cleaned, with special emphasis given to the undercarriage.
   iii. This includes, but is not limited to: wheel wells, bumpers, radiator grills, springs, shock absorbers, wire harnesses, skid plates, oil plans, axles, frame ledges, buckets, tracks, etc.
   iv. Cleaning shall also include all dirt and debris inside the cab, or operator area.
   v. A Shop-Vac or commercial car wash vacuum system may be used for operator compartments, provided the method used effectively removes all visible debris.
   vi. Cleaning shall be performed in a manner that will reasonably remove all visible soil, plant and other foreign material larger than ¼ IN DIA.
   vii. All equipment that requires washing is subject to inspection by the government personnel, or Contractor/Partners assigned to this duty, to ensure compliance.

C. Equipment that requires washing is defined as track or rubber-tired machinery intended for use primarily off-road.
   i. Examples include backhoes, loaders, earthmovers, graders, rollers, bulldozers, water trucks, etc.; or four-wheel drive

or passenger vehicles that show evidence of being driven in off-road areas.

ii. Equipment may also be stationary, such as a material screening plant, or a mobile office (mobile offices may be cleaned in the same manner as operator compartments as outlined above).

iii. The equipment is generally under the direct control of the Contractor or subcontractors, is likely to remain on the construction site for an extended period of time and may contain adhered soil and seed from other projects sites.

D. Equipment/Vehicles that do not require washing are defined as those normally used for highway driving only and travel primarily on paved surfaces and well-maintained service roads and parking areas (this includes approved staging areas).

i. Examples include semi-tractor trailers, dump trucks, concrete trucks, pickup trucks, fuel trucks, service trucks, etc.

ii. These delivery and passenger vehicles are generally not under the direct control of the Contractor, have no earth-moving function, and do not remain on the project site.

iii. These vehicles have a low probability of carrying adhered soil and seed from other Projects.

E. Equipment inspections:

i. All equipment that will be used off surfaced roadways may be inspected by government, or other authorized personnel prior to entering the Park. Inspections shall be conducted outside of the NPS Park boundary.

ii. Equipment determined to be free of soil or mud based on visual examination by government personnel will be cleared to enter the Park.

iii. The Contractor shall notify the NPS inspection office no less than 5 business days prior to the time the Contractor wishes to move equipment into the Park that will be used off surfaced roadways.

iv. Equipment not passing initial inspection must be rewashed outside the park at no additional expense to the government.

v. All equipment that will be entering the water shall be inspected daily and documented. The inspection should check for leaks, and other contaminants that may occur from damage to the vehicle.

1.7 Soils Investigation Report.

A. No soils investigation report was completed for this project.

1.8 Milestones / Limitations on Work.

A. The commercial season for raft guides is predominately from **May 1 to October 1** each year. Private raft trips occur year-round. Hualapai raft trips may occur at any time. The Contractor shall schedule construction during the period from mid-October to mid-April to minimize disruption to the commercial raft guides.

1.9 Construction Materials.

The work includes the excavation of in-situ material to construct the boat launch ramp. All excavated material including debris, vegetation and other deleterious surface material shall be removed and disposed of outside the Park. Other construction materials shall be as described below:

A. Aggregate base required for the construction of the project shall be obtained from offsite commercial sources outside the Park.
B. Riprap required for the construction of the project shall be obtained from offsite commercial sources outside the Park.
C. Concrete required for the construction of the project shall be obtained from offsite commercial sources outside the Park.
D. Asphalt required for the construction of the project shall be obtained from offsite commercial sources outside the Park.
E. Organic material included in clearing and grubbing shall be disposed of outside the Park. Disposal shall be in accordance with local regulations.
F. Excess soil excavated from the site may be disposed of onsite with coordination and approval of the Contracting Officer or COR.
G. Existing Pipe Mats to be removed and salvaged to Park. Contractor shall remove existing Pipe Mats and transport existing Pipe Mats to a location determined by Contracting Officer or COR.

1.10 Permits.

The Contractor shall prepare and implement a Temporary Storm Water Pollution Prevention Plan in accordance with Section 01 57 23. The Contractor shall be responsible for drafting, applying for, and obtaining a construction stormwater permit for any area of disturbance greater than 1-acre. The permit application will include, as a minimum, the erosion control measures included in the drawings and in Section 01 57 23 and such Best Management Practices appropriate to the proposed construction activities. The Contractor shall coordinate with the Arizona Department of Environmental Quality (ADEQ) in obtaining the permit, if required, as well as in constructing, maintaining and closing out the project subject to the permit.

Per the ADEQ, the Contractor is **not** required to replace equipment hydraulic fluid with biodegradable fluid when working within waterways. If the contractor chooses to replace the hydraulic fluid, it shall be at no additional cost to the owner.

1.11 Verification of Quantities

The Contractor shall be responsible for verifying the quantities of excavation, fill, aggregate base, concrete, asphalt and riprap required for the project. AutoCAD files are available upon request and will be provided to the Contractor for information only. Fill quantities shall allow for potential shrink.

1.12 EXCESS EXCAVATION PLACEMENT LOCATION

All excess excavation shall be hauled and placed at the “upper gravel parking” lot as directed by the Contracting Officer or COR. The waste site is located ~ 750’ from the project at the “upper gravel parking lot”. The material shall

be dumped and stockpiled in a linear fashion, creating a berm as directed by the Contracting Officer or COR. The following map shows the location of the placement for the excess excavation:

END OF SECTION 01 11 00

SECTION 01 11 40

WORK RESTRICTIONS

PART 1 - GENERAL

1.1 PARK REGULATIONS

A. General: The Contractor must comply with the following rules and conditions:

1. Ensure personnel (contractors or subcontractors) working in the park become familiar with and obey all park regulations, wear hard hats in designated areas, and do not enter any restricted areas unless required to do so and until cleared for such entry.

2. Ensure equipment is conspicuously marked for identification.

3. The Contractor shall restrict employees / representatives to the work site and control travel directly to and from the work site.

4. Restore all traffic / parking / security signs and markings, including space numbers, designations, and lines, to their original form if such signs / markings are defaced or deleted during construction / repair.

5. Control and provide security of Contractor-owned equipment and materials at the work site. Report immediately missing / lost / stolen property to the park dispatch / law enforcement rangers at 702-293-8998 (non-emergencies).

6. Vehicles associated with the Contractor shall be waived the entrance fee upon entering in a marked company vehicle or by providing the names of employees entering in personal vehicle(s). Please note that the entrance fee is waived only for the purpose of reporting directly to a specific work location. Any deviation for recreational purposes is subject to payment of required entrance fees.

7. Vehicles / Heavy Equipment:

a. Rules of the Road: All vehicles and heavy equipment will comply with posted traffic regulations, including speed limits and double-yellow center lane markings. Vehicles and heavy equipment shall take every safe opportunity to use paved roadside pullouts to allow faster moving traffic to pass. Failure to comply with traffic regulations will result in a citation being issued to the driver.

b. Vehicle Parking: Vehicles are not permitted within long-term or overnight parking along park roads or in associated overlooks / pullouts. Vehicles and heavy equipment will be permitted at designated parking areas only.

c. Vehicle Exhaust: All vehicles will be properly maintained to ensure that the exhaust produced is within legal limits. Effects

of excessive vehicle exhaust may be subject to enforcement of State and Federal laws regarding emissions as well as those regarding threatened and endangered species.

d. Spills: Contractor shall be responsible for any cleanup efforts required in accordance with 40 CFR and all applicable state environmental quality laws regarding disposal and cleanup of hazardous / industrial wastes. Contractor must supply and have readily available onsite a spill kit, including oil-absorbent booms. Contractor must immediately notify the Contracting Officer or COR of spills.

e. Commercial Vehicle Safety Inspections: The Contractor, employees, contractors, and subcontractors shall fully cooperate regarding safety inspections of commercial vehicles within the Park. Commercial vehicle safety inspections are conducted unannounced for employee and visitor safety. Vehicles are checked for safety and mechanical deficiencies and for compliance with current state and federal laws and regulations. Driver licenses and medical certificates are also checked.

f. DOT Compliance: All vehicles are to be compliant with all DOT requirements including but not limited to driver with appropriate license class, medical examiner card as appropriate with license class, carrying three (3) triangles or three (3) flares, mounted fire extinguisher, and valid DOT safety sticker.

g. Slow Vehicles: The Contractor is to notify the Contracting Officer or COR of slow vehicles that may cause traffic delays or extended traffic lines. Vehicles that are slow are requested to enter the Park AFTER 2:00 p.m. and exit the Park BEFORE sunset.

h. Oversized Vehicles: Oversized vehicles are defined as vehicles where the width of the vehicle or load exceeds one lane (i.e., beyond the center line of the paved road). Oversized vehicles must not exceed the clearances along the Park road corridor. Oversized vehicles will require an escort and drivers must avoid driving on the edges of the Park road. The Contractor is to notify the Contracting Officer or COR of oversized vehicles, scheduled dates and estimated arrival times at the park entrance, and the identity of who is escorting the vehicle (e.g., police, contractor, etc.). Vehicles that are oversized are requested to enter the Park AFTER 2:00 p.m. and exit the Park BEFORE sunset.

i. Road Work: Contractor shall provide adequate traffic control, including flaggers on either side of any work performed on the road. Any workers on or near the road must wear highly visible, bright clothing. (See Section 01 50 00 for additional details).

j. Law Enforcement: Law enforcement rangers will intervene if they perceive any unsafe or unlawful activity. Contractor must immediately comply with any instructions issued by a park law enforcement ranger.

k. Road & Weight Restrictions: All vehicle load, weight and size limitations, as established by State law, apply to vehicles operated on the Park road (36 CFR § 4.11). No loads heavier

than the current load rating for the historic Park bridge will be permitted.

8. Emergency Medical and Accident Reporting:

   a. The Contractor or subcontractor shall contact Park Dispatch for any medical emergency or traffic accident occurring within the Park.

      Emergency number: Dial 911 as needed.

      Park Dispatch: 702-293-8932 (emergency)

      Park Dispatch is called so that the entrance station will be prepared should any emergency vehicles (e.g. ambulance) need to enter the Park and so that any available Emergency Medical Services personnel in the Park might respond until such time as the ambulance arrives.

   b. The Contractor or subcontractor is required to report ANY personal injury and / or property damage incident occurring within the park. This report must be made to a Law Enforcement Ranger at the first available opportunity <u>before</u> leaving the park:

      Park Dispatch: 702-293-8998 (non-emergency)

1.2 RESOURCE PROTECTION

A. General: The Park is committed protecting natural and cultural resources found within the park and adjacent lands. The Contractor must comply with the following rules and conditions:

1. Invasive Species: The introduction of non-native invasive species can threaten rare and endangered species or can create new populations of non-native species not traditionally found in the park. The contractor is required to inform personnel, subcontractors, and vendors to thoroughly clean all vehicles, equipment, tools, supplies, and materials prior to packing / loading. The Park requires, and will perform, inspections to ensure non-transport of non-native species PRIOR to arriving at the park entrance. Contact the resource staff directly at 702-293-8734 or 702-293-8849 at least (5) five days in advance of park entry to arrange for inspection(s).

2. Endangered Species: Endangered species are protected by Federal law. Obey all park regulations. Drivers must obey all traffic laws and keep an eye out for animals on or alongside road. Contact Park dispatch at 702-293-8998 (non-emergency) immediately if animal is hit or injured or will not move off the road. All contractor's personnel working in Lake Mead National Recreation Area must have up-to-date Lake Mead Desert Tortoise awareness training. Prior to starting work, contact the resource staff directly at 702-293-8734

or 702-293-8849 at least five (5) business days in advance to schedule the Desert Tortoise awareness training.

The following endangered species are found within the park and require certain considerations.

a. Desert Tortoise – Desert Tortoise are frequently along the roadsides at Lake Mead National Recreation Area and do not readily move when approached by cars. If there is a Desert Tortoise on the road, drivers must stop and allow the Desert Tortoise to move away on its own.
b. Desert Tortoise Training – All employees of the Contractor will be required to attend tortoise awareness training provided by the NPS. Training typically takes approximately 15 minutes and Contractor shall arrange for training at least five (5) business days prior to attending.

3. Archaeological Resources: Archaeological resources are physical evidence of past human activity, including evidence of the effects of that activity on the environment. Archaeological resources are found above and below ground and underwater. The contractor shall appoint an archaeological monitor during all ground-disturbing activities in archaeological sensitive areas. If the monitor discovers resources, the contractor shall stop work or relocate work to a non-sensitive area and contact the Contracting Officer and COR immediately. Archaeological sensitive areas and resources typically found in the park or at the project site will be discussed further at the preconstruction meeting.

4. Soundscape / Noise: The contractor shall minimize noise levels at the project site to protect the soundscape of the park. Perform noise-producing work in less sensitive hours of the day or week or as directed by the Contracting Officer or COR.

END OF SECTION 01 11 40

SECTION 01 27 00

DEFINITION OF CONTRACT LINE ITEMS

PART 1 – GENERAL

1.1 LIST OF CONTRACT LINE ITEMS

A. Contract Line-Item No.1 – (New Launch Ramp)

1. This work is for the reconstruction of the existing boat launch ramp at Pearce Ferry (PF)Launch Ramp to lessen the ramp slope and widen the upper portion of the ramp including but not limited to, Traffic Control, Erosion Control, Site Preparation, Remove and Repave Asphalt, Removal and Reuse of Existing Precast Panels, Excavation, Grading, Aggregate Base, Providing and Installing Cast-In-Place Concrete, Providing and Installing 4” Diameter Leveling Pipe, Reinstalling Existing Precast Panels, Ditching, Removing and Resetting Existing Signs, Installing a Culvert, and placement of Rip Rap and Straw Wattles. This line item includes providing one hundred thirty-two (132) new Stainless-Steel Clips, Plates and Cotter Pins (assume new for all existing precast panels).
2. Measurement shall be made by the Lump Sum, completed and accepted.
3. Payment shall be made at the contract Lump Sum price. This price item consists of all necessary material, labor, and equipment required to complete the project as shown and specified.
4. Payment(s) will be made monthly.

END OF SECTION 01 27 00

SECTION 01 31 00

PROJECT MANAGEMENT & COORDINATION

PART 1 – GENERAL

1.1 SUBMITTALS

A. Division 01 documents: The following items shall be submitted a minimum of one week prior to the Preconstruction Conference. Contracting Officer or COR will notify Contractor of tentative date for the Pre-Construction Conference.

1. Letter designating Project Superintendent.
2. Construction Schedule.
3. A comprehensive breakdown of the Schedule of Values Contract Line Item 1. **The breakdown of the Schedule of Values shall be per 01 32 16.2.1.**
4. Accident Prevention Plan.
5. A list of Subcontractors for this project.
6. Written statements from subcontractors certifying compliance with applicable labor standard clauses.
7. Satisfactory evidence of liability insurance coverage and workman's compensation for the Contactor and all subcontractors.

B. All items listed must be provided to the Contracting Officer or COR before the Pre-Construction Conference is held. If all of these documents have not been received one week prior to the scheduled Pre-Construction Conference date, the conference will be cancelled, Notice to Proceed will not be issued, and the Contracting Officer or COR will consider other contractual remedies. Work shall not commence until written Notice to Proceed has been issued.

1.2 REQUESTS FOR INFORMATION (RFIs)

A. General: On discovery of the need for additional information or interpretation of the Contract Documents, the Contractor shall prepare and submit an RFI utilizing the form designated by the Contracting Officer or COR.

1. Contracting Officer or COR will not respond to RFIs submitted by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in the work.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. RFI number, numbered sequentially.
2. Date.
3. RFI subject.
4. Specification Section number and title and related paragraphs, as appropriate.
5. Drawing number and detail references, as appropriate.

6. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
7. Contractor’s signature.
8. Requested date for response.
9. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
   a. Include dimensions, thicknesses, and details of affected materials, assemblies, and attachments on attached sketches.

C. Contracting Officer’s Action: Contracting Officer or COR will review each RFI, determine action required, and respond. Contracting Officer or COR will determine the critical nature of each RFI and issue a response accordingly.

1. The following are not considered to be RFIs and will receive no action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor's means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Engineer's actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.

2. Contracting Officer's action may include a request for additional information, in which case time for response will date from time of receipt of additional information.

3. Contracting Officer's action on RFIs may result in the need for a change to the Contract Time or the Contract Sum. All contract changes will be processed following the terms and conditions of the contract.

END OF SECTION 01 31 00

SECTION 01 32 16

CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of Construction Schedule requirements including but not limited to the following:
   1. Schedule of Values for Contract Line-Item No. 1.
   2. Construction Schedule Requirements.
   3. Construction Schedule Updates.

B. Purpose: The purpose of the Construction Schedule is to ensure adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. The Construction Schedule will assist the Contractor and Contracting Officer or COR in monitoring the progress of the work, evaluating proposed changes, and processing the Contractor's monthly progress payment.

1.2 SUBMITTALS

A. Schedule of Values: After contract award and before the Pre-Construction conference submit a schedule of dollar values based on the Contract Price Schedule for Contract Line-Item No. 1.

B. Construction Baseline Schedule: After contract award and before the Pre-Construction conference, submit a baseline schedule, large enough to show entire schedule for entire construction period.

C. Construction Schedule Updates: Prior to the progress payment request date, submit estimates of the percent completion of each schedule activity and necessary supporting data.

1.3 COORDINATION

A. Coordinate Construction Baseline Schedule with the Schedule of Values, list of subcontracts, payment requests, and other required schedules and reports.

PART 2 - PRODUCTS

2.1 SCHEDULE OF VALUES

A. Breakdown Contract Line-Item No. 1 into component work activities used in the schedule, for which progress payments may be requested. The work activities broken out within the schedule of values shall be integrated

into and made a logical part of the construction baseline schedule submitted under this specification. The total costs for the component work activities shall equal the contract price for that item. The Contracting Officer or COR may request data to verify accuracy of dollar values. Include general condition costs, overhead and profit in the total dollar value of unit price items and in the component work activities for each item. Do not include general condition costs, overhead or profit as a separate item.

B. The total cost of all items shall equal the contract price. The Schedule of Values will form the basis for progress payments.

C. An acceptable Schedule of Values shall be agreed upon by the Contractor and the Contracting Officer or COR before the first progress payment is processed.

D. The Schedule of Values Shall include the following line items:

Bid Item #1 - New Launch Ramp		
Item #	**Description**	**Unit of Measure**
1	Erosion Control	LS
2	Traffic Control	LS
3	Site Demolition	LS
4	Excavation	CY
5	Fill	CY
6	Ditching	LF
7	Culvert	LF
8	Geotextile Fabric	SF
9	Aggregate Base Course	CY
10	Asphalt Paving	SF
11	Cast-in-Place Concrete Ramp	SF
12	Pre-Cast Panel Concrete Ramp	SF
13	Riprap	CY
14	Remove & Reset Concrete Barriers	EA
15	Remove & Reset Existing Signs	EA
16	Mobilization and Demobilization	LS
17	Bonds and Permits	LS

2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

A. Construction Baseline Schedule: Prepare Construction Baseline Schedule using computerized scheduling software.

1. Construction Baseline Schedule shall show submittal review, construction start date, work activities / staff resources, activity durations, major milestones, inspection dates, closeout activities, and project end date.

2. Establish procedures for updating Construction Baseline Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

3. Contracting Officer or COR may request an updated Construction Schedule at any time to confirm progress of the work.

END OF SECTION 01 32 16

SECTION 01 33 23

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Government's responsive action.

B. Informational Submittals: Written information that does not require Government's responsive action. Submittals may be rejected for not complying with the requirements.

1.3 GENERAL SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Review them for legibility, accuracy, completeness, and compliance with Contract Documents.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Contracting Officer or COR reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittal List: A submittal list has been attached to the end of this Specification Section. The intent is to provide an overall summary of submittal requirements and not a comprehensive list. The requirements of the individual Specification Sections, terms and conditions of the Contract still apply regardless of what is shown on the submittal list.

C. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Contracting Officer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Action Submittals

a. Initial Review: Allow 30 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
b. Re-submittal Review: Allow 15 days for review of each re-submittal.

2. Informational Submittals

a. Review: Allow 10 days for review of each submittal.

D. Approved Equals:

1. For each item proposed as an "approved equal," submit supporting data, including:

a. Drawings and samples as appropriate.
b. Comparison of the characteristics of the proposed item with that specified.
c. Changes required in other elements of the work because of the substitution.
d. Name, address, and telephone number of vendor.
e. Manufacturer's literature regarding installation, operation, and maintenance, including schematics for electrical and hydraulic systems, lubrication requirements, and parts lists. Describe availability of maintenance service, and state source of replacement materials.

2. A request for approval constitutes a representation that Contractor:

a. Has investigated the proposed item and determined that it is equal or superior in all respects to that specified.
b. Will provide the same warranties for the proposed item as for the item specified.
c. Has determined that the proposed item is compatible with interfacing items.
d. Will coordinate the installation of an approved item and make all changes required in other elements of the work because of the substitution.
e. Waives all claims for additional expenses that may be incurred because of the substitution.

E. Additional Copies: Unless additional copies are required for final submittal, and unless Contracting Officer or COR observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. The Contracting Officer or COR will return submittals, without review, received from sources other than the Contractor.

1. CM-16 Transmittal Form: All material submittals shall be transmitted using National Park Service form CM-16, to be provided by Contracting Officer or COR. No action will be taken on a material submittal item unless accompanied by the transmittal form.

~~2. Documents required in division 1 are to be delivered under a separate cover letter. Do not use the CM-16 Transmittal form for these documents.~~

G. Identification: Place a permanent label 1 by 4 inches on each submittal for identification.

1. Include the following information on label for processing and recording action taken:

a. Project name, Park, PMIS number, Contract number.
b. Date.
c. Submittal number or other unique identifier, including revision identifier.

1) The submittal number shall be a sequential number (e.g., 001). Re-submittals shall include an alphabetic suffix after another decimal point (e.g., 001.A).

H. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Re-submit submittals until they are marked “Approved” or “Approved with notations”.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating “Approved” or “Approved with notations”.

1.4 CONTRACTOR’S USE OF CAD FILES

A. General: At Contractor’s written request, copies of CAD files will be provided to Contractor for Contractor’s use in connection with Project, subject to the following conditions:

1. Files will be provided as is; no format or other changes to files or changes to the objects in the drawing will be made by the Government.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. The Contracting Officer or COR reserves the right to require submittals in addition to those called for in individual sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data is not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions: When Contract Documents require compliance with manufacturer's printed instructions, provide one complete set of instructions to Contracting Officer or COR and keep another complete set of instructions at the project site until substantial completion.
d. Manufacturer's catalog cuts: Submit only pertinent pages; mark each copy of standard printed data to identify specific products proposed for use.
e. Wiring diagrams showing factory-installed wiring.
f. Printed performance curves.
g. Operational range diagrams.
h. Compliance with specified referenced standards.
i. Testing by recognized testing agency.

4. Number of Copies: Submit four copies of Product Data, unless otherwise indicated. The Contracting Officer or COR will return one copy. Retain copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Shopwork manufacturing instructions.
f. Templates and patterns.
g. Schedules.
h. Notation of coordination requirements.
i. Notation of dimensions established by field measurement.
j. Relationship to adjoining construction clearly indicated.
k. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches.

3. Number of Copies: **It is preferred that all submittals be submitted via electronic transfer and in a .PDF format.** If not, submit four copies of each submittal. Contracting Officer or COR will return one copy.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Submittal Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine the final acceptance of construction associated with each set.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. The Contracting Officer or COR will return the submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit four sets of Samples. Contracting Officer or COR will retain three Sample sets; remainder will be returned. Retain Sample set as a Project Record Sample.

E. Construction Materials: The Contractor is encouraged to submit for approval products made from recycled or environmentally responsible material. Every effort will be made by the National Park Service to approve these materials.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. The Contracting Officer or COR will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes the signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Informational submittals that do not comply with the requirements specified in the Contract Documents will be rejected and one copy will be returned.

B. Coordination Drawings: Comply with the requirements specified in Section 01 31 00 "Project Management and Coordination."

C. Contractors Construction Schedule: Comply with the requirements specified in Section 01 32 16 "Construction Schedule."

D. Schedule of Values: Comply with the requirements specified in Section 01 32 16 "Construction Schedule".

E. Accident Prevention Plan: Comply with the requirements specified in Section 01 35 23 "Safety Requirements."

F. Waste Recycling Plan: Comply with the requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

G. Quality Control Plan: Comply with the requirements specified in Section 01 40 00 "Quality Requirements."

H. Storm Water Pollution Prevention Plan: Comply with the requirements specified in Section 01 57 23 "Temporary Storm Water Pollution Prevention."

I. Qualification Data: Prepare written information that demonstrates capabilities and experience of a firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

J. Welding Certificates: Prepare written certification that welding procedures and personnel comply with the requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

K. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with the requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

L. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with the requirements in the Contract Documents. Include evidence of manufacturing experience where required.

M. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with the requirements in the Contract Documents.

N. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with the requirements in the Contract Documents.

O. Material Test Reports: Prepare reports written by a qualified testing agency, on the testing agency's standard form, indicating and interpreting test results of material for compliance with the requirements in the Contract Documents.

P. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with the requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

Q. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

R. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

S. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

T. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with the requirements in the Contract Documents.

U. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

V. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

W. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Summary of installation procedures being followed, whether they comply with the requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with the requirements.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions.

3.2 CONTRACTING OFFICER'S ACTION

A. General: Submittals will be returned disapproved without technical review if identification information is missing, not filled in, or if placed on the back of the submittal; an incorrect number or format of submittals is provided; the transmittal form is incorrectly filled out; submittals are not coordinated; or submittals do not show evidence of Contractor's approval.

1. Any work done or orders for materials or services placed before approval shall be at the Contractor's own risk.

B. Action Submittals: The Contracting Officer or COR will review each submittal, make marks to indicate corrections or modifications required, and return one copy. Contracting Officer or COR will annotate the CM-16 Transmittal Form indicating the action taken, as follows:

1. The returned submittal will be marked in one of three ways as defined below:

a. APPROVED: Acceptable with no corrections.
b. APPROVED WITH NOTATIONS: Minor corrections or clarifications required. All comments are clear, and no further review is required. The Contractor shall address all review comments when proceeding with the work.
c. DISAPPROVED - RESUBMIT: Rejected as not in accordance with the contract or as requiring major corrections or clarifications. The Contracting Officer or COR will identify the reasons for disapproval. The Contractor shall revise and resubmit with changes clearly identified.

C. Informational Submittals: The Contracting Officer or COR will review each submittal and will not return it or will reject and return one copy

if it does not comply with the requirements. The Contracting Officer or COR will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.

END OF SECTION 01 33 23

SECTION 01 35 23

SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. General: This section includes establishing an effective accident prevention program and providing a safe environment for all personnel and visitors.

1.2 SUBMITTALS

A. Accident Prevention Plan: After contract award and before the Pre-Construction conference, submit for review an Accident Prevention Plan. The Contracting Officer or COR will review the proposed Plan. If the plan requires any revisions or corrections, the Contractor shall resubmit the Plan within ten (10) days. No progress payments will be made until the Plan is accepted.

~~B. COVID-19 Safety Plan: After the contract award and before the Pre-Construction conference, submit for review a COVID-19 Safety Plan. The Contracting Officer or COR will review the proposed Plan. If the plan requires any revisions or corrections, the Contractor shall resubmit the Plan within ten (10) days. No progress payments will be made until the Plan is accepted. This plan shall include the requirements of Executive Order No. 14042 and the requirements for a Federal Contractor.~~

1.3 QUALITY ASSURANCE

A. Comply with contract clauses entitled "Accident Prevention" and "Permits and Responsibilities". In case of conflicts between Federal, State, and local safety and health requirements, the most stringent shall apply. Equipment or tools not meeting OSHA requirements will not be allowed on the project sites. Failure to comply with the requirements of this section and related sections may result in suspension of work.

B. Qualifications of Employees:

1. All employees must be physically qualified and able to perform their assigned duties in a safe manner.

2. Do not allow employees to perform work whose ability or alertness is impaired because of prescription or illegal drug use, fatigue, illness, intoxication, or other conditions that may expose themselves or others to injury.

3. Operators of vehicles, hoisting equipment, and hazardous plant equipment shall be able to understand signs, signals, and operating instructions, and be fully capable of operating such

equipment. Provide operating instructions for all equipment. Newly hired operators shall be individually tested by an experienced operator or supervisor to determine if they are capable of safely operating equipment.

1.4 ACCIDENT REPORTING

A. Reportable Accidents: A project reportable accident is defined as death, occupational disease, traumatic injury to employees or the public, fires, and property damage by accident more than one hundred dollars ($100). Notify NPS Law Enforcement Park Rangers, the Contracting Officer and COR immediately in the event of a reportable accident. Within seven (7) days of a reportable accident, fill out and forward to Contracting Officer or COR an Accident/Property Damage Report (Form CM-22). Form may be obtained from the Contracting Officer or COR.

PART 2 - PRODUCTS

2.1 ACCIDENT PREVENTION PLAN

A. The Plan shall be written to comply with OSHA and project requirements (a generic plan is not acceptable) including but not limited to the following:

1. Name of responsible supervisor to carry out the program.
2. Weekly and monthly safety meetings.
3. First aid procedures.
4. Outline of each phase of the work, the hazards associated with each major phase, and the methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Identify the work included under each phase.
5. Training, both initial and continuing.
6. Planning for possible emergency situations, such as floods, fires, cave-ins, slides, explosions, power outages, and windstorms. Such planning shall take into consideration the nature of construction, site conditions, and degree of exposure of persons and property.

~~2.2 COVID-19 SAFETY PLAN~~

~~A. The Plan shall be written to comply with EO 14402, CDC and State/Local Health Department Guidance and project requirements (a generic plan is not acceptable) including but not limited to the following:~~

~~1. Name of the responsible supervisor to carry out the program.~~
~~2. Weekly and monthly safety meetings.~~
~~3. Personal Protective Equipment (PPE) provided to Contractor's employees.~~
~~4. Personal Hygiene Procedures and Supplies provided to Contractor's employees.~~
~~5. Outline of daily procedures and the methods proposed to provide for proper protection and safety of the public, National Park Service personnel, and Contractor's employees.~~

~~6. Planning for possible positive test results and spread of COVID-19. Such planning shall take into consideration contact tracing and the degree of exposure of persons to each other.~~

2.3 FIRST AID FACILITIES

A. Provide adequate facilities for the number of employees and the hazards associated with the types of ongoing construction work at the site.

2.4 PERSONNEL PROTECTIVE EQUIPMENT

A. Meet requirements of applicable ANSI standards.

PART 3 - EXECUTION

3.1 EMERGENCY INSTRUCTIONS

A. Post telephone numbers and reporting instructions for ambulance, physician, hospital, fire department, and police in conspicuous locations at the work site.

3.2 FIRE AND LIFE SAFETY

A. Comply with the requirements of NFPA 241 (Standard for Safeguarding Construction, Alteration, and Demolition Operations).

B. Store hazardous materials in accordance with manufacturers and OSHA recommendations. Maintain readily available, on site, MSDS for each chemical.

1. Immediately report all spills of hazardous materials to the park.
2. Maintain a spill emergency response kit.

3.3 PROTECTIVE EQUIPMENT

A. Inspect personal protective equipment daily and maintain it in a serviceable condition. Clean, sanitize, and repair personal items, as appropriate, before issuing them to another individual.

B. Inspect and maintain other protective equipment and devices before use and on a periodic basis to ensure safe operation.

3.4 SAFETY MEETINGS

A. As a minimum, conduct weekly fifteen (15) minute "toolbox" safety meetings. These meetings shall be conducted by a foreman or supervisor and attended by all construction personnel at the worksite. Topics need to coincide with work scheduled for the following week. Document and submit meeting minutes to the Contracting Officer or COR within one (1) day after the meeting.

B. Conduct monthly safety meetings for all levels of supervision. Meetings shall be attended by all contractors and subcontractors performing work on the site. Notify the Contracting Officer or COR of meeting dates and times. These meetings shall be used to review the effectiveness of the Contractor's safety effort, to resolve current

health and safety problems, to provide a forum for planning safe construction activities, and for updating the Accident Prevention Plan. The Contracting Officers Representative will attend the meeting and enter the results of the meetings into the daily log.

3.5 HARD HATS AND PROTECTIVE EQUIPMENT AREAS

A. A hard hat area shall be designated by the Contractor. The hard hat area shall be posted by the Contractor in a manner satisfactory to the Contracting Officer or COR.

B. It is the Contractor's responsibility to require all those working on or visiting the site to wear hard hats and other necessary personal protective equipment at all times. As a minimum, provide six (6) six hard hats for use by visitors.

3.6 TRAINING

A. First Aid: Provide adequate training to an adequate number of personnel to ensure prompt and efficient first aid.

B. Hazardous Material: Train and instruct each employee exposed to hazardous material in safe and approved methods of handling and storage. Hazardous materials are defined as explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substances that could cause death or injury.

END OF SECTION 01 35 23

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Construction staking services are required to layout the work. The Contractor will be responsible for all layout and construction staking utilizing the existing control and coordinate data for roadway, site, launch ramp and any other construction which requires surveying. Dimensions and elevations indicated in layout of work shall be verified by the Contractor. Discrepancies between Drawings, Specifications, and existing conditions shall be referred to the Contracting Officer or COR for adjustment before work is performed.

C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements. The quality of all work shall be the responsibility of the Contractor.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality- assurance and -control procedures that facilitate compliance with the Contract Document requirements.

D. See Divisions 02 through 49 Sections for specific test and inspection requirements. In general, the below table represents the minimum testing schedule:

Test	**Standard**	**Frequency**	**Requirements**
Trenches/Soils			
Standard Proctor	ASTM D698/C	Each soil type, aggregate type and each source.	
Nuclear Soil Density	ASTM D6938	1 set every 300 feet of trench. 1 set every 3 services 1 test every 3000 SF or 100 FT of road with random offsets	95% max dry density, +/- 3% Optimum Moisture Content.

Base and Subbase			
Standard Proctor	ASTM D698/C	Each aggregate type and each source.	
Nuclear Soil Density	ASTM 6938	Every 3,000 SF or 100 feet of road with random offsets.	95% max dry density, +/- 3% Optimum Moisture Content.
Gradation	ASTM D422	Prior to start and at every change in source.	Provide results to Engineer for approval prior to use.
Atterberg Limits	ASTM D4318	Prior to start and at every change in source.	Provide results to Engineer for approval prior to use.
Concrete			
Sampling	ASTM C172	1st truck & every 50 CY	
Temperature	ASTM C1064	1st truck & every 50 CY	
Air Content	ASTM C231	1st truck & every 50 CY	4%-7% for 1 ½” 4.5% - 7.5% for 1” or ¾”
Slump	ASTM C143	1st truck & every 50 CY	3” to 5”
Cylinders	ASTM C31	1st truck & every 50 CY	4” or 6” cylinders
Compressive Strength	ASTM C39	7 days, 28 days	
Unit Weight	ASTM C138	1st truck & every 50 CY	
Asphalt			
Density	ASTM D2950		95% of mix design density

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual

products incorporated into the Work and completed construction comply with requirements.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing, to establish product performance and compliance with industry standards.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

1.3 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer or COR for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To

comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Contracting Officer or COR for a decision before proceeding.

1.4 SUBMITTALS

A. Quality Control Plan:

1. After contract award and before the Pre-Construction conference, submit for approval a written Contractor Quality Control (CQC) plan.
2. If the plan requires any revisions or corrections, the Contractor shall resubmit the plan within 10 days.
3. The Government reserves the right to require changes in the plan during the contract period as necessary to obtain the quality specified.
4. No change in the approved plan may be made without written concurrence by the Contracting Officer and COR.

B. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

C. Contractor's Quality Control Daily Reports: Submit showing all inspections and tests on the first workday following the date covered by the report. Quality Control Supervisor shall utilize the forms attached at the end of this Section.

D. Test Reports

1. Test reports shall be completed by the person performing the test.
2. Submit Daily Test Information Sheets with Quality Control Daily Reports.
3. Submit failing test results and proposed remedial actions within four hours of noted deficiency.
4. Submit three copies OR email a copy of complete test results not later than one calendar days after the test was performed.

E. Accessibility Inspection Report: Fill out the applicable sections of the Accessibility Inspection Report and attach to the Quality Control Daily Report. Utilize the attached Accessibility Inspection form to document compliance with the Architectural Barriers Act Accessibility Standards (ABAAS). Inspect at various stages of construction as needed to ensure the finished product meets the guidelines. Submit report not later than three calendar days after the inspection was performed.

F. Off-Site Inspection Reports: Submit prior to shipment.

G. If the CQC plan and Quality Control Daily Reports are not submitted as specified, the Contracting Officer may retain all payments until

such time a plan is accepted and implemented or may retain payments for work completed on days there are no Quality Control daily reports.

H. Permits, Licenses, and Certificates: For NPS records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Contractors Quality Control Staff:

1. The Contractor's Quality Control Supervisor may also perform other duties.
2. The Contractor's designated Quality Control Supervisor shall be on the project site whenever contract work is in progress.
3. The Contractor's job supervisory staff may be used to assist the Quality Control Supervisor supplemented, as necessary, by additional certified testing technicians.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems like those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce the required units.

E. Fabricator Qualifications: A firm experienced in producing products like those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce the required units.

F. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are like those indicated for this Project in material, design, and extent.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by Contract, is acceptable to the Contracting Officer and COR.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
3. All measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards in accordance with NBS requirements. Upon request, measuring and testing devices shall be made available for use by the Government for verification tests.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 49.

1.6 QUALITY CONTROL

A. NPS Responsibilities: Where quality-control services are indicated as NPS responsibility, Contracting Officer or COR will engage a qualified testing agency to perform these services.

1. Contracting Officer or COR will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Tests and inspections not explicitly assigned to NPS are Contractor's responsibility. Inspect and test work as needed to ensure that the quality of materials, workmanship, construction, finish, and functional performance follow applicable specifications, drawings, and those required by the Building Code. Perform quality-control services required of Contractor by the Building Official, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   i. Contractor shall not employ the same entity engaged by NPS, unless agreed to in writing by the Contracting Officer.
2. Where quality-control services are indicated as Contractor's responsibility, submit the appropriate report, for each quality-control service.
3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

4. The Contracting Officer or COR may designate test locations.
5. Submit additional copies of each written report directly to the Building Official when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with NPS and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Contracting Officer, COR and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of

delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.7 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: NPS will not provide any qualified special inspector to conduct special tests and inspections.

1. The contractor is responsible for performing Special Tests and Inspections for the following work:

i. Soil/Aggregate gradation.
ii. Soil/Aggregate density.
iii. Soil/Aggregate compaction.
iv. Riprap gradation.
v. Concrete Mix Design.
vi. Concrete slump.
vii. Concrete air entrainment.
viii. Concrete strength.
ix. Asphalt Mix Design.
x. Asphalt compaction.
xi. Asphalt thickness.

PART 2 - PRODUCTS

2.1 QUALITY CONTROL PLAN

A. The Quality Control Plan shall include:

1. A list of personnel responsible for quality control and assigned duties. Include each person's qualifications.
2. A copy of a letter of direction to the Contractor's Quality Control Supervisor outlining assigned duties.
3. Names, qualifications, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms.
4. Methods of performing, documenting, and enforcing quality control of all work.
5. Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.

PART 3 - EXECUTION

3.1 OFF-SITE CONTROL

A. Items that are fabricated or assembled off-site shall be inspected for quality control at the place of fabrication.

3.2 ON-SITE CONTROL

A. Notification:

1. Notify the Contracting Officer or COR at least 48 hours in advance of the preparatory phase meeting.
2. Notify the Contracting Officer or COR at least 24 hours in advance of the initial and follow-up phases.

B. Preparatory Phase: Perform before beginning each feature of work.

1. Review control submittal requirements with personnel directly responsible for the quality control work. As a minimum, the Contractor's Quality Control Supervisor and the foreman responsible for the feature of work shall be in attendance.
2. Review all applicable specifications sections and drawings related to the feature of work.
3. Ensure that copies of all referenced standards related to sampling, testing, and execution for the feature of work are available on site.
4. Ensure that provisions have been made for field control testing.
5. Examine the work area to ensure that all preliminary work has been completed.
6. Verify all field dimensions and advise the Contracting Officer or COR of discrepancies with contract documents.
7. Ensure that necessary equipment and materials are at the project site and that they comply with approved shop drawings and submittals.
8. Document all preparatory phase activities and discussions on the Contractor's Quality Control Daily Report.

C. Initial Phase:

1. As soon as work begins, inspect and test a representative portion of a particular feature of work for quality of workmanship.
2. Review control testing procedures to ensure compliance with contract requirements.
3. Document all initial phase activities and discussions on the Contractor's Quality Control Daily Report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

D. Follow-Up Phase: Inspect and test as work progresses to ensure compliance with contract requirements until completion of work.

E. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be required on the same feature of work for the following reasons:

1. Quality of on-going work is unacceptable.
2. Changes occur in the applicable quality control staff, on-site production supervision, or work crew.
3. Work on a particular feature of work is resumed after a

substantial period of inactivity.

3.3 DOCUMENTATION

A. Maintain Quality Control Daily Reports, Daily Test Report Information Sheets, and Accessibility Inspection Reports (attached) of quality control activities and tests.

B. Quality Control Daily Reports may not be substituted for other written reports required under clauses of the contract, such as Disputes, Differing Site Conditions, or Changes.

3.4 ENFORCEMENT

A. The Contractor shall stop work on any item or feature pending satisfactory correction of any deficiency noted by the quality control staff, the Contracting Officer or COR.

3.5 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

CONTRACTOR'S QUALITY CONTROL DAILY REPORT

REPORT NO._____SHEET 1 OF _____

PROJECT				CONTRACT NO.	DATE
PARK				CONTRACTOR'S REPRESENTATIVE ON THE JOB	
WEATHER (Rain, Snow, Cloudy, Windy, etc.)	RAINFALL Inches	TEMPERATURE MAX.	MIN.	GROUND CONDITIONS (Dry, Damp, Wet, Frozen, etc.)	

1. PRIME CONTRACTOR

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY PRIME CONTRACTOR:

MATERIALS DELIVERED	OFFICIAL VISITORS TO SITE

2A. SUBCONTRACTOR,_____: (If more than one subcontractor use copies of following page.)

NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY SUBCONTRACTOR:

3. SPECIFIC INSPECTIONS: (Inspections performed, results, and corrective actions)

4. TESTING: ☐1 Check if any testing was performed today. (Complete and attach Test Report Information Sheets.)
Type and Location of Testing: _____

5. VERBAL INSTRUCTION RECEIVED FROM GOVERNMENT ON CONSTRUCTION DEFICIENCIES OR RE-TESTING REQUIRED:

6. REMARKS:

7. CERTIFICATION:

I certify that the above report is complete and correct and that I, or my authorized representative, have inspected all work performed this day by the prime contractor and each subcontractor and determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____
Contractor's Quality Control Representative

SUBCONTRACTOR WORK CONTINUED:	CONTRACT NO.	REPORT NO. _____ SHEET____OF _____

2 SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments
WORK PERFORMED BY SUBCONTRACTOR:						

2 SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments
WORK PERFORMED BY SUBCONTRACTOR:						

2 SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments
WORK PERFORMED BY SUBCONTRACTOR:						

2 SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	COMMENTS
WORK PERFORMED BY SUBCONTRACTOR:						

DAILY TEST REPORT INFORMATION SHEET

CONTRACT NO._____REPORT NO. _____

1. Individual Making Inspection or Test:	
2. Testing Laboratory; Name:	Phone #:
Address:	
3. Description of Work and Test Method:	
4. Location of Samples and Tests or Inspections:	
5. Specification Section:	
6. Inspection or Test Data:	
7. Test Results and Interpretations of Test Results:	
8. Comments or Professional Opinion About Compliance of Inspected Work or Tested Work with contract Document Requirements:	
9. Recommendations:	
10. Corrective Actions Taken:	

CERTIFICATION:

I certify that the above testing report is complete and correct and that all testing performed this day for this contract is in strict compliance with the plans and specifications except as noted above.

_____

Signature of Inspector

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 ENVIRONMENTAL DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114 and as specified herein.

B. Biobased Materials: As defined in the Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, "biobased" means a "commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials." Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.

1. Biobased content: The amount of biobased carbon in the material or product as a percentage of weight (mass) of the total organic carbon in the material or product.

C. Chain-of-Custody: Process whereby a product or material is maintained under the physical possession or control during its entire life cycle.

D. Deconstruction: Disassembly of buildings for the purpose of recovering materials.

E. DFE (Design for the Environment): A technique that includes elements of resource conservation and pollution prevention as applied in various product sectors. A technique that incorporates approaches which are part of product (or assembly) concept, need and design. Considerations involve material selection, material and energy efficiency, reuse, maintainability and design for disassembly and recyclability. Refer to ISO Guide 64 for additional clarification.

F. Environmentally preferable products: Products and services that have a lesser or reduced effect on the environment in comparison to conventional products and services. Refer to EPA's Final Guidance on Environmentally Preferable Purchasing at http://www.epa.gov/epp/guidance/finalguidancetoc.htm.

G. Non-Renewable Resource: A resource that exists in a fixed amount that cannot be replenished on a human time scale. Non-renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over millions of years. Examples include iron ore, coal, and oil.

H. Perpetual Resource: A resource that is virtually inexhaustible on a human time scale. Examples include solar energy, tidal energy, and wind energy.

I. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with Federal Trade Commission (FTC) Guide for the Use of Environmental Marketing Claims.

J. Renewable Resource: A resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the usable supply of that resource. A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include trees in forests, grasses in grasslands, and fertile soil.

1.2 QUALITY ASSURANCE

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer for a decision before proceeding.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on a Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACPA	American Concrete Pipe Association
ADOT	Arizona Department of Transportation
ADEQ	Arizona Department of Environmental Quality
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute

AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANLA	American Nursery and Landscape Association
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc. APA Architectural Precast Association
APA	APA - The Engineered Wood Association
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASC	Adhesive and Sealant Council
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLA	American Society of Landscape Architects
ASME	ASME International (The American Society of Mechanical Engineers International)
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industry International)
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute AWPA American Wood-

	Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CBM	Certified Ballast manufacturers
CDA	Copper Development Association
CEA	Canadian Electricity Association
CFFA	Chemical Fabrics & Film Association, Inc.
CFPC	Certified Forest Products Council
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CRA	California Redwood Association
CRRC	Cool Roof Rating Council
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association

CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
EWA	APA-The Engineered Wood Association
~~FIBA~~	~~Federation Internationale de Basketball (The International Basketball Federation)~~
~~FIVB~~	~~Federation Internationale de Volleyball (The International Volleyball Federation)~~
FM Approvals	FM Approvals
FM Global	FM Global (Formerly: FMG - FM Global)
FMRC	Factory Mutual Research (Now FM Global)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute

HI	Hydraulic Institute
HI	Hydronics Institute
HMA	Hardwood Manufacturers Association
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPMA	Hardwood Plywood Manufacturers Association
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IA	Irrigation Association
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILIA	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LIA	Lead Industries Association. Inc.
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute

MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MIMA	Mineral Insulating Manufacturers Association
MLSFA	Metal Lath/Steel Framing Association - A Division of NAAMM
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAHB	National Association of Home Builders
NAIMA	North American Insulation Manufacturers Association
NAPA	National Asphalt Pavement Association
NAPCA	National Association of Pipe Coating Applicators
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NEII	National Elevator Industry, Inc.
NeLMA	Northeastern Lumber Manufacturers' Association

NEMA	National Electrical Manufacturers Association
NETA	National Electrical Testing Association
~~NDOT~~	~~Nevada Department of Transportation~~
~~NDEP~~	~~Nevada Department of Environmental Protection~~
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NHPMA	Northern Hardwood and Pine Manufacturers Association, Inc.
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NPA	National Particleboard Association
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Now ITS)
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PEI	Porcelain Enamel Institute

PGI	PVC Geomembrane Institute
PI	Perlite Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RMMI	Rocky Mountain Masonry Institute
SAE	SAE International
SCMA	Southern Cypress Manufacturers Association
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SFPA	Southern Forest Products Association
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry

SRI	Steel Recycling Institute
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TIMA	Thermal Insulation manufacturers Association (see NAIMA)
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association

WRI Wire Reinforcement Institute, Inc.

WSFI Wood and Synthetic Flooring Institute (see MFMA)

WSRCA Western States Roofing Contractors Association

WWPA Western Wood Products Association

WWPA Woven Wire Products Association

WWPI Western Wood Preservers Institute

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

BOCA BOCA International, Inc. (See ICC)

IAPMO International Association of Plumbing and Mechanical Officials

ICBO International Conference of Building Officials (See ICC)

ICBO ES ICBO Evaluation Service, Inc. (See ICC-ES)

ICC International Code Council

ICC-ES ICC Evaluation Service, Inc.

SBCCI Southern Building Code Congress International, Inc. (See ICC)

NEC National Electrical Code (by NFPA)

UBC Uniform Building Code (See ICC)

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

CE Army Corps of Engineers

CPSC Consumer Product Safety Commission

DOC Department of Commerce

DOD Department of Defense

DOE Department of Energy

DOI Department of Interior

EPA Environmental Protection Agency

FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDA	Food and Drug Administration
GSA	General Services Administration
HUD	Department of Housing and Urban Development
LBL	Lawrence Berkeley National Laboratory
MSHA	Mine Safety and Health Administration
NCHRP	National Cooperative Highway Research Program (See TRB)
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety & Health Administration
PBS	Public Building Service (See GSA)
PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board USDA Department of Agriculture
USPS	Postal Service

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

ABAAS	Architectural Barriers Act Accessibility Standards
CFR	Code of Federal Regulations
DOD	Department of Defense Military Specifications and Standards
DSCC	Defense Supply Center Columbus (See FS)
FED-STD	Federal Standard (See FS)
FS	Federal Specification FTMS

Federal Test Method Standard
(See FS)

MIL (See MILSPEC)

MIL-STD (See MILSPEC)

MILSPEC Military Specification and Standards

NAAQS National Ambient Air Quality Standards

NBS National Bureau of Standards

UFAS Uniform Federal Accessibility Standards

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation

CCR California Code of Regulations

CPUC California Public Utilities Commission

ADOT Arizona Department of Transportation

TFS Texas Forest Service
Forest Resource Development

1.5 ENVIRONMENTAL REFERENCE STANDARDS

A. American Forest and Paper Association:

1. Sustainable Forestry Initiative

B. American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE):
ASHRAE 52.2, Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size
ASHRAE 55, Thermal Environmental Conditions for Human Occupancy
ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality
ASHRAE 62.2, Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings
ASHRAE/IESNA 90.1, Energy Standard for Buildings, Except Low-Rise Residential Buildings
ASHRAE 90.2, Energy Efficient Design of Low-Rise Residential Buildings

C. American Association of State Highway and Transportation Officials (AASHTO): AASHTO M288 Geotextile Specification for Highway Applications

MP009-06 Standard Specification for Compost for Erosion/Sediment Control (Filter Berms and Filter Socks)
MP010-03 Standard Specification for Compost for Erosion/Sediment Control (Compost Blankets)

D. American Society for Testing and Materials International (ASTM):
A478 Standard Specification for Chromium-Nickel Stainless Steel Weaving and Knitting Wire
A580/A580M Standard Specification for Stainless Steel Wire
A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc- Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube
C1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
C128 Standard Test Method for Density, Relative Density (Specific Gravity), and Ab- sorption of Fine Aggregate
C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

C1319 Standard Specification for Concrete Grid Paving Units

C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
C1371 Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
C1386 Standard Specification for Precast Autoclaved AERATED Concrete (PAAC) Wall Construction Units
C1483 Standard Specification for Exterior Solar Radiation Control Coatings on Buildings
C1549 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces
C289 Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
C311 Test Methods for Sampling and Testing Fly Ash or Natural Possolans for Use as a Mineral Admixture in Portland-Cement Concrete
C33 Standard Specification for Concrete Aggregates
C593 Standard Specification for Fly Ash and Other Pozzolans for Use With Lime

C595 Standard Specification for Blended Hydraulic Cements

C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
C739 Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation
C936 Standard Specification for Interlocking Concrete Paver Units
C989 Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
D1435 Standard Practice for Outdoor Weathering of Plastics
D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3))

D1972 Standard Practice for Generic Marking of Plastic Products
D198 Standard Test Methods of Static Tests of Lumber in Structural Sizes
D2103 Standard Specification for Polyethylene Film and Sheeting
D217 Standard Test Methods for Cone Penetration of Lubricating Grease
D2369 Standard Test Method for Volatile Content of Coatings
D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics- Diaphragm Bursting Strength Tester Method
D3792 Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph
D3864 Standard Guide for Continual On-Line Monitoring Systems for Water Analysis D3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
D4017 Standard Test Method for Water in Paints and Paint Materials by Karl Fischer Method
D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
D4444 Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters
D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
D4552 Standard Practice for Classifying Hot-Mix Recycling Agents
D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
D4716 Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
D4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Product
D4840 Standard Guide for Sampling Chain-of-Custody Procedures
D4887 Standard Test Method for Preparation of Viscosity Blends for Hot Recycled Bituminous Materials
D5106 Standard Specification for Steel Slag Aggregates for Bituminous Paving Mixtures D5116 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products
D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
D5268 Standard Specification for Topsoil Used for Landscaping Purposes
D5359 Standard Specification for Glass Cullet Recovered from Waste for Use in Manu- facture of Glass Fiber
D5505 Standard Practice for Classifying Emulsified Recycling Agents
D5509 Standard Practice for Exposing Plastics to a Simulated Compost Environment
D5512 Standard Practice for Exposing Plastics to a Simulated Compost Environment Using an Externally Heated Reactor
D5539 Standard Specification for Seed Starter Mix
D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations
D5603 Standard Classification for Rubber Compounding Materials—Recycled Vulcanizate Particulate Rubber
D5663 Standard Guide for Validating Recycled Content in Packaging Paper and Paper- board
D5759 Standard Guide for Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
D5792 Standard Practice for Generation of Environmental Data Related to

Waste Management Activities: Development of Data Quality Objectives
D5834 Standard Guide for Source Reduction Reuse, Recycling, and Disposal of Solid and Corrugated Fiberboard (Cardboard)
D5851 Standard Guide for Planning and Implementing a Water Monitoring Program
D5852 Standard Test Method for Erodibility Determination of Soil in the Field or in the Laboratory by the Jet Index Method
D6002 Standard Guide for Assessing the Compostability of Environmentally Degradable Plastics
D6006 Standard Guide for Assessing Biodegradability of Hydraulic Fluid
D6007 Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber
D6046 Standard Classification of Hydraulic Fluids for Environmental Impact
D6081 Standard Practice for Aquatic Toxicity Testing of Lubricants: Sample Preparation and Results Interpretation
D6108 Standard Test Method for Compressive Properties of Plastic Lumber and Shapes
D6109 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber
D6112 Standard Test Methods for Compressive and Flexural creep and Creep-Rupture of Plastic Lumber and Shapes
D6117 Standard Test Methods for Mechanical Fasteners In Plastic Lumber and Shapes
D6155 Standard Specification for Nontraditional Coarse Aggregates for Bituminous Paving Mixtures
D6245 Standard Guide for Using Indoor Carbon Dioxide Concentrations to Evaluate In- door Air Quality and Ventilation
D6261 Standard Specification for Extruded and Compression Molded Basic Shapes Made from Thermoplastic Polyester (TPES)
D6262 Standard Specification for Extruded, Compression Molded, and Injection Molded Basic Shapes of Poly(aryl ether ketone) (PAEK)
D6270 Standard Practice for Use of Scrap Tires in Civil Engineering Applications
D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers
D6330 Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions
D6345 Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air
D6400 Standard Specification for Compostable Plastics
D6435 Standard Test Method for Shear Properties of Plastic Lumber and Plastic Lumber Shapes
D6629 Standard Guide for Selection of Methods for Estimating Soil Loss by Erosion
D6662 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards
D6712 Standard Specification for Ultra-High-Molecular-Weight Polyethylene (UHMW- PE) Solid Plastic Shapes
D6886 Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatograpy
D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Be- tween -30°C and 30°C With a Vitreous Silica Dilatometer

D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))
D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair
E1021 Standard Test Methods for Measuring Spectral Response of Photovoltaic Cells
E1038 Standard Test Method for Determining Resistance of Photovoltaic Modules to Hail by Impact with Propelled Ice Balls
E1039 Standard Test Method for Calibration of Silicon Non-Concentrator Photovoltaic Primary Reference Cells Under Global Irradiation
E1040 Standard Specification for Physical Characteristics of Nonconcentrator Terrestrial Photovoltaic Reference Cells
E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
E1171 Standard Test Method for Photovoltaic Modules in Cyclic Temperature and Humidity Environments
E1333 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber
E1362 Standard Test Method for Calibration of Non-Concentrator Photovoltaic Secondary Reference Cells
E1433 Standard Guide for Selection of Standards on Environmental Acoustics
E1462 Standard Test Methods for Insulation Integrity and Ground Path Continuity of Photovoltaic Modules
E1596 Standard Test Methods for Solar Radiation Weathering of Photovoltaic Modules
E1597 Standard Test Method for Saltwater Pressure Immersion and Temperature Testing of Photovoltaic Modules for Marine Environments
E1609 Standard Guide for Development and Implementation of a Pollution Prevention Program
E1686 Standard Guide for Selection of Environmental Noise Measurements and Criteria
E1690 Standard Test Method for Determination of Ethanol Extractives in Biomass
E1721 Standard Test Method for Determination of Acid-Insoluble Residue in Biomass
E1755 Standard Test Method for Ash in Biomass
E1758 Standard Test Method for Determination of Carbohydrates in Biomass by High Performance Liquid Chromatography
E1780 Standard Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source
E1799 Standard Practice for Visual Inspections of Photovoltaic Modules
E1802 Standard Test Methods for Wet Insulation Integrity Testing of Photovoltaic Modules
E1821 Standard Test Method for Determination of Carbohydrates in Biomass by Gas Chromatography
E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
E1830 Standard Test Methods for Determining Mechanical Integrity of Photovoltaic Modules
E1861 Standard Guide for Use of Coal Combustion By-Products in Structural Fills
E1918 Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
E1971 Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings

E1980 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low- Sloped Opaque Surfaces
E1991 Standard Guide for Environmental Life Cycle Assessment of Building Mate- rials/Products
E2047 Standard Test Method for Wet Insulation Integrity Testing of Photovoltaic Arrays
E2114 Standard Terminology for Sustainability Relative to the Performance of Buildings
E2128 Standard Guide for Evaluating Water Leakage of Building Walls
E2129 Standard Practice for Data Collection for Sustainability Assessment of Building Products
E2397 Standard Practice for Determination of Dead Loads and Live Loads associated with Green Roof Systems
E2398 Standard Test Method for Water Capture and Media Retention of Geocomposite Drain Layers for Green Roof Systems
E2399 Standard Test Method for Maximum Media Density for Dead Load Analysis of Green Roof Systems
E2400 Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems
E241 Standard Guide for Limiting Water-Induced Damage to Buildings

E2432 Standard Guide for General Principles of Sustainability Relative to Buildings

E408 Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection- Meter Techniques
E413 Standard Classification for Rating Sound Insulation
E477 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers
E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
E683 Standard Practice for Installation and Service of Solar Space Heating Systems for One- and Two-Family Dwellings
E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
E781 Standard Practice for Evaluating Absorptive Solar Receiver Materials When Exposed to Conditions Simulating Stagnation in Solar Collectors With Cover Plates
E782 Standard Practice for Exposure of Cover Materials for Solar Collectors to Natural Weathering Under Conditions Simulating Operational Mode
E823 Standard Practice for Nonoperational Exposure and Inspection of a Solar Collector
E881 Standard Practice for Exposure of Solar Collector Cover Materials to Natural Weathering Under Conditions Simulating Stagnation Mode
E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
E903 Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
E948 Standard Test Method for Electrical Performance of Photovoltaic Cells Using Reference Cells Under Simulated Sunlight
F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2034 Standard Specification for Sheet Linoleum Floor Covering
F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

E. Bat Conservation International:
Bat Approved Bat Houses

F. Carpet and Rug Institute
Green Label Testing Programs
Green Label Plus Testing Programs

G. Center for Resource Solutions
Green-e program

H. EPA:
Comprehensive Procurement Guidelines
ENERGY STAR
Environmentally Preferable Purchasing Program Final Guidance
GreenScapes program
Heat Island Initiative
Indoor Air Quality Building Education and Assessment Model(I-BEAM) National Environmental Performance Track
Pollution Prevention (P2) Product Stewardship Program
Significant New Alternatives Policy (SNAP) Program

I. Federal Trade Commission:
Guide for the Use of Environmental Marketing Claims

J. Forest Stewardship Council:
Chain-Of-
Custody Forest
Management

K. Green Building Initiative (GBI):
Green Globes - US

L. Green Seal:
GC-03 Anti-Corrosive Paints
GC-12 Occupancy Sensors
GC-13 Split-Ductless Air-Source Heat Pumps
GS-05 Compact Fluorescent Lamps
GS-11 Paints
GS-13 Windows
GS-14 Window Films
GS-31 Electric Chillers
GS-32 Photovoltaic Modules
GS-36 Commercial Adhesives
GS-37 Industrial & Institutional Cleaners

M. International Iron and Steel Institute:
CO2 Breakthrough Program

N. International Organization of Standardization:
Guide 64; Guide for Inclusion of Environmental Aspects in Product Standards
9660 Information processing -- Volume and file structure of CD-ROM for information interchange
14001 Environmental management systems – Specification with guidance for use
14004 Environmental Management Systems – General Guidelines on

Principles, Systems and Supporting Techniques
14020 Environmental labels and declarations – General principles
14024 Environmental labels and declarations – Type I environmental labelling - Principles and procedures
14040 Environmental management – Life cycle assessment – Principles and framework

O. National Association of Home Builders:
Advanced Framing Techniques: Optimum Value Engineering

P. National Institute of Building Sciences:
MOIST program for transfer of heat and moisture
Whole Building Design Guide

Q. National Institute of Standards and Technology:
BEES (Building for Environmental and Economic Sustainability)
Lifecycle Decision Support Tool

R. Sheet Metal and Air Conditioning Contractors' National Association:

IAQ Guidelines for Occupied Buildings Under Construction

S. Southcoast Air Quality Management
District: 1168 Adhesive and
Sealant Applications

T. US Composting Council:
Seal of Testing Assurance Program

U. US Department of Agriculture:
Biobased Products – Definitions and Descriptions

V. US Green Building Council:
LEED™ v2.2 Green Building Rating System

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00

TEMPORARY FACILITIES & CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including support facilities, temporary utilities and security and protection facilities.

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Contracting Officer and COR, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum as required.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Environmental Protection: Provide environmental protection as required by agency(ies) with jurisdiction and as indicated in the Contract Documents. Coordinate with requirements of the following:

1. Regulatory Requirements.
2. Environmental Management.
3. Construction Waste Management.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before NPS acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Temporary materials may be new or used but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

B. Safety Barrier Fence: Orange plastic fence, minimum height, 4 feet.

C. Barrier Tape: Yellow tape Imprinted with "CAUTION: CONSTRUCTION AREA", manufactured by Reef Industries, Inc., Houston, Texas, or approved equal.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Temporary weather tight sheds or other covered facilities for storage of materials subject to weather damage. Number and size of structures shall be subject to Contracting Officer's and COR’s approval.

C. The location of the Contractor Staging Area is shown on the drawings. The boundaries of the Staging Area will be flagged by the NPS.

D. Construction Water: Construction water for compaction or dust control services. Contractor may draw water from the river at the launch ramp. Location and facilities shall have a submittal. Equipment shall have a totalizer water meter on it and a final report showing total water used submitted to the NPS at the end of the project.

E. Toilets: Sufficiently lighted and ventilated toilet facilities in weatherproof, sight proof, handicap accessible, sturdy enclosures with privacy locks.

1. Provide separate toilet facilities for men and women.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Contracting Officer and COR authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to agency(ies) with jurisdiction and marked for intended use.

3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance and as directed by the Contracting Officer or COR.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, NPS, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services. Acquire all necessary permits.

B. Non-potable water for construction may be taken directly from Lake. Install storage, piping and connections as required.

C. Potable water is not available on site. Furnish cool, potable water for construction personnel in locations convenient to work stations.

D. Sanitary Facilities: USE OF EXISTING TOILET FACILITIES WILL NOT BE PERMITTED. Provide temporary toilets, and wash facilities for use by construction personnel.

1. Place in approved locations secluded from public observation and convenient to work stations. Relocate as work progress requires.
2. Maintain and clean toilet facilities at least weekly.
3. Completely remove sanitary facilities on completion of work.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 50 feet of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove structures, equipment, and furnishings, and terminate

services after punch list is 100 percent completed or when directed by Contracting Officer or COR. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Contracting Officer and COR.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Erect and maintain barricades, lights, danger signals, and warning signs in accordance with Manual on Uniform Traffic Control Devices (MUTCD), Part 6, 2012 edition.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. Illuminate barricades and obstructions at night; keep safety lights burning from sunset to sunrise.
4. Adequately barricade and post open cuts in or adjacent to thoroughfares.
5. Protect pedestrian traffic by guardrails or fences.
6. When pedestrian traffic is detoured onto a roadway, provide temporary walkways with protection as required at ends and overhead. For walkways, use lumber running parallel to direction of traffic movement and provide ramps at changes of elevation.
7. Cover pipes, hoses, and power lines crossing sidewalks and walkways with troughs using beveled edge boards.
8. Install Barrier Tape where directed by Contracting Officer or COR. Keep a minimum of two rolls on site at all times.

D. Parking: Use designated areas of existing parking areas for construction personnel.

E. Project Identification and Temporary Signs: Provide Project identification and other signs. Fence, barricade, or otherwise block off the immediate work area to prevent unauthorized entry.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.
3. Erect and maintain sufficient detour signs at road closures and along detour routes.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of agency(ies) with jurisdiction.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Cleaning of Equipment: The Contractor shall ensure that prior to moving on to the Project Area, all equipment, is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. Ensure that all equipment has been pressure washed and is free of exotic species prior to start-up of operations and moving of equipment to Project Area. Equipment shall be considered free of soil, seeds, and other debris when a visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools are not required.

C. Temporary Erosion and Sedimentation Control: Refer to Section 01 57 23 "Temporary Storm Water Pollution Prevention".

D. Tree and Plant Protection: Refer to Section 01 11 00 "Summary of Work".

E. Pest Control: Follow NPS requirements and practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

F. Barricades, Warning Signs, and Lights: Comply with requirements of MUTCD, Part 6, 2012 edition for erecting structurally adequate barricades, including warning signs and lighting.

G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Responsible Person: A capable and qualified person shall be placed in charge of fire protection. The responsibilities shall include locating and maintaining fire protective equipment and establishing and maintaining safe torch cutting and welding procedures.
2. Smoking: Smoking within buildings or temporary storage sheds is prohibited.

3. Vehicles and Equipment: Provide one extinguisher on each vehicle or piece of equipment.
4. Service and Refueling Areas: Locate areas a minimum of 50 feet from buildings. Shut down equipment before refueling.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. NPS reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period.

END OF SECTION 01 50 00

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION PREVENTION

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this section consists of implementing measures to prevent Storm Water Pollution during construction activities, in accordance with the Clean Water Act, the National Pollution Discharge Elimination System (NPDES) permit program, and all Federal, State, and local regulations, and in accordance with the Storm Water Pollution Prevention Plan (SWPPP) to be prepared for this project.

1.2 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114.

B. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

1.3 SUBMITTALS

A. Storm Water Pollution Prevention Plan: Submit Storm Water Pollution Prevention Plan after contract award and before the pre-construction conference.

1. Show that the Storm water Pollution Prevention Plan satisfies all Federal and State NPDES permit requirements including, but not limited to, the Arizona Stormwater General Permit for Construction Activity (AZR100000).

B. Inspection Schedule: Submit schedule for inspection and monitoring of all storm water pollution prevention measures.

C. Erosion Control Products: Submit manufacturer’s product information and installation recommendations for turbidity curtain, silt fence, filter fabric, erosion control blanket, straw bales, straw wattles and any other materials proposed for use on this project.

1.4 QUALITY ASSURANCE

A. Orientation Meeting: The Contractor shall be responsible for arranging and conducting an Erosion and Sediment Control meeting/briefing to inform all parties scheduled to be on-site during the project of the measures to be implemented for proper erosion and sediment control (may be included as part of the Pre-Construction Meeting).

1. Installation of turbidity curtains, silt fences, storm drain protection, and all other forms of erosion and sediment control shall not begin until after this meeting has occurred.

B. Erosion Control Supervisor: The Contractor shall designate the Erosion Control Supervisor who will be responsible for implementing the SWPPP.

1. The Erosion Control Supervisor shall be familiar with the SWPPP procedures and practices and shall ensure that emergency procedures and the SWPPP are updated as needed and available for inspection.

PART 2 - PRODUCTS

2.1 STORM WATER POLLUTION PREVENTION PLAN

A. Provide SWPPP which includes the following information and forms:

1. Site description.
2. Identification and contract information for Erosion Control
3. Expected sequencing of operations and construction schedule.
4. Weather monitoring procedure.
5. Descriptions and details of erosion controls, including dust
6. Erosion control plans.
7. Controls for other potential onsite storm water pollutants.
8. Applicable specifications.
9. Maintenance and inspection procedures and forms.
10. Description of potential non-storm water discharges at site.
11. Notice of Intent (NOI) form.
12. Notice of Termination (NOT) form.
13. Contractor and Sub-contractor Certification forms.
14. Other record keeping forms and procedures.
15. Housekeeping Best Management Practices, including vehicle wash-down areas, protection of equipment storage and maintenance areas and sweeping of roadways related to hauling activities.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL PROTECTION

A. Protection of Natural Resources: Comply with applicable regulations and these specifications. Preserve the natural resources within the Project boundaries and outside the limits of permanent Work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by the Contracting Officer and COR.

B. Construction Zone: Arrange construction activities to minimize erosion to the maximum practical extent.

1. Clearing, excavation, and grading shall be limited to those areas of the project site necessary for construction. Minimize the area exposed and unprotected.
2. Clearly mark and delineate the limits of work activities.
3. Equipment shall not be allowed to operate outside the limits of work or to disturb existing vegetation.
4. Excavation and grading shall be completed during the dry season to the maximum extent possible

3.2 REGULATORY REQUIREMENTS

A. Permits: The Contractor shall obtain all required NPDES permits in a manner that results in no impacts to scheduled work. The Contractor shall account for the possibility of significant lead time in scheduling and executing the work.

1. Implement the requirements of the NPDES permit for erosion control due to storm water runoff during construction.
2. Implement all good housekeeping practices, inspections and record keeping.
3. Prior to construction, the Contractor and all subcontractors shall sign certifications (included in the SWPPP) that they understand the requirements of the NPDES permit.
4. All subcontractors shall comply with the requirements of the NPDES under the supervision of the Contractor.
5. The accepted SWPPP must comply with the terms and conditions of the EPA permit.

B. Notice of Intent (NOI): The Contractor shall file a Notice of Intent (NOI) and implement the accepted SWPPP during construction.

C. Notice of Termination (NOT): After Substantial Completion of the construction project, file a Notice of Termination (NOT).

D. CO Notification: The Contractor shall notify the Contracting Officer and COR in writing and by telephone of the following events:

1. The required erosion and sediment control meeting/briefing.
2. Following installation of required sediment control structures.
3. Prior to removal of or modification to sediment control structures.
4. Prior to removal of all sediment control structures.

3.3 STORM WATER POLLUTION PREVENTION PLAN

A. Review and Acceptance: The Contractor and the Contracting Officer (CO) and COR will jointly review the draft SWPPP and agree to any needed revisions. The Contractor shall incorporate all revisions, sign, and submit the final SWPPP to the Contracting Officer and COR. The final SWPPP will be the document enforced on the project.

1. The accepted SWPPP will describe and ensure implementation of the practices which will be used to reduce the pollutants in storm water discharges.
2. The Contractor shall maintain a current copy of the SWPPP and all associated records and forms at the jobsite throughout the

duration of the project.

3. The SWPPP shall be available at all times for public inspection and for the inspection and use of the CO.
4. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Implementation: Implement the SWPPP as required throughout the construction period and maintain all erosion control elements in proper working order.

1. Do not perform clearing and grubbing or earthwork until the SWPPP has been implemented.

C. The SWPPP (including inspection forms) and all data used to complete the NOI shall be provided to the CO after Substantial Completion of the project.

3.4 SITE INSPECTIONS AND SWPPP REVISIONS

A. Inspections: The Contractor and the CO will perform a weekly inspection of the site and within 24-hours of the end of a storm event of 0.5 inches or greater.

1. The inspection shall include disturbed areas that have not been completely stabilized, areas used for storage of materials, locations where vehicles enter or exit the site, and all other erosion and sediment controls that are included in the Plan.
2. Inspections shall be documented on forms provided in the Plan.
3. The inspection forms shall be retained onsite in the Plan notebook throughout the construction period.

B. SWPPP Revisions: It may be necessary to revise the Plan during construction to make necessary improvements, revisions, or to respond to unforeseen conditions noted during construction or site inspections.

1. The Plan shall specify the mechanism whereby revisions may be proposed by the Contractor or the CO.
2. The Contractor and the CO will jointly review each revision to the SWPPP before changes are incorporated and implemented. The Contractor will then provide a revised copy of the SWPPP to the Contracting Officer and COR.
3. Accepted modifications will be implemented within 7 calendar days following the date of the inspection when deficiencies or necessary corrections are first noted.

C. Negligence: Provide additional temporary erosion and pollution controls made necessary by Contractor's errors or negligence at no additional cost to the Government.

3.5 EROSION CONTROL MEASURES

A. Erosion control measures shall consist of any and all Best Management Practices (BMP's) for erosion and pollution control in accordance with ADOT's "Erosion and Pollution Control Manual / BMP Detail

Drawings".

B. Erosion control measures shall be used to contain only direct precipitation in the construction zone. The contained water shall be allowed to percolate into the ground or drain slowly through the drainage filter sediment traps.

C. Earthen sediment traps or holding ponds shall not be used unless accepted by the Contracting Officer or COR.

D. Construct berms to reduce runoff velocity as well as direct surface runoff around and away from all fuel containment, storage, and borrow areas.

E. Divert surface runoff around and away from cut and fill slopes by constructing berms or ditches at the base of disturbed slopes. Provide conveyance for the runoff in temporary pipes or protected channels to temporary sediment traps.

F. Place drainage filters around all catch basins to create sediment traps to control run-off from the construction area.

G. Excess water used for dust control shall be contained within the construction areas by the erosion control measures.

H. Temporary Measures: Temporary erosion and pollution control measures shall be used to correct conditions that develop during construction that were not foreseen during design.
   1. Temporary silt fences shall be installed around any stockpiles and/or excavated material that cannot be backfilled during the same day in which it was excavated.
   2. Silt fences, storm drain protection, and all other forms of erosion and sediment control shall be installed, inspected, and accepted by the Contracting Officer or COR before beginning any utility excavation.
   3. Silt fences shall be placed immediately downstream of any utility trench that has not been backfilled at the end of the working day.
   4. Silt fences shall be installed prior to leaving the work site for the day.
   5. Silt fences and storm drain protection shall be inspected by the Contractor weekly. Repairs to these devices shall be completed prior to leaving the work site for the day.
   6. Failure to maintain silt fences and storm drain protection shall be cause for an immediate stop-work order.
   7. Silt fences shall be removed with permission of the Contracting Officer or COR within 20 working days after final acceptance of the project and/or after the establishment of permanent stabilization of all excavations and fill areas.

I. The Contractor shall prevent the deposition of materials onto paved areas. The Contractor shall inspect the paved areas for deposited materials weekly and remove the materials immediately.

J. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent erosion. Temporary measures shall be to Contractor's own design and Contractor shall be solely

responsible for risks related to the management of erosion control during construction.

K. Before the work begins, sufficient equipment shall be available on the site to assure that the operation and adequacy of the erosion control system can be maintained.

3.6 EROSION CONTROL PRODUCTS

A. Provide erosion control products such as silt fence, clean rock, straw wattles and turbidity curtain, with adequate anchors to withstand river current.

B. Clean rock used for the stabilized construction entrance shall be imported from an off-site source and installed as a first item of work.

C. Turbidity curtains shall be constructed of the materials shown in the drawings and installed per manufacturer's recommendations.

3.7 INSTALLATION OF EROSION CONTROL MEASURES

A. TURBIDITY CURTAIN

1. The top of the curtain should consist of flexible floatation buoys, and the bottom shall be held down by a load line incorporated into the curtain fabric. The fabric shall be a brightly colored PVC-coated polyester.

2. The curtain shall be held in place by ballast chain or anchors placed per manufacturer's specifications and shall be adequately sized to withstand the river's current.

3. Tow the fabric out in a furled condition, and connect to the anchors, if applicable. The anchors should be connected per manufacturer's specifications. Once in place, cut the furling lines, and allow the bottom of the curtain to sink.

4. Sediment that has been deflected and settled out by the curtain should be removed; however, consideration must be given to the probable outcome of the removal procedure. Removal of the curtain may create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. The soil particles accumulated by the turbidity curtain should be removed only if it is deemed necessary by the Contracting Officer or COR.

5. Check manufacturer's requirements when installing turbidity curtains.

6. The curtain should be inspected daily for holes or other problems and any repairs needed should be made promptly.

7. Allow sediment to settle prior to its removal or removal of the curtain. After removing sediment, wait at least 6-12 hours before removing the curtain.

8. To remove, install furling lines along the curtain, detach from anchors, and tow out of the water.

B. SILT FENCE

1. The silt fence shall be installed as shown on the drawings and per manufacturer's specifications.

3.8 MAINTENANCE OF TEMPORARY FACILITIES

A. Ensure erosion and sediment control structures remain effective throughout excavation and grading operations. Relocate structures as necessary.

B. Inspect control structures after each significant rainfall. Promptly repair breaches which occur.

C. The Contractor shall remove entrapped sediment from behind sediment control structures after each storm.

3.9 SEDIMENT DISPOSAL

A. Sediment excavated from temporary sediment control structures shall be reused on site as fill to flatten slopes. Sediment shall be allowed to dry out as required before reuse.

B. Contractor shall place the sediment removed from traps and other structures where it will not enter a storm drain or watercourse and where it will not immediately reenter the basin.

3.10 REMOVAL OF TEMPORARY STORM WATER POLLUTION CONTROL MEASURES

A. All temporary control measures shall be removed with permission of the Contracting Officer or COR within 20 working days after final acceptance of the project, and/or once grading is completed and slopes have stabilized.

END OF SECTION 01 57 23

SECTION 01 67 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in the Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and environmental requirements.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

C. Definitions pertaining to sustainable development: As defined in ASTM E2114.

D. Biobased Materials: As defined in the Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, “biobased” means a “commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials.” Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced

from biomass as defined by The Biomass Research and Development Act of 2000.

1. Biobased content: The amount of biobased carbon in the material or product as a percentage of weight (mass) of the total organic carbon in the material or product.

E. Chain-of-Custody: Process whereby a product or material is maintained under the physical possession or control during its entire life cycle.

F. Environmentally preferable products: Products and services that have a lesser or reduced effect on the environment in comparison to conventional products and services. Refer to EPA's Final Guidance on Environmentally Preferable Purchasing for more information http://www.epa.gov/epp/guidance/finalguidancetoc.htm.

G. Stewardship: Responsible use and management of resources in support of sustainability.

H. Sustainability: The maintenance of ecosystem components and functions for future generations.

1.3 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Contractor is encouraged to obtain materials in biodegradable or recyclable/reusable packaging which uses the minimum amount of packaging possible.

C. Storage:

1. Store products to allow for inspection and measurement of

quantity or counting of units.

2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

1.5 PACKAGING

A. Where Contractor has the option to provide one of the listed products or equal, preference shall be given to products with minimal packaging and easily recyclable packaging as defined in ASTM D5834.

B. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.

1.6 ENVIRONMENTALLY PREFERABLE PRODUCTS

A. Provide environmentally preferable products to the greatest extent possible.

1. To the greatest extent possible, provide products and materials that have a lesser or reduced effect on the environment considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the product.
2. Eliminate the use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI or the Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account life cycle impacts.
3. Use products meeting or exceeding EPA’s recycled content recommendations for EPA- designated products. Use materials with recycled content such that the sum of post- consumer recycled content plus on-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

B. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Government reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Contracting Officer and COR will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Governments.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements or approved equal.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements or approved equal.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements or approved equal.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements or approved equal.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of

manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.

7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product, system, or approved equal.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers, or approved equal. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.

2.2 COMPARABLE PRODUCTS

A. Conditions: Contracting Officer and COR will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Contracting Officer or COR will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.1 PROTECTION AFTER INSTALLATION

A. Provide adequate coverings as necessary to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction. Remove when no longer needed.

END OF SECTION 01 67 00

AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

Project Name:_____Project Number: _____

Contractor Name:_____License Number: _____

Contractor Address: _____

Product	**Total $ value provided**	**Total $ value w/ recycled content Pre-consumer**	**Total $ value w/ recycled content Post-consumer**	**Total $ value w/ biobased content**	**Exempted indicate 1,2,3,4**	**Comments**
Hydraulic Mulch (paper based)						
Hydraulic Mulch (wood based)						
Compost						
Parking Stops (Concrete w/ fly ash, slag cement or low cement content)						
Parking Stops (Plastic/Rubber)						
Patio Blocks/Rubber						
Patio Blocks/Plastic						
Playground Surfaces						
Concrete w/ fly ash						
Concrete w/ slag cement						
Concrete w/ low cement content						
Plastic lumber						
Building Insulation						
Rock Wool						
Fiber glass						
Cellulose						
Perlite Comp Board						
Plastic Rigid Foam						
Glass Fiber						

Foam						
Phenolic Rigid Foam						
Ceramic tile						
Resilient						
Floor Tiles/Rubber						
Floor Tiles/Plastic						
Running Tracks						
Carpet (PET)						
Paint						
Reprocessed Latex Paint White & Light Colors						
Reprocessed Latex Dark						
Consolidated Latex Paint						
toilet/shower partitions (plastic or steel)						
Other						

CERTIFICATION

I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1. The product does not meet appropriate performance standards
2. The product is not available within a reasonable time frame
3. The product is not available competitively (from two or more sources)
4. The product is only available at an unreasonable price (compared with a comparable non-recycled content product.)

Signature:_____Date:_____

END OF
AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

SECTION 01 73 40

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Coordination with utility service providers.
2. Construction layout.
3. Field engineering and surveying.
4. General installation of products.
5. Protection of installed construction.
6. Correction of the Work.

1.2 SUBMITTALS

A. Certificates: Submit certificates signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Quantity Surveys: Submit 2 copies showing quantities of work performed and actual construction completed and in place.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where the Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to the Contracting Officer or COR in accordance with Division 01 Specification 01 31 00 "Project Management and Coordination".

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the existing benchmarks. If discrepancies are discovered, notify Contracting Officer and COR promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify the Contracting Officer and COR when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the established standard.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party

member, and types of instruments and tapes used. Make the log available for reference by NPS.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations. Controls that are destroyed by Contractor will be replaced by the Contractor at their expense.

1. Existing Monuments: All bench marks, land corners, and triangulation points, established by other surveys, existing within the construction area shall be preserved. If existing monuments interfere with the work, secure written permission before removing them.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with NPS requirements for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading more than that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

I. Quantity surveys: Shall be conducted, and the data derived from these surveys shall be used in computing the quantities of work performed and the actual construction completed and in place.

1. The Contractor shall conduct the original and final surveys and surveys for any periods for which progress payments are requested. All these surveys shall be conducted under the direction of a representative of the Contracting Officer or COR, unless the Contracting Officer or COR waives this requirement in a specific instance. The Government shall make such computations as are necessary to determine the quantities of work performed or finally in place. The Contractor shall make the computations based on the surveys for any periods for which progress payments are requested.
2. Promptly upon completing a survey, the Contractor shall furnish the originals of all field notes and all other records relating to the survey or to the layout of the work to the Contracting Officer or COR, who shall use them as necessary to determine the amount of progress payments. The Contractor shall retain copies of all such material furnished to the Contracting Officer or COR.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
3. Contractor shall provide progress cleaning that minimizes sources of food, water, and harborage available to pests.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

1. Utilize non-toxic cleaning materials and methods.

a. Comply with GS 37 for general purpose cleaning and bathroom cleaning.
b. Use natural cleaning materials where feasible. Natural cleaning materials include:

1. Abrasive cleaners: substitute 1/2 lemon dipped in borax.
2. Ammonia: substitute vinegar, salt and water mixture, or baking soda and water.
3. Disinfectants: substitute 1/2 cup borax in gallon water.
4. Drain cleaners: substitute 1/4 cup baking soda and 1/4 cup vinegar in boiling water.
5. Upholstery cleaners: substitute dry cornstarch.

E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

F. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

H. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

I. Final Cleaning: At completion of Work, remove all remaining waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave Project clean and ready for occupancy.

1. Provide final cleaning in accordance with ASTM E1971.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

END OF SECTION 01 73 40

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT & DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Solid Waste: Garbage, debris, sludge, or other discharged material (except hazardous waste) including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations.

D. Debris: Non-hazardous solid waste generated during the construction, demolition, or renovation of a structure which exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

E. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

F. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

G. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

H. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end

use, treatment, handling, storage, transportation, or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261.

I. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

J. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

1.3 PERFORMANCE REQUIREMENTS

A. General: This project shall minimize the creation of construction, deconstruction, and demolition waste to protect and restore natural habitat and resources. Factors that contribute to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination shall be minimized. A Waste Management Plan shall be developed to ensure that existing site and building materials are reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.

B. Salvage / Recycle Requirements: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work. The following waste categories, at a minimum, shall be diverted from a landfill:

1. Land clearing debris
2. Clean dimensional wood, palettes
3. Plywood, OSB, and particle board
4. Concrete
5. Asphaltic concrete
6. Cardboard, paper, packaging, newsprint
7. Metals (from banding, stud trim, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze)
8. Gypsum drywall—unpainted
9. Non-hazardous paint and paint cans
10. Beverage containers: Aluminum, glass, and plastic containers
11. Insulation
12. Ceiling grid and tiles
13. Ductwork
14. Wiring
15. Other mixed construction and demolition waste as appropriate

C. If any waste materials encountered during the deconstruction/demolition or construction phase are found to contain lead, asbestos, PCBs, (such as fluorescent lamp ballasts), or other harmful substances, they are to be handled and removed in accordance with local, state, and federal laws and requirements concerning hazardous waste.

D. Existing items and material to be removed during the deconstruction/demolition phase shall be reused in the construction phase of the Project. Items that cannot be reused shall be recycled. Items considered for reuse must be in refurbishable condition and must meet the quality standards set forth in these specifications. The

Contractor shall ensure that the quality of the item(s) in question will meet or exceed accepted industry or trade standards for first quality commercial grade application. During construction, deconstruction, or demolition the Contracting Officer or COR may designate other objects or materials for reuse.

E. Salvage/Recycle Requirements: Government goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible including, but not limited to, the following materials:

1. None.

1.4 SUBMITTALS

A. Waste Management Plan: After award of the contract and prior to the scheduled Pre-Construction Conference, the Contractor shall submit a draft Waste Management Plan to the Contracting Officer or COR for approval. Submit one (1) electronic copy of the plan. Revise and resubmit Plan as required by the Contracting Officer or COR. Approval of the Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Progress Documentation: Supplemental to the Waste Management Plan, document solid waste disposal, diversion, and cost/revenue analysis and submit a completed worksheet monthly. Use Appendix A - Project Waste Management Plan Worksheet, and report totals to date for all column headings. Use Appendix B for solid waste volume to weight conversions.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit three (3) copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether the organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether the organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. Qualification Data: For Waste Management Coordinator.

I. Progress payment requirements:

1. With each Application for payment, submit updated Project Waste Management Plan worksheet for solid waste disposal and diversion.
2. With each Application for Payment, submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material.

J. Closeout Submittals

1. With Closeout Submittals, submit a summary of the Project Waste Management Plan worksheet for solid waste disposal and diversion. Submit on form in Appendix A of this Section.

1.5 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED™-Accredited Professional, certified by the USGBC, as waste management coordinator. Waste management coordinator may also serve as LEED™ coordinator.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Meeting: Conduct separate meetings or cover in the Pre-Construction Conference and comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

PART 2 - PRODUCTS

2.1 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include a list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include a list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:

1. Landfill tip fees/ton
2. If diverted, tip fee savings from landfill diversion
3. Costs of recycling, salvage, or reuse
4. Revenue from recycling, salvage, or reuse
5. Total cost or savings from diversion (Calculate by using tip fee savings and subtracting costs of recycling or adding revenue from recycling)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by the Contracting Officer or COR. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. The Contractor shall establish contacts with local recycling and reuse companies to set up the lines of responsibility. The contractor shall be responsible for coordinating with these companies in terms of identifying materials, pickup schedules, and standard quality for recycled materials.

D. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three (3) days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

E. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

F. Separation facilities:

1. The Contractor shall designate, and the Contracting Officer or COR shall approve a specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.
2. Waste and recycling bins are to be placed near each other, and close to the point of waste generation but out of the traffic pattern.
3. Recycling and waste bin areas are to be kept neat and clean and clearly marked to avoid co-mingling of materials.
4. Bins shall be protected during non-working hours from off-site contamination.
5. The garbage dumpsters should be checked periodically to monitor recyclables being thrown away or if there are undocumented materials that could be recycled.

G. Materials handling procedures: Materials to be recycled shall be protected from contamination and shall be handled, stored, and transported in a manner that meets the requirements set by the designated facilities for acceptance. Establish a defined area for the operations of each trade, especially woodcutting so that off-cuts will be kept in one area and can be sorted by dimension for future reuse.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: None anticipated for this Project.

C. Salvaged Items for Governments Use: Pipe Mats.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. Republic Services.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include a list of acceptable and unacceptable materials at each container and bin.

   a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Government’s property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Concrete: Load and haul concrete to recycling location to remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch size.

B. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

C. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Government’s property and legally dispose of them.

END OF SECTION 01 74 19

01 74 19 - Appendix A

Project Waste Management Plan Worksheet

	A	B	C	D	E	F	G	H	I	J
Material	**Quantity Recycled (in tons)**	**Quantity Salvaged or Reused (in tons)**	**A + B = Total Quantity Diverted from Landfill**	**Quantity To Landfill (in tons)**	**C + D = Total Quantity Generated (in tons)**	**Tip Fee/Ton at Landfill**	**C x F = Tip Fee Savings resulting from Landfill Diversion**	**Cost of Recycling (R), Salvage (S), or Reuse (Re) (Specify R, S, or Re)**	**Revenue from Recycling, Salvage, or Reuse**	**G - H + I = Total Cost (-) or Savings (+) from Diversion**
Asphalt/Concrete										
Brick/Masonry/Tile										
Building Materials (doors, windows, fixtures, shingles, lumber, insulation, sheet goods, etc.)										
Carpet										
Carpet Padding, Foam Only										
Cardboard										
Ceiling Tile										
Drywall										
Glass										
Scrap Metal Aluminum										
Copper										
Steel										
Unpainted Wood & Pallets										
Yard Trimmings, Brush, Trees, Stumps, etc.										
Garbage/Trash										
Other										
Column Totals										
	Total Quantity Recycled	**Total Quantity Reused or Salvaged**	**Total Quantity Diverted from Landfill**	**Total Quantity To Landfill**	**Total Quantity Generated**		**Tip Fee Savings from Diversion**	**Total Cost of Recycling, Salvage, or Reuse**	**Revenue from Recycling, Salvage, or Reuse**	**Total Cost (-) or Savings (+) from Diversion**

Percentage Diverted = _____ (C divided by E from Column Totals) Should meet specified diversion requirement.

STANDARD SOLID WASTE CONVERSIONS

The following sections provide conversions for solid waste and recyclable materials. Section 1 provides formulas to convert solid waste volume (cubic yards) into tons. Section 2 includes conversion factors to estimate the volume and weight of a number of solid waste and recyclable materials.

1. To convert cubic yards to tons:

A: For un-compacted trash, to convert the units of cubic yards into tons, using the standard density of trash value of 250 pounds per cubic yard:

Using "X" cubic yards, multiply by 250 pounds per cubic yard, divide by 2000 pounds per ton, to obtain value in tons.

$$\text{"X" } \textit{cubic yards} \times 250 \frac{\textit{pounds}}{\textit{cubic yard}} \div \frac{1 \textit{ ton}}{2000 \textit{ pounds}} = _____ \textit{ tons}$$

This equals:

$$\text{"X" } \textit{cubic yards} \times 0.125 \frac{\textit{tons}}{\textit{cubic yard}} = _____ \textit{ tons}$$

In this case, 8 cubic yards = one ton.

B: To determine your own density value for un-compacted trash (instead of using the standard value of 250 pounds per cubic yard), using a 32-gallon trash can:

(1) Weigh the trash can both filled and empty (use a full 32-gallon trash can filled with trash roughly level to the top);
(2) Subtract the empty weight from the filled weight to get the weight of trash (filled weight – empty weight = weight of trash);
(3) Use the formula, using "Y" your weight of trash (pounds), divided by 0.15 cubic yards per 32-gallon trash can, to obtain your value in pounds per cubic yard, which equals:

$$\text{"Y" } \frac{\textit{pounds}}{\textit{32 gallon can}} / 0.15 \frac{\textit{cubic yards}}{\text{32 gallon can}} = _____ \frac{\textit{pounds}}{\text{cubic yard}}$$

(4) Substitute this value for the 250 pounds per cubic yard value in Method A above.

This would be the more accurate measure of your park's specific waste.

C: For compacted trash, to convert cubic yards into tons:

To use a compaction ratio, multiply the appropriate ratio times the un-compacted trash weight in Formula A to obtain the compacted trash weight.

$$\text{"X" } \textit{cubic yards} \times \frac{3}{1} \text{ (compaction ratio)} \times 250 \frac{\textit{pounds}}{\textit{cubic yard}} \times \frac{1 \textit{ ton}}{2000 \textit{ pounds}} = _____ \textit{ tons}$$

Typical compaction ratios for trash:

3:1 (typical)
4:1 (higher-compaction vehicles)

If you or your hauler don't know the compacting ratio, the typical values for compacted trash are 500 to 1000 lbs./cubic yard, average 700 lbs./cubic yard. **Use 700 lbs. per cubic yard if you don't have more accurate records.**

For compacted trash, 0.4 is used instead of 0.125 in Formula A:

"X" *cubic yards* x 0.4 $\frac{\textit{tons}}{\textit{cubic yard}}$ = _____ *tons*

D: To convert container size to cubic yards for un-compacted waste:

If you don't have size and weight information on your specific containers, then these typical values can be used:

1 cubic yard = 202 gallons
32-gallon can = 0.15 cubic yards
60-gallon tote = 0.30 cubic yards
90-gallon tote = 0.45 cubic yards

2. EPA's Standard Volume-to-Weight Conversion Factors

Category	Recyclable Materials (u/c = uncompacted/ compacted & baled)	Volume	Estimated Waste (in pounds)
FOOD SCRAPS[A]	Food scraps, solid and liquid fats	55-gal drum	412
GLASS	Bottles[B] Whole Bottles A. Semicrushed Crushed (mechanically) Uncrushed to manually broken Refillable Whole Bottles[C] Refillable beer bottles Refillable soft drink bottles 8 oz glass container	 1 yd^3 1 yd^3 1 yd^3 55-gal drum 1 case = 24 bottles 1 case = 24 bottles 1 case = 24 bottles	 500-700 1,000-1,800 1,800-2,700 300 10-14 12-22 12
LEAD-ACID BATTERIES	Car[D] Truck[E] Motorcycle[E]	1 battery 1 battery 1 battery	39.4 lb 53.3 lb lead and plastic 9.5 lb lead and plastic

Category	Recyclable Materials (u/c = uncompacted/ compacted & baled)	Volume	Estimated Waste (in pounds)
METALS	Aluminum Cans[F]		
	Whole	1 yd^3	50-75
	Compacted (manually)	1 yd^3	250-430
	Uncompacted	1 full grocery bag	1.5
			0.9
	Ferrous (tin coated steel cans)[G]	1 case = 24 cans	
			150
	Whole	1 yd^3	850
	Flattened	1 yd^3	22
	Whole	1 case = 6 cans	
	Major Appliances[E]		64.2
	Air conditioners (room)	1 unit	92
	Dishwashers	1 unit	130
	Dryers (clothes)	1 unit	193
	Freezers	1 unit	50
	Microwave ovens	1 unit	181.1
	Refrigerators	1 unit	267
	Ranges	1 unit	177
	Washers (clothes)	1 unit	131
	Water heaters	1 unit	

Category	Recyclable Materials (u/c = uncompacted/ compacted & baled)	Volume	Estimated Waste (in pounds)
PAPER	Newspaper[F]		
	Uncompacted	1 yd^3	360-505
	Compacted/baled	1 yd^3	720-1,000
	12 in. stack	-	35
	Old Corrugated Containers[F]		
	Uncompacted	1 yd^3	50-150 (300)[1]
	Compacted	1 yd^3	300-500
	Baled	1 yd^3	700-1,100
	Computer Paper[F]		
	Uncompacted	1 yd^3	655
	Compacted/baled	1 yd^3	1,310
	1 case	2,800 sheets	42
	White Ledger[F]		
	Stacked (u/c)	1 yd^3	375-465/755-
	Crumpled (u/c)	1 yd^3	925
	Ream of 20# bond;	1 ream = 500	110-205/325
	8.5”x11”	sheets	5
	Ream of 20# bond;	1 ream = 500	6.4
	8.5”x14”	sheets	38
	White ledger pads	1 case = 72 pads	
	Tab Cards[F]		605
	Uncompacted	1 yd^3	1,215-1,350
	Compacted/baled	1 yd^3	
	Miscellaneous Paper		38
	Yellow legal pads[F]	1 case = 72 pads	22
	Colored message pads[F]	1 carton = 144	250
	Telephone directories[H]	pads	
	Mixed Ledger/Office Paper[F]	1 yd^3	380/755
	Flat (u/c)		110-205/610
	Crumpled (u/c)	1 yd^3	
		1 yd^3	

Category	Recyclable Materials (u/c = uncompacted/ compacted & baled)	Volume	Estimated Waste (in pounds)
PLASTIC[J]	PET (Soda Bottles)		
	Whole bottles	1 yd^3	30-40
	(uncompacted)	1 yd^3	515
	Whole bottles (compacted)	gaylord	40-53
	Whole bottles	30” x 62”	500-550
	(uncompacted)	semiload	30,000
	Baled	gaylord	700-750
	Granulated	16 L	1
	Granulated		
	8 bottles (2 L size)	1 yd^3	24
	HDPE (Dairy)	1 yd^3	270
	Whole (uncompacted)	32” x 60”	400-500
	Whole (compacted)		
	Baled	32” x 60”	900
	HDPE (Mixed)	gaylord	800-1,000
	Baled	semiload	42,000
	Granulated		
	Granulated	1 yd^3	50
	Other Plastic	1 yd^3	400-700
	Uncompacted		
	Compacted/baled	1 yd^3	32
	Mixed PET and HDPE (Dairy)		
	Whole	semiload	50
	Film	30” x 42” x 48”	400-700
	Baled		
	Baled		
TEXTILES[H]	Mixed Textiles	1 yd^3	175
TIRES	Car Tires		
	Whole tire[E]	1 tire	21
	Crumb rubber[K]	1 tire	12
	Truck Tires		
	Whole tire[E]	1 tire	70
	Crumb rubber[K]	1 tire	60
WOOD	Wood chips[L]	1 yd^3	725
	Pallets[F]	-	30-100 (40 avg)
YARD TRIMMINGS[F]	Grass Clippings		
	Uncompacted	1 yd^3	350-450
	Compacted	1 yd^3	550-1,500
	Leaves		
	Uncompacted	1 yd^3	200-250
	Compacted	1 yd^3	300-450
	Vacuumed	1 yd^3	350
FURNISHINGS[E]	Foam rubber mattress	1 mattress	55
MUNICIPAL SOLID WASTE[M]	Residential waste (uncompacted at curb)	1 yd^3	150-300
	Commercial-industrial waste (uncompacted)	1 yd^3	300-600
	MSW (compacted in truck)	1 yd^3	500-1,000
	MSW (landfill density)	1 yd^3	750-1,250

A. Information obtained from Washington State.
B. Draft National Recycling Coalition Measurement Standards and Reporting Guidelines presented to NRC membership. October 31, 1989.
C. Personal communication with a representative from Allwaste. November 6, 1995.
D. Battery Council International. 1995. 1994 National Recycling Rate Study.
E. U.S. EPA. 1995. Methodology for Characterization of Municipal Solid Waste in the United States: 1994 Update. EPA530-R-96-001. Washington, DC.
F. U.S. EPA. 1993. Business Guide for Reducing Solid Waste. EPA530-K-92-004. Washington, DC.
G. Personal communication with a representative from the Steel Recycling Institute. November 1, 1995.
H. Information obtained from Massachusetts State.
I. Information obtained from New Jersey and New York States.
J. Personal communication with a representative from the American Plastics Council. November 2, 1995.
K. Personal communication with a representative from the Scrap Tire Management Council. November 6, 1995.
L. Information obtained from Northeast Forest Products, Martin Mulch Company, and the Solid Waste Association of North America.
M. Solid Waste Association of North America, Manger of Landfill Operations Training and Certification Course. January 1989.
N. Information obtained from New Jersey and New York States.

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Project Record Drawings.
2. Closeout Submittals.
3. Substantial Completion and Final Inspection.
4. Warranties.
5. Final cleaning.

1.2 PROJECT RECORD DRAWINGS

A. Maintain one complete full-size set of contract drawings and one full-size set of vendor supplied drawings. Clearly mark changes, deletions, and additions using National Park Service drafting standards to show actual construction conditions. Show additions in red, deletions in green and special instructions in blue.

B. Keep record drawings current. Make record drawings available to the Contracting Officer or COR for inspection at the time of monthly progress payment requests. If project record drawings are not current, the Contracting Officer or COR may retain an appropriate amount of the progress payment.

C. On completion of the total project, submit complete record drawings. Include all shop drawings, sketches, and additional drawings that are to be included in the final set, with clear instructions showing the location of these drawings.

1.3 CLOSEOUT SUBMITTALS

A. Submit the following before requesting final inspection:

1. Submit two (2) copies of operation and maintenance manual with a preventative maintenance schedule, product cut sheets, specific warranties, guarantees, workmanship bonds, final certifications, and similar documents.

2. Submit digital images of construction progress and final photographs recorded on CD-R or DVD-R with index and descriptions.

3. Posted Operating Instructions: Furnish operating instructions attached to or posted adjacent to equipment. Include wiring diagrams, control diagrams, control sequence, start-up, adjustment,

operation, lubrication, shut-down, safety precautions, procedures in the event of equipment failure, and other items of instruction recommended by the manufacturer.

4. Deliver tools, spare parts, extra materials, and similar items to location designated by Contracting Officer or COR. Label with manufacturer's name and model number where applicable.

5. Instruct NPS personnel in the basic operation, adjustment, and maintenance of products, equipment, and systems.

1.4 SUBSTANTIAL COMPLETION AND FINAL INSPECTION

A. When project, or designated portion of project, is substantially complete, request in writing a final inspection. Upon receipt of written request that project is substantially complete, the Contracting Officer or COR will proceed with inspection within ten (10) days of receipt of request or will advise the Contractor of items that prevent the project from being designated as substantially complete.

B. If, following final inspection, the work is determined to be substantially complete, the Contracting Officer or COR will prepare a Punch List to be corrected before final acceptance and issue a Letter of Substantial Completion. Contractor shall complete the work described on the Punch List within thirty (30) calendar days, as weather permits. If the Contractor fails to complete the work within this time frame, the Contracting Officer or COR may either replace or correct the work with an appropriate reduction in the contract price or charge for re-inspection costs in accordance with the Inspection of Construction clause of the contract.

C. If, following final inspection, the work is not determined to be substantially complete; Contracting Officer or COR will notify Contractor in writing. After completing work, Contractor shall request a new final inspection. All re-inspection costs may be charged against the Contractor in accordance with the Inspection of Construction clause of the contract.

1.5 FINAL ACCEPTANCE OF THE WORK

A. After all deficiencies have been corrected, a Letter of Final Acceptance will be issued.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Contracting Officer or COR for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. See Division 01 Specification Section “Execution” for information on cleaning agents.

PART 3 – EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.

f. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

   i. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

g. Wipe surfaces of electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
h. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use.
i. Leave Project clean and ready for occupancy.

C. Waste Disposal: Comply with requirements of Division 01 section, “Construction Waste Management”.

END OF SECTION 01 77 00

SECTION 01 81 13

SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes general requirements and procedures for compliance with certain sustainable design requirements.

B. Contractors shall familiarize themselves with the relevant requirements and provide the necessary information and instruction to all subcontractors and installers.

C. Related Sections:

1. See Divisions 01 through 33 Sections for requirements specific to the work of each of these Sections.

1.2 DEFINITIONS

A. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

B. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles (800 km) from Project site. Manufacturing refers to the final assembly of components into the building product that is installed at Project site.

C. Regionally Extracted and Manufactured Materials: Regionally manufactured materials made from raw materials that are extracted, harvested, or recovered within a radius of 500 miles (800 km) from Project site.

1.3 SUBMITTALS

A. Project Materials Cost Data: Provide statement indicating total cost for purchased materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:

1. Concrete materials.
2. Steel materials.
3. Utilities (drainage materials).
4. Rock materials.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

A. Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10 percent of cost of materials used for Project.

1. Cost of post-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
2. Cost of pre-consumer recycled content of an item shall be determined by dividing weight of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.

2.2 Do not include mechanical and electrical components, and specialty items such as lighting and equipment in the calculation.

2.3 REGIONAL MATERIALS

A. Provide a minimum of 20 percent of building materials (by cost) that are regional materials.

B. Provide a minimum of 20 percent of materials (by cost) that are regionally manufactured materials.

C. Provide a minimum of 10 percent of materials (by cost) that are regionally extracted and manufactured materials.

PART 3 - EXECUTION (Not used)

END OF SECTION 01 81 13

DIVISION 03

CONCRETE

SECTION 03 33 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Mohave County, Arizona Standard Specifications and Details.

C. Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Cast-in-Place Concrete Launch Ramp.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast- furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Ensure concrete materials, concrete mixtures, rebar, curing materials, related materials and execution for concrete pavements meet or exceed requirements of the Clark County, Nevada Uniform Standard Specifications.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

D. Shop Drawings:

1. Steel Reinforcement: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material,

grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, and supports for concrete reinforcement.

E. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.

F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Contracting Officer or COR.
2. Match existing adjacent construction joint layout as close as possible.

G. Qualification Data: For Installer and Manufacturer.

H. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Bonding agents.
7. Semirigid joint filler.
8. Joint-filler strips.
9. Repair materials.

I. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

J. Field quality-control reports.

K. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities." (Quality Control Manual - Section 3, "Plant Certification Checklist").

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: The Contractor shall engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

   a. Contracting Officer or COR.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
   e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, anchor rod and anchorage device installation tolerances, steel reinforcement installation and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Furnish formwork and formwork accessories according to ACI 301.

B. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

C. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Use biobased material in accordance with Section 016700 paragraph 1.2.D.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Epoxy-Coated Reinforcing Bars:
   1. Steel Bars: ASTM A 615/A 615M, Grade 60, deformed bars.
   2. Epoxy Coating: ASTM A775 with less than 2 percent damaged coating in each 12-inch bar length.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from galvanized- steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

D. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, deformed bars, assembled with clips.

E. Plain-Steel Wire: ASTM A 82/A 82M, galvanized.

F. Deformed-Steel Wire: ASTM A 496/A 496M.

G. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

   1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

   1. For concrete surfaces exposed to view where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

   1. Portland Cement: ASTM C 150, Type V gray or white.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inches nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
c. Euclid Chemical Company (The), an RPM company; ARRMATECT.
d. Grace Construction Products, W. R. Grace & Co.; DCI.
e. Sika Corporation; Sika CNI.

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set- accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Rheocrete

222+.
b. Cortec Corporation; MCI- 2000 or 2005NS.
c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
d. Sika Corporation; FerroGard 901.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
b. BASF Construction Chemicals - Building Systems; Confilm.
c. ChemMasters; SprayFilm.
d. Conspec by Dayton Superior; Aquafilm.
e. Dayton Superior Corporation; Sure Film (J-74).
f. Edoco by Dayton Superior; BurkeFilm.
g. Euclid Chemical Company (The), an RPM company; Eucobar.
h. Kaufman Products, Inc.; Vapor-Aid.
i. Lambert Corporation; LAMBCO Skin.
j. L&M Construction Chemicals, Inc.; E-CON.
k. Meadows, W. R., Inc.; EVAPRE.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group; MONOFILM.
n. Sika Corporation; SikaFilm.
o. SpecChem, LLC; Spec Film.
p. Symons by Dayton Superior; Finishing Aid.
q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
r. Unitex; PRO-FILM.
s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. BASF Construction Chemicals - Building Systems; Kure 200.
c. ChemMasters; Safe-Cure Clear.
d. Conspec by Dayton Superior; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
f. Edoco by Dayton Superior; Res X Cure WB.

g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
h. Kaufman Products, Inc.; Thinfilm 420.
i. Lambert Corporation; AQUA KURE - CLEAR.
j. L&M Construction Chemicals, Inc.; L&M Cure R.
k. Meadows, W. R., Inc.; 1100-CLEAR.
l. Nox-Crete Products Group; Resin Cure E.
m. Right Pointe; Clear Water Resin.
n. SpecChem, LLC; Spec Rez Clear.
o. Symons by Dayton Superior; Resi-Chem Clear.
p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

D. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

E. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types I and II, non-load bearing or Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

F. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ChemMasters; Exposee.
b. Conspec by Dayton Superior; Delay S.
c. Dayton Superior Corporation; Sure Etch (J-73).
d. Edoco by Dayton Superior; True Etch Surface Retarder.
e. Euclid Chemical Company (The), an RPM company; Surface Retarder Formula S.

f. Kaufman Products, Inc.; Expose.
g. Meadows, W. R., Inc.; TOP-STOP.
h. Metalcrete Industries; Surftard.
i. Nox-Crete Products Group; CRETE-NOX TA.
j. Scofield, L. M. Company; LITHOTEX Top Surface Retarder.
k. Sika Corporation, Inc.; Rugasol-S.
l. SpecChem, LLC; Spec Etch.
m. TK Products, Division of Sierra Corporation; TK-6000 Concrete Surface Retarder.
n. Unitex; TOP-ETCH Surface Retarder.
o. Vexcon Chemicals Inc.; Certi-Vex Envioset.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. The Contractor to use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement

conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

E. All concrete mixes to be Type V sulfate resistant concrete.

F. Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cement Ratio: 0.45
3. Minimum Cementitious Materials Content: 470 lb/cu. yd.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content:
   a. Air Content: 5-1/2 percent plus or minus 1.5 percent for 1-1/2-inch nominal maximum aggregate size.
   b. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.
   c. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch nominal maximum aggregate size.

2.9 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. Confirm with written authorization for the operational use of the onsite mixing facility with the Contracting Officer or COR prior to any construction activities.
2. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
3. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
4. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added.

Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 32 11 23 “Aggregate Base Courses”.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

D. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

E. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

F. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

G. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.4 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.5 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg for 24 hours after placing concrete. Concrete must be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Contracting Officer or COR.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement. See construction plans for stainless steel information and location.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 VAPOR RETARDERS

A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.

1. Lap joints 6 inches and seal with manufacturer's recommended adhesive or joint tape.

3.8 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete. See construction plans for joint information and location.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Contracting Officer or COR.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form control joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one- fourth of concrete thickness as follows:

1. Control Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch / indicated on plan. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Control Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Contracting Officer or COR.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

L. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

M. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding 1/2 inch.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.

1. Apply to concrete surfaces exposed to public view.

3.11 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.

1. Do not further disturb surfaces before starting finishing operations.

C. Reference construction drawings for “v-groove” finish requirements for launch ramp.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in- place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.13 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot- weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the

following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8-inch, minus 1/4 inch.
3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to

Paving Edge: 1/2 inch per 12 inches of tie bar.

5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.16 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.17 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Contracting Officer or COR. Remove and replace concrete that cannot be repaired and patched to Contracting Officer's or COR’s approval.

B. Patching Mortar: Mix dry pack patching mortar, consisting of one-part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Contracting Officer or COR.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop outs, honeycombs, rock pockets, crazing and cracks more than 0.01-inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

3.18 FIELD QUALITY CONTROL

A. Testing and Inspecting: The Contractor will engage a qualified testing and inspection agency to perform field tests and inspections and to prepare and submit test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M;

   a. Test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   b. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory- cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

10. Test results shall be reported in writing to Contracting Officer or COR, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Contracting Officer or COR. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Contracting Officer or COR.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 03 33 00

SECTION 03 41 00

PLANT PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Mohave County, Arizona Standard Specifications and Details.

C. Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction.

1.2 SUMMARY

A. Section Includes:

1. Removing, stockpiling and installing existing precast structural concrete for launch ramp.

1.3 SUBMITTALS

A. Qualification Data: For Installer.

B. The Contractor shall provide a detailed operations and maintenance information and schedule for proper installation of the panels in the future.

1.4 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.5 MOVING, STORAGE, AND HANDLING

A. Support units during moving on non-staining shock-absorbing material in same position as during storage.

B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
2. Place adequate dunnage of even thickness between each unit.

3. Place stored units so identification marks are clearly visible, and units can be inspected.

C. Handle and transport units in a position consistent with their shape and design to avoid excessive stresses that would cause cracking or damage.

D. Lift and support units only at designated points shown on Shop Drawings.

1.6 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 LEVELING PIPE

A. Leveling Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40).

2.2 STAINLESS-STEEL CONNECTION MATERIALS

A. Clips: Stainless-Steel Round Bar: ASTM A 276, Type 304.

B. Plates: Stainless Steel Bar: ASTM A 276, Type 304.

C. Cotter Pins: Stainless Steel Bar: ASTM A 276, Type 304.

2.3 SOURCE QUALITY CONTROL

A. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Contracting Officer's or COR’s approval. Contracting Officer or COR reserves the right to reject precast units that do not match approved samples, sample panels, and mockups.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance

of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Do not install precast concrete units until supporting base and leveling pipes are complete and approved.

3.2 INSTALLATION

A. Install clips, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

B. Field cutting of precast units is not permitted without approval of the Contracting Officer or COR.

C. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

D. Leveling Pipe: Install 40’ leveling pipe segments to allow for 6’ minimum pipe overlap.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor will engage a qualified testing agency to perform tests and inspections.

B. Testing agency will report test results promptly and in writing to Contractor and Contracting Officer or COR.

C. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.4 REPAIRS

A. Repair precast structural concrete units if permitted by Contracting Officer or COR.

1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.

C. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Contracting Officer or COR.

3.5 CLEANING

A. Clean exposed surfaces of precast concrete units after completion of joint treatment to remove all marks, dirt, and stains.

1. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03 41 00

DIVISION 31

EARTHWORK

SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Mohave County, Arizona Standard Specifications and Details.

C. Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction.

1.2 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated paving, curbs, cast-in-place concrete and pre-cast concrete panels.
3. Stockpiling pre-cast panels.
4. Hauling and disposal of paving, curbs and cast-in-place concrete.
5. Removing designated trees, shrubs, and other plant life.

1.3 SUBMITTALS - NONE

1.4 QUALITY ASSURANCE

A. Conform to Mohave County and the State of Arizona code for environmental requirements and disposal of debris.

B. Perform Work according to Mohave County Department of Public Works, Arizona standards.

1.5 PRODUCTS - NONE

1.6 MATERIALS - NONE

PART 2 - EXECUTION

2.1 EXAMINATION

A. Identify salvage/stockpile area for placing removed pre-cast panels.

2.2 PREPARATION

A. Call local utility line information service at 811 or click www.Arizona811.com not less than three <3> working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

2.3 PROTECTION

A. Protect benchmarks, survey control points, and existing structures from damage or displacement.

2.4 CLEARING

A. Clear areas required for access to Site and execution of Work to minimum depth of 6 inches.

B. Remove trees and shrubs within construction limits. Remove stumps, main root ball, surface rock, and all organic material.

C. Clear undergrowth and deadwood, without disturbing subsoil.

2.5 REMOVAL

A. Remove debris, rock, and extracted plant life from Site.

B. Remove paving, curbs, and cast-in-place concrete from Site.

C. Continuously clean-up and remove waste materials from Site. Do not allow materials to accumulate on Site.

D. Do not burn or bury materials on Site. Leave Site in clean condition.

2.6 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Stockpile in area designated on Site to depth not exceeding 4 feet and protect from erosion.

D. Do not remove topsoil from Site.

END OF SECTION 31 10 00

SECTION 31 23 16.13

TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

1.2 SUBMITTALS

A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

B. Samples: In air-tight containers, 10 lb sample of each type of fill to testing laboratory.

C. Materials Source: Name of imported fill materials suppliers.

1.3 QUALITY ASSURANCE

A. Perform Work according to Mohave County Department of Public Works, Arizona standards.

B. Prepare excavation protection plan under direct supervision of professional engineer experienced in design of this Work and licensed in State of Arizona.

1.4 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.5 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Subsoil Fill: Native Material.

B. Granular Fill: Aggregate Base Course as specified in Section 32 11 23.

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated.

1. Contracting Officer or COR may make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use either laser-beam instrument with qualified operator to establish lines and grades, or survey equipment with offset hubs at intervals of not more than 25 feet.

3.2 PREPARATION

A. Call local utility line information service at 811 or click www.Arizona811.com not less than three <3> working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, rock outcropping and other features remaining as portion of final site.

D. Protect benchmarks, existing structures, paving, and gravel parking areas from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public travel way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Meet current OSHA Safety and Health Standards for all excavation, trenching, shoring and related work.

B. Excavate subsoil required for utilities.

C. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd, measured by volume. Remove larger material as required by the Contracting Officer or COR.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 24 inches wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe/conduit.

H. Do not interfere with 45-degree bearing splay of foundations.

I. When Project conditions permit, slope side walls of excavation starting 24 inches above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this Section.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Contracting Officer or COR until suitable material is encountered.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Aggregate Base Course and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Remove loose matter.

M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with Aggregate Base Course as directed by Contracting Officer or COR.

N. Stockpile subsoil in area designated on Site to depth not exceeding 8 feet and protect from erosion.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation Work.

D. Repair damage caused by failure of sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact according to schedule at end of this Section.

D. Employ placement method that does not disturb or damage pipe or conduits in trench.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Do not leave more than 50 feet of trench open at the end of working day.

G. Protect open trenches to protect the public.

3.6 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus ½ inch from required elevations.

B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. Perform laboratory material tests for each material to be utilized as backfill according to AASHTO T-99 or ASTM D698.

B. Perform in place compaction tests according to following:

1. Density and Moisture Tests: ASTM D6938.

C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

D. Frequency of Tests: One set of tests per 300 feet. A set of tests includes density tests at 12 inches above the pipe, at one-half the trench depth and at the surface.

3.8 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.9 SCHEDULE

A. Storm Piping:

1. Cover pipe and bedding with Native Subsoil fill: Install loose lifts, not exceeding 12 inches thick, to subgrade elevation.
2. Compact uniformly to minimum 95 percent of maximum density and within ± 3% optimum moisture.

END OF SECTION 31 23 16.13

SECTION 31 23 16

EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for paving, roads, and parking areas.
3. Excavating for slabs on grade.
4. Excavating for Site improvements.

1.2 SUBMITTALS

A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

B. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

1.3 QUALITY ASSURANCE

A. Perform Work according to Mohave County Department of Public Works, Arizona standards.

B. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Arizona.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Call local utility line information service at 811 or click www.Arizona811.com not less than three <3> working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, rock outcropping and other features remaining as portion of final site.

D. Protect benchmarks, existing structures, paving, and gravel parking areas from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

3.2 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation Work.

B. Excavate subsoil to accommodate slabs on grade, paving, Site grading and construction operations.

C. Excavate to working elevation for piling Work.

D. Slope banks with machine to angle of repose or less until shored.

E. Do not interfere with 45-degree bearing splay of foundations.

F. Grade top perimeter of excavation to prevent surface water from draining into excavation.

G. Trim excavation and remove loose matter.

H. Removal of Deleterious Materials:

1. Remove lumped subsoil, boulders, and rock up to 1/3 cu. yd., measured by volume.
2. Remove larger material as directed by the Contracting Officer or COR.

I. Notify the Contracting Officer or COR of unexpected subsurface conditions.

J. Correct over-excavated areas with Aggregate Base Course as specified in Section 31 23 23 - Fill, or as directed by Contracting Officer or COR.

K. Stockpile subsoil in area designated on Site to depth not exceeding 8 feet and protect from erosion.

L. Repair or replace items indicated to remain that have been damaged by excavation.

M. Excavation quantities near the existing launch ramp may be greater than estimated due to high flow events which deposit sand and silt.

3.3 FIELD QUALITY CONTROL

A. Request visual inspection of bearing surfaces by Contracting Officer or COR before installing subsequent Work.

3.4 PROTECTION

A. Prevent displacement or loose soil from falling into excavation and maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that may be created by earth operations.

END OF SECTION 31 23 16

SECTION 31 23 23

FILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Mohave County, Arizona Standard Specifications and Details.

C. Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction.

1.2 SUMMARY

A. Section Includes:

1. Fill under concrete slabs and pre-cast panels on grade.
2. Fill under asphalt paving areas.
3. Fill under gravel or other developed areas.
4. Fill for over-excavation.

1.3 SUBMITTALS

A. Product Data: Geotextile fabric indicating fabric and construction.

B. Samples: In airtight containers, one <1> 10-lb. sample of each type of fill to testing laboratory.

C. Materials Source: Submit name of imported materials suppliers.

D. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Conform to Mohave County and the State of Arizona code for environmental requirements and disposal of debris.

B. Perform Work according to Mohave County Department of Public Works, Arizona standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subsoil Fill: Existing material.

B. Granular Fill: Imported Material, Type A per Mohave County, as follows:

Table 702-1			
Sieve Analysis: Test Methods AASHTO T-27, T-11			
Sieve Size	**Accumulative Percentage Passing Sieve, by Weight**		
	Select Material		**Aggregate Base Course**
	Type A	**Type B**	
3 in.	100	- -	- -
1-1/2 in.	- -	100	100
1 in.	- -	- -	90 – 100
No. 4	30 - 75	30 - 70	38 - 65
No. 8	20 - 60	20 - 60	25 – 60
No. 30	10 - 40	10 - 40	10 – 40
No. 200	0 - 12	0 - 12	3 – 12
Plasticity Index: Test Methods AASHTO T-89 Method A, T-90, T146 Method A			
Maximum allowable value	5	5	5
Fractured Face, One Face: Test Method ARIZ 212, Percent by Weight of the Material Retained on a #4 Sieve			
Minimum required value	50	50	50
Resistance to Degradation and Abrasion by the Los Angeles Abrasion Machine: Test Method AASHTO T-96, Percent Loss by Weight			
Maximum allowable value at 100 revolutions	10	10	10
Maximum allowable value at 500 revolutions	40	40	40

2.2 ACCESSORIES

A. Geotextile Fabric: Woven or Nonwoven, Class A per Mohave County, as follows:

TABLE 796-2			
FILTRATION & DRAINAGE GEOSYNTHETIC PROPERTIES			
Property	**Class A (1)**	**Class B (2)**	**Test Method**
Grab tensile strength: lbs.	180 min.	80 min.	ASTM D4632
Seam strength: lbs.	160 min.	70 min.	ASTM D4632
Puncture strength: lbs.	80 min.	25 min.	ASTM D4833
Trapezoidal tear: lbs.	50 min.	25 min.	ASTM D4533
Apparent opening size: US Standard sieve size	>50	>50	ASTM D4751
Ultraviolet Stability: %	50 min.	50 min.	ASTM D4355

PART 3 - EXECUTION

3.1 PREPARATION

A. Compact subgrade to specified density requirements for subsequent backfill materials.

B. Soft Subgrade:

1. Cut out soft areas of subgrade not capable of compaction in place.
2. Backfill with granular fill and compact to density equal to or greater than specified requirements for subsequent fill material.

3.2 BACKFILLING

A. Backfill areas to contours and elevations.

B. Systematically backfill to allow maximum time for natural settlement.

C. Do not backfill over porous, wet, or spongy subgrade surfaces.

D. Maximum Compacted Depths:

1. Place material in continuous layers to following depths:

a. Subsoil Fill: 12 inches loose.
b. Granular Fill: 8 inches loose.

E. Use placement method that does not disturb or damage utilities in trench or prepared subgrade.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

G. Make gradual grade changes, and blend slope into level areas.

H. Stockpile surplus backfill materials from Site at location designated by Contracting Officer or COR.

I. Leave fill material stockpile areas free of excess fill materials.

3.3 TOLERANCES

A. Top Surface of Backfilling under Concrete or Paved Areas: Plus or minus 1/2 inch from required elevations.

B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.4 FIELD QUALITY CONTROL

A. Perform laboratory material tests according to ASTM D698 and/or AASHTO T99.

B. In-Place Compaction Testing:

1. Density Tests: ASTM D1556 or ASTM D6938.
2. Moisture Tests: ASTM D6031.
3. Compact all fill to 95% Standard Proctor, +/- 3% optimum moisture.

C. If tests indicate that Work does not meet specified requirements, remove Work, replace, compact, and retest.

D. Testing Frequency: One test every 3,000 Square Feet or one test every 100 feet of roadway, with random offsets.

E. Proof-roll compacted fill surfaces under slabs on grade and paving areas.

3.5 PROTECTION

A. Reshape and recompact fills subjected to vehicular traffic during construction.

END OF SECTION 31 23 23

SECTION 31 37 16.13

RUBBLE-STONE RIPRAP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Mohave County, Arizona Standard Specifications and Details.

C. Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction.

1.2 SUMMARY

A. Section Includes: Riprap placed loose.

1.3 SUBMITTALS

A. Product Data: Manufacturer information regarding size distribution and types for rock for riprap.

B. Samples:

1. One <1> 50-lb. sample of riprap materials to testing laboratory.
2. Submit in airtight containers.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from a single source throughout Work of this Section.

B. Place riprap as shown in the drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Riprap:

1. Description:

   a. Broken stone.
   b. Solid and nonfriable.

2. Type: Shall be clean, hard, sound, durable uniform in quality, and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance.

3. Size: FHWA **Class 1 Riprap** per the gradation requirements shown below:

   D_{100} = 9-12* inches (Revised upper limit)

   D_{85} = 7-11 inches

   D_{50} = 5-8 inches

   D_{15} = 3-6 inches

PART 3 - EXECUTION

3.1 APPLICATION

A. Place geotextile fabric over substrate as shown in drawings.

B. Place riprap where indicated.

C. Place riprap into position and remove foreign material from surfaces.

D. Do not place riprap over frozen or spongy subgrade surfaces.

E. Average Installed Thickness: As indicated.

END OF SECTION 31 37 16.13

DIVISION 32

EXTERIOR IMPROVEMENTS

SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Mohave County, Arizona Standard Specifications and Details.

C. Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction.

1.2 SUMMARY

A. Section Includes:

1. Select aggregate base course.

2. Aggregate base course.

1.3 SUBMITTALS

A. Product Data:

1. Geotextile fabric.

B. Samples: In air-tight containers, one (1) five-gallon bucket sample of each type of aggregate fill to testing laboratory.

C. Materials Source: Name of aggregate materials suppliers.

D. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout Work.

B. Perform Work according to Mohave County Department of Public Works, Arizona standards.

PART 2 - PRODUCTS

2.1 AGGREGATE MATERIALS

A. **Select Aggregate Base Course:** Imported Material, Screened 1 ½ Inch minus crushed mineral aggregate obtained from commercial sources outside of the Park boundaries for use as fill or base leveling course below the water level and under riprap. The mineral aggregate shall be clean, hard, durable and free from deleterious matter, as follows:

Table A.1 – Gradation Acceptance Limits

Sieve Sizes	Percentage by Dry Weight Passing Sieve
2-Inch	100
1 ½-Inch	50-100
1-Inch	20-65
3/4-Inch	0-15
3/8-Inch	0-5

B. **Crushed Aggregate Base Course:** Imported Material, Aggregate Base Course per Mohave County, as follows:

Table 702-1			
Sieve Analysis: Test Methods AASHTO T-27, T-11			
Sieve Size	**Accumulative Percentage Passing Sieve, by Weight**		
	Select Material		**Aggregate Base Course**
	Type A	**Type B**	
3 in.	100	- -	- -
1-1/2 in.	- -	100	100
1 in.	- -	- -	90 – 100
No. 4	30 - 75	30 - 70	38 - 65
No. 8	20 - 60	20 - 60	25 – 60
No. 30	10 - 40	10 - 40	10 – 40
No. 200	0 - 12	0 - 12	3 – 12
Plasticity Index: Test Methods AASHTO T-89 Method A, T-90, T146 Method A			
Maximum allowable value	5	5	5
Fractured Face, One Face: Test Method ARIZ 212, Percent by Weight of the Material Retained on a #4 Sieve			
Minimum required value	50	50	50
Resistance to Degradation and Abrasion by the Los Angeles Abrasion Machine: Test Method AASHTO T-96, Percent Loss by Weight			
Maximum allowable value at 100 revolutions	10	10	10
Maximum allowable value at 500 revolutions	40	40	40

C. Perform Work according to Mohave County Department of Public Works, Arizona standards.

2.2 ACCESSORIES

A. Geotextile Fabric: As specified in Section 31 23 23.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted substrate is dry and ready to support paving and imposed loads.

1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 32 11 23 “Aggregate Base Courses”.

B. Verify substrate has been inspected, gradients and elevations are correct.

3.2 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft or muddy surfaces.

3.3 AGGREGATE PLACEMENT

A. Install geotextile fabric over subgrade according to manufacturer's instructions.

1. Lap ends and edges minimum 12 inches.
2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.

B. Spread aggregate over prepared substrate to total compacted thickness as indicated, in maximum lifts of 6 inches.

C. Roller compact aggregate to 95 percent maximum density, +/- 3% optimum moisture.

D. Level and contour surfaces to elevations, profiles, and gradients indicated.

E. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.

F. Maintain optimum moisture content of fill materials to attain specified compaction density.

G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

A. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.

B. Maximum Variation From Thickness: 1/4 inch.

C. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed according to ASTM D1556 or ASTM D6938.

B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

C. Frequency of Tests: One test for every 3,000 sq. ft. or 100 feet of roadway, for each layer of compacted aggregate.

3.6 COMPACTION

A. Compact materials to 95 percent of maximum density and within ± 3% optimum moisture., as determined from laboratory test for proctor values per ASTM D698.

END OF SECTION 32 11 23

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphalt materials.
2. Aggregate materials.
3. Asphalt paving wearing course.

1.2 SUBMITTALS

A. Product Data:

1. Submit product information for asphalt and aggregate materials.
2. Submit mix design with laboratory test results supporting design.

1.3 QUALITY ASSURANCE

A. Mixing Plant: Conform to Mohave County Department of Public Work, Arizona standards.

B. Obtain materials from same source throughout.

C. Perform Work in accordance with Mohave County Department of Public Work, Arizona standards.

1.4 AMBIENT CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 ASPHALT PAVING

A. Performance / Design Criteria:

B. Paving: Design for light duty commercial vehicles.

C. Asphalt Materials:

1. Asphalt Binder: AASHTO M320; performance grade PG 70-10.

2. Tack Coat: ASTM D977; diluted emulsified asphalt, slow setting type.

D. Aggregate Materials:
1. Coarse Aggregate: In accordance with Mohave County Department of Public Work, Arizona standards for Marshall Mix Design, ¾" Mix.
2. Fine Aggregate: In accordance with Mohave County Department of Public Work, Arizona standards for Marshall Mix Design, ¾" Mix.

E. Aggregate Base: Specified in Section 32 11 23.

2.2 MIXES

A. Use dry material to avoid foaming. Mix uniformly.

B. Asphalt Paving Mixtures: Designed in accordance with Mohave County Department of Public Work, Arizona standards for Marshall Mix Design, **3/4" Mix**, as shown below:

TABLE 710-3				
MARSHALL MIX DESIGN CRITERIA				
Criteria	Requirements			
	3/8" Mix	1/2" Mix	3/4" Mix	Designated Test
1.Voids in Mineral Aggregate: %, min	15.0	14.0	13.0	AI MS-2
2.Effective Voids: %, Range	4.0±0.2	4.0 ±0.2	4.0 ±0.2	AI MS-2
3.Absorbed asphalt: %, Range*	0-1.0	0-1.0	0-1.0	AI MS-2
4.Dust to Eff. Asphalt Ratio, Range **	0.6-1.4	0.6-1.4	0.6-1.4	AI MS-2
5.Tensile Strength Ratio: % Min.	65	65	65	ASTM D4867
6.Dry Tensile Strength: psi, Min.	100	100	100	ASTM D4867
7.Stability: pounds, Minimum	2,000	2,500	2,500	AASHTO T-245
8.Flow: 0.01-inch, Range	8-16	8-16	8-16	AASHTO T-245
9.Mineral Aggregate Grading Limits				AASHTO T-27
		Percent Passing with Admix		
Sieve Size	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix	
1-1/4 inch				
1 inch			100	
3/4 inch		100	90 – 100	
1/2 inch	100	85 – 100	---	
3/8 inch	90-100	62 – 85	62 – 77	
No. 8	45-60	40 – 50	35 – 47	
No. 40	10-22	10 – 20	10 – 20	
No. 200	2.0 – 10.0	2.0 – 10.0	2.0 – 8.0	

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify gradients and elevations of base.

B. Verify compacted aggregate bae is dry and ready to support paving and imposed loads.

3.2 INSTALLATION

A. Tack Coat

1. Apply tack coat to contact surfaces of cast-in-place concrete and existing asphalt pavement.

B. Single Course Asphalt Paving

1. Install Work in accordance with Mohave County Department of Public Work, Arizona standards.
2. Place asphalt within 24 hours of applying primer or tack coat.
3. Place asphalt surface course to thickness indicated on Drawings.
4. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
5. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.3 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 12-foot straight edge.

B. Compacted Thickness: Within 1/4 inch of specified thickness.

C. Variation from Indicated Elevation: Within 1/2 inch.

D. Compaction: After final compaction, the mat density of the finished bituminous surface course shall at no point have a density less than 95 percent ("percent compaction") of the job specific target previously determined by the mix design.

3.4 FIELD QUALITY CONTROL

A. Take samples and perform tests including thickness and mat density tests in accordance with the following.

B. Asphalt Paving Mix Temperature: Measure temperature at time of placement.

C. Asphalt Paving Thickness: Thickness to be determined by yield calculations, utilizing 110 lbs per SY per Inch. No cores need to be taken.

D. Asphalt Paving Density: ASTM D2950 nuclear method; test three <3> locations for every 3,000 square feet compacted paving.

END OF SECTION 32 12 16

DIVISION 33

UTILITIES

SECTION 334213

STORMWATER CULVERTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Corrugated steel pipe culvert.
2. Bedding and cover materials.
3. Slope protection at pipe end.

1.2 SUBMITTALS

A. Product Data: Manufacturer information regarding pipe, fittings, and accessories.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Perform Work according to Mohave County Department of Public Works, Arizona standards.

B. Manufacturer: Company specializing in manufacturing products specified in this Section with three <3> years' experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage:

1. Store materials according to manufacturer instructions.
2. Do not place pipe or pipe materials in areas obstructing pedestrian or vehicle traffic.
3. Do not store pipe flat on ground.
4. Store UV-sensitive materials out of direct sunlight.

B. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Cradle pipe to prevent point stress.
4. Provide additional protection according to manufacturer instructions.

1.5 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PIPE CULVERT

A. Corrugated Steel Pipe:

1. Comply with AASHTO M36.
2. Finish: Galvanized.
3. Joints: Spiral Rib with Lock Seam.
4. Shape and Diameter: As indicated on drawings.
5. Tapered Ends:

a. Material: Same as pipe.
b. Machine cut for joining to pipe end.

6. Coupling Bands:

a. Material: Galvanized steel.
b. Minimum Size: 10 1/2 inches wide.
c. Connection: Two neoprene O-ring gaskets and two galvanized-steel bolts.

2.2 MATERIALS

A. Bedding and Cover:

1. Bedding: Aggregate Base Course, as specified in Section 32 11 23 - Aggregate base Course.
2. Backfill: Native Material with no rocks greater than 4 inches.

2.3 MIXES

A. Fill at Pipe Ends:

1. Riprap as indicated and specified in Section 31 37 16.13 - Rubble-Stone Riprap.

2.4 FINISHES

A. Steel:

1. Galvanizing:

a. Comply with ASTM A123/A123M.
b. Hot-dip galvanize after fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench subgrade is ready to receive Work of this Section.

B. Verify that excavations, dimensions, and elevations are as indicated.

3.2 PREPARATION

A. Correct over-excavation with aggregate base coarse.

B. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

3.3 INSTALLATION

A. Excavation and Bedding:

1. Excavate culvert trench to 4 inches below pipe invert, and as indicated.
2. Hand trim excavation for accurate placement of piping to indicated elevations.
3. Level fill materials in continuous layers not exceeding 8 inches in depth, and compact to 95 percent maximum density.

B. Culvert:

1. Positioning: Shore culvert to required position and retain in place until after compaction of adjacent fills.
2. Repair surface damage to pipe protective coating with two coats of compatible bituminous paint coating.
3. Backfilling and Compaction:

    a. As specified in Section 31 23 23 - Fill.
    b. Level fill materials in continuous layers not exceeding 8 inches in depth, and compact to 95 percent maximum density.
    c. Install cover to minimum compacted thickness of 6 inches, and compact to 95 percent maximum density.
    d. Place geotextile fabric over backfill as indicated.

4. Install culvert end gratings.

C. Pipe Ends:

1. Place fill at pipe ends as indicated.
2. Level fill materials in continuous layers not exceeding 8 inches in depth, and compact to 95 percent maximum density.

3.4 TOLERANCES

A. Maximum Variation from Indicated Slope: 1/10 foot in 10 feet.

B. Maximum Variation from Intended Elevation of Culvert Invert: 1/10 foot.

C. Maximum Offset of Pipe from Indicated Alignment: 1 inch in 10 feet of pipe.

3.5 FIELD QUALITY CONTROL

A. Inspection: Request inspection from Contracting Officer or COR prior to and immediately after placing aggregate cover over pipe.

B. Compaction Testing:

1. Comply with ASTM D698 and ASTM D6938.
2. Compact all backfill to 95% Standard Proctor, +/- 3% optimum moisture.
3. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
4. Testing Frequency: 1 Test, at differing depths, every 50 feet of trench.

3.6 PROTECTION

A. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

END OF SECTION 33 42 13