YELLOWSTONE NATIONAL PARK

MODULAR HOUSING UNITS
YELL 326141

PROJECT SPECIFICATIONS

NATIONAL PARK SERVICE (NPS)
DENVER SERVICE CENTER (DSC)

100% Final CDs

June, 2026

Yellowstone National Park YELL 326141

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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Work Covered by Contract Documents
2. Work Phases
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4. Government-Furnished Materials
5. Contractor Use of Site
6. Public Use of Site
7. Access During Construction
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1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Location: Yellowstone National Park:
1. Canyon Government Area: Northwest of Canyon Village along Grand Loop Road and Norris Canyon Road, Wyoming.
2. Northeast Entrance Government Area: 3.5 miles West of Cooke City, Montana along US Highway 212 near the existing Northeast Entrance Station.
3. Mammoth Government Area: Mammoth, Wyoming along US Highway 89 near the Mammoth Community Center

B. The Work consists of:

1. The project includes procurement and construction of modular housing for employees working in the area. Site construction will include grading, roadway construction, drainage, and utility installation including electrical, telecom, potable water, fire suppression and sanitary sewer.

2. Contractor shall be aware of in-person equipment inspection requirements for Yellowstone National Park. Additionally, Contractor shall adhere to material sourcing requirements which require material to be procured from a gravel pit that has passed recent inspections. Refer to Section 01 71 13 “Mobilization and Demobilization”.

C. Project will be constructed under a single prime contract.

1.3 WORK PHASES

A. The Work shall be conducted in one phase.

1.4 WORK UNDER OTHER CONTRACTS

A. General: Cooperate with separate Contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate Work of this Contract with work performed under separate contracts.

1.5 GOVERNMENT-FURNISHED MATERIALS

A. Government-Furnished Materials:

1. None anticipated.

1.6 CONTRACTOR USE OF SITE

A. General: Contractor shall have limited use of site for construction operations. Limit use of premises to work in areas indicated on drawings. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to limits of disturbance shown on the Drawings.
2. All staging areas shall be approved by the Contracting Officer.
3. Limit site disturbance, including earthwork and clearing of vegetation, to limits shown on the Drawings.

B. Storage of Materials: Confine storage of materials to designated staging areas as shown on the Drawings or in coordination with the Contracting Officer.

C. Parking: Confine parking to areas as shown on the Drawings or in coordination with the Contracting Officer. Parking off road or on non-vegetated areas is not allowed unless approved by the Contracting Officer.

D. Stockpiling: Confine stockpiling to designated staging areas as shown on the Drawings or in coordination with the Contracting Officer. Maximize the use of previously disturbed areas for stockpiling to minimize ground disturbance.

E. Preservation of Natural Features:

1. Prevent damage to natural surroundings. Restore damaged areas, repairing or replacing damaged trees and plants, at no additional expense to the Government.
2. Provide temporary barriers to protect existing trees and plants and root zones.
3. Do not remove, injure, or destroy trees or other plants without prior approval. Consult with Contracting Officer and remove agreed-on roots and branches that interfere with construction.
4. Do not fasten ropes, cables, or guys to existing trees.

5. Carefully supervise excavating, grading, filling, and other construction operations near trees to prevent damage.
6. Whitebark pine trees require protection and shall not be disturbed unless authorized by Contracting Officer. Any whitebark pine trees that require relocation shall require approval by Contracting Officer prior to any disturbance. Refer to Section 32 00 00 "Tree Protection".

F. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Government employees, and emergency vehicles at all times. Do not use for parking or storage of materials.

1. Schedule deliveries to minimize use of driveways and entrances.
2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

G. Construction Camp:
1. Establishment of housing camps will not be allowed in the Mammoth or Northeast Entrance Government Areas.
2. Establishment of housing camps will be permitted near Canyon Village. The Contractor has been assigned 15 trailer sites which will have electric, water and sewer hookups. Activation of water and sewer service is dependent on weather.
   a. The Contractor will be responsible for paying rental fees for these sites to the NPS, which will be determined for each construction season (generally May through October). The 2026 rates will be $485.74 / month. The Contractor would also be responsible for paying for the electricity to these sites.
   b. Adhere to Park rules, animal deterrent policies, cleanliness policies, and return Site to previous condition at completion of work. These requirements also apply to all Contractor's employees who may, with prior approval, establish their own camping facilities. The use of campgrounds or other in-park commercial lodging is prohibited.

H. Hauling Restrictions: Comply with legal load restrictions in hauling of materials. Load restrictions on park roads are identical to state load restrictions with such additional regulations as may be imposed by the Park Superintendent. Contractor shall obtain current rules and regulations for vehicular traffic on park roads from the Park's Visitor Services Office, which can be reached at (307) 344-2107. Overweight vehicles generally need to be discussed with the Visitor Services Office and Federal Highways Administration (FHWA). FHWA will evaluate capacities of bridges in the Park and inform Contractor if there is an acceptable path for the Contractor to take through the Park and if there are any specific requirements they have to follow. A special permit will not relieve Contractor of liability for damage which may result from moving of equipment.
1. Contractor is required to submit a travel control plan and haul route for oversize or overweight vehicles to the Visitor Services Office and Contracting Officer for approval.

I. Bridge Restrictions: Identify jurisdictions, load restrictions, permit requirements, time and calendar restrictions as outlined.

J. Rare, threatened or endangered species: The Contracting Officer will ensure that all project related employees, such as contract employees, be given orientation on how to avoid disturbing or encountering wildlife and how to minimize unavoidable effects or encounters. Orientation will include information about park regulations regarding food storage, disposal of garbage and other

wildlife attractants, approaching or harassing wildlife, and endangered species protection (plants and wildlife).

K. To minimize possible petrochemical leaks from construction equipment, the Contractor will regularly monitor and check construction equipment to identify and repair any leaks. Equipment will not be serviced or refueled near streams. Storage and refueling of equipment and construction parking shall be at least 150 feet from streams or riparian areas in designated staging areas, unless otherwise approved by the Contracting Officer.

L. Pressure wash and clean all construction vehicles and equipment as specified in Section 01 50 00, "Temporary Facilities and Controls". Inspections of vehicles and equipment by NPS are required prior to entering the Park.

M. The following conditions shall apply during the Contractor's stay at the Park:
1. The Contractor shall supply a list of all Contractor and subcontractor employees to the Contracting Officer.
2. To prevent unnatural attractants to bears, no food, garbage, drinks, trash, or food and drink containers shall be placed outside trailers or buildings, except during actual use. Store lunch pails and all food inside vehicles or job trailers.
3. All trash cans that are not of bear-resistant design shall be located inside trailers or buildings.
4. Waste produced by the Contractor is the responsibility of the Contractor and may not be put in NPS containers.
5. All work site food and drink trash shall be placed in trash cans.
6. All barbecue units shall be stored in trailers and buildings when not in use.
7. Bird feeders are prohibited.
8. Pets are prohibited.
9. Feeding of any wildlife is prohibited.
10. Any mishandling of garbage, food, trash or other bear attractants described above will result in the responsible party receiving a citation subject to a fine and/or court appearance before the United States Magistrate.

N. All costs for bear management actions directly related to mishandling of garbage, trash, foods or other bear attractants shall be at no additional cost to the Government.

O. The Contractor, all employees, and their families present at the Park shall be required to attend bear orientation sessions presented by the NPS.

1.7 PUBLIC USE OF SITE

A. Contractor shall conduct his operations to ensure the least inconvenience to public and current residents of the Canyon, Mammoth and Northeast Government Areas. All traffic on Park Roads must be permitted to pass. If excavation, backfill or paving operations require a temporary closure of a street, the Contractor shall submit a Traffic Control Plan and route traffic on a clearly signed and marked detour. The Contractor will be required to provide, place and maintains signs for all detours.

1.8 ACCESS DURING CONSTRUCTION

A. Seasonal road closures occur in the Park. Adverse weather may cause short-term closures of the Park. See http://www.nps.gov/yell/planyourvisit/parkroads.htm for the latest information.

B. The Contractor is responsible for clearing snow from the site within the work areas indicated on Drawings and as required to complete the Work. Contractor shall not conduct snow removal activities on Park main roads. Prior to any winter shutdown, all equipment, materials, and stockpiles must be located and adequately marked so they can be easily identified during snow plowing operations. All excavation must be backfilled prior to a winter shutdown.

C. Access into the Park will only be allowed upon presentation of proper identification with prior notification to the Park officials, or by securing gate passes or stickers.

1.9 OCCUPANCY REQUIRMENTS FOR BUILIDINGS

A. Existing Buildings

1. Partial Government Occupancy: Government will occupy premises during entire construction period, with exception of areas under construction. Cooperate with Government during construction operations to minimize conflicts and facilitate Government usage. Perform Work so as not to interfere with Government's operations. Maintain existing exits, unless otherwise indicated.

    a. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Contracting Officer.

B. New Buildings

1. Government Occupancy of Completed Areas of Construction: Government reserves right to occupy and to place and install equipment in completed areas of building, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the entire project.

    a. Contracting Officer will prepare a Beneficial Occupancy letter for each specific portion of the Work to be occupied before Government occupancy.
    b. Obtain a Certificate of Occupancy from National Park Service (NPS) before Government occupancy.
    c. Before partial Government occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed.
    d. On beneficial occupancy, Government will operate and maintain mechanical and electrical systems serving occupied portions of building.
    e. On beneficial occupancy, Government will assume responsibility for maintenance and custodial service for occupied portions of building.

1.10 CONDUCT OF OPERATIONS

A. Construction Contractor shall conduct his operations in conformance with rules and regulations promulgated by the Secretary of the Interior for the National Park Service, and applicable park rules and regulations prescribed by Park Superintendent.

B. Work on Saturdays, Sundays, Federal holidays or at night may not be performed unless stated in the Work Restrictions below or without prior consent from the Contracting Officer. Submit requests 4 business/calendar days in advance of the work to the Contracting Officer for approval.

C. No signs or advertisements, except those specified herein, shall be displayed on the construction site or within the park unless approved by the Contracting Officer.

1.11 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 8:00 a.m. to 5:00 p.m. local time zone, Monday through Friday, except when otherwise indicated.

1. Alternate Work Hours: Contractor may use alternate work days and hours, including holidays, nights and weekends, for the duration of the Project only if approved in advance by the Contracting Officer.

B. Existing Utilities

1. Existing Utilities: Prior to excavation the Contractor shall first contact One-call of Wyoming and Montana, then the Yellowstone Branch of Information System Management. The Contractor shall have the One-call ticket number ready to provide the Yellowstone Branch of Information System Management.
2. Notify Contracting Officer and utility companies of proposed locations and times for excavation.
3. Construction Contractor shall be responsible for locating and preventing damage to known utilities. If damage occurs, repair utility at no additional expense to the Government.
4. If damage occurs to an unknown utility, repair utility. An equitable adjustment will be made in accordance with the Changes clause of the contract.
5. Utility Contact List:
    a. One-call of Wyoming (800) 849-2476
    b. One-call of Montana (800) 424-5555
    c. Yellowstone Branch of Information Systems Management, Mammoth
        1) Phone (307) 344-2470
        2) Fax (307) 344-2067
    d. Northwestern Energy (Canyon and Mammoth Government Areas) – https://northwesternenergy.com.
    e. Flathead Electric (Northeast Entrance Government Area) - https://flatheadelectric.com. (406) 751-4483.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Government or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Contracting Officer not less than four (4) business days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Contracting Officer's written permission.
3. Hours and length of Utility Shutdowns: Shutdown durations may vary seasonally and for each site. Unless otherwise approved by Contracting Officer, limit shutdown duration to no more than 24 hours during low flow months and no more than 12 hours during high flow months. Low flow months are October through April and high flow months are May through September).

D. Nonsmoking Building/Tobacco Use/Vaping: Smoking is not permitted within the project site.

1.12 SPECIAL CONSTRUCTION REQUIREMENTS

A. Project Management and Communication Software: Software administered by the National Park Service (NPS) shall be used to manage communication and document sharing during construction.

1. See Section 01 31 00 "Project Management and Coordination" for requirements on using NPS project management and communication software.

B. The Contractor is responsible for maintaining appropriate safety measures to secure the site and ensure the safety of visitors and Park staff in areas adjacent to Work.

C. Install tree protection and temporary fencing to protect trees impacted by construction, unless otherwise designated for removal by the Contracting Officer. Tree protection shall be completed in accordance with the Drawings and Section 32 00 00 – "Tree Protection".

D. Minimize noise and artificial light during nighttime hours to reduce disturbance to wildlife.

E. The Contractor shall adhere to the mitigations listed in the Categorical Exclusion Documents included with these Contract Documents as Appendix A. These mitigations include, but are not limited to, the following:
1. Wetlands to be avoided will be marked on the Drawings and flagged prior to start of work. Contact Contracting Officer and YNP Vegetation Program to schedule flagging. There is one wetland area at the Canyon Government Area that will be impacted by the road construction. This disturbance is covered under U.S. Army Corps of Engineers Nationwide Permits and all conditions associated with that permit shall be adhered to by the Contractor.
2. UTE LADIES'-TRESSES Conservation Measures: Herbicide spot treatments for infrastructure activities will maintain a minimum distance of 3.3 ft from Ute ladies-tresses. Ground-based broadcast applications will maintain a minimum distance of 10 ft from Ute Ladies-tresses. Train project personnel to identify the species to ensure project activities do not result in adverse effects. Limit soil disturbance and compaction by limiting the use of mechanical equipment such as heavy equipment and vehicles. Control runoff of soil during project activities and avoid using machinery in wet soils and areas prone to ruts. Minimize creation of dust when using mechanical equipment (heavy equipment and vehicles).
3. YELLOW-BILLED CUCKOO: Contractor will participate in orientations on how to avoid disturbing or encountering a yellow-billed cuckoo and other wildlife, including regulations regarding vehicle speed limits, food storage, disposal of garbage and other attractants, and approaching or harassing wildlife. Any observation of a yellow-billed cuckoo shall be reported to the Contracting Officer and appropriate action taken to reduce potential effects.

4. GRIZZLY BEAR Conservation Measures: Contractor will participate in orientations on how to avoid disturbing or encountering bears and other wildlife, including regulations regarding vehicle speed limits, food storage, disposal of garbage and other attractants, and approaching or harassing wildlife. Unless authorized, workers in YNP will avoid designated closure areas that have high historic use by grizzly bears during spring and summer, as well as closure areas around active bear dens to minimize wildlife disturbance and human-wildlife interactions. During and after management activities, managers will take prevention and restoration measures to avoid the introduction of exotic invasive species and discourage the establishment of herbaceous foods such as clover.
5. CANADA LYNX Conservation Measures: Contractor shall participate in orientations on how to avoid disturbing, approaching, or harassing lynx and other wildlife. Any observation of Canada lynx shall be reported to the Contracting Officer and appropriate action would be taken to reduce potential effects.
6. WHITEBARK PINE Conservation Measures: See Section 1.12 F below.
7. SUCKLEY'S CUCKOO BUMBLE BEE Conservation Measures: To the extent feasible, no nectar feeding plants or host plant species for Suckley's Cuckoo Bumble Bee will be removed. If habitat disturbance is necessary, adjust the timing of activities in areas containing plants used by Suckley's Bumble Bee to avoid interfering with breeding or feeding. To the extent feasible, avoid using pesticides or herbicides in Suckley's cuckoo bumble bee habitat that could result in direct mortality or eliminate host and nectar plants. If pesticide application is necessary near Suckley's cuckoo bumble bee habitat, select chemical formulations specific to the targeted pest, time applications to avoid activity periods, establish buffers, and minimize drift to non-target areas by direct ground application. All chemical formulations shall be approved by the Contracting Officer.
8. MONARCH BUTTERFLY Conservation Measures: To the extent feasible, no nectar feeding plants or host plant species for monarch butterflies or caterpillars will be removed during management activities. If habitat disturbance is necessary, adjust the timing of activities in areas containing plants used by monarchs to avoid interfering with breeding or feeding. To the extent feasible, avoid using pesticides or herbicides in monarch butterfly habitat that could result in direct mortality or eliminate host and nectar plants. If pesticide application is necessary near monarch butterfly habitat, select chemical formulations specific to the targeted pest, time applications to avoid monarch activity periods, establish buffers, and minimize drift to non-target areas by direct ground application. All chemical formulations shall be approved by the Contracting Officer.
9. WOLVERINE Conservation Measures: Contractor shall participate in orientations on how to avoid disturbing or encountering wolverines and other wildlife, including regulations regarding vehicle speed limits, food storage, disposal of garbage and other attractants, and approaching or harassing wildlife. \Any observation of wolverines within the proposed action area shall be reported to the Contracting Officer and appropriate action would be taken to reduce potential effects.
10. All equipment and tools shall be cleaned completely prior to entering the work zone to prevent the spreading of invasive species. Equipment shall be inspected for compliance.
11. All erosion and sediment control devices shall be adequately maintained to ensure continued performance of their intended function. Those that have sustained damage or have reached their capability shall be replaced or maintenance performed.
12. All material brought into the Park from outside sources must be certified weed-free fill from a recently certified facility. Please contact Yellowstone Center for Resources for the most up to date list of certified facilities.
13. Work crews shall adhere to bear safety and food storage regulations.

14. If previously unknown archeological or paleontological resources are discovered, all ground disturbing activities within the immediate vicinity (300 ft) shall be halted and the Park Archaeologist and Contracting Officer notified immediately.
15. In the event human remains or other items that fall under the purview of the Native American Graves Protection and Repatriation Act (NAGPRA) are discovered, all work on the Project must stop and the Contracting Officer and Park Archeologist contacted immediately. As required by law, the coroner will be notified first. All provisions outlined in the NAGPRA (1990) will be followed.
16. To avoid impacts to migratory birds during the nesting season, vegetation or tree removal activities shall occur outside of March 1-August 15th for raptors and May 1-August 15th for songbirds. If within the March 1 – August 15th window a nest is suspected, because of observed structures or behaviors (e.g. large collections of sticks or smaller plant material in trees, birds carrying food into nest-like structures), the Contracting Officer shall be notified to ensure coordination with the NPS Bird Program Manager.
17. Project shall comply with NPS and Yellowstone National Park lighting guidelines. This will include but is not limited to low-level lighting, minimized glare, downward focused light fixtures, and energy efficient light sources.
18. To minimize the amount of ground disturbance, staging and stockpiling shall be located in previously disturbed areas if possible. All staging and stockpiling areas shall be approved by the Contracting Officer and returned to pre-construction conditions following construction. Fencing is required around construction zones and staging areas.
19. To the extent practical, work shall be scheduled to avoid construction activity and construction related delays during peak visitation times. No holiday or night time work shall be allowed. Weekend work shall not be allowed unless authorized in writing by the Contracting Officer and Park Superintendent.
20. Project shall comply with NPS and Park lighting guidelines to reduce impacts to the night sky and wildlife. This will include, but not be limited to, low-level lighting, minimized glare, downward focused lighting fixtures, and energy efficient light sources such as low-pressure sodium lamps.
21. Line located must be completed before any excavation work begins. The Contractor is responsible for calling 811.

F. The Contractor shall adhere to the Whitebark Pine and General Conservation Measures listed in the United States Fish and Wildlife Service (USFWS) Programmatic Biological Opinion for the Effects to Whitebark Pine from the Parkwide Housing Projects in Yellowstone National Park, Park and Gallatin Counties in Montana, and Park and Teton Counties in Wyoming; dated May 23, 2025 included with these Contract Documents as Appendix B. These measures include, but are not limited to, the following:
1. Pre-project surveys and marking will be conducted by NPS to identify whitebark pine. The Contractor shall be aware of all marked whitebark pine.
2. Ground disturbance from heavy equipment shall be avoided within whitebark pine stands and within 10 meters of known whitebark pine trees.
3. If using heavy equipment in a whitebark pine stand cannot be avoided, equipment shall be used sparingly and will be cleaned before entering and leaving work sites to prevent the spread of invasive species, pathogens, and pests.
4. Avoid off road motorized travel in whitebark pine habitat.
5. When working in whitebark pine stands, work will not introduce or spread Ribes species that are an alternate host for white pine blister rust.
6. Herbicide spot treatments for infrastructure activities shall maintain a minimum distance of 1 meter from a whitebark pine tree. Ground-based broadcast applications shall maintain a minimum distance of 3 meters from the trunk of a whitebark pine tree.

7. Train project personnel to identify the species regardless of the whitebark pine age class to ensure project activities.
8. Wherever possible, avoid removing or damaging healthy, unsuppressed whitebark trees. Limit soil disturbance and compaction by limiting the use of mechanical equipment. Control runoff of soil during project activities and avoid using machinery in wet soils and areas prone to ruts.
9. Minimize creation of dust when using mechanical equipment (heavy equipment and vehicles).

1.13 SOILS AND GEOTECHNICAL INVESTIGATION REPORTS

A. Geotechnical Reports appended to this Project Manual are intended to supplement rather than serve in lieu of Contractor's own investigations. They are provided for Contractor's information and convenience as appendices, but are not part of the Contract Documents.
   1. Canyon Government Area: The Geotechnical Engineering Report Canyon Housing Upgrades, dated November 23, 2020 prepared by Terracon Consultants, Inc.
   2. Northeast Entrance Government Area: Geotechnical Engineering Report Northeast Entrance Housing Upgrades, dated November 23, 2020 prepared by Terracon Consultants, Inc.
   3. Geotechnical Investigation Proposed Four-Plex Mammoth Hot Springs Yellowstone National Park, WY dated February 22, 1989 prepared by Braun Engineering Testing, Inc. is available as an appendix with this package and is provided for the Contractor's information only.

B. In case of conflict between report and drawings or specifications, the drawings and specifications govern.

1.14 UNEXPECTED DISCOVERY OF ARCHEOLOGICAL RESOURCES

A. The Contractor is not expected to encounter archeological remains in the area. However, if any concealed archaeological or paleontological resources are encountered, the Contractor must cease work within 50 feet of the discovery immediately and notify the Contracting Officer and Park Archeologist immediately. The Site and the artifacts need to be assessed to determine if an archeological site has been unexpectedly uncovered. Work in the discovery area cannot resume until Contractor obtains approval from the Contracting Officer. Work may proceed outside of the discovery area.

B. Any and all historic objects discovered during this Project shall be turned over immediately with provenience information to the Contracting Officer.

C. In the event that human remains are discovered during construction activities, all activities in the vicinity of the discovery must stop and the Contracting Officer shall be contacted immediately. If the remains are determined to have no forensic value and are of Native American descent or an historical person, all provisions outlined in the Native American Graves Protection and Repatriation Act (1990), as amended, will be followed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 11 00

SECTION 01 26 01 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section consists of administrative and procedural requirements for contract modifications.

1.2 DEFINITIONS AND ALLOWANCES

A. Home Office Overhead: Costs incurred in support of all of a contractor's projects and not attributable to a specific job. The cost for home office overhead is only allowed as a percentage of all direct work excluding profit. The following items represent allowable home office overhead costs identified in Part 31 of the Federal Acquisition Regulation (FAR):

1. Rent
2. Utilities
3. Furnishings
4. Office equipment
5. Executive and management staff not exclusively assigned to the project
6. Support, accounting, and administrative staff
7. Preparation of cost proposals, estimating, and schedule analyses connected with Modifications
8. Estimating and preconstruction services
9. Mortgage costs
10. Real estate and corporate taxes
11. Automobile maintenance and travel costs for home office personnel
12. Home office insurances i.e. structure, automotive, umbrella, flood, etc.
13. Depreciation of equipment and other assets
14. Home office supplies (paper, staples, etc.)
15. Legal services
16. Accounting and data processing
17. Professional fees/registration

B. General Conditions (Field Office Overhead): Management and administrative costs incurred on site for the designated project. Costs associated with preparation of modifications will not be allowed. Costs for these items are to be included only in the general conditions of the modification estimate. Only in the case of a contract time extension are additional general conditions included in modifications. The following items, if applicable, are considered allowable costs for calculating General Conditions:

1. Project Manager (PM), Assistant Project Manager
2. Superintendent, Assistant Superintendent
3. Quality Control, Safety Officer, Environmental Manager, etc.
4. Engineers

5. Travel, lodging, and per diem (as established by Federal Travel Regulations)
6. Scheduling
7. Field Office Trailers and associated temporary utilities
8. Field office supplies

    a. Mailing and couriers
    b. Reproduction costs
    c. Storage
    d. Phones
    e. Computers
    f. Copiers

9. Personal vehicles i.e. Superintendent Pickup trucks

C. General Requirements: Costs directly associated with the project and are necessary to perform the actual work of the modification. These costs shall be shown as direct costs in the estimate. The following items, if applicable, are considered allowable costs for calculating General Requirements:

1. Hoisting
2. Material handling
3. Temporary fencing
4. Port-a-lets
5. Trash removal, dumpsters
6. Barricades
7. Small tools
8. Safety supplies
9. Scaffolding
10. Daily cleaning
11. Traffic control
12. Temporary signage
13. Temporary heating and power

D. Personnel Costs: Costs included in the modification must only be for General Conditions staff and workers actually present and working on project site. Modification costs for salaried workers are only allowed within the structure of a 40-hour week and no overtime or holiday pay will be allowed.

1. Worker Hourly Rates are costs directly associated with the individual worker and consist of the following:

    a. Base Rate: The hourly rate paid directly to the worker
    b. Labor Burden: Employer payments of all applicable burdens; includes insurance and taxes the business must pay on behalf of the worker to government entities and educational forums, such as:

        1) Social Security
        2) Medicare
        3) Workers Compensation – Policy and company calculation to be made available.
        4) Federal Unemployment Tax Act (FUTA) - Cap Rate and percentage to be proportionally allocated over one year.

5) State Unemployment Tax Act (SUTA) - Cap Rate and percentage to be proportionally allocated over one year.
6) Union agreement costs - Other costs required under an enforceable collective bargaining agreement.

c. Fringe Benefits: Various non-wage compensations provided to employees such as:

1) Health Care Insurance Premiums
2) Cell Phone
3) Clothing
4) 401K and Pensions
5) Vehicle allowances
6) Gas allowance
7) Life insurance premiums
8) Disability insurance
9) Other Fringe Benefits required under an enforceable collective bargaining agreement

E. Bonuses or Deferred Compensation: No Bonus or Deferred Compensation will be allowed within any components of pricing including Home Office Overhead, General Conditions, General Requirements, Hourly Worker Rates, or the direct costs of work.

F. General Liability Insurance: An insurance policy that protects Contractor from claims resulting from bodily injury or property damage to a third party. Include as a separate line item within all modification proposals and provide a current insurance quote upon request.

G. Performance and Payment Bonds: A performance bond is a surety bond issued by an insurance company or bank to guarantee satisfactory completion of a project. The Payment Bond guarantees the Contractor will pay the labor and material costs incurred. Banks and Insurance companies charge a premium for individual project based on a sliding scale related to the size of the project. Include as a separate line item in modification proposals and provide current company bonding rates upon request.

H. Builder's Risk Insurance: Covers the contractor's loss due to fire, high winds, or other natural forces. Not reimbursed by the National Park Service (NPS) and shall not be included in modification proposals.

1.3 MODIFICATION PROPOSAL PRICING REQUIREMENTS

A. General:

1. Proposal be received in the format and within the time frame specified in the Request for Proposal (RFP) letter. Costs or delays resulting from failure of contractor to submit within the time frame specified will not be compensable.
2. Proposal shall be detailed with itemized lists of equipment, materials, labor, production rates, overhead, profit, and bond markup for each item. Labor costs must be itemized by craft and hourly rate, including Fringe Benefits and Labor Burden. If the costs of Fringe Benefits and Labor Burden are not itemized, it is assumed they are included in the hourly rate shown, or contractor is not requesting reimbursement. Contractor may

utilize the government provided Contractor Estimate Form, or their own form, provided that it contains the same information and level of detail as the Government's form.

3. Requests for extensions of contract time as a result of change must be justified with a Time Impact Analysis (TIA). Refer to Section 01 32 16 "Construction Schedule", for time impact analysis requirements. TIA and associated costs shall be received with the proposal by the date shown within the Request for Proposal letter. Contractor's failure to submit within the specified time frame will be construed as the Contractor waiving right for additional time and no time extension will be allowed.
4. All supporting documentation used to justify the proposed modification will be made available to the Contracting Officer (CO) upon request.
5. Contractor shall review and approve all subcontractor/supplier pricing in detail for proper format, scope, production rates, and pricing prior to submission to NPS. All delay costs associated with not reviewing and approving subcontractor/supplier pricing will be borne by the Contractor.
6. All pricing and production rates within the estimate must be based on fair and reasonable pricing and cannot include built-in contingency.

B. Labor:

1. Contractor shall estimate cost of labor by itemizing each craft involved, indicating worker hourly rate (base rate + labor burden + fringe benefits) for each and itemizing hours required for each craft directly engaged in modification work. Any work proposed requiring overtime work or premium pay shall be itemized separately. Rates shall be in accordance with the Davis-Bacon Act as incorporated herein. Labor Burden may include payroll taxes, Social Security, unemployment insurances, workers compensation insurance, Federal Insurance Contributions Act (FICA), FUTA, and other direct costs resulting from Federal, State or local laws.
2. Itemize labor costs for equipment operators separate from equipment costs.
3. Labor cost for foremen shall only be costs for related work required for the modification.

C. Materials:

1. Estimated cost for materials shall include quotes from multiple sources. Material prices shall include applicable fees and credits, including but not limited to, sales tax, freight and delivery charges, and tax rebates.
2. No markup shall be applied to any material provided by NPS.

D. Equipment:

1. Equipment used for the project must be appropriately sized for work being performed.
2. Do not include costs for "miscellaneous tools and equipment", in your proposal for a replacement value of $500 or less. Costs shown in excess of $500 shall be broken out separately.
3. Regardless of ownership, rates to be used in determining equipment rental costs shall be the lowest cost from one of the following sources:

    a. United States (U.S.) Army Corps of Engineers, Ownership and Operating Expense Schedule (use latest edition and applicable region)
    b. Construction Blue Book

c. Local equipment rental rates, documented by actual invoice charges, or itemized vendor quotes.

4. Estimated equipment rates shall include operating costs of all fuel, oil, lubrication, supplies, small tools, necessary attachments, ground engaging components, tires and tracks, routine repairs and maintenance (cost of major repair and overhaul is not allowed per Federal Acquisition Regulation (FAR) 31.105(d)(2)), depreciation, storage, insurance, and all incidentals. Mobilization, if applicable, may be included for equipment solely used on the modification work but must be listed separately.
5. Estimate full rate for equipment only for duration that equipment will be utilized to accomplish work of the modification.
6. Standby unit rates used in accordance with paragraph 1.3, D, 2, above. If the U.S. Army Corp of Engineers is utilized then their standby rates prevail. If Bluebook or local equipment pricing is accepted, then 1/2 of equipment costs minus any operating costs, major repair and overhaul will be accepted.
7. If equipment is in standby mode due solely to a documented NPS delay, established standby rate shall apply from the first day of the delay.
8. Equipment not used and on job site for up to five consecutive days may be classified at standby rates, provided the equipment is or has been used solely to perform work on the modification and will be necessary to complete additional modification work. Equipment still on the jobsite but not in use after five consecutive days will not be considered in the modification pricing.
9. Requests for compensation for equipment stand by time must be justified, documented and itemized separately.
10. The estimated timeframe (daily, weekly, monthly) for use of the equipment must reflect the lowest cost to the Government.

E. Establishment and Application of Overhead and Profit Percentages:

1. Home Office Overhead and Profit (OH&P) shall be applied to direct costs only. Profit shall not be applied to overhead amounts; and overhead shall not be applied to profit. Home office overhead shall contain only allowable, allocable, and reasonable costs per the contract documents and FAR Part 31. Profit percentages are based on risk factors found in FAR Part 31which have been applied to the specific type of work included in this project. Negotiated rates shall not exceed the following percentages for OH&P for contractor self-performed work:

Overhead……10%
Profit……8.25%

2. Total aggregate limit of markup (OH&P) for Contractor and Subcontractors on modification work shall not exceed 25%. The NPS will not be responsible for allocation of percentages between contractor and subcontractors at any tier.
3. If Contractors form a partnership, partnership may only receive home office overhead and profit in same amount as an individual Contractor (refer to paragraph 1.3,E,1 above). It is the responsibility of the partners to decide on division of revenue.
4. Combined Increases and Decreases: On proposals involving both increases and decreases in the Contract Price, overhead and profit mark-ups are required on net increases and deducted on net decreases.
5. At no time can profit be calculated on Overhead or itself, it must be calculated on direct costs of work only.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 012601

SECTION 01 27 00 – DEFINITION OF CONTRACT LINE ITEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This section explains in general, what is and is not included in a contract line item, and limits or cut off points where one item ends and another begins.

B. If no contract line item exists for a portion of work, include costs in a related item.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall perform all work necessary to construct and deliver to NPS a complete Project conforming to the Contract Documents. Details not shown or provided in the Drawings and Specifications, but required for a complete and operational Project, shall be included in the Contract Price as approved by NPS.

B. The contract line items of work described hereunder, paid pursuant to the Agreement for the Contract items of work identified in the Pricing Schedule, shall constitute full compensation for furnishing all labor, materials, tools, equipment, services, and incidentals as necessary to perform all work in the manner and time prescribed in the Contract Documents, inclusive of all provisions in the Contract Documents, complete and in place as shown on the Drawings, and as otherwise may be directed by NPS.

C. Progress Payments will be made as work progresses, conforming to the provisions of the Contract Documents.

3.2 LIST OF CONTRACT LINE ITEMS

A. Contract Line Item Number [0001] Canyon Government Area Site Improvements

1. This item consists of site improvement work indicated on the Contract documents including clearing and grubbing, temporary facilities and controls, erosion control, mobilization and demobilization, earthwork and grading, riprap placement, concrete and asphalt work, utility work, and soil preparation for restoration.

2. Measurement for payment will be determined on percent of construction complete.
3. Payment will be made at the contract lump sum price.

B. Contract Line Item Number [0002] Canyon Government Area, Standard Modular Building Units

1. This item consists of modular building units as indicated on Drawings.
2. Measurement for payment will be per unit.
3. Payment will be made at the contract price per unit.

C. Contract Line Item Number [0003] Canyon Government Area, ABAAS-Compliant Modular Building Units

1. This item consists of ABAAS-compliant modular building units as indicated on Drawings.
2. Measurement for payment will be per unit.
3. Payment will be made at the contract price per unit.

D. Contract Line Item Number [0004] Northeast Entrance Government Area Site Improvements

1. This item consists of site improvement work indicated on the Contract Documents including clearing and grubbing, temporary facilities and controls, erosion control, mobilization and demobilization, earthwork and grading, riprap placement, concrete and asphalt work, utility work, and soil preparation for restoration.
2. Measurement for payment will be determined on percent of construction complete.
3. Payment will be made at the contract lump sum price.

E. Contract Line Item Number [0005] Northeast Entrance Government Area Standard Modular Building Units

1. This item consists of modular building units as indicated on Drawings.
2. Measurement for payment will be per unit.
3. Payment will be made at the contract price per unit.

F. Contract Line Item Number [0006] Northeast Entrance Government Area ABAAS-Compliant Modular Building Units

1. This item consists of ABAAS-Compliant modular building units as indicated on Drawings.
2. Measurement for payment will be per unit.
3. Payment will be made at the contract price per unit.

G. Contract Line Item Number [0007] Mammoth Government Area Site Improvements

1. This item consists of site improvement work indicated on the Contract Documents including clearing and grubbing, temporary facilities and controls, erosion control, mobilization and demobilization, earthwork and grading, concrete and asphalt work, utility work, and soil preparation for restoration.
2. Measurement for payment will be determined on percent of construction complete.
3. Payment will be made at the contract lump sum price.

H. Contract Line Item Number [0008] Mammoth Government Area, Standard Modular Building Units

1. This item consists of modular building units as indicated on Drawings.
2. Measurement for payment will be per unit.
3. Payment will be made at the contract price per unit.

I. Contract Line Item Number [0009] Mammoth Government Area, ABAAS-Compliant Modular Building Units

1. This item consists of ABAAS-compliant modular building units as indicated on Drawings.
2. Measurement for payment will be per unit.
3. Payment will be made at the contract price per unit.

END OF SECTION 01 27 00

Yellowstone National Park
YELL 326141

Price Schedule
Supplement to Section 01 27 00 - Definition of Contract Line Items

Contract Line Item	Contract Line Item Title[1]	Quanitity	Unit of Measurement	Unit Price	Subtotal
CLIN 1	Canyon Government Area Site Improvements	1	Lump Sum (LS)		
CLIN 2	Canyon Government Area, Standard Modular Building Units	9	Per Unit		
CLIN 3	Canyon Government Area, ABAAS-Compliant Modular Building Units	1	Per Unit		
CLIN 4	Northeast Entrance Government Area Site Improvements	1	Lump Sum (LS)		
CLIN 5	Northeast Entrance Government Area, Standard Modular Building Units	1	Per Unit		
CLIN 6	Northeast Entrance Government Area, ABAAS-Compliant Modular Building Units	1	Per Unit		
CLIN 7	Mammoth Government Area Site Improvements	1	Lump Sum (LS)		
CLIN 8	Building Units	3	Per Unit		
CLIN 9	Mammoth Government Area, ABAAS-Compliant Modular Building Units	1	Per Unit		
				Total Base Bid $	

[1]Refer to Section 01 27 00 for Complete Description

Total Written Amount of Base Bid

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Definitions
2. Construction Coordination
3. Submittals
4. Coordination Drawings
5. Requests for Information (RFIs)
6. NPS Project Management and Communication Software
7. Project Meetings
8. Environmental Coordination
9. Permits

B. Related Requirements:

1. Section 01 32 16 "Construction Schedule" for preparing and submitting Construction Contractor's construction schedule.
2. Section 01 73 40 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.2 DEFINITIONS

A. Agency with Jurisdiction: An agency that has been granted legal authority over a location, action, or resource. This authority includes the ability to issue a permit or other legal permission document.

B. Construction Permits – Contractor Provided: Permits obtained by the Contractor based on the means and methods to conduct the work. Construction Permits are typically issued by the Agency to the Contractor and not to the National Park Service.

C. Government Furnished Permits (GF Permits): Permits obtained by National Park Service, usually through the Architect/Engineer or a consultant, during the design process are usually concerned with impacts to resources protected by federal law. However, GF permits can include other permits that are obtained for the convenience of the Government during the design. GF permits are "furnished" to the Contractor in the Request for Proposal (RFP) and as part of the final Contract Documents. The Contractor shall comply with GF permit provisions.

1.3 CONSTRUCTION COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, which depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other Construction Contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of components, including mechanical and electrical.
5. Properly plan construction operations to include permit requirements. Allow enough time to execute permit provisions to maintain work schedule, site visits, inspections, and reporting deadlines.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other Construction Contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to:

1. Preparation of Construction Contractor Construction Schedule
2. Preparation of the Schedule of Values
3. Installation and removal of temporary facilities and controls
4. Delivery and processing of submittals
5. Progress meetings
6. Permit requirements
7. Pre-installation conferences
8. Project closeout activities
9. Commissioning activities

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of Contract Documents or standard printed data. Include following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

b. Indicate dimensions shown on Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Contracting Officer (CO) for resolution of such conflicts.
c. Indicate space requirements for routine maintenance and anticipated replacement of components during the life of the installation.
d. Show location and size of access doors required for access to concealed dampers, valves, and controls.
e. Indicate required installation sequences.

2. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
3. Follow NPS DSC Electronic Drawing Standards. See CAD/BIM (Computer Aided Design/Building Information Modeling) & Drafting Standards page > DSC Requirements section.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural, structural, mechanical, plumbing, fire-protection, fire-alarm, and electrical elements. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work:

    a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Contracting Officer will review coordination drawings to confirm Work is being coordinated; details of coordination are Contractor's responsibility. If Contracting Officer determines coordination drawings are not prepared in scope or detail, or are otherwise deficient, Contracting Officer will inform Contractor, who shall make changes and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 23 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Submittal Format: Submit or post coordination drawing files using Portable Document Format (PDF) file format.
3. Contracting Officer will furnish Contractor one set of digital data files (AutoCad.dwg) of Drawings for use in preparing coordination digital data files.

    a. Contracting Officer makes no representations as to accuracy or completeness of digital data files as they relate to Drawings.
    b. Digital Data Software Program: Drawings are available in AutoCad.dwg.

D. Division 1 documents:

1. Letter designating Project Superintendent
2. Construction Schedule
3. A Comprehensive Schedule of Values
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. Certificates of Insurance and Standard Form SF1413 for Contactor and all Subcontractors
8. Waste Management Plan
9. Quality Control Plan
10. Temporary Storm Water Pollution Prevention Plan (SWPP or UPPP)
11. Indoor Air Quality (IAQ) Management Plan
12. Construction Contractor Commissioning Plan
13. List of Required Construction Permits. Include the following information for each permit:
    a. Name of Permit
    b. Agency(ies) with Jurisdiction issuing the permit
    c. Information required from Government to complete permit application

E. Provide items listed to Contracting Officer at least one week prior to Pre-Construction Conference, or as directed by Contracting Officer.
1. Failure to submit items may result in:
    a. Construction conference may be cancelled, Notice to Proceed may not be issued, and Contracting Officer will consider other contractual remedies.

b. Work shall not commence until written Notice to Proceed has been issued and Certificates of Insurance and SF1413 documents are received for Contractor and all Subcontractors.

1.5 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of Contract Documents, Construction Contractor shall prepare and submit an RFI utilizing form created on NPS project management and communication software.

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

B. Content of RFI: Include 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. Field dimensions and conditions, as appropriate.
7. Construction Contractor's suggested resolution: If suggested resolution impacts Contract Time or Contract Sum, Construction Contractor shall state impact in RFI.
8. Construction Contractor's signature
9. Requested date for response
10. 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, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Form: Complete and submit on NPS project management and communication software.

D. Contracting Officer’s Action: Contracting Officer will review each RFI, determine action required, and respond. Contracting Officer will determine critical nature of each RFI and issue 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 Construction Contractor's means and methods.
d. Requests for coordination information already indicated in Contract Documents.
e. Requests for adjustments in Contract Time or Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Contracting Officer's action may include a request for additional information; time for response will date from time of receipt of additional information.
3. Contracting Officer's action on RFIs may result in need for a change to Contract Time or Contract Sum. All contract changes will be processed following terms and conditions of contract.

1.6 PROJECT MANAGEMENT AND COMMUNICATION SOFTWARE

A. The Government will furnish and administer the project management and communication software for use on this project. Use to manage project communication and document sharing during contract period on:

1. Project directory
2. Project correspondence
3. Meeting agendas and minutes
4. Contract modifications forms and logs
5. RFI form and processing
6. Task and issue management
7. Photo documentation
8. Baseline schedule, schedule updates and calendar management
9. Submittal form and processing
10. Payment coordination documentation
11. Reminder and tracking functions
12. Archiving functions
13. Notification of submittal and RFI statuses and current responsible party
14. Permits and addendums

B. Some documents are not suitable to be shared using NPS project management and communication software. Documents containing Personal Identifying Information (PII) (i.e. certified payrolls) shall not be shared and shall be coordinated with project team as appropriate.

1.7 PROJECT MEETINGS

A. Preconstruction Conference: Before start of construction, Contracting Officer will arrange an on-site meeting with Contractor. Meeting agenda will include the following as a minimum:

1. Roles & Responsibilities / Lines of Authority
2. Park rules and regulations
3. Jobsite Safety
4. Resolution of comments on required Division 1 documents
5. Coordination of Subcontractors
6. Labor law application
7. Modifications
8. Payments to Construction Contractor
9. Payroll reports
10. Contract time
11. Liquidated damages
12. Construction Contractor Performance Evaluation
13. Display of Hotline posters

14. Notice to proceed
15. Correspondence procedures
16. NPS project management and communication software
17. Acceptance/rejection of work
18. Progress meetings
19. Submittal procedures
20. NPS Final Accessibility Inspection
21. Environmental requirements
22. Permit requirements
23. As-constructed drawings/operation and maintenance (O&M) manuals.
24. Saturday, Sunday, holiday and night work.
25. Reference materials
26. Value engineering
27. Schedule of Values

B. Progress Meetings: Contracting Officer will schedule weekly meetings with Construction Contractor.

1. Attendees: In addition to Government Representatives, each Construction Contractor, Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented. Participants at meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Meeting agenda will include:

    a. Approval of minutes of previous meetings
    b. Submittal status
    c. Review of off-site fabrication and delivery schedules.
    d. Requests for information (RFI) and other issues.
    e. Modifications
    f. Work in progress and projected.
        1) Status of required inspections (Special Inspections, Accessibility, etc.)
    g. Inspections of work in progress and projected (Special inspections, Accessibility, etc.)
    h. Construction Schedule update (provide updated Critical Path Method (CPM)).
    i. Status of Project Record Drawings and O&M manuals.
    j. Other business relating to work.
    k. Permit requirements

C. Preinstallation Conferences: Conduct at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend meeting. Advise Contracting Officer of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for particular activity under consideration, including requirements for:

    a. Contract Documents

b. Options
c. Related RFIs
d. Related Change Orders
e. Purchases
f. Deliveries
g. Submittals
h. Review of mockups
i. Possible conflicts
j. Compatibility requirements
k. Time schedules
l. Weather limitations
m. Manufacturer's written instructions
n. Warranty requirements
o. Compatibility of materials
p. Acceptability of substrates
q. Temporary facilities and controls
r. Space and access limitations
s. Regulations of agency(ies) with jurisdiction
t. Testing and inspecting requirements
u. Installation procedures
v. Coordination with other work
w. Required performance results
x. Protection of adjacent work
y. Protection of construction and personnel

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene conference at earliest feasible date.

1.8 ENVIRONMENTAL COORDINATION

A. Construction Contractor’s Environmental Manager: Designate on-site party responsible for overseeing Construction Contractor’s conformance to environmental goals for project and implementing procedures for environmental protection.

1. Qualifications: Minimum 3 years Construction experience on projects of similar size and scope; with environmental procedures similar to this project; must be familiar with environmental regulations applicable to construction operations.
2. Responsibilities: Responsibilities shall include:

a. Compliance with applicable Federal, State, and local environmental regulations, including maintaining required documentation.
b. Implementation of Waste Management Plan (WMP).
c. Implementation of Indoor Air Quality (IAQ) Management Plan.
d. Implementation of Storm Water Pollution Prevention Plan (SWPPP).

e. Present overview of environmental issues and summarize site specific procedures relating to management plans at Preconstruction conference.
f. Training for Construction Contractor personnel in accordance with position requirements.
g. Monitoring and documentation of environmental procedures.

B. Perform project quality control in accordance with requirements specified in Related Sections, including:

1. Quality Requirements
2. Regulatory Requirements
3. Indoor Air Quality (IAQ) Management
4. Noise and Acoustics Management
5. Temporary Storm Water Pollution Prevention Environmental Management
6. Construction Waste Management

C. Construction Contractor's Environmental Training Program: Construction Contractor shall provide environmental training for workers performing work on project site. Training shall include:

1. Overview of environmental issues related to building industry.
2. Overview of environmental issues related to Project.
3. Review of site-specific procedures and management plans:

a. Construction Waste Management
b. Indoor Air Quality (IAQ) Management
c. Noise and Acoustics Management
d. Temporary Storm Water Pollution Prevention

4. Pollution Prevention (P2) practices: Submit evidence of P2 training and participation in P2 programs.
5. Compliance with environmental regulations: As specified in Regulatory Requirements. Submit Construction Contractor 40 CFR (Code of Federal Regulations) employee training records upon request of Contracting Officer.

D. Provide documentation for environmental procedures as specified herein and in accordance with approved Waste Management Plan, IAQ Management Plan, and Storm Water Pollution Prevention Plan.

1.9 PERMITS

A. General:

1. Permits and Responsibilities: Construction Contractor shall, without additional expense to the Government, be responsible for obtaining necessary licenses and permits, and for complying with Federal, State and municipal laws, codes, and regulations applicable to the performance of the work. Construction Contractor shall also be responsible for damages to persons or property that occur as a result of Construction Contractor's fault or negligence; and for materials delivered and work performed until completion and acceptance of the work.

2. For the purpose of this contract, Construction Contractor will not be considered an agent of the Government. Construction Contractor shall comply with appropriate Federal, State and local laws.

B. Government Furnished Permits: During development of the project's design, permits listed below were negotiated and agreed to by the Government. Terms and provisions of these permits shall be adhered to for the duration specified in each permit.
   1. Water and Wastewater Permits to Construct - Wyoming Department of Environmental Quality (Canyon and Mammoth)
   2. Water and Wastewater Permits to Construct - Montana Department of Environmental Quality (Northeast Entrance)
   3. CWA 404 Nationwide Permits – US Army Corps of Engineers (Canyon)
   4. CWA 401 Water Certification – U.S. Environmental Protection Agency (Canyon)

C. Contractor Furnished Permits: Permits listed below were identified during the design process as likely to be required based on typical means and methods of construction. The list is provided to assist Contractor in determining which permits will be required for contract's chosen means and methods. The list shall not be considered complete; it is the Contractors' responsibility to determine means and methods and obtain required permits. Contractor shall obtain all permits required to legally conduct work.
   1. Electrical Utility Connection Permits - Northwestern Energy (Canyon and Mammoth), Flathead Energy (Northeast Entrance)
   2. Telecom Hookup – Century Link
   3. Traffic Control - NPS / FHWA
   4. CWA 402 NPDES Construction Stormwater General Permit - U.S. Environmental Protection Agency and States of Wyoming and Montana
   5. Dewatering Permit (if applicable) - U.S. Environmental Protection Agency
   6. Any required Construction and Building Permits

D. Coordination with Agency(ies) with Jurisdiction Issuing Permits

   1. Coordination: Contact the Agency(ies) with Jurisdiction as needed and sufficiently in advance to avoid delaying work: Coordinate meetings, reporting requirements, inspections, and other requirements.

E. Administrative Procedures:

   1. Coordinate scheduling and timing of required administrative provisions of project permits with Agency(ies) with Jurisdiction, Construction Manager, and Park to avoid conflicts.
   2. Supply needed information to Agency(ies) with Jurisdiction issuing permits, pay fees required and provide material needed to comply with permit's conditions and provisions.
   3. Upload permits to NPS project management and communication software when permits are obtained.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 16 – CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section consists of Construction Schedule requirements including:

1. Schedule of Values
2. Construction Schedule Requirements.
3. Construction Schedule Updates.
4. Time Impact Analysis.

B. Purpose: The Construction Schedule ensures adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. It shall assist the Contractor and Contracting Officer in monitoring the progress of the work, evaluating proposed changes, and processing Contractor's monthly progress payments. It shall include the dates in the contract, phases, milestones, occupancies, holidays, weather consideration, a critical path, and the requirements of this section.

1.2 DEFINITIONS

A. Activity: A discrete part of a project identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: Allocation of the Schedule of Values for completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by the Contracting Officer.

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

D. Critical Path: Longest connected chain of interdependent activities through the network schedule that establishes minimum overall Project duration and contains no float.

E. Float: Measure of leeway in starting and completing an activity.

1. Float: Not for the exclusive use or benefit of the Government or Contractor but is jointly owned.
2. Free Float: Amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total Float: Measure of leeway in starting or completing an activity without adversely affecting planned Project completion date.

F. Resource Loading: Allocation of manpower and equipment necessary for completion of an activity as scheduled.

G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

1.3 SUBMITTALS

A. Electronic Copies: Schedules and reports submitted shall be posted on the NPS project management and communication software as PDF (portable document format) files. The intent of the Government is to limit the number of printed reports to those determined by the project team as essential.

B. Schedule of Values: After contract award and before Pre-Construction conference, submit schedule of dollar values based on Contract Price Schedule.

C. Construction Baseline Schedule: After contract award and before Pre-Construction conference, submit two paper copies of baseline schedule, large enough to show entire schedule for entire construction period. Utilize Schedule of Values in preparation of Construction Baseline Schedule.

D. Critical Path Method (CPM) Reports: Concurrent with CPM schedule, submit three paper copies of the following computer-generated reports. For each activity, include activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of predecessor and successor tasks for activities sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.

E. Construction Schedule Updates: On or before 7th day preceding progress payment request date, submit estimates of percent completion of each schedule activity and necessary supporting data. Provide two paper copies.

F. Construction Schedule Revisions and Time Impact Analysis: For each Construction Schedule revision, submit two paper copies of a Time Impact Analysis. Incorporate a Fragmentary Network (Fragnet) into currently accepted Construction Schedule demonstrating proposal to incorporate a modification, change, delay, or Contractor request.

1.4 QUALITY ASSURANCE

A. Contractor shall meet with Contracting Officer on day of the preconstruction conference to go over:

1. Review software limitations, content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Government occupancy/substantial completions.
4. Review delivery dates for Government-furnished products.
5. Review schedule for work of separate Government contracts.
6. Review time required for review of submittals and re-submittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review time required for obtaining and activating permits.
10. Review and finalize list of construction activities to be included in schedule.
11. Review baseline schedule comments, resolve issues and progress on incorporating them
12. Review procedures for updating schedule.
13. Discuss reporting requirements and establish protocol for naming and transmitting electronic schedules.

B. Contractor's Schedule Representative: Before the preconstruction conference, designate an authorized representative to be responsible for preparing and maintaining the Construction Schedule. Submit resume outlining qualifications of Scheduler to Contracting Officer for acceptance. Scheduler shall have prepared and maintained at least 5 previous schedules of similar size and complexity similar to this Contract, demonstrating proficiency of using scheduling software. Authorized representative will be responsible for preparing the Baseline Schedule, required updates, revisions, Time Impact Analyses, and reports.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate construction contractors.

B. Coordinate Construction Baseline Schedule with Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. In developing Construction Baseline Schedule, ensure Subcontractor’s work at all tiers, and prime Contractor’s work, is included and coordinated.
2. Secure time commitments for performing critical elements of work from parties involved.
3. Coordinate each construction activity in network with other activities and schedule in proper sequence.

PART 2 - PRODUCTS

2.1 SCHEDULE OF VALUES

A. Breakdown each lump-sum item into component work activities used in the schedule for which progress payments may be requested. Work activities broken out within schedule of values shall be integrated into and made a logical part of the construction baseline schedule. Total costs for the component work activities shall equal contract price for that lump-sum item. Contracting Officer may request data to verify accuracy of dollar values. Include mobilization, general condition costs, overhead and profit in the total dollar value of unit price items and in the component work activities for each lump-sum item. Do not include mobilization, general condition costs, overhead or profit as a separate item.

B. Do not break down unit price items. Use only the contract price for unit price items.

C. Total cost of all items shall equal the contract price. The Schedule of Values will form the basis for progress payments and the Construction Schedule.

2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

A. Construction Baseline Schedule: Prepare Construction Baseline Schedule using a computerized, cost and resource-based**,** time-scaled Critical Path Method network analysis diagram for the Work.

1. Develop and finalize Construction Baseline Schedule so it can be accepted for use no later than 30 days after date established for the Notice of Award.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing work within applicable completion dates, regardless of Governments acceptance of schedule.

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

B. Construction Baseline Schedule Preparation: Prepare a list of all activities required to complete the Work. Using preliminary Critical Path Method network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate estimated duration, sequence requirements, and relationship of each activity in relation to other activities.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the Critical Path Method schedule within the limitations of the Contract Time.

4. Show sequence and interdependence of activities required for completion of work. Ensure work sequences are logical and Construction Baseline Schedule shows a coordinated plan of the work.
5. Resource loading of each activity shall include personnel by labor category and equipment type and capacity proposed to complete the activity in duration shown.
6. Consider seasonal weather conditions in planning and scheduling work influenced by high and low ambient temperatures, wind, or precipitation to ensure completion of work within contract time.
7. Time Frame: Proposed duration assigned to each activity shall be Contractor's best estimate of time required to complete activity considering the scope and resources planned for activity.

    a. An early finish date may be shown but the late finish date shall be same date as last day of contract period. An early completion schedule shall contain:

        1) Insert an activity titled "Project Float" as a successor to last activity in early project completion schedule network.
        2) Add a milestone titled "Contract End Date" as a successor to the activity "Project Float".
        3) Add duration to the activity "Project Float" as required so the milestone "Contract End Date" equals the last day of Contract Period.

    b. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.
    c. Contractor shall limit use of lead or lag duration’s between schedule activities.
    d. Project Calendars: Develop and incorporate the following calendars:

        1) Administrative Calendar: Include calendar based on a 7-day week to be used on activities based on calendar days. Apply this calendar to administrative tasks or other tasks not affected by non-working days (Federal Holidays, weather, etc.).
        2) Project Calendar: Include calendar based on planned work week for the project. Include Federal Holidays, weekends, and non-workdays indicated in contract documents. Apply this calendar to activities not anticipated to be affected by weather. Be clear when identifying number of work days in work week.
        3) Weather Calendar: Utilize Project Calendar and show anticipated normal downtime related to weather as non-working time. Weather days shall be based on data for local area from a reliable source like the National Oceanic and Atmospheric Administration (NOAA), National Park Service records, or source acceptable to Contracting Officer. Apply this calendar to activities anticipated to be affected by weather.

    e. Activity Duration: Define so no activity is longer than 14 days, except for non-construction activities including mobilization, shop drawings and submittals, fabrication and delivery of materials and equipment.
    f. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in the schedule. Procurement cycle activities can include submittals, approvals, purchasing, fabrication, and delivery.

1) Modular Units

g. Submittal Review Time: Include review and re-submittal times indicated. Coordinate submittal review times in Construction Baseline Schedule.
h. Startup and Testing Time: Include for all major equipment and systems.
i. Substantial Completion: Allow time for Government administrative procedures necessary for certification of Substantial Completion. (For more information, refer to Specification 01 77 00 "Closeout Procedures.")

8. Constraints: Include constraints and work restrictions indicated in Contract Documents and as follows in schedule and show how the sequence of Work is affected.

a. Phasing: Arrange list of activities on schedule by phase.
b. Work under More Than One Contract: Include a separate activity for each contract.
c. Work Restrictions: Show effect of the following on the schedule:

1) Coordination with existing construction
2) Limitations of continued occupancies
3) Uninterruptible services
4) Partial occupancy before Substantial Completion
5) Use of premises restrictions
6) Provisions for future construction
7) Seasonal variations
8) Environmental control
9) Permit provisions

d. Other Constraints:

e. Work Stages: Indicate important stages of construction for each major portion of the Work.

1) Subcontract awards
2) Submittals
3) Purchases
4) Mockups
5) Fabrication
6) Sample testing
7) Deliveries
8) Installation
9) Tests and inspections
10) Adjusting
11) Curing
12) Building flush-out.

9. Milestones: Include milestones indicated in Contract Documents in schedule, including, but not limited to, Notice to Proceed, Substantial Completion.

C. Joint Review, Revision, and Acceptance:

1. Within seven calendar days of receiving Contractor's proposed Construction Baseline Schedule, Contracting Officer shall review initial Construction Baseline Schedule.

2. Within seven calendar days after review, Contractor shall revise and resubmit Construction Baseline Schedule in accordance with comments presented from review.
3. In the event the Contractor fails to define any element of work, activity, or logic and the Contracting Officer review does not detect this omission or error, such omission or error, when discovered by Contractor or Contracting Officer, shall be corrected by Contractor within seven calendar days and shall not affect contract period.
4. Upon acceptance of the Construction Baseline Schedule, Contracting Officer saves schedule as a baseline and updates on a monthly basis. Construction schedule update will be used to evaluate Contractor's monthly applications for payment based upon information developed at monthly Construction Schedule update meeting.

D. Cost Correlation: In the heading of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of dates used to prepare payment requests.

1. Contractor shall assign cost to construction activities on Construction Baseline Schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Contracting Officer’s approval, be assigned to fabrication and delivery activities. Costs shall be included for testing activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable).
2. Each activity cost shall reflect an accurate value based on the Contract Price Schedule.
3. Total cost assigned to activities shall equal total Contract Price.

E. Recovery Schedule: When periodic schedule update indicates Work is 14 or more calendar days behind current accepted schedule, a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule shall also be submitted. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery shall be accomplished.

F. Computer Software: Prepare schedules using a program developed specifically to manage construction schedules.

1. Use Microsoft Project or Primavera, for Windows 11 and newer.

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE UPDATES

A. Progress Meeting Updates: Provide a 3 week look-ahead schedule, derived from the currently accepted schedule, before each weekly progress meeting. Utilize look-ahead schedule to facilitate and take notes on discussions held during progress meeting.

B. Monthly Schedule Updates:

1. General: Update Construction Schedule on monthly basis to reflect construction progress and activities throughout entire contract period and until project substantial completion. The status date of each schedule update shall be the 7th day preceding the progress payment request date.

2. Procedure: Contractor shall meet with Contracting Officer each month at Construction Schedule update meeting to review progress made through the status date of the Construction Schedule update, including dates activities were started or completed and percentage of work completed on each activity started or completed.
3. Reports: Concurrent schedule revisions, prepare tabulated reports showing:

    a. Identification of activities that have changed
    b. Changes in early and late start dates
    c. Changes in early and late finish dates
    d. Changes in activity durations in workdays
    e. Changes in the critical path
    f. Changes in total float or slack time
    g. Changes in the Contract Time

4. Narrative: Report shall include a brief description of actual progress made during update period; actual and potential delaying activities; impediments to progress; issues related to inclement weather; progress toward established milestones and project float. Report shall include a brief description of work anticipated to be performed in the next month. Minor revisions to the schedule should be identified for evaluation and acceptance or rejection.
5. As Work progresses, indicate Actual Completion percentage for each activity.
6. If schedule update shows a late finish date after contract completion date, include:

    a. Known delays
    b. Actions to get back on schedule
    c. Pending modifications
    d. Impediments or constraints affecting progress

7. Progress Payments: Monthly updating of the currently accepted Construction Schedule shall be an integral part of the process upon which progress payments will be made. If Contractor fails to provide schedule updates or revisions, a portion of the monthly payment may be retained until corrections have been made.

C. Distribution: Distribute copies of accepted schedule to Contracting Officer, Contracting Officers Representative, Construction Management Representative, Subcontractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work.

D. Construction Schedule Revisions:

1. Required Revisions: If, as a result of the monthly schedule update, it appears the currently accepted Construction Schedule no longer represents actual prosecution and progress of the work, Contracting Officer will request, and Contractor shall submit, a revision to the Construction Schedule. Contractor may also request reasonable revisions to currently accepted Construction Schedule in event the Contractor's planning for the work is revised. If Contractor desires to make changes, Contractor shall notify Contracting Officer in writing, stating reason for proposed revision. Accepted revisions shall be incorporated into currently accepted Construction Schedule for next monthly schedule update.

2. Procedure: If revision to currently accepted Construction Schedule is contemplated, Contractor or Contracting Officer shall advise the other in writing at least seven calendar days prior to next monthly schedule update meeting, describing revision and reasons for the revision. Government-requested revisions will be presented in writing to the Contractor, who shall respond in writing within seven calendar days.
3. Reports: Concurrent with making revisions to schedule, prepare tabulated reports showing:

    a. Identification of activities changed
    b. Changes in early and late start dates
    c. Changes in early and late finish dates
    d. Changes in activity durations in workdays
    e. Changes in critical path
    f. Changes in total float or slack time

3.2 TIME IMPACT ANALYSIS FOR CONTRACT MODIFICATIONS CHANGES DELAYS AND CONTRACTOR REQUESTS:

1. Requirements: When contract modifications or changes are initiated, delays experienced, or Contractor desires to revise currently accepted Construction Schedule, Contractor shall submit to Contracting Officer a written time impact analysis illustrating the influence of modification, change, delay, or Contractor request on contract time.
2. Time Extensions: Activity delays, resulting in a late completion date projection, shall not automatically mean an extension of contract time is warranted or due to Contractor. It is possible a modification, change, or delay will not affect existing critical path activities or cause non-critical activities to become critical. A modification, change, or delay may result in absorbing a part of available total float that may exist within an activity chain of the Schedule, not causing any effect on contract time. Time extensions will be granted in accordance with terms of contract.
3. Extension of contract time will be granted only to the extent the equitable time adjustments to activity or activities affected by modification, change, or delay exceeds total (positive or zero) float available on a particular activity.
4. Procedure: Each time impact analysis shall be submitted within time period stated in a request for proposal, or time period designated under the clauses entitled Changes or Default. In cases where Contractor does not submit a written request for extension of time and a time impact analysis within the designated time, it is mutually agreed that the particular modification, change, delay, or Contractor request does not require an extension of the contract time. Upon acceptance, time impact analysis shall be incorporated into currently accepted Construction Schedule at next monthly schedule update.
5. Contract Modifications: Prepare time-impact analysis using fragnets to demonstrate effect of proposed change on overall Construction Schedule for each proposed contract modification concurrent with submission.

END OF SECTION 01 32 16

SECTION 01 32 33 – PHOTO DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for:

1. Existing condition images
2. Periodic construction images

B. See Section 01 77 00 "Closeout Procedures" for a complete listing of closeout documents.

1.2 SUBMITTALS

A. Construction Images: Submit images electronically within seven days of taking the image. Include:

1. Date, time and number (sequentially number all images) in filename.
2. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
3. Submit digital images exactly as originally recorded in digital camera, without alteration, or modifications using image-editing software.

B. Closeout: Submit complete set of digital image electronic files as a Project Record Document**.** Submit on Digital Video Disc (DVD).

1. Provide index as separate file on Disc. List each image as a file name with number, date, and time. Include description and or vantage point image was taken.
2. Submit images that have the same aspect ratio as the sensor, un-cropped.

PART 2 - PRODUCTS

2.1 FORMAT REQUIREMENTS

A. Media: DVD-R Archival Gold

B. Media Labels: Archival DVD labeling markers, archival labels, or direct print.

C. Images: Provide sRGB (standard Red Green Blue) color images in JPEG (Joint Photographic Experts Group) format. Minimum sensor size of 8 megapixels, and at image resolution of not less than 1600 by 1200, and 300 dpi (dots per inch).

PART 3 - EXECUTION

3.1 CONSTRUCTION IMAGES

A. General: Take digital images using the maximum range of depth of field, in-focus, to clearly show the Work. No blurry or out-of-focus areas accepted.

1. Maintain index with each set of Construction images and identify the number, date, time, and description for each.
2. Maintain one set of images accessible in field office at Project site available for reference.

B. Existing Condition Images: Before starting construction, take color digital images of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.

1. Flag excavation areas before recording construction images.
2. Take eight separate images to show existing conditions adjacent to property before starting Work.
3. Take eight separate images of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

C. Periodic Construction Images: Take 24 color, digital images weekly, with timing each month adjusted to coincide with cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last images were taken.

D. Additional Images: Contracting Officer may issue requests for additional images.

1. Three days advance, where feasible.
2. In emergency situations, take additional images within 24 hours of request.
3. Additional images include, but are not limited to:

a. Immediate follow-up when on-site events result in construction damage or losses.
b. Fabrication locations away from Project site.
c. Substantial Completion of a major phase or component of Work.
d. Extra record images at time of final acceptance.

END OF SECTION 01 32 33

SECTION 01 33 23 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

A. Action Submittals: Written, graphic information, and physical samples that require 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 requirements.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 GENERAL SUBMITTAL PROCEDURES

A. General: Prepare and submit submittals required by individual Specification Sections and in some cases as requested in drawings. Types of submittals are indicated in individual specific sections or on the attached Submittal List.

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

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

1. Coordinate 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 Work so processing will not be delayed because of need for concurrent review coordination.

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

C. Submittal List: Submittal list is attached to the end of this Specification Section for your convenience. Intent is to provide an overall summary of submittal requirements and not a comprehensive list. Terms and conditions of Contract still require satisfaction of requirements of individual specification sections regardless of what is shown on submittal list.

D. Processing Time: Allow enough time for submittal review and re-submittals. Contract time extensions will not be authorized if submittals are not transmitted with enough time 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 21 days for review of each re-submittal.

2. Informational submittals

a. Review: Allow 14 days for review of each submittal.

E. Approved Equal Submittal Requirements:

1. For each item proposed, submit supporting data, including:

a. Drawings and samples as appropriate.
b. Comparison of the salient 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 installation of an approved item and make changes required in other elements of the work because of the substitution.
e. Waives claims for additional expenses that may be incurred as a result of the substitution.

F. Submittals: Identify and incorporate information in each submittal file as follows:

1. Transmittal Form (CM-16): Utilize NPS Transmittal Form for all submittals. No action will be taken on a submittal item unless accompanied by this Transmittal Form.

2. Physical samples: Complete Transmittal Form and deliver physical sample to the Contracting Officer (or designee) on site for processing. All comments and actions will be documented on the Transmittal Form.

G. Identification: Submittal number or other unique identifier, including revision identifier.

1. Submittal number shall use a sequential number (e.g. .001). Re-submittals shall include alphabetic suffix after another decimal point (e.g. .001.A).

H. Re-submittals: Make re-submittals using same process used with initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in the title block on the Transmittal Form (CM-16) 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, and others as necessary for performance of construction activities.

J. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved with notations". Ensure notations have been incorporated and, at a minimum, keep one copy of final approved submittal on site for use during construction.

1.4 CONTRACTOR'S USE OF CAD/BIM FILES

A. General: At Contractor's written request, copies of CAD/BIM (Computer Aided Design/Building Information Modeling) files will be provided to Contractor for use in connection with Project, subject to:

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

2. The Contractor acknowledges that the CAD files are representational of the design intent for the project and are not presented or warranted to be accurate.

3. Use of the CAD files is not defense for failure to conform with the requirements of the contract documents.

4. Reliance on dimensional or other information contained or inherent in the CAD files is at the Contractor's sole risk.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. 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 are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each submittal to show which products and options are applicable.
3. As applicable, include:

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

4. Submit product data in PDF (portable document format) file format before or concurrent with samples.

B. 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 Contract Documents. As applicable, include:

    a. Dimensions
    b. Identification of products
    c. Fabrication and installation drawings
    d. Roughing-in and setting diagrams
    e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring
    f. Shopwork manufacturing instructions
    g. Templates and patterns
    h. Schedules
    i. Notation of coordination requirements
    j. Notation of dimensions established by field measurement
    k. Relationship to adjoining construction clearly indicated
    l. Seal and signature of professional engineer if specified
    m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring
2. Submit shop drawings as PDF electronic file

C. 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. Complete and post the Transmittal Form (CM-16) on the NPS project management and communication software website for processing and documentation of action on submitted samples.
3. Identification: Attach label on unexposed side of Samples that includes:

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

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing 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. Contracting Officer will return with options selected.

6. 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: 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 will retain three Sample sets; remainder will be returned.

D. Construction Materials: Contractor is encouraged to submit products made out of recycled or environmentally responsible material. Every effort will be made by NPS to approve these materials.

2.2 INFORMATIONAL SUBMITTALS

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

1. Post informational submittals as PDF electronic files directly to the NPS project management and communication software.
2. Certificates and Certifications: Provide a notarized statement with signature of entity responsible for preparing certification. Certificates and certifications shall be signed by officer or other individual authorized to sign documents on behalf of that entity.
3. Informational submittals that do not comply with requirements specified in Contract Documents will be rejected and one copy will be returned.

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

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

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

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

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

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

H. Storm Water Pollution Prevention Plan: Comply with requirements specified in Section 01 57 23 "Temporary Storm Water Pollution Prevention" and storm water permit requirements identified in Section 01 31 00 "Project Management and Coordination."

I. Indoor Air Quality Management Plan: Comply with requirements specified in Section 01 57 19.11 "Indoor Air Quality Management."

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

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

L. Installer Certificates: Prepare written statements on manufacturer’s letterhead certifying Installer complies with Contract Documents and, where required, is authorized by manufacturer for this specific Project.

M. Manufacturer Certificates: Prepare written statements on manufacturer’s letterhead certifying manufacturer complies with Contract Documents. Include evidence of manufacturing experience where required.

N. Product Certificates: Prepare written statements on manufacturer’s letterhead certifying product complies with Contract Documents.

O. Material Certificates: Prepare written statements on manufacturer’s letterhead certifying material complies with Contract Documents.

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

Q. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in 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.

R. 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.

S. 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 Contract Documents.

T. 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.

U. 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 requirements in Contract Documents.

V. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

W. Design Data: Prepare written and graphic information, including: 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.

X. Manufacturer's Instructions: Prepare written or published information documenting 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.

Y. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. As applicable, include:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Summary of installation procedures being followed, compliance with 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.

Z. Permit Compliance Products: Prepare required information for compliance with permit provisions. Products include written notification of project startup, suspension, and completion of work; photo documentation of site conditions; reports; and drawings.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 CONTRACTING OFFICER'S ACTION

A. General: Submittals will be disapproved without technical review if identification information is missing, not filled in, or if placed on back of submittal; an incorrect format of submittals is provided; 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 Contractor's own risk.

B. Action Submittals: Contracting Officer will review each submittal, generate comments on corrections or modifications required, and indicate appropriate action on the Transmittal Form (CM-16). Submittal will be marked as defined below:

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

C. Informational Submittals: Contracting Officer will review each submittal and will either accept or reject it.

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

3.3 SUPPLEMENT

A. The supplement listed below, following "End of Section," is a part of this specification:
1. Submittal List.

END OF SECTION 01 33 23

Submittal List with Review Estimate Template

National Park Service (NPS) - Denver Service Center (DSC) | 1-27-21

SUBMITTAL LIST

Park Acronym/Project Management Information System (PMIS) Number:	**YELL 326141**
Project Title:	**Modular Housing Units**

SUBMITTAL			REQUIREMENTS (Indicate with **X**)							
			INFORMATIONAL				ACTION			
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
01 11 00		**Summary of Work**								
	1.6	Traffic Control Plan and Haul Route for Oversixe or Overweight Vehicles				X				
	1.6	List of Employees				X				
01 31 00		**Project Management and Coordination**								
	1.4	Coordination Drawings				X				
	1.4	Division 1 Documents				X				
	1.8	Environmental Training Program				X				
01 32 16		**Construction Schedule**								
	1.3	Schedule of Values				X				
	1.3	Construction Baseline Schedule				X				
	1.3	CPM Reports				X				
	1.3	Construction Schedule Updates, Revisions and Time Impact Analysis				X				
01 32 33		**Photo Documentation**								
	1.2	Construction and Closeout Images				X				
01 35 13		**Natural Resources Protection**								
	1.4	Spill Prevention and Response Plan				X				
	1.4	MSDSs				X				
	1.4	Hazardous Materials Spill Prevention and Response Plan				X				
01 35 13.22		**Archeological Resources Protection**								
	1.3	Daily Work Schedule				X				
01 35 23		**Safety Requirements**								
	1.3	Accident Prevention Plan				X				
01 40 00		**Quality Requirements**								
	1.4	Quality Control Plan				X				
	1.4	Qualification Data				X				
	1.4	Contractor's Quality Control Daily Reports		X						
	1.4	Daily Test Reports		X						
	1.4	Accessibility Inspection Report		X						
	1.4	Off-Site Inspection Reports		X						
	1.4	Permits, Licenses, and Certificates				X				
01 45 33		**Special Inspections and Testing**								
	1.4	Qualifications				X				
	1.4	Contractor's Statement of Responsibility				X				

SUBMITTAL LIST

Park Acronym/Project Management Information System (PMIS) Number:	**YELL 326141**
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SUBMITTAL			REQUIREMENTS (Indicate with **X**)							
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SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
01 50 00		**Temporary Facilities and Controls**								
	1.6	Traffic Control Plan								X
	1.6	Construction Access Plan								X
01 57 19.11		**Indoor Air Quality Management**								
	1.4	IAQ Management Plan				X				
	1.4	Product Data and MSDS				X				
	1.4	Inspection and Test Reports				X				
01 57 23		**Temporary Storm Water Pollution Prevention**								
	1.3	SWPPP				X				
	1.3	Inspection Schedule				X				
	1.3	Erosion Control Products			X					
	1.4	Quality Assurance Plan				X				
01 67 00		**Product Requirements**								
	1.3	Record Submittals				X				
01 73 40		**Execution**								
	1.2	Certificates	X							
	1.2	Landfill Receipts				X				
	1.2	Certified as-built survey		X						
	1.2	Quantity Surveys		X						
01 74 19		**Construction Waste Management and Disposal**								
	1.4	Waste Management Plan & Updates				X				
	1.4	Progress Documentation				X				
	1.4	Waste Reduction Calculations		X						
	1.4	Records of Donations and Sales				X				
	1.4	Recycling and Processing Facility Records				X				
	1.4	Landfill and Incinerator Disposal Records				X				
	1.4	Qualification Data for Waste Management Coordinator				X				
	1.4	Progress Payment Documentation				X				
	1.4	Closeout Submittals				X				
01 77 00		**Closeout Procedures**								
	1.3	Closeout Requirements				X				
	1.3	Warranties, bonds, final certifications				X				
	1.3	NPS forms for occupancy, etc				X				
	1.3	Project and Environmental Record Documents				X				
	1.3	Posted Operating Instructions				X				
	1.3	Specials tools, spare parts, keys, etc.				X				
	1.3	Checklists and testing reports				X				
	1.3	Test and balance report				X				
01 78 23		**Operation and Maintenance Data**				X				
	1.2	O&M Manual								

SUBMITTAL LIST

Park Acronym/Project Management Information System (PMIS) Number:	**YELL 326141**
Project Title:	**Modular Housing Units**

SUBMITTAL			REQUIREMENTS (Indicate with **X**)							
			INFORMATIONAL				ACTION			
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
01 79 00		**Demonstration and Training**								
	1.3	Instruction Program				X				
02 41 00		**Demolition and Salvage**								
	1.4	Schedule and Plan of Demolition, Relocation, and Reinstallation Activities				X				
	1.4	Disposal / recycling statement				X				
02 49 19		**Selective Demolition**								
	1.4	Proposed Protection Measures				X				
	1.4	Predemolition Photographs or Video				X				
03 11 13		**Void Forms**								
	1.3	Product Data							X	
03 30 00		**Cast In Place Concrete**								
	1.5	Product Data							X	
	1.5	Mix Design								X
	1.5	Test Reports								X
	1.5	Manufacturer Instructions							X	
	1.5	Project Record Documents								X
	1.5	Warranty								X
03 30 50		**Minor Concrete**								
	1.4	Concrete Mix Design								X
03 62 00		**Non-Shrink Grout**								
	1.2	Product Data							X	
05 50 00		**Metal Fabrications**								
	1.2	Product Data								X
	1.2	Shop Drawings							X	
10 14 00		**Signage**								
	1.4	Supporting documentation, certificates and supplier information								X
	1.4	Shop Drawings and Sign Panel Proofs						X		X
	1.4	Product Data							X	
13 34 26		**Residential Modular Building Systems**								
	1.5	Product Data							X	
	1.5	Shop Drawings						X		
	1.5	Samples for Initial Selection					X			
	1.5	Samples for Verification					X			
	1.5	Door Schedule								X
	1.5	Delegated-Design Submittals								X
	1.6	Qualification Data				X				
	1.6	Letter of Design Certification	X							
	1.6	Erector Certificates	X							
	1.6	Field Quality-Control Reports		X						
	1.6	Surveys				X				
	1.6	Sample Warranties				X				

SUBMITTAL LIST

Park Acronym/Project Management Information System (PMIS) Number:	**YELL 326141**
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SUBMITTAL			REQUIREMENTS (Indicate with **X**)							
			INFORMATIONAL				ACTION			
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
26 50 00		**Site Electrical**								
	1.8	List of Materials				X				
	1.8	Shop Drawings						X		
31 11 00		**Clearing and Grubbing**								
	1.4	Disposal Plan				X				
	1.4	Recycling Statement and Disposal Agreement				X				
31 13 00		**Selective Tree and Shrub Removal and Trimming**								
	1.4	Product Info for Tree Wound Paint			X					
	1.4	Silviculturist Credentials and Certifications				X				
	1.4	Disposal Plan				X				
31 23 00		**Excavation and Fill**								
	1.4	Work Plan								X
	1.4	Excavation and Backfill Plan								X
	1.4	Test Reports and Documentation for Materials	X		X					
31 23 19		**Dewatering**								
	1.2	Water Control Plan and Dewatering Systems								X
	1.2	Discharge Permits and Reporting Requirements				X				
31 25 00		**Erosion and Sediment Control**								
	1.3	Product Data							X	
	1.3	Additional Erosion and Sediment Control Measures								X
	1.3	Storm Water Operator Qualifications				X				
31 37 00		**Riprap**								
	1.4	Stone Data	X						X	
	1.4	Filter Fabric Product Data and Certification	X						X	
	1.4	Samples					X			
31 50 00		**Excavation Support and Protection**								
	1.4	Shop Drawings						X		
	1.4	Qualification Data				X				
32 00 00		**Tree Protection**								
	1.5	Tree Protection Plan								X
32 11 00		**Base Courses**								
	1.4	Product Data								X
	1.4	Certifications for Material Testing Personnel and Labs								X
	1.4	Contractor Quality Control Testing Documentation								X
32 12 00		**Flexible Paving**								
	1.4	Certifications, Testing, and Samples	X							
	1.4	Certificates of Compliance	X							
	1.4	Mix Design Proposal								X
	1.4	Contractor Quality Control Plan				X				
32 16 00		**Concrete Curbs, Aprons and Pads**								
	1.4	Concrete Mix Design								X

SUBMITTAL LIST

Park Acronym/Project Management Information System (PMIS) Number:	YELL 326141
Project Title:	**Modular Housing Units**

SUBMITTAL			REQUIREMENTS (Indicate with **X**)							
			INFORMATIONAL				ACTION			
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER
32 17 00		**Paving Specialties**								
	1.4	MSDS and Product Data Sheets							X	
32 17 13		**Parking Bumpers**								
	1.3	Product Data Sheets							X	
32 32 00		**Retaining Walls**								
	1.2	Product Data							X	
	1.2	Shop Drawings						X		
	1.2	Samples					X			
	1.3	Qualification Data				X				
	1.3	Product Certificates	X							
	1.3	Test and Evaluation Repoirts				X				
	1.3	Field Quality-Control Reports				X				
32 90 00		**Restoration**								
	1.4	Noxious and Invasive Weed Plan								X
	1.4	Mulch Sample for Disturbed Areas					X			
32 92 00		**Grasses**								
	1.4	Mulch Sample for Reseeded Areas					X			
33 14 00		**Water Utility Transmission and Distribution**								
	1.4	Supporting Documentation, Certs of Compliance, Shop Drawings, Manufacturer Info						X	X	
	1.4	Product Data							X	
	1.4	Test Reports								X
33 30 00		**Sanitary Sewerage**								
	1.4	Supporting Documentation, Certs of Compliance, Shop Drawings, Manufacturer Info						X	X	
	1.4	Precast Structures Design Drawings						X		
	1.4	Product Data							X	
	1.4	Test Reports								X
33 40 00		**Stormwater Utilities**								
	1.4	Certificate of Compliance								X
	1.4	Water tight joint testing								X
	1.4	Product data and certifications	X						X	

SECTION 01 35 13 - NATURAL RESOURCES PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Yellowstone National Park contains areas of significant natural resources that must be protected during construction. The Contractor shall conform to the requirements set forth in this section and related sections to protect natural resources both within the project limits and elsewhere in the park for the duration of the contract.

B. The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The Contractor shall comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for compliance with this section, in all areas within the Park boundary, by its employees and its subcontractor employees. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

C. Related Sections:

1. Section 01 11 00 - Summary of Work
2. Section 01 33 23 - Submittal Procedures
3. Section 01 50 00 - Temporary Facilities and Controls
4. Section 32 00 00 - Tree Protection

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. U.S. National Archives and Records Administration (NARA):
    a. 33 CFR 328 Definitions
    b. 40 CFR 68 Chemical Accident Prevention Provisions
    c. 40 CFR 152 - 186 Pesticide Programs
    d. 40 CFR 260 Hazardous Waste Management System: General
    e. 40 CFR 261 Identification and Listing of Hazardous Waste
    f. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
    g. 40 CFR 279 Standards for the Management of Used Oil
    h. 40 CFR 302 Designation, Reportable Quantities, and Notification

i. 40 CFR 355 Emergency Planning and Notification

j. 49 CFR 171 - 178 Hazardous Materials Regulations

k. 42 USC Section 6901

l. National Pollutant Discharge Elimination System (NPDES)

2. U.S. Army Corps of Engineers (USACE):

a. Nationwide Permits applicable to the work:

i. Nationwide Permits 14 and 57, NWO-2025-01286-RWY (copy will be provided to Contractor prior to the start of Construction)

b. The Nationwide Permit listed above has general conditions that must be followed for the Nationwide Permit to be valid. The Contractor is responsible for reviewing these general conditions and complying with them at all times.

c. The Contractor shall also adhere to the conditions of the CWA 401 Water Certification by the USEPA associated with the Nationwide Permit.

1.3 DEFINITIONS

A. Biological Resources: All native and non-native plants and wildlife, the habitats where they are found, and the communities they form.

B. Class III Landfill: Landfill that accepts non-hazardous waste such as household, commercial and industrial waste, including construction, remodeling, repair, and demolition operations.

C. Contractor Generated Hazardous Waste: Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste materials would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

D. Contractor Generated Solid Waste: Solid wastes such as building materials, packaging, rubbish, debris, rubble, food waste, wrappers, spent disposable utensils, leaves, weeds, grass, and other organic materials resulting from construction, remodeling, repair, and demolition operations.

1. Rubbish/Debris: Combustible and non-combustible wastes such as paper, boxes, glass, crockery, tin cans, metal, and lumber scrap.

2. Green Waste: Combustible and non-combustible wastes such as leaves tree trimmings, and other organic materials that result from construction or maintenance and repair work.

3. Sanitary Waste: Refuse and scraps resulting from preparation, cooking,

distribution, or consumption of food.

E. Environmental Pollution and Damage: Presence of chemical, physical, or biological elements or agents which could:

1. Adversely affect human health or welfare.
2. Unfavorably alter ecological balances important to human life, affect other species of importance to humanity.
3. Degrade the utility of the environment for aesthetic, cultural, or historical purposes.

F. Soils: Minerals deposited by geologic and natural processes, such as glaciations, erosion, inundation, and volcanism.

G. Special Status Species: Biological Resources that are considered sufficiently rare that they require special consideration and/or protection.

H. Environmental Protection: Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

I. Exotic Species: Species of plants or animals that do not naturally occur in a particular area and often interfere with natural biological systems. Also known as alien, introduced, invasive, or non- native species.

J. Hazardous Materials: Any material that can be defined as an explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substance that could lead to death or injury.

K. Hazardous Waste: A hazardous material becomes a hazardous waste if the material has no safe end use in the project.

L. Inert Solids/Inert Waste: Non-liquid solid waste including, but not limited to soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by local, state, or federal regulatory agencies, and which does not contain significant quantities of decomposable solid waste.

M. Land Application for Discharge Water: The term “Land Application” for discharge water implies that the Contractor shall discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the “waters of the United States” shall occur. Land Application shall be in compliance with all applicable Federal, State, and local laws and regulations.

N. Natural Resources: All biological and physical resources and their associated processes.

O. Non-Native: Species of plants or animals that do not naturally occur in a particular area and often interfere with natural biological systems. Also known as alien, introduced, invasive, or exotic species.

P. Nonsensitive Areas: Areas that have a low likelihood of containing significant in-the-ground archeological or cultural resources.

Q. Pesticide: Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

R. Physical Resources: Soil, water, and air resources. Those naturally occurring elements of the earth, exclusive of plants and wildlife.

S. Root Zones: Typical spread of the roots from the trunk of a tree; normally defined as in a vertical plane with the drip line of the tree branches.

T. Surface Discharge: The term “Surface Discharge” implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or “waters of the United States” and would require a permit to discharge water from the governing agency.

U. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction. Defined by the drip line of individual trees or the perimeter dripline of groups of trees, unless otherwise directed.

V. Vegetation: Trees, shrubs, groundcovers, grass and other plants.

W. Waters of the United States: All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

X. Wetlands: Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must come from the National Park Service.

Y. Wildlife: Includes all fish, mammals, insects, birds, macro and micro-organisms, reptiles, amphibians, etc.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with Section 01 33 23 “Submittal Procedures”.

1. Submittals:

a. Spill Prevention and Response Plan. This plan shall be submitted no less than 20 days prior to the need for approval.

b. MSDSs for all materials proposed for use, all spill response kit contents,

reporting structure for spills, and a copy of the work schedule to coordinate with Contracting Officer.

c. Hazardous Materials Spill Prevention and Response Plan.

PART 2 - PRODUCTS

2.1 TREE PROTECTION FENCING

A. Refer to Drawings and Section 32 00 00 “Tree Protection”.

2.2 FENCING & BARRICADES

A. Provide temporary barriers for sensitive resource areas as shown on the Drawings and Specifications.

2.3 TEMPORARY GROUND PROTECTION MATS

A. Provided by the Contractor and approved by the Contracting Officer prior to use.

2.4 RECYCLED MATERIALS

A. Utilize products made from recycled materials and produced in such a way as to minimize environmental harm whenever possible.

PART 3 - EXECUTION

3.1 COMPLIANCE WITH FEDERAL AND STATE PERMIT REQUIREMENTS

A. Contractor will comply with all Federal and State permits required for construction-related activities that would include but not be limited to:

1. U.S. Army Corps of Engineers Nationwide Permits for activities affecting wetlands and waters of the U.S.
2. U.S. Fish and Wildlife Service Programmatic Biological Opinion for the Effects to Whitebark Pine from the Parkwide Housing Projects in Yellowstone National Park, Park and Gallatin Counties, Montana and Park and Teton Counties, Wyoming.
3. Categorical Exclusion Documents for Canyon and Mammoth Government Areas.
4. National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activities.
5. Wyoming Department of Environmental Quality Permit to Construct.
6. Montana Department of Environmental Quality Permit to Construct.

3.2 ENVIRONMENTAL PROTECTION MEASURES

A. The Contractor shall comply with these comprehensive waste management measures and shall comply with all applicable Federal, State and local regulations and address all aspects related to the transportation, labeling, storage, handling and disposal of all construction- related hazardous and non-hazardous liquid and solid wastes.

1. Spill Prevention and Response Plan (SPRP):

   a. The primary purpose of the SPRP is to prevent sewage spills from occurring by proper planning and protection of the project area, and then to respond to any sewage spills that may occur during the course of this project including appropriate notification of staff. The Plan will be general in nature and typical to all phases of the work with site specific plans required for each area involving trenching or any work with the possibility of accessing the existing system.

   b. The SPRP is structured in two parts – first a Spill Prevention Plan and then a Spill Response Plan. The Spill Prevention Plan (SPP) includes evaluation of specific conditions, set-up of containment for actual construction work as well as for bypass pumping. Sewer bypasses must be constructed to tie existing lines into the new system and to tie the new system into the existing system. The Spill Response Plan (SRP) includes the initial response to stop and contain a spill, notification of staff, clean-up, and follow-up documentation. The SPP and the SRP together comprise the entire SPRP.

   c. All Contractor employees are required to be trained in spill prevention and response in accordance with this SPRP.

2. Non-Hazardous Solid Waste:

   a. Waste, trash, and debris shall be controlled at all times and disposed in authorized containers in the Contractor's staging area.

   b. All food and food-related waste must be disposed of in lockable, bear-proof disposal bins. Verify that dumpster lids are secure at close of work each day.

   c. Construction debris may be stored in unlidded dumpsters or construction debris truck/trailers if removed daily. Do not mingle sanitary or food waste or recyclables with construction debris.

   d. All waste bins or dumpsters used for construction debris shall be clearly marked "No Food or Trash".

   e. The Contractor shall designate an employee to police the work site daily for waste, wrappers, food packaging and the like. All waste shall be picked up and disposed of in the appropriate bins or dumpsters.

   f. Burying or burning of trash and debris on-site is not permitted. All un-used materials, trash, and debris shall be the property of the Contractor and shall be transported outside of the Park boundary for disposal in accordance with law.

   g. Remove debris from permanently closed spaces prior to enclosing them.

3. Non-Hazardous Liquid Waste:

   a. Waste water from construction activities, such as onsite material

processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. shall not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. The Contractor shall dispose of the construction related wastewater off Government property in accordance with all Federal, State, Regional and Local laws and regulations.

b. Water contaminated with silt, grout, or other construction by-product must be pumped to a holding tank. Location of the holding tank will be proposed by Contractor and approved by the Contracting Officer.

4. For discharge of ground water, the Contractor will comply with State and or Federal permits that affect wetlands and waters of the U.S. The contractor shall submit a plan for surface ground water discharge from pumping activities to the Contracting Officer.

5. Hazardous Materials and Wastes:

a. Identify potentially hazardous substances to be used on the job site.

b. Identify handling procedures to ensure that hazardous substances are not released into the air, water, or ground.

c. Comply with Federal, State, and local laws and regulations for storage, handling, and disposal of these materials.

d. Storage of hazardous or flammable chemicals in the staging area or elsewhere on the site is prohibited except as approved by the Contracting Officer.

e. Hazardous materials shall not be discarded into the jobsite debris or waste disposal facilities.

f. Empty containers shall be removed from the site and disposed of in a manner prescribed by law.

g. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations.

h. A copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time is to be maintained on site and submitted to the Contracting Officer.

i. Before new hazardous materials are brought on site or removed from the site, the MSDS file shall be updated and submitted to the Contracting Officer.

B. Contractor shall provide a Hazardous Materials Spill Prevention and Response Plan to address spill prevention and response measures for hazardous substances used on site, including fuels. Prior to the start of work, the Contractor shall submit a plan that complies with NPS, Federal and State requirements and allows contractors to properly notify officials in the event of an emergency occurring during construction activities. Park requirements include at a minimum:

1. During non-work operations, stationary equipment shall be parked over specially prepared containment pads designed to trap any leaking oil, fuel, or

hydraulic fluids.

2. Inspect construction site daily for proper storage of hazardous materials, proper parking of equipment on containment pads, and for hydraulic and oil leaks of equipment, tighten hoses, and ensure they are in good condition.

3. Routine oiling and lubrication shall be conducted in areas with secondary containment using Best Management Practices (BMPs) at all times. Refueling of equipment in wetlands or stream channel areas is not allowed at any time.

4. Contractor shall maintain secondary containment for all equipment operating with fluids (such as drilling) or when direct discharge of leakage, spills, or other source of construction or equipment fluids can flow directly to any streambed, whether flowing with water or dry. Containment shall be designed and installed so as to prevent accidental spills into streambeds in the event of mechanical failure or hose breakage.

5. Contractor shall maintain spill response materials on the project site when using heavy equipment to ensure rapid response to small spills. These materials shall include absorbent pads, booms, or other materials as appropriate to contain oil, hydraulic fluid, solvents, and hazardous material spills. A list of the spill response materials to be kept on site shall be submitted to the Contracting Officer.

6. Contractor shall provide names and phone numbers of appropriate contractor's personnel to be contacted at any time (24 hours per day) regarding accidental release of hazardous substances to air, soil or water. This list shall be submitted to the COR and a copy visibly displayed in work areas on site.

7. Contractor shall have the Contracting Officer's and other appropriate Government emergency numbers posted and shall immediately notify the Contracting Officer or other Government representative on any accidental release of hazardous substances to air, soil or water.

C. The Contractor shall comply with these measures to protect natural resources. In addition, the Contractor must comply with all applicable Federal, State, and local regulations for the protection of these resources.

1. Natural Resource Protection:

a. Plant Condition Inventory (Pre- and Post-Construction): The Contractor and the Contracting Officer shall perform an on-site inventory of trees and other overall vegetation features within or near to the work limits. A print of the Drawings showing tree locations and a photo record will be used to note condition of trees and vegetation. This annotated drawing will be retained by the Contracting Officer for use during the final walk-through and tree/vegetation assessment. This walk through shall be a part of the Closeout Procedures requirements (see Section 01 77 00, Closeout Procedures).

b. The Plant Condition Inventory shall be scheduled in coordination with the pre-construction conference.

c. Access to work sites requiring travel through undeveloped areas outside the work limits must be approved by the Contracting Officer.

d. Provide temporary barriers (e.g., orange construction fence) to protect existing trees, plants and critical root zones that are designated to remain but are: (1) within the construction limits; 2) on or just outside the construction limits; (3) within the clearing limits (i.e., the zone extending 5 feet beyond the staked construction limits); or (4) on, or just outside the clearing limit line. Barriers shall be in place before construction begins.

e. Trees, shrubs, vines, grasses, and other vegetative features indicated and defined on the Drawings to be preserved shall be clearly identified by marking, fencing, or other approved techniques. The Contractor shall restore vegetative features damaged or destroyed during construction operations outside the limits of the approved work area. Tree protection shall be performed in accordance with Section 32 00 00 “Tree Protection”.

f. If any special status plants were identified within areas to be disturbed during the Plant Condition Inventory, Contractor shall notify the Contracting Officer at least three days in advance so the Contracting Officer can notify Vegetation staff in order for them to perform salvage operations.

g. Except in areas indicated on the Drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy resources including trees, shrubs, vines, grasses, topsoil, and landforms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized.

h. Should removal of additional trees or tree roots be requested, Contractor shall notify the Contracting Officer who will coordinate an inspection and determination by the appropriate authorities whether to remove the tree or not.

i. After tree removal, large roots may remain in the ground. Contractor shall be responsible for carefully removing in-ground tree roots of removed trees to permit excavation, drilling, or other ground penetrating construction activities. During tree root removal, do not use backhoes, chains, or other equipment in a manner that will harm roots of adjacent trees.

j. Minimize disturbance to tree trunks and root zones to prevent damage to trees.

k. Removal of whitebark pine trees of any size must be authorized by the Contracting Officer. NPS will coordinate relocation of whitebark pine if feasible or notify the Contractor of other mitigation measures.

l. Adhere to special Whitebark Pine Conservation Measures and General Conservation Measures detailed in the U.S. Fish and Wildlife Service Programmatic Biological Opinion as summarized in Section 01 11 00 “Summary of Work” and attached to these Contract Documents.

m. Adjust trenches and other excavations to keep them outside of the critical root zone wherever possible.

    i. Adjust the survey line as necessary to maintain required clearances.

ii. Notify the Contracting Officer of any proposed trenches or other excavations within the critical root zone of the trees.

n. If required by the Contracting Officer, install ground protecting mats. Use and place mats according to the manufacturer's recommendations. Contractor shall replace mats damaged during construction at no cost to the Government.

o. Avoid soil compaction within plant root zones with heavy equipment and vehicles within the project work limits.

p. Do not cut wheels or make sharp turns with wheeled or tracked equipment in root zones.

q. Do not pile excavated soil against tree trunks.

r. Do not mechanically compact soils in undeveloped areas except to meet minimum compaction requirements as approved by the Contracting Officer.

s. Maintain original soil topography in plant root zones whenever possible.

t. Preserve tree snags where feasible as potential bat or bird habitat.

2. Plant Appraisal:

a. If the Contractor destroys or injures trees and vegetation designated for protection or outside the work limits, the Contractor will be assessed damages prior to final progress payment.

b. Replacement costs for damaged vegetation will be computed according to the method described in the International Society of Arboriculture's most recent Guide for Plant Appraisal. This method is based on the cost of the largest commonly available tree or shrub, with modifications based on species value, condition, and location.

c. This damage appraisal process will be triggered by any of the following types of damage to vegetation outside the work limits or unauthorized disturbance of vegetation within the work limits.

i. Removal of any tree or shrub.
ii. Pruning or removal of more than 30 percent of a tree or shrub canopy.
iii. Removal or fracture of any limb or trunk that is one of the major structural entities of the damaged plant.
iv. Removal or fracture of any limb greater than 12 inches in diameter.
v. Bark damage or removal around more than 30 percent of the trunk circumference.
vi. Trenching or soil disturbance within the critical root zone that is deeper than 1-foot unless shown on the Drawings.

d. If the damaged vegetation is protected under the Endangered Species Act or other special legislation, additional penalties may be assessed as per consultation with the U.S. Fish & Wildlife Service.

e. Pruning or removal of vegetation shall be supervised by Contracting Officer. The designated personnel may designate plant species for

salvage. When authorized and supervised by the Contracting Officer, the Contractor is exempted from any penalties that might be assessed due to damage to vegetation.

i. Acceptable disturbance to roots is limited to 15 percent of the area under the drip line being either cut or filled. Any tree with more than 50 percent of its roots disturbed should be removed during construction at the direction of the Contracting Officer.

ii. Wounds occurring from construction activity may be possible entry sites for disease spores. If a tree is accidentally injured during construction, it may need to be removed at the direction of the Contracting Officer.

f. Trench alignments or other factors may result in variations in which trees are affected. The Contractor shall accommodate these variations at no additional expense to the Government.

g. Minor cuts and damaged areas shall be assessed by the Contracting Officer. Repair to the plant will be at the recommendation of the Park personnel and approval of the Contracting Officer.

3. Protection from Exotic Plant Species:

a. In order to prevent the introduction of exotic species into the park, all earth moving equipment must be inspected by NPS staff at a pre-arranged site for dirt, dust, mud, seeds or other potential contaminants prior to entering the Park. Refer to Section 01 50 00 “Temporary Facilities and Controls” for details on the inspection process.

b. Minimize ground disturbance to the greatest extent possible.

c. The Contractor shall get approval in writing from the Contracting Officer for fill material that must be used in a way or stored in a location not clearly specified in the contract.

d. If herbicide spraying is required, the Contractor shall provide a licensed operator to spray according to applicable state regulations. All herbicides must be approved in advance by the Contracting Officer. The Contractor shall not spray any herbicides until approved in writing by the Contracting Officer.

e. Drain and flush all pumps, tanks, live wells, buckets and other containers that might carry water contaminated with exotic plants and animals, such as the zebra mussel, prior to bringing equipment into the Park. Thoroughly wash all hauling tanks and equipment using a hard spray from a garden hose. If equipment was used in infested waters, use the following steps to clean the equipment:

i. Wash with hot water (140 F or 40 C) or a high pressure washer (250 pounds per square inch). Remove all aquatic weeds -- they can carry zebra mussels.

ii. Disinfect equipment. Recent research shows that disinfection of nets and equipment with benzalkonium chloride at typical treatment rates (10 milligrams per liter for 24 hours, 100 milligrams per liter for 3 hours, or 250 milligrams per liter for 15 minutes) will effectively eliminate most exotic animals. Two other

commonly used disinfectants, calcium hypochlorite and iodine, are ineffective against zebra mussels.

iii. Adult zebra mussels can live more than a week out of water in moist, shaded areas. Dry pumps, nets and other equipment used in infested waters in the sun for two to four days after cleaning. If adult mussels are present, dry equipment for two weeks.

4. Wetlands and Waterway Protection:

a. Comply with all state and federal regulations including the Federal Water Pollution Control Act (33 USC§ 1251 et seq.).

b. The Contractor shall adhere at all times to all applicable permit conditions including federal and state water quality standards and Clean Water Act Section 401 certification requirements. conditions of U.S. Army Corps of Engineers Nationwide Permit.

c. Except as authorized by this contract, do not operate mechanized equipment, discharge or place material within the boundaries of any U.S. waters as identified by the ordinary high water mark or edge of wetland. This includes wetlands, unless authorized by a permit issued by the U.S. Army Corps of Engineers according to 33 USC § 1344, and if required by the state agency having jurisdiction over the discharge of material into waters of the U.S. In the event of an unauthorized discharge:

i. Immediately prevent further contamination;
ii. Immediately notify the appropriate authorities and the Contracting Officer; and
iii. Mitigate damages as required.

d. Plywood must be laid down for equipment travel through delineated wetlands. Staging of equipment and materials must be on hard surfaces or in designated zones. Stockpiling of excavated material must be in approved areas, away from any wetlands. Silt fences or other approved erosion control measures must be in place prior to working in areas adjacent to mapped wetlands.

e. Separate work areas, including material sources by use of a suitable barrier that prevents sediment, petroleum products, chemicals, other liquids, or solid materials from entering a waters of the U.S. Construct and remove barriers to avoid discharge of material into the waters of the U.S. Remove and properly dispose of sediment or material collected by the barrier.

f. Implement best management practices to avoid or minimize potential adverse impacts to wetlands, stream channel, and water quality.

g. The Contractor shall fence construction areas adjacent to aquatic habitats to prohibit the movement of aquatic species into the construction area and to control siltation and disturbance in aquatic habitats.

h. The Contractor shall salvage and reuse wetland soils as fill to the maximum extent possible.

i. Maintain appropriate erosion and sedimentation controls during construction and permanently stabilize all exposed soil at the earliest

practicable date. Properly maintain structures or fill material to avoid adverse impacts on aquatic environments or public safety.

j. Whenever possible, place excavated material on an upland site. However, when this is not feasible, place temporary stockpiling of excavated material in wetlands on filter cloth, mats, or take comparable measures to ensure the underlying wetland is protected. Stabilize the material with filter cloth or other appropriate means to prevent reentry of excavated material into the waterway or wetland. All measures and precautions shall be taken to prevent entry of said materials into a surface water of the state or U.S. as a result of high water or precipitation events.

k. Remove temporary stockpiles or other temporary disturbances in wetlands as soon as possible. Return wetland areas temporarily disturbed by stockpiling or other activities during construction to their preexisting elevations, and restore soil, hydrology and native vegetation as soon as possible.

l. During dewatering, intakes shall be completely screened with wire mesh not larger than 5 millimeters to prevent aquatic species from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction.

m. Access routes to and through work locations in the meadows and wetlands shall be planked with 1 1/8” plywood, ground protection mats or other method approved by the Contracting Officer.

n. Re-grade and restore disturbed areas to preexisting contours to maintain drainage patterns.

5. Fish and Wildlife Protection:

a. Refer to Section 01 11 00 “Summary of Work”.

b. The Contractor and Contractor’s employees shall not feed any animals within the Park.

c. The Contractor and Contractor’s employees shall obey park speed limits and take other precautions to avoid vehicle strikes of wildlife.

d. The Contractor shall make all reasonable efforts to protect threatened, endangered, or candidate species and their habitat in accordance with Federal, State, Regional, and local laws and regulations.

e. Implement the following practices to prevent animal entrapment in excavated pits and trenches:

i. Excavation pits shall have a ramp or incline at either end (and/or other escape route) to allow wildlife to escape.
ii. Trenches shall be backfilled daily.
iii. Each morning prior to commencing work activities, Contractor shall inspect construction site for trapped wildlife in excavation pits and carefully remove. If necessary, contact the Contracting Officer for assistance.

f. Bear Precautions: Bears may be present at the project site and elsewhere

in and around the Park. The Contractor shall incorporate the following precautions while in the park.

i. All food, toiletries, and scented items (i.e., bug spray) shall be stored according to the regulations found on https://www.nps.gov/yose/planyourvisit/bears.htm.
ii. All food waste and food-related waste shall be disposed of in accordance with Non-Hazardous Solid Wastes requirements described elsewhere within this section.
iii. All vehicles shall be checked daily to ensure that no items that may attract bears remain inside an unattended vehicle. Items that shall not be left in vehicles include canned food, drinks, soap, cosmetics, toiletries, domestic trash, recyclable food containers, ice chests, grocery bags, and unwashed items used for preparing or eating meals.
iv. All windows and doors in recreational vehicles or trailers used for lodging or office space shall be closed and latched when not occupied.
v. The Contractor shall walk the job site at the end of each day and check for trash, food, and food-related items remaining at the site and dispose of the items in a bear-proof receptacle.
vi. Proper food storage is important to the welfare of the Park's bear population and is required by law.

6. Soil:

a. The Contractor shall confine all earth moving activities to within the work limits as defined in the Drawings. The displacement of soil or other materials outside the defined limits shall be approved by the Contracting Officer.

b. Landscape: Landforms and other landscape features indicated and defined on the Drawings to be preserved shall be clearly identified by marking, fencing, or other approved techniques. The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

c. Topsoil shall be salvaged and placed in a separate location from sub-soils and replaced on top of other soils as the trench is backfilled. The location for stockpiling soils and other woody materials shall be approved by the Contracting Officer.

7. Air:

a. Measures shall be taken to ensure that dust, debris, materials, trash, etc., do not become airborne and travel off the project site.

b. Equipment operations shall be in accordance with all Federal and State air emission and performance laws and standards.

c. Engines shall not be left running for more than 5 minutes while vehicles or other equipment are standing by.

d. Vehicles or equipment with excessive emissions or discharging black smoke will be removed from operation immediately and may not be used until appropriate maintenance and repairs have corrected the emissions

problem.

e. Clearing of vegetation shall be minimized to the greatest extent possible to prevent creation of dust sources.

f. Water or other approved compounds will be used to stabilize disturbed soils. Do not apply water when construction caused dust is not present.

g. When hauling dry materials, truck beds will be securely covered to prevent blowing dust or loss of debris.

h. When hauling wet materials, Contractor shall seal or screen truck beds to prevent soil leaks.

i. Contractor shall not exceed a maximum of 15 mph within construction areas in the Park. Slower speeds shall be maintained if necessary to reduce dust formation.

j. At construction zone access points, Contractor shall prevent paved areas from accumulation of mud, soils and other organic materials

8. Noise:

   a. Refer to Section 01 57 19.12 Noise and Acoustics.

9. Night Sky:

   a. Minimize night lighting during work. If night lighting is necessary, design lighting to be minimal, directed downward, and shielded.

END OF SECTION 01 35 13

SECTION 01 35 13.22 – ARCHEOLOGICAL RESOURCES PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section consists of protecting archeological resources contained in soil deposits.

1.2 DEFINITIONS

A. Archeological Resources: Archeological resources are physical evidences of past human activity, including evidences of effects of that activity on the environment. Archeological resources represent both prehistoric and historic time periods, found above and below ground and under water.

B. Archeologically Sensitive Areas: Areas having potential to contain significant (National Register eligible) archeological resources. If National Register eligible or listed archeological resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with state historic preservation officer and, if necessary, associated American Indian tribes.

C. Non-sensitive Areas: Areas with little potential of containing significant (National Register eligible) archeological resources.

D. Archeological Monitor: Representative of Government designated to oversee construction activities that could disturb archeological resources.

E. Archeological Resources Protection Act (ARPA) of 1979 (Public Law (P.L.) 96-95; 93 United States Statues at Large (Stat.) 712): defines archeological resources as any material remains of past human life or activities that are of archeological interest and at least 100 years old; Section 4 of the statute describes the requirements that must be met before Federal authorities can issue a permit to excavate or remove any archeological resource on Federal or Indian lands; the curatorial requirements of artifacts, and other materials excavated or removed.

F. Historic Objects: Historic objects are physical evidences of past human activity not recovered from archeological contexts, and represent both prehistoric and historic time periods. Elements, fragments, and components of structures are considered historic objects if they are no longer a part of the original structure.

1.3 SUBMITTALS

A. Daily Work Schedule: Detail construction work in archeologically sensitive areas. Submit to Contracting Officer 30 days before start of ground disturbing site work.

1.4 QUALITY ASSURANCE

A. At least one week before on-site work begins, Contractor shall meet with Contracting Officer and Archeological Monitor to discuss Daily Work Schedule, equipment, and special methods used in archeologically sensitive areas. Contractor shall ensure approved Daily Work Schedule is followed throughout construction.

PART 2 - PRODUCTS

2.1 DAILY WORK SCHEDULE

A. Daily Work Schedule is required for work occurring within archeologically sensitive areas. Include all work that is to occur within the area and key the schedule to the drawings to include:

1. Starting and ending dates of ground-disturbing construction.
2. Locations of temporary facilities, such as barriers, field offices, staging areas, sanitary facilities, borrow pits, and haul and access roads.
3. Types of construction, such as clearing, topsoil stripping, structure or trench excavation, landscaping, and post construction clean-up.
4. Methods and equipment used for each type of construction.
5. Plan for relocating work in the event of temporary work stoppages at each archeologically sensitive area.

PART 3 - EXECUTION

3.1 BARRICADES

A. Comply with requirements specified in Section 01 50 00 "Temporary Facilities and Controls”.

3.2 OBSERVATION

A. Archeological Monitor provided by NPS will observe ground-disturbing site work, including construction of temporary facilities, at archeologically sensitive areas, from a safe location mutually agreed on by Contractor and Monitor. As new ground is broken, Monitor will examine excavated materials, using construction layout centerline and perimeter staking as a reference point to record locations of findings.

3.3 DISCOVERY OF RESOURCES

A. If Archeological Monitor discovers resources, immediate relocation of work to a non-sensitive area may be required for Monitor to identify and document resources and, if necessary, develop appropriate mitigation plan. While Archeological Monitor is documenting resources in sensitive areas, Contractor shall relocate work to non-sensitive areas where monitoring is not normally required.

B. If resources are discovered while Archeological Monitor is absent, stop work immediately and report the discovery to the Contracting Officer.

C. Any and all historic objects discovered during this project (i.e. under foundations, in wall, attic, or crawl spaces, on the ground surface, etc.) shall be tuned over immediately with provenience information to the Archeological Monitor.
   i. Non-decorative architectural materials are not to be collected; the park already has these items represented in the collections.
   ii. Decorative architectural materials shall be limited to a small sample of the decorative item that is representative of the style and/or workmanship.

3.4 WORK STOPPAGE

A. Contractor shall plan, schedule, and execute work to prevent stoppages at one area from stopping all work at construction site.

END OF SECTION 01 35 13.22

SECTION 01 35 23 - SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes establishing an effective accident prevention program and providing a safe working environment for personnel and visitors.

1.2 CONDITIONS PRESENT FOR PROJECT

A. The following safety conditions should be addressed by the Contractor at a minimum: Cave-ins, earthquakes, geothermal activity, fires, confined spaces, water, electrocution, trenching, scaffolding, crane and lifting equipment procedures, wildlife, weather, hazardous materials, flooding, fatigue, heat, cold, among many other requirements.

B. The Contractor shall ensure safety personnel with CPR and First Aid Certifications are present at each active project area when any work is being performed.

1.3 SUBMITTALS

A. Accident Prevention Plan (APP): Submit APP after contract award and before Pre-Construction conference. Contracting Officer will review proposed APP. If APP requires any revisions or corrections, Contractor shall resubmit Plan within 10 days. No progress payments will be made until the APP is accepted.
   1. Project locations include:
      a. Canyon, Mammoth and Northeast Entrance Government Areas
      b. Other areas approved for Contractor use including but not limited to staging area, equipment storage areas, and concrete batching areas.

1.4 QUALITY ASSURANCE

A. Comply with contract clauses "Accident Prevention" and "Permits and Responsibilities." In case of conflicts between Federal, State, and local safety and health requirements, the most stringent shall apply. Onsite equipment shall meet 29 CFR 1926 (Code of Federal Regulations) (Occupational Safety and Health Administration (OSHA)) requirements. Failure to comply with requirements of this section and related sections may result in suspension of work.

B. Site Safety Supervisor:

1. Designate authorized onsite representative for preparation and maintenance of the APP.
2. Shall be responsible for:

    a. Implementation and enforcement of the APP
    b. Daily safety inspections
    c. Conducting and documenting weekly and monthly safety meetings
    d. Review of safety requirements at progress meetings
    e. Compilation and maintenance of Safety Data Sheets (SDS) and safety reference materials
    f. Tracking and resolution of safety violations
    g. Site personnel and visitor compliance with site safety and health requirements and APP
    h. Investigation and reporting of accidents and injuries

C. Qualifications of Employees:

1. Able to perform their assigned duties in a safe manner.
2. Do not allow employees 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 to perform work.
3. Provide operating instructions for equipment. Operators of vehicles, hoisting equipment, and hazardous plant equipment shall be able to understand signs, signals, operating instructions, and be fully capable of operating such equipment. Retain copies of operator licenses and certifications onsite.

1.5 ACCIDENT REPORTING

A. Reportable Accidents: Defined as: death, occupational disease, and/or traumatic injury to employees or the public; fires; and/or property damage by accident in excess of $100.

1. Notify Contracting Officer immediately in the event of a reportable accident.
2. Fill out and forward an Accident/Property Damage Report Form (CM-22) to Contracting Officer within 7 days of a reportable accident. Obtain form from Contracting Officer.

1.6 GEOTHERMAL ACTIVITY

A. The Project is located in a geothermally active area and care must be taken to avoid impacting subsurface hydrothermal systems. The following conditions are considered “red flags” if observed during ground-disturbing activities; all work must halt, and the Contracting Officer and Park Geologist contacted for further instruction and/or monitoring if any of the following conditions are encountered:
    1. A pre-existing hole in the ground the size of a basketball.
    2. Any concentrations of either carbon dioxide or hydrogen sulfide are measured.
    3. If during excavation a red clay layer is encountered.

B. Excavations and trenching in this area shall be done with the utmost care and caution to mitigate any disturbance of the hydrothermal system. If the Contractor encounters subsurface water above 25 degrees C (77 degrees F) or ground temperatures above 30 degrees C (86 degrees F) cease all

earth work in the area and notify the Contracting Office and Park Geologist at (307) 344-2441 or (406) 224-5846.

1.7 WILDLIFE SAFETY

A. When it is determined by the Contracting Officer that there is a potential animal/human conflict, stop work at the construction site until the Contracting Officer determines that it is safe for work to continue.

B. Unnatural Attractants: To prevent unnatural attractants to wildlife, keep all foods, fuel, pet foods, garbage, drinks, trash, or food and drink containers inside vehicles, or enclosed construction equipment, except during actual use. Contractor supplied garbage bins, within the construction site, must be bear proof and meet Park requirements. Remove all garbage and food trash from the Project Site daily. Specific guidelines will be further outlined during Park orientation sessions presented by the National Park Service. Notify Contracting Officer 2 weeks before starting work so the orientation session can be coordinated.

C. Contractor and subcontractor employees are required to attend Park orientation and receive training with regards to the NPS bear management plan, safety protocols, and food storage regulations.

D. Any mishandling of garbage, trash, food, and other potential bear attractants described above will result in Yellowstone National Park issuing the appropriate level of law enforcement to the responsible person, or Contractor. If mishandling occurs and a specific individual is not determined, the Contractor will be held responsible.

PART 2 - PRODUCTS

2.1 ACCIDENT PREVENTION PLAN (APP)

A. APP shall be written to comply with OSHA and project requirements (generic plan is not acceptable) including but not limited to:

1. Name and qualifications of supervisor responsible to carry out program.
2. Weekly and monthly safety meetings shall be documented with topics and attendees.
3. First aid and rescue procedures.
4. Job Hazard Analysis (JHA) for each major phase. List of hazards associated and methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Include initial and continuing training.
5. Planning for possible emergency situations, as detailed in Article 1.2. Such planning shall take nature of construction, site conditions, and degree of exposure of persons and property into consideration.

2.2 FIRST AID FACILITIES

A. Provide adequate facilities for number of employees and appropriate to construction hazards.

2.3 PERSONNEL PROTECTIVE EQUIPMENT (PPE)

A. Selection shall conform to OSHA Subpart E.

PART 3 - EXECUTION

3.1 DAILY SAFETY INSPECTIONS

A. Conduct daily safety inspections and maintain daily safety reports which include:
   1. Area/operation inspected
   2. Date of inspection
   3. Identified hazards
   4. Corrective actions taken

3.2 EMERGENCY INSTRUCTIONS

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

3.3 FIRE AND LIFE SAFETY

A. Comply with requirements of the 2024 International Fire Code Chapter 33 Fire Safety During Construction and Demolition.

3.4 HAZARDOUS MATERIALS

A. Hazardous materials: Explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substances that could cause death or injury.

B. Store hazardous materials in accordance with manufacturer’s and OSHA Subpart D requirements. Maintain Safety Data Sheets (SDS) for each chemical readily available on site.

   1. Immediately report spills of hazardous materials to the Park.
   2. Maintain a spill emergency response kit.
   3. Train employees how to respond to a spill and use emergency response kit.

3.5 PROTECTIVE EQUIPMENT

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

3.6 SAFETY MEETINGS

A. As a minimum, conduct one weekly 15-minute "toolbox" safety meeting conducted by a foreman or supervisor and attended by construction personnel at worksite. Topics shall coincide with work

scheduled for following week. Document and submit meeting minutes to Contracting Officer within one day after meeting.

B. Conduct monthly safety meetings for personnel, contractors, and subcontractors performing work on the site. Notify Contracting Officer of meeting dates and times. Meetings shall be used to: review effectiveness of Contractor's safety effort; resolve current health and safety problems; provide a forum for planning safe construction activities, and for updating Accident Prevention Plan. Contracting Officers Representative will attend meetings and enter results of meetings into the daily log.

3.7 HARD HATS AND PROTECTIVE EQUIPMENT AREAS

A. A hard hat use area shall be designated by Contractor. Hard hat area shall be posted by Contractor in a manner satisfactory to Contracting Officer.

B. It is Contractor's responsibility to require persons working on or visiting site to wear hard hats and PPE in good repair at all times. As a minimum, maintain six hard hats and other APP required equipment.

3.8 TRAINING

A. First Aid: Provide training to 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.

END OF SECTION 01 35 23

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

B. 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 Contract Document requirements. Quality of work shall be 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 Contract Document requirements.

C. See Divisions 2 through 49 Sections for specific test and inspection requirements.

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 actual products incorporated into the work and completed construction comply with requirements.

C. Preconstruction Testing: Tests and inspections performed specifically for project before products and materials are incorporated into work to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections performed by a Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing, to establish product performance and compliance with industry standards.

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

F. Field Quality Control Testing: Tests and inspections performed on-site for installation of work and for completed work.

G. Testing Agency or Laboratory: Entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. 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 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 corresponding generic name.

1.3 CONFLICTING REQUIREMENTS

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

B. Minimum Quality Levels: Quality level shown or specified shall be minimum provided or performed. Actual installation may comply exactly with minimum quality specified, or it may exceed minimum within reasonable limits. To comply with requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Contracting Officer before proceeding.

1.4 SUBMITTALS

A. Quality Control Plan:

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

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

C. Contractor Quality Control (CQC) Daily Reports: Submit showing inspections and tests on first workday following date covered by report. Quality Control Supervisor shall utilize DSC Forms.

1. Review Construction Management Representative (CMR) Daily report if applicable and reconcile any differences prior to posting.

D. Test Reports

1. Test reports shall be completed by person performing 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 of complete test results no later than one calendar day after test was performed.

E. Accessibility Inspection Report:

1. Fill out applicable sections of the Accessibility Inspection Report and attach to Contractor Quality Control Daily Report.
2. Utilize attached Accessibility Inspection form to document compliance with Architectural Barriers Act Accessibility Standards (ABAAS).
3. Inspect at various stages of construction as needed to ensure finished product meets standards.
4. Submit report no later than one calendar day after inspection was performed.

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

G. If Contractor Quality Control plan and Quality Control Daily Reports are not submitted as specified, Contracting Officer may retain payments until such time plan(s) is/are accepted and implemented, or may retain payments for work completed on days with no Quality Control Daily Reports.

H. Permits, Licenses, and Certificates: For National Park Service (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 work.

1.5 QUALITY ASSURANCE

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

B. Contractor’s Quality Control Staff:
1. Contractor's Quality Control Supervisor shall be assigned no other duties.
2. Contractor's designated Quality Control Supervisor shall be on the project site whenever contract work is in progress.
3. Contractor's job supervisory staff may be used to assist Quality Control Supervisor supplemented, as necessary, by additional certified testing technicians.

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

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

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

F. Professional Engineer Qualifications: Professional engineer legally qualified to practice in jurisdiction where Project is located and is experienced in providing engineering services of kind indicated (including Structural Tests and Special Inspections (STSI)). Engineering services are defined as those performed for installations of system, assembly, or products similar to those indicated for Project in material, design, and extent.

G. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing Work.

H. Testing Agency Qualifications: A Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or an independent agency with experience and capability to conduct testing and inspecting indicated, according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by Contract, is acceptable to Contracting Officer.

1. Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7 (Code of Federal Regulations).
2. National Voluntary Laboratory Accreditation Program (NVLAP): Testing agency accredited according to National Institute of Standards and Technology's (NIST) National Voluntary Laboratory Accreditation Program.
3. Measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards in accordance with NIST requirements. Measuring and testing devices shall be made available for use by Government for verification tests.

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

1.6 QUALITY CONTROL

A. Contractor is responsible for testing and inspections, including Structural Tests and Special Inspections (STSI), as shown on the Drawings and indicated in the Specifications. Inspect and test work as needed to ensure quality of materials, workmanship, construction, finish, and functional performance are in compliance with applicable specifications, drawings, and those required by the Building Code.

1. Engage qualified testing agency to perform quality-control services.
2. Submit appropriate report for each quality-control service.
3. Testing and inspecting requested by Contractor and not required by Contract Documents are Contractor's responsibility.
4. Contracting Officer may designate test locations.

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

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

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

E. 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:

1. Access to 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 material mixes that require control by testing agency.
7. Security and protection for samples and testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with minimum delay and to avoid removing and replacing construction to accommodate testing and inspecting.

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

PART 2 - PRODUCTS

2.1 QUALITY CONTROL PLAN

A. Quality Control Plan shall include:

1. List of personnel responsible for quality control and assigned duties. Include each person's qualifications. Include alternate(s) and qualifications.
2. Copy of letter of direction to Contractor's Quality Control Supervisor(s) outlining assigned duties and authorities designated by principal or owner.
3. Names, qualifications / accreditations, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms from laboratories.

4. Methods of performing, documenting, and enforcing quality control of work including Contractor report forms and acknowledgment of NPS forms.
5. Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.
6. Specific discussion regarding mockups, off-site visits, receiving inspections, manufacturers representation, startup requirements, and other aspects of performance specific to Project.
7. Provisions for substantial completion(s) and final inspection(s) per Contract.

PART 3 - EXECUTION

3.1 OFF-SITE CONTROL

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

3.2 ON-SITE CONTROL

A. Notification:

1. Notify Contracting Officer at least 48 hours in advance of preparatory phase meeting.
2. Notify Contracting Officer at least 24 hours in advance of 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 quality assurance and quantity control of the work. As a minimum, Contractor's Quality Control Supervisor and foreman responsible for feature of work shall be in attendance.
2. Review applicable specifications sections and drawings related to feature of work.
3. Ensure copies of referenced standards related to sampling, testing, and execution for feature of work are available on site.
4. Ensure provisions have been made for field control testing.
5. Examine work area to ensure preliminary work has been completed.
6. Verify field dimensions and advise Contracting Officer of discrepancies with contract documents.
7. Ensure necessary equipment and materials are at project site and they comply with approved shop drawings and submittals.
8. Document preparatory phase activities and discussions on Contractor's Quality Control Daily Report.

C. Initial Phase:

1. As soon as work begins, inspect and test representative portion of particular feature of work for quality of workmanship.
2. Review control testing procedures to ensure compliance with contract requirements.
3. Document initial phase activities and discussions on 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 same feature of work for following reasons:

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

3.3 DOCUMENTATION

A. Maintain Quality Control Daily Reports, Daily Test Report Information Sheets, and Accessibility Inspection Reports of quality control activities and tests. (Download from DSC Workflows website > Forms/Templates/Samples/Guidelines page > Construction Forms section.)

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

C. Quality Control Daily Reports shall accurately portray all work and materials. The materials shall match the materials as approved from the Construction Documents (CD) requirements. Combustible/flammable materials shall be documented as well.

3.4 ENFORCEMENT

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

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 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

SECTION 01 42 00 – REFERENCE STANDARDS

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: Amount of biobased carbon in the material or product as a percentage of weight (mass) of total organic carbon in the material or product.

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

D. Deconstruction: Disassembly of buildings for 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 International Organization for Standardization (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 Program.

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 potential for renewal only by geological, physical, and chemical processes taking place over of 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 Federal Trade Commission (FTC) Guide for 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 Contract Documents to the extent referenced. Such standards are made a part of Contract Documents by reference.

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

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

1.3 INDUSTRY STANDARDS

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

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

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

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from 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 in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the

entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

AA	Aluminum Association (The) www.aluminum.org	(703) 358-2960
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.plib.org/aitc	
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
API	American Petroleum Institute www.api.org	(202) 682-8000
APLS	Approved Product Lists	

	Division Approved Product Lists (APLS) (wv.gov)	
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
FHWA	Federal Highway Administration www.fhwa.dot.gov	
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830

ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
MDEQ	Montana Department of Environmental Quality	(406) 444-2544
MDT	Montana Department of Transportation www.mdt.mt.gov	
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MUTCD	Manual on Uniform Traffic Control Devices Manual on Uniform Traffic Control Devices (MUTCD) - FHWA (dot.gov)	
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NECA	National Electrical Contractors Association www.necanet.org	
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788

PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PGI	PVC Geomembrane Institute http://pgi-tp.cee.uiuc.edu	(217) 333-3929
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
WDEQ	Wyoming Department of Environmental Quality	(307) 777-7937
WYDOT	Wyoming Department of Transportation www.wyoroad.info	(888) 996-7623

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in following list. Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

DIN	Deutsches Institut fur Normung e.V. www.din.de	49 30 2601-3003
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. icc-es.org	(800) 423-6587 (562) 699-0543

C. 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 following list. Names, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

ABA & ABAAS United States Access Board	Architectural Barriers Act (ABA) Architectural Barriers Act Accessibility Standards (ABAAS) www.access-board.gov
CoE	Army Corps of Engineers www.usace.army.mil
CPSC	Consumer Product Safety Commission www.cpsc.gov
DOC	Department of Commerce www.commerce.gov
DOD	Department of Defense www.defense.gov
DOJ	Department of Justice www.justice.gov
DOE	Department of Energy www.energy.gov
EPA	Environmental Protection Agency www.epa.gov
FAA	Federal Aviation Administration www.faa.gov
FCC	Federal Communications Commission www.fcc.gov
FDA	Food and Drug Administration www.fda.gov
GSA	General Services Administration www.gsa.gov
HUD	Department of Housing and Urban Development www.hud.gov
LBL	Lawrence Berkeley National Laboratory www.lbl.gov
NCHRP	National Cooperative Highway Research Program (See TRB (Transportation Resource Board))

NIST	National Institute of Standards and Technology www.nist.gov
OSHA	Occupational Safety & Health Administration www.osha.gov
PHS	U.S. Department of Health and Human Services www.hhs.gov
RUS	Rural Utilities Service (See USDA (Department of Agriculture))
SD	State Department www.state.gov
TRB	Transportation Research Board www.nationalacademies.org/trb/transportation-research-board
USDA	Department of Agriculture www.usda.gov
USP	U.S. Pharmacopeia www.usp.org
USPS	Postal Service www.usps.com

D. 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 following list. Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

ABAAS	Architectural Barriers Act Accessibility Standards www.access-board.gov
CFR	Code of Federal Regulations Available from Government Printing Office www.govinfo.gov/app/collection/cfr
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point www.dsp.dla.mil/Specs-Standards/
DSCC	Defense Supply Center Columbus (See FS (Federal Specification))
FED-STD	Federal Standard (See FS (Federal Specification))
FS	Federal Specification

Available from Department of Defense Single Stock Point
www.dsp.dla.mil/Specs-Standards/
Available from General Services Administration
www.gsa.gov

Available from National Institute of Building Sciences
www.nibs.org

FTMS — Federal Test Method Standard
(See FS (Federal Specification))

MIL — (See MILSPEC (Military Specification and Standards))

MIL-STD — (See MILSPEC (Military Specification and Standards))

MILSPEC — Military Specification and Standards
Available from Department of Defense Single Stock Point
www.dsp.dla.mil/Specs-Standards/

UFAS — Uniform Federal Accessibility Standards
Available from Access Board
www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/ufas
*(UFAS is **only** for housing projects per Fair Housing Act. See also the Fair Housing Act Design Manual, www.huduser.gov/portal/publications/destech/fairhousing)*

WPWSS — Wyoming Public Works Standard Specifications

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):
- 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 of Sanitation Engineers (ASSE)

E. 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 Absorption 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 Pozzolans 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 foot pound force per cubic foot (ft-lbf/ft3) (2,700 kilonewton meter per cubic meter (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 Manufacture 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 Paperboard
- 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 Indoor 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 Chromatography
- D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
- D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -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 Materials/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

F. Bat Conservation International:
- Bat Approved Bat Houses

G. Carpet and Rug Institute
- Green Label & Green Label Plus Testing Programs, carpet-rug.org/testing/green-label-plus

H. Center for Resource Solutions
- Green-e program

I. Environmental Protection Agency (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

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

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

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

M. 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

N. International Iron and Steel Institute:
- CO2 Breakthrough Program

O. 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

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

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

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

S. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
- IAQ Guidelines for Occupied Buildings Under Construction

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

U. US Composting Council:
- Seal of Testing Assurance Program

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

W. US Green Building Council:
- LEED™ 2009 Green Building Rating System
- LEED™ v4 (version 4) Green Building Rating System

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 45 33 - SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.1 SUMMARY

A. This section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2021 IBC and is in addition to and supplements requirements included in Statement of Special Inspections shown on the Drawings.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
2. International Code Council (ICC):
   a. International Building Code (IBC).
   b. Evaluation Service (ICC-ES) Reports and Legacy Reports.

1.3 DEFINITIONS

A. Agencies and Personnel:

1. Agency Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
2. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
3. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by statutory requirements of professional registration laws of state or jurisdiction in which Project is to be constructed.
4. Special Inspector: Qualified person retained by the Contractor who will demonstrate competence to the satisfaction of AHJ and Contracting Officer for inspection of a particular type of construction or operation requiring Special Inspection. Must be an independent third party hired directly by the Contractor.

B. Nonstructural Components:

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical and Plumbing Component Supports: Structural members or assemblies which transmit loads and forces from mechanical or plumbing equipment to structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

C. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections provided on the Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces and installation of deep foundation elements by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.

D. Statement of Special Inspections: Detailed written procedure contained on the Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.

E. Special Inspection:

1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in area where the Work is being performed. Special Inspection, Periodic: Part-time or intermittent observation of the Work requiring Special Inspection by an approved Special Inspector who is present in area where the Work has been or is being performed, and at completion of the Work.

F. Structural Systems and Components:

1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on the Drawings.

4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to plane of the wall. Unless noted otherwise on the Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on the Drawings.

1.4 SUBMITTALS

A. Qualifications for each special inspector showing required credentials for items to be inspected in accordance with the International Building Code.

B. Informational Submittals:

1. Contractor's Statement of Responsibility: Form shall be completed by entity responsible for construction of main seismic-force-resisting system, listed in Statement of Special Inspections. Refer to Article Supplements located at end of section.

1.5 STATEMENT OF SPECIAL INSPECTIONS REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1705: See the Drawings for basic lateral load resisting systems for each structure and other designated seismic systems.
2. Wind-force-resisting systems designated under IBC Section 1705: None required.
3. Architectural, Plumbing, Mechanical, and Electrical Components subject to Special Inspection under IBC Sections 1705.12.5 and 1705.12.6 for Seismic Resistance: None required.

B. Statement of Special Inspections:

1. As included on the Drawings, Project-specific requirements were prepared by Registered Design Professional in Responsible Charge. The following identifies elements of inspection, observation, and testing program to be followed in construction of the Work:
   a. Designated seismic systems and main seismic force-resisting systems and components that are subject to Special Inspection and Structural Observation for lateral load resistance.
   b. Special Inspection and testing required by IBC Section 1705 and other applicable sections and referenced standards therein.
   c. Type and frequency of Special Inspection required.
   d. Type and frequency of testing required.
   e. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Contracting Officer.
   f. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contracting Officer.
   g. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to

Contracting Officer.

C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency or by Authority Having Jurisdiction's (AHJ) approved, qualified inspection staff. Contractor will secure and pay for services of agency to perform Special Inspection and associated testing.

D. Code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections as shown on the Drawings and further provided in this section, is for benefit of Owner and does not:

1. Relieve Contractor of responsibility for providing adequate quality control measures.
2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
3. Constitute or imply acceptance.
4. Affect continuing rights of Owner after acceptance of completed Work.

E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.

F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor and Special Inspectors and Professional Observer are onsite, but not able to provide contracted services.

G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required because of rejection of materials of in place Work that cannot be made compliant to Contract Document without additional inspections and observation and testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. All other testing and inspections, unless noted otherwise, are provided by Contractor.

B. Provide access to shop or Site for Special Inspection and Testing and Professional Observation requirements.

C. Notify Contracting Officer in advance of required Special Inspection and Professional Observation no later than 48 hours prior to date of Special Inspection and Professional Observation.

D. Provide access for Special Inspector to construction documents.

E. Retain special inspection records onsite to be readily available for review.

F. Cooperate with Special Inspector and Contracting Officer and provide safe access to the Work to be inspected.

G. Submit Fabricator's Certificates of Compliance for approved fabricators.

H. Provide reasonable auxiliary services as requested by the Special Inspector. Auxiliary services required include, but not limited to:

1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests to assist the Special Inspector in performing test/inspections.
2. Providing storage space for the Special Inspector's exclusive use, such as for storing and curing concrete test samples and delivery of samples to testing laboratories.
3. Providing the Special Inspector with access to all approved submittals.
4. Providing security and protection of samples and test equipment at the Project Site.
5. Provide samples of materials to be tested in required quantities.

I. Materials and systems shall be inspected during placement where Continuous Special Inspection is required.

J. Where Periodic Special Inspection is indicated in the Statement of Special Inspections:

1. Schedule inspections for either during or at completion of their placement or a combination or both.
2. Schedule periodically inspected Work (either inspected during or after its placement) so that corrections can be completed and re-inspected before Work is inaccessible.
3. Sampling a portion of the Work is not allowed. Schedules shall provide for inspection of all Work requiring periodic inspection.

3.2 SUPPLEMENT

A. The supplement listed below, following "End of Section," is a part of this specification:

1. Contractor's Statement of Responsibility.

END OF SECTION 01 45 33

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

_____
(Project)

_____
(Name of Contracting Company)

_____
(Business Address)

(_____)_____ (_____)_____
(Telephone) (Fax)

I, (We) hereby certify that I am (we are) aware of the Special Inspection and Testing and Professional Observation requirements contained in Contract Documents for this Project for seismic force-resisting systems as listed in Statement of Special Inspections, and that:

1. I, (We) aware of the systems and the requirements of the special inspection and acknowledge our responsibility in the implementation of the Statement of Special Inspections for the construction of the following systems:

Facility	Specification	Lateral Force-Resisting System

2. Control of this Work will be exercised to obtain conformance with Contract Documents approved by Contracting Officer.

3. Procedures within the Contractor's organization to be used for exercising control of the Work, method and frequency of reporting, and distribution of reports required under Statement of Special Inspections for Project are attached to this statement.

4. I, (We) will provide 48-hour notification to Contracting Officer and approved inspection agency as required for structural tests and Special Inspection for Project.

5. The following person is hereby identified as exercising control over requirements of this section for the Work designated above:

Name:_____

Qualifications: _____

_____

_____

(Print name and official title of person signing this form)

Signed by: _____

Date:_____

Project Name: _____

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Contracting Officer, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and 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 Contract Sum as required.

B. Water Service: Potable Water from existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations without any additional permit costs.

C. Electric Power Service: Electric power from existing system is available for use with metering and with payment of use charges. Provide connections and extensions of services as required for construction operations without any additional permit costs.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with National Electrical Contractors Association (NECA), National Electrical Manufacturers Association (NEMA), and Underwriter Laboratories (UL) standards and regulations for temporary electric service. Install service to comply with National Fire Protection Association (NFPA) 70.

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

1. Regulatory Requirements
2. Indoor Air Quality (IAQ) Management

3. Noise and Acoustics Management
4. Environmental Management
5. Construction Waste Management

C. Accessible Temporary Egress: Comply with applicable provisions in the United States (U.S.) Architectural & Transportation Barriers Compliance Board's Architectural Barriers Act Accessibility Standard (ABAAS) Accessibility Guidelines.

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.

1.6 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. Contractor shall submit a proposed Traffic Control Plan to NPS for review and comments no later than five (5) working days after the pre-construction conference. Construction shall not begin until the Traffic Control Plan has been reviewed and accepted by NPS.
1. The site-specific Traffic Control Plan shall be prepared and certified/stamped (*include license, registration, or certification number of certifying person*) by a Civil Engineer or Professional Traffic Operations Engineer (PTOE) licensed to practice engineering in the State of Wyoming, or an ATSSA certified Work Site Traffic Supervisor. If the Contractor makes significant changes to the accepted Traffic Control Plan during the course of the project, these changes must also be prepared and certified by a licensed/certified person as identified above.

C. Prior to establishment of any staging, storage and/or laydown areas, or support facilities, or starting clearing and grubbing activities, the Contractor shall submit for review and acceptance of NPS, a Construction Access Plan. The plan at minimum shall include maps/figures, a schedule, and describe the locations and methods to be used to establish and maintain all on-site support facilities including but not limited to:
1. Contractors field office (to be located at either Canyon or Mammoth Government Area).
2. Employee parking, and/or other employee support facilities.
3. Staging areas, and stockpile locations.
4. Temporary access roads, and proposed haul routes for import and export of construction materials to and from the site.
5. Include any off-site support facilities (acquired separately and controlled by Contractor).

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. Pavement: Comply with applicable paving sections for asphalt or concrete.

C. Portable Chain-Link Fencing: Minimum 2 inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8 inch OD line posts and 2-7/8 inch OD corner and pull posts, with 1-5/8 inch OD top and bottom rails. Provide galvanized steel bases for supporting posts.

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

E. Wood Enclosure Fence: Plywood, 6 feet or 8 feet high, framed with four 2 by 4 inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

F. Lumber and Plywood: Comply with requirements in Division 06 Section " Miscellaneous Rough Carpentry."

G. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

H. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

I. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

J. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

2.2 TEMPORARY FACILITIES

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

B. Contracting Officers Field Office: Field office shall be a separate structure from Contractor's office.

1. Prefabricated, job built, or a mobile unit; excellent condition, structurally sound, non-flammable exterior construction, weather tight, minimum 300square feet.
2. Operable windows and security screens, adjustable ventilation.
3. Restroom (minimum of lavatory and toilet, with exhaust fan if room is windowless) or accessible Contractor facilities if available.
4. Air conditioner and heater.
5. Interior partition with lockable door to divide office
6. Paneling or freshly painted walls, acoustical tile or painted ceilings, and resilient flooring.

7. Two exterior doors with dead bolts keyed from outside,
8. Minimum 20-square-foot landing and steps at each exterior door.

C. 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 approval.

D. 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. Heating, Ventilation, and Air Conditioning (HVAC) Equipment: Unless Contracting Officer 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 Minimum Efficiency Reporting Value (MERV) of 8 at each return air grille in system and remove at end of construction.

C. Direct Digital Control (DDC) Internet Connection: Furnish, install and maintain a high-speed connection (Digital Subscriber Line (DSL) or similar) between the project’s DDC system and the internet through a Contractor furnished internet service provider. Contractor is responsible for maintenance of this connection and costs associated with internet service provider through warranty period of this contract. Upon completion of warranty period, service shall be transferable to the Government at which time future costs for connection will no longer be the responsibility of Contractor.

D. Contracting Officer’s Field Office

1. Outlets: Minimum of two, quad outlets with surge protection.
2. Refrigerator: Under counter, 3.2-cubic-foot volume with 0.8-cubic-foot freezer with dedicated power receptacle.
3. Fire Extinguisher: UL listed and FM (Factory Mutual) approved, minimum rating of 2-A:10-B:C, dry chemical.
4. First-Aid Kit: General office/light industrial kit.
5. Two desks with five drawers each and two chairs with casters; two drafting tables (minimum 40 inches wide by 5 feet long) and two stools; drawing rack; two 2-drawer and one 4-drawer legal size locking filing cabinets with keys; 8 feet of 12 inch deep shelving; coat rack; two additional guest chairs; two desk lamps; two drafting table lamps; and a maximum/minimum thermometer.

6. Manufactured computer work station, capable of containing CPU (central processing unit), monitor, keyboard, printer; work station chair.
7. Additional tables necessary for FAX machine and copier.
8. Two 5-gallon trash cans and one 30-gallon trash can with lid.
9. Ceiling mounted general lighting fixtures.

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.

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 necessary permits.

B. Storm Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Provide best management practices for storm runoff and temporary drainage controls.

C. Non-potable water for construction is available within the Canyon and Northeast Entrance Government Areas with coordination of the Contracting Officer. Install piping and connections as required.

D. Potable water is available on site. Make connections to existing facilities as needed. Facilities must be cleaned and maintained in a condition acceptable to NPS. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: 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.

F. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Use of permanent heating system will not be allowed without written authorization from Contracting Officer. When the permanent heating system is approved for use as temporary heating, pay costs until final acceptance. Permanent heating system shall be sufficiently complete, including controls, to permit safe operation
2. Provide and maintain adequate approved facilities, as required for safety and construction requirements, during the work. Provide ample clearance around stoves, heaters, chimney and vent connections to prevent ignition of combustible material
3. Install and maintain temporary filters when air handing equipment is used for temporary heating. Install new filters before final acceptance in addition to any extra sets of filters required. Clean coils as determined by Contracting Officer.
4. Warranties for equipment used for temporary heating shall start on date of Final Acceptance.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Contractor shall coordinate with the electrical utility (Northwestern Energy at Canyon and Mammoth Government Areas and Flathead Energy at Northeast Entrance Government Area) and the Contracting Officer regarding whether temporary electric power service shall be overhead or underground. The Contractor is responsible for payment for all temporary power.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone and Internet Service: No telephone or internet service is available on site for Contractor's use. Make arrangements for telephone and internet as needed and pay costs.

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. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Contracting Officer.

B. Contracting Officers Field Office:

1. Provide Heat, lights, power, air conditioning, and wireless telecom services. Contractor Is responsible for the costs of providing for these temporary services.
2. Provide office, furnishings, and utility connections no later than 7 days after date of Notice to Proceed. Exact location will be determined by Contracting Officer.
3. Maintain equipment, furnishings, and structures. Provide equipment replacement elements as needed. Provide weekly cleaning services and trash disposal. Maintain and service water and sewer holding tanks as required.

C. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Provide dust control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
3. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 32 11 00 “Base Courses”.
4. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.

D. Traffic Controls: Erect and maintain barricades, lights, danger signals, and warning signs in accordance with Manual on Uniform Traffic Control Devices (MUTCD), Part 6, latest 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. Keep a minimum of two rolls on site.

E. Parking: Use designated areas shown on Drawings or as approved by the Contracting Officer as parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of the agency(ies) with jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. 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.

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

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

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 minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Refer to Section 01 35 13 “Natural Resources Protection” for additional requirements.

B. Cleaning of Equipment: Contractor shall ensure prior to moving on to Project Area, equipment, is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. Ensure equipment has been pressure washed and is free of exotic species. Equipment shall be considered free of soil, seeds, and other debris when visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools are not required.
1. Pressure wash with high temperature (minimum 140 degrees F) all construction vehicles and equipment, including the undercarriage, prior to entering the Park and between construction sites.
2. The Contractor shall coordinate with NPS inspectors (as identified by the Contracting Officer) a minimum of 2 working days (not including weekends) before equipment is scheduled to enter the Park to make arrangements for the inspections. Inspections are generally available Monday through Thursday. Contractor is requested to group as many inspections together as possible.
3. Prior to offloading any equipment, obtain verbal approval from the Contracting Officer. Any equipment that is unacceptable to the Contracting Officer shall be immediately removed from the Park.
4. The spread of exotic invasive plan species in the Park is a serious concern, and no equipment shall be allowed to offload nor remain within the Park if dirt or other contaminants with the potential to harbor seeds are apparent. Any equipment that departs the Project Site (excluding hauling vehicles) must repeat an identical cleaning and inspection process, including formal acceptance by the Contracting Officer prior to being remobilized and offloaded at the Site.

C. Temporary Erosion and Sedimentation Control: Refer to Section 01 57 23 "Temporary Storm Water Pollution Prevention" and 31 25 00 “Erosion and Sedimentation Control”.

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

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

F. Wetland and Waterway Protection: Adhere to all applicable regulations and permit conditions. Refer to Section 01 35 13 “Natural Resources Protection”.

G. Site Enclosure Fence: Before construction operations begin, furnish and install fencing to prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Locate vehicular gates to avoid interference with traffic on public thoroughfares.
3. Locate pedestrian entrance gates as required to provide controlled personnel entry.

H. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

I. Barricades, Warning Signs, and Lights: Comply with requirements of Manual on Uniform Traffic Control Devices (MUTCD), Part 6, latest edition and agency(ies) with jurisdiction for erecting structurally adequate barricades, including warning signs and lighting. Coordinate with the Contracting Officer on signage.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

K. 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: Capable and qualified person shall be placed in charge of fire protection. Responsibilities shall include locating and maintaining fire protective equipment and establishing and maintaining safe torch cutting and welding procedures.
2. Tobacco Use, Smoking, and Vaping: Smoking within buildings or temporary storage sheds is prohibited.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of NPS and Agencies with Jurisdiction. Check with Park; many require "burn permits" for welding.
4. Develop and supervise overall fire-prevention and -protection program for personnel at Project Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

5. Provide temporary standpipes and hoses for fire protection. Hang hoses with warning sign stating hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
6. Hazard Control: Take necessary precautions to prevent fire during construction. Do not store flammable or combustible liquids in existing buildings. Provide adequate ventilation during use of volatile or noxious substances. Ensure cleanup procedures and storage requirements are followed at close of every work session.
7. Spark Arresters: Equip gasoline or diesel-powered equipment used during periods of potential fire hazards or in potential forest and grass fire locations with spark arresters approved by United States Department of Agriculture (USDA) Forest Service.

    a. Written determinations of periods and areas of potential fire hazard will be issued by Contracting Officer.

8. Buildings: Furnish a minimum of one extinguisher for each 1,500 square feet of area or major fraction thereof.

    a. Travel distance from any work station to nearest extinguisher shall not exceed 75 feet.

9. Vehicles and Equipment: Provide one extinguisher on each vehicle or piece of equipment.
10. 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. 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 24-hour basis where required to achieve indicated results and 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.

E. Any damaged or disturbed areas shall be restored to pre-existing conditions and decompacted and revegetated as necessary conforming to Section 32 90 00 - Restoration.

END OF SECTION 01 50 00

SECTION 01 57 19.11 – INDOOR AIR QUALITY MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Special requirements for Indoor Air Quality (IAQ) management during construction operations.

    a. Control of emissions during construction.
    b. Moisture control during construction.

2. Procedures for testing baseline IAQ. Baseline IAQ requirements, specify maximum indoor pollutant concentrations for acceptance of the facility.

1.2 DEFINITIONS

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

B. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.

C. Hazardous Materials: Any material regulated as a hazardous material in accordance with 49 CFR 173 (Code of Federal Regulations), 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. Throughout this specification, hazardous material includes hazardous chemicals.

1. Hazardous materials include pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).

D. Indoor Air Quality (IAQ): Composition and characteristics of air in an enclosed space that affect occupants of that space. Indoor air quality of a space refers to relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including impact on thermal comfort such as air temperature, relative humidity and air speed.

E. Interior final finishes: Materials and products exposed to interior occupied spaces; including flooring, wall covering, finish carpentry, and ceilings.

F. Packaged dry products: Materials and products installed in dry form delivered in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.

G. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and materials which require curing.

1.3 QUALITY ASSURANCE

A. Inspection and Testing Lab Qualifications: Minimum of 5 years of experience in performing types of testing specified herein.

1.4 SUBMITTALS

A. IAQ Management Plan: After award and before Pre-construction conference, prepare and submit IAQ Management Plan, including:

1. Procedures for control of emissions during construction.

    a. Identify schedule for application of interior finishes: Identify each interior finish that generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors. Indicate air handling zone, sequence of application, and curing times.
    b. Identify potential sources of odor and dust.
    c. Identify construction activities likely to produce odor or dust.
    d. Identify areas of project potentially affected, especially occupied areas.
    e. Evaluate potential problems by severity and describe methods of control.
    f. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent Heating HVAC systems, types of filters and schedule for replacement of filters.
    g. Describe cleaning and dust control procedures.

2. Procedures for moisture control during construction.

    a. Identify porous materials and absorptive materials.
    b. Identify schedule for inspection of stored and installed porous and absorptive materials.

3. Revise and resubmit Plan as required by Contracting Officer.

    a. Approval of Contractor’s Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Product Data:

1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
2. Material Safety Data Sheets (MSDS): Submit MSDSs for inclusion in Operation and Maintenance Manual for:

a. Adhesives
b. Floor and wall patching/leveling materials
c. Caulking and sealants
d. Insulating materials
e. Fireproofing and firestopping
f. Carpet
g. Paint
h. Clear finish for wood surfaces
i. Lubricants
j. Cleaning products

C. Inspection and Test Reports:

1. Moisture control inspections
2. Moisture content testing
3. Moisture penetration testing
4. Microbial Growth testing

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

A. During construction operations, follow the recommendations in Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction.

B. HVAC Protection:

1. Seal return registers during construction operations.
2. Provide temporary exhaust during construction operations.
3. To greatest extent possible, isolate and/or shut down return side of HVAC system during construction. When ventilation system must be operational during construction activities, provide temporary filters at air inlets (returns) and at locations for filters prescribed in the design.
4. Contractor shall bear cost of cleaning required due to failure to protect ducts and equipment from construction dust.

C. Source Control: Provide low and zero VOC materials as specified.

D. Pathway Interruption: Isolate areas of work to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.

E. Housekeeping: During construction, maintain project and building products and systems to prevent contamination of building spaces.

F. Temporary Ventilation: For materials/products that generally require ventilation for off gassing, provide an ACH (air changes per hour) of 1.5 or more and as follows:

1. Provide minimum 48-hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees Fahrenheit minimum to 90-degree Fahrenheit maximum continuously during ventilation period. Do not ventilate within limits of Work unless otherwise approved by Contracting Officer.
2. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
3. Provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE 52.2 during construction. Coordinate with HVAC work.

G. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.

H. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cubic feet. of outdoor air per square feet of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and relative humidity no higher than 60%.

1. Obtain Contracting Officers concurrence that construction is complete enough before beginning flush-out.
2. If additional construction involving materials that produce particulates or any of specified contaminants is conducted during or after flush-out, then flush-out process must be restarted.
3. Install new HVAC filtration media in locations identified to have permanent filtration in contract documents after completion of flush-out and before occupancy or further testing.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

A. Housekeeping:

1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
2. Verify installed materials and products are dry prior to sealing and weatherproofing building envelope.
3. Store interior absorptive materials only after building envelope is sealed and weatherproofed.

B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.

1. Examine materials for dampness as they arrive. If acceptable to Contracting Officer, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.

3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly and after each rain event.

    a. If stored or installed absorptive materials become wet, notify Contracting Officer. Inspect for damage. If acceptable to the Contracting Officer, dry completely prior to closing in assemblies; otherwise, remove (in accordance with the Waste Management Plan) and replace with new materials.

4. Basement: Monitor basement and crawlspace humidity and dehumidify when relative humidity is greater than 70 percent for more than 2 weeks or at first sign of mold growth.
5. Site drainage: Verify final grades of site work and landscaping drain surface water and ground water away from building.
6. Weatherproofing: Inspect moisture control materials as they are being installed. Include:

    a. Air barrier: Verify air barrier is installed without punctures and/or other damage. Verify air barrier is sealed completely.
    b. Flashing: Verify correct shingling of flashing for roof, walls, windows, doors, and other penetrations.
    c. Vapor Barrier: Verify vapor barrier is installed in accordance with Contract documents.
    d. Insulation layer: Verify insulation is installed without voids.
    e. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair.

7. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
8. HVAC: Inspect HVAC system to verify:

    a. condensate pans are sloped and plumbed correctly;
    b. access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils;
    c. ductwork and return plenums are air sealed;
    d. duct insulation is installed and sealed; and
    e. chilled water line and refrigerant line insulation are installed and sealed.

C. Schedule:

1. Schedule work such that absorptive materials, such as porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air barriers, flashing, exterior sealants and roofing, at earliest possible time.

D. Testing for Moisture Content: Test moisture content of porous materials and absorptive materials to ensure they are dry before sealing them into an assembly. Document and report results of testing. Where tests are not satisfactory, dry materials and retest. If satisfactory results cannot be obtained with retest, remove and replace with new materials.

1. Concrete: Moisture test as per one or more of the following; unless otherwise indicated, acceptable upper limits for concrete are < 4% top inch; < 85% headspace relative humidity (RH); <3 pounds per 1000 square feet per day:

    a. ASTM D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
    b. ASTM F1869 Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
    c. ASTM F2170 Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes

2. Wood: Moisture test as per ASTM D4444 - Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters; unless otherwise indicated acceptable upper limits for wood products are less than 20% at center of piece; less than 15% at surface.

E. Testing for Moisture Penetration:

1. Windows: Test as per ASTM E1105 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; unless otherwise indicated, acceptable upper limits are no leakage for 15 minutes.
2. Horizontal Waterproofing (not roofing): Test as per ASTM D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations; acceptable upper limits are no leakage for 15 minutes.
3. Masonry: Test as per ASTM C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces; acceptable upper limits are no leakage for 15 minutes.
4. Exterior Walls:

    a. Air tightness of the enclosure test: ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization or ASTM E1827 Standard Test Methods for Determining Air tightness of Buildings Using an Orifice Blower Door; acceptable upper limits are 0.25 CFM/sf or less at 50 Pascal's.
    b. Water Leakage: Review as per ASTM E2128 Standard Guide for Evaluating Water Leakage of Building Walls.

END OF SECTION 01 57 19.11

SECTION 01 57 19.12 – NOISE AND ACCOUSTICS MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Special requirements for noise and acoustics management during construction operations.

1.2 DEFINITIONS

A. Ambient noise level: The total noise associated with a given environment, being usually a composite of normal or existing sounds from all sources near and far, excluding the noise source at issue.

B. Daytime: The hours from 7 A.M. to 9 P.M. on weekdays and 9 A.M. to 9 P.M. on weekends and holidays.

C. Nighttime: All non-daytime hours.

D. Property line: The real or imaginary line along the ground surface and its vertical extension, which separates real property owned or controlled by one person from contiguous real property owned or controlled by another person or from any public right-of-way or from any public space.

E. Receiving noise area: Any real property where people live or work and where noise is heard, excluding the project or source area.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 NOISE MANGEMENT

A. Noise Control: Perform construction operations to minimize noise. Perform noise-producing work in less sensitive hours of the day or week as directed by the Contracting Officer.

B. Repetitive and/or intermittent, high-level noise: Permitted only during Daytime.

1. Do not exceed the following dB(A) limitations at 50 feet:

Sound Level in dB(A)	Time Duration of Impact Noise
70	More than 12 minutes in any hour
80	More than 3 minutes in any hour

2. Maximum permissible construction equipment noise levels at 50 feet:

EARTHMOVING	dB(A)	MATERIALS HANDLING	dB(A)
Front Loaders	75	Concrete Mixers	75
Backhoes	75	Concrete Pumps	75
Dozers	75	Cranes	75
Tractors	75	Derricks Impact	75
Scrapers	80	Pile Drivers	95
Graders	75	Jack Hammers	75
Trucks	75	Rock Drills	80
Pavers, Stationary	80	Pneumatic Tools	80
Pumps	75	Saws	75
Generators	75	Vibrators	75
Compressors	75		

C. Ambient Noise:

1. Maximum noise levels (dB (decibel)) for receiving noise area at the limits of construction shall be as follows:

a. Residential receiving area
Daytime: 65 dB
Nighttime: 45 dB

b. Commercial/Industrial receiving area
Daytime: 67 dB
Nighttime: 65 dB

c. In the event the existing local ambient noise level exceeds the maximum allowable receiving noise level (dB), the receiving noise level maximum for construction operations shall be adjusted as follows:

d. Residential receiving area: Maximum 3 additional dB above the local ambient as measured at property line.

e. Commercial/Industrial receiving area: Maximum 5 additional dB above the local ambient as measured at the property line.

3.2 FIELD QUALITY CONTROL

A. Assess potential effects of construction noise on adjacent neighbors and facility occupants in accordance with ASTM E1686 and as follows:

1. Ambient noise measurement: Measure at property line at a height of at least four (4) feet above the immediate surrounding surface. Average the ambient noise level over a period of at least 15 minutes.

2. Ambient noise measurement at urban sites: Conduct during morning peak traffic hour between 7 A.M. and 9 A.M. and afternoon peak traffic hour between 4 P.M. and 6 P.M. In addition, conduct a 24-hour measurement at the proposed project site to document the noise pattern throughout the day. Adjust and weight for seasonal and climatic variations.

B. Monitor noise produced from construction operations in accordance with ASTM E1780.

END OF SECTION 01 57 19.12

SECTION 01 57 23 - TEMPORARY STORM WATER POLLUTION PREVENTION

PART 1 - GENERAL

1.1 SUMMARY

A. Federal Regulations for controlling discharges of pollutants (including chemicals, erodible material, and trash) from municipal separate storm sewer systems, construction sites, and industrial activities, were brought under the National Pollution Discharge Elimination System (NPDES) permit process by amendments to the Clean Water Act (CWA), and promulgation of federal stormwater regulations issued by the United States Environmental Protection Agency (USEPA). The USEPA uses amount of ground disturbance as a measure of a project potential to generate pollution from erosion. The USEPA is the regulatory authority for the CWA in Yellowstone National Park. Construction disturbances 1 acre and above require coverage under the USEPA Construction General Permit or equivalent permit to include both construction storm water management and construction dewatering activities, and development of a formal Stormwater Pollution Prevention Plan (SWPPP). The Contractor will be responsible for completing and submitting the Notice of Intent (NOI) and preparation of the SWPPP.

B. The Contractor shall also adhere to all construction stormwater, SWPPP and NPDES permitting requirements for the States of Wyoming (at Canyon and Mammoth Government Areas) and Montana (at Northeast Entrance Government Areas). The Contractor shall submit the NOI and SWPPP to the Wyoming and Montana Departments of Environmental Quality in addition to the USEPA.

C. National Park Service (NPS) Standards and Guidelines require water quality be protected to ensure compliance with Organic Act. Contractor shall prepare an Under-An-Acre Pollution Prevention Plan (UPPP) for each project resulting in less than 1 acre of soil disturbance or not otherwise subject to requirements of NPDES program. (UPPP Guideline)

D. The work of this section consists of implementing measures to prevent discharges of pollutants, including temporary storm water pollution during construction activities, either through compliance with NPDES permit program, or in conformance with NPS guidance for UPPPs. It is anticipated that disturbance associated with this project will be greater than one (1) acre and less than 5 acres and NPDES permit requirements will apply.

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 utility of the environment for aesthetic, cultural, or historical purposes.

C. National Pollution Discharge Elimination System (NPDES) Phase I: Regulates discharges from construction sites that disturb 5 acres or more.

D. NPDES Phase II: Regulations expand existing General Permit requirements under Phase I to include and regulate discharges from construction sites that disturb land equal to or greater than one (1) acre and less than 5 acres, known as Small Construction Activity.

E. Storm Water Pollution Prevention Plan (SWPPP): Developed and implemented stormwater management measures to protect surface water from pollutants during construction activities disturbing an acre or more in compliance with federal, state, and local requirements for permit approval under NPDES program.

F. Under-an-Acre Pollution Prevention Plan (UPPP): Developed and implemented pollution prevention plan (including stormwater management measures, if needed) to protect environment from pollutants on construction projects with less than one acre of disturbance in conformance with NPS guidelines.

1.3 SUBMITTALS

A. After contract award and before pre-construction conference, prepare and submit:
   1. A SWPPP that satisfies Federal and State NPDES permit requirements.

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

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

1.4 QUALITY ASSURANCE

A. Contractor shall prepare and submit a quality assurance plan to Contracting Officer for review and concurrence.

B. Orientation Meeting: Contractor shall arrange and conduct an Erosion and Sediment Control meeting/briefing to inform parties, scheduled to be on-site during project, of measures to be implemented for proper erosion and sediment control (may be included as part of Pre-Construction Meeting).

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

C. Pollution Prevention and Erosion Control Manager: Contractor shall designate Pollution Prevention and Erosion Control Manager responsible for implementation, inspection, maintenance, and amendments to approved plan.

1. Pollution Prevention and Erosion Control Manager shall be familiar with temporary storm water pollution prevention procedures and Best Management Practices and ensure emergency procedures and plan are updated as needed and available for inspection.

2. When changes in approved plan are required, Pollution Prevention and Erosion Control Manager shall prepare and certify an amendment and submit to Contracting Officer for review and concurrence.

PART 2 - PRODUCTS

2.1 UNDER-AN-ACRE POLLUTION PREVENTION PLAN (NOT USED)

2.2 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

A. Provide SWPPP which satisfies Federal and State NPDES permit requirements and includes:

1. All Site Operators. Include a list of all other operators who will be engaged in construction activities at the Site, and the areas of the Site over which each operator has control.
2. Stormwater Team.
3. Nature of Construction Activities.
4. Site description and map.
5. Identification and contract information for Pollution Prevention and Erosion Control Manager.
6. Expected sequencing of operations and construction schedule.
7. Weather monitoring procedure.
8. Descriptions and details Best Management Practices for pollution prevention and erosion controls, including dust control.
    a. Natural buffers and/or equivalent sediment controls.
    b. Perimeter controls for a “linear construction site”
    c. Sediment track-out controls.
    d. Inlet protection measures.
    e. Sediment basins.
    f. Treatment chemicals.
    g. Stabilization measures.
    h. Spill prevention and response procedures.
    i. Waste management procedures.
    j. Application of fertilizers.
9. Pollution prevention and erosion control plans.
10. Controls for other potential onsite storm water pollutants.
11. Applicable specifications.
12. Maintenance and inspection procedures and forms.
13. Description of potential non-storm water discharges at site.
14. Notice of Intent (NOI) form.
15. Notice of Termination (NOT) form.
16. Contractor and Sub-contractor Certification forms.
17. Other record keeping forms and procedures.
18. Procedures for inspection, maintenance and corrective action.

19. Procedures for Turbidity Benchmark Monitoring from Dewatering Discharges (if applicable).
20. 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 natural resources within project boundaries and outside limits of work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by Contracting Officer.

B. Construction Zone: Arrange construction activities to minimize pollution (i.e., erosion, trash, etc.) to maximum practical extent.

1. Clearing, excavation, and grading shall be limited to those areas of project site necessary for construction. Minimize area exposed and unprotected.
2. Clearly mark and delineate limits of work activities.
3. Equipment shall not be allowed to operate outside limits of work or to disturb existing vegetation.
4. Excavation and grading shall be completed during dry season to maximum extent possible.
5. Material shall be stored away from locations where water is present to greatest extent practicable.

3.2 REGULATORY REQUIREMENTS

A. Permits: Contractor shall obtain required NPDES permits resulting in no impacts to scheduled work. Contractor shall account for possibility of significant lead time in scheduling and executing work.

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

B. Notice of Intent (NOI): Contractor shall file a Notice of Intent and formal SWPPP as required to the Agency(ies) with Jurisdiction.

C. Notice of Termination (NOT): After Substantial Completion of Work, file a Notice of Termination (NOT) with the Agency(ies) with Jurisdiction.

D. Contracting Officer Notification: Contractor shall notify Contracting Officer in writing and by telephone of these events:

1. 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 sediment control structures.

3.3 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

A. Review and Acceptance: Contractor and Contracting Officer will jointly review draft SWPPP and agree to needed revisions. Contractor shall incorporate revisions, sign, and submit final SWPPP to Contracting Officer. Final SWPPP will be the document enforced on the project.

1. Accepted SWPPP will describe and ensure implementation of practices to be used to reduce pollutants in storm water discharges.
2. Contractor shall maintain current copy of SWPPP and associated records and forms at job site throughout duration of project.
3. SWPPP shall be available for public inspection and inspection and use of Contracting Officer.
4. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.

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

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

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

3.4 UNDER AN ACRE POLLUTION PREVENTION PLAN (NOT USED)

3.5 SITE INSPECTIONS AND PLAN REVISIONS

A. Inspections: Contractor and Contracting Officer will perform a weekly inspection onsite.

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

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

1. Plan shall specify mechanism whereby revisions may be proposed by Contractor or Contracting Officer.

2. Contractor and Contracting Officer will jointly review each revision to Plan before changes incorporated and implemented. Contractor will then provide revised copy of Plan to Contracting Officer.
3. Accepted modifications will be implemented within 7 calendar days following date of 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 Government.

3.6 HOUSEKEEPING AND SITE MANAGEMENT

A. Store materials onsite in conformance to Federal, state, local, and manufacturer's regulations and specifications. Use Best Management Practices to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.

B. Manage solid waste in conformance to Federal, state, and local regulations. Best Management Practices should be used to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.

C. Include a spill prevention and control plan with provisions placed in SWPPP.

D. Manage hazardous waste (including contaminated soil) in conformance to Federal, state, local and NPS regulations and guidelines.

3.7 EROSION CONTROL MEASURES

A. Erosion control measures shall consist of Best Management Practices for storm water discharges, including silt fencing, barrier protectors, coconut husk wattles, temporary soil retention blankets, excelsior drainage filters, sediment traps and berms.

B. Berms and excelsior drainage filters shall be used to form sediment traps and control run-on and run-off into other areas, including creeks, streams, marshes, access roads, well areas, and staging areas.

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

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

E. Reduce runoff velocity and direct surface runoff around and away from fuel containment, storage, and borrow areas.

F. Divert surface runoff around and away from cut and fill slopes.

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

H. Excess water used for dust control shall be contained within demolition areas by erosion control measures.

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

J. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent erosion as described in approved SWPPP.

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

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. Contractor shall remove entrapped sediment from behind excelsior drainage filter after each storm.

3.9 REPORTING

A. If a discharge occurs or if project receives written notice or order from regulatory agency, Contractor shall immediately notify Contracting Officer and shall file written report to Agency(ies) with Jurisdiction within 7 days of discharge event, notice, or order. Corrective measures shall be implemented immediately following discharge, notice, or order. The report to the Agency(ies) with Jurisdiction shall contain:

1. Date, time, location, nature of operation, and type of discharge, including cause or nature of notice or order.
2. Best Management Practices deployed before discharge event, or prior to receiving notice or order.
3. Date of deployment and type of Best Management Practices deployed after discharge event, or after receiving notice or order, including additional Best Management Practices installed or planned to reduce or prevent re-occurrence.
4. An implementation and maintenance schedule for affected Best Management Practices.

3.10 SEDIMENT DISPOSAL

A. Sediment excavated from temporary sediment control structures shall be disposed on site with general fill, or with topsoil. Sediment shall be allowed to dry out as required before reuse.

B. Contractor shall place 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.

3.11 REMOVAL OF UNDER-AN-ACRE POLLUTION CONTROL MEASURES (NOT USED)

3.12 REMOVAL OF TEMPORARY STORM WATER POLLUTION CONTROL MEASURES

A. Temporary control measures shall be removed with permission of Contracting Officer within 20 working days after final acceptance of project, and/or once grading is complete and slopes have stabilized. NPDES permit requirements must also be met in regard to removal of temporary control measures.

END OF SECTION 01 57 23

SECTION 01 67 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in 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 Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number and other designation shown or listed in manufacturer's published product literature, current as of date of Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility**,** except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Approved Equals: Product demonstrated and approved through submittal process, or where indicated as a product substitution, to have 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. Definitions pertaining to sustainable development: As defined in ASTM E2114.

C. Biobased Materials: As defined in 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) 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: Amount of biobased carbon in material or product as a percentage of weight (mass) of total organic carbon in material or product.

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

E. Environmentally preferable products: Products and services with lesser or reduced effect on the environment in comparison to conventional products and services. Refer to Environmental Protection Agency's (EPA) Final Guidance on Environmentally Preferable Purchasing for more information.

F. Stewardship: Responsible use and management of resources.

G. Maintenance of ecosystem components and functions for future generations.

1. Recycled Content Materials: Products containing pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with International Organization for Standardization (ISO) 140001 Standard for the Use of Environmental Marketing Claims.
2. Rapidly Renewable Material: Material made from plants typically harvested within a ten-year cycle.
3. Regional Materials: Materials manufactured and extracted, harvested, or recovered within a radius of 500 miles from Project location.

1.3 SUBMITTALS

A. Record Submittals as specified in Section 01 77 00 Close-Out Procedures, submit:

1. Affirmative Procurement Reporting Form. Submit on form in Appendix A of this Section, or similar form as approved by Contracting Officer.
2. Submit environmental data in accordance with Table 1 of ASTM E2129 for these products:

a. Masonry
b. Finish Carpentry
c. Plastic Fabrications
d. Building Insulation
e. Roofing
f. Joint Sealers
g. Wood & Plastic Doors
h. Windows
i. Skylights
j. Glazed Curtain Wall
k. Gypsum Board
l. Tile
m. Acoustical Ceilings
n. Resilient Flooring
o. Carpet
p. Wall Coverings
q. Paints & Coatings
r. Toilet Compartments
s. Loading Dock Equipment
t. Office Equipment
u. Furnishings & Accessories
v. Renewable Energy Equipment
w. Plumbing fixtures and equipment.
x. HVAC equipment

y. Lighting equipment

3. Material Safety Data Sheets (MSDS): For each product required by OSHA to have an MSDS, submit an MSDS. MSDS shall be prepared within the previous five years. Include information for MSDS Sections 1 to 16 in accordance with ANSI Z400.1 and as follows:

a. Section 1: Chemical Product and Company Identification
b. Section 2: Composition/Information on Ingredients
c. Section 3: Hazards Identification
d. Section 4: First Aid Measures
e. Section 5: Fire Fighting Measures
f. Section 6: Accidental Release Measures
g. Section 7: Handling and Storage
h. Section 8: Exposure Controls/Person Protection
i. Section 9: Physical and Chemical Properties
j. Section 10: Stability and Reactivity Data
k. Section 11: Toxicological Information. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects. Provide written description of the process used in evaluating chemical hazards relative to preparation of the MSDS.
l. Section 12: Ecological Information. Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in event of accidental release.
m. Section 13: Disposal Considerations. Include data regarding proper disposal of the chemical. Include information regarding recycling and reuse. Indicate whether or not product is considered to be "hazardous waste" according to United States EPA Hazardous Waste Regulations 40 CFR 261 (Code of Federal Regulations).
n. Section 14: Transportation Information. Identify hazard class for shipping.
o. Section 15: Regulatory Information. Identify federal, state, and local regulations applicable to the material.
p. Section 16: Other Information. Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts. Identify the date MSDS was prepared.

4. Chain of Custody: Submit chain-of-custody documentation for sustainable forestry for these products:

a. Rough Carpentry
b. Finish Carpentry
c. Wood Doors
d. Windows
e. Wood Flooring
f. Furnishings & Accessories

1.4 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.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that 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 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 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 Contract Documents. Ensure products are undamaged and properly protected.
5. Obtain materials in biodegradable or recyclable/reusable packaging which uses minimum amount of packaging possible.

C. Storage:

1. Allow for inspection and measurement of quantity or counting of units.
2. Store materials in manner to not endanger Project structure.
3. Store products subject to damage by the elements, under cover in 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 well-drained area on solid surfaces to prevent mixing with foreign matter.

1.6 PACKAGING

A. Where Contractor has option to provide one of 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.

C. Provide minimum 45 percent post-consumer recycled content and minimum 100 percent recovered fiber content of industrial paperboard in accordance with EPA’s Comprehensive Procurement Guidelines and ASTM D5663.

D. Provide minimum 10 percent post-consumer recycled content and minimum 10 percent recovered fiber content of carrier board in accordance with EPA’s Comprehensive Procurement Guidelines and ASTM D5663.

E. Provide minimum 5 percent post-consumer recycled content and minimum 5 percent recovered fiber content of brown papers (e.g., wrapping papers and bags) in accordance with EPA's Comprehensive Procurement Guidelines and ASTM D5663.

1.7 ENVIRONMENTALLY PREFERABLE PRODUCTS

A. Provide environmentally preferable products to greatest extent possible.

1. To greatest extent possible, provide products and materials with 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 use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either Montreal Protocol and Title VI or 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 one-half of the pre-consumer content constitutes at least 10% (based on cost) of total value of the materials in project.

1.8 PRODUCT WARRANTIES

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

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for product specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare written document containing appropriate terms and identification, ready for execution. Submit draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with Specifications, prepare written document using appropriate form properly executed.
3. Refer to Divisions 2 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products to comply with Contract Documents, undamaged and, unless otherwise indicated, 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 produced and used successfully in similar situations on other projects.
3. Government reserves right to limit selection to products with warranties not in conflict with requirements of Contract Documents.
4. Where products are accompanied by term "as selected," Contracting Officer will make selection.
5. Where products are accompanied by term "match sample," sample to be matched is Governments.
6. Descriptive, performance, and reference standard requirements in Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name single product and manufacturer, provide named product that complies with requirements or approved equal.
2. Manufacturer/Source: Where Specifications name single manufacturer or source, provide product by named manufacturer or source that complies with requirements or approved equal.
3. Products: Where Specifications include 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 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 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 "Products" Articles for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include 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 "Products" Articles for consideration of an unnamed product.
7. Product Options: Where Specifications indicate sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide specified product, system, or approved equal.
8. Visual Matching Specification: Where Specifications require matching an established Sample, select product that complies with requirements and matches Architect's sample. Contracting Officer’s decision will be final on whether a proposed product matches.

a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

9. Visual Selection Specification: Where Specifications include phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

a. Standard Range: Where Specifications include phrase "standard range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
b. Full Range: Where Specifications include phrase "full range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 APPROVED EQUAL PRODUCTS

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

1. Evidence proposed product does not require revisions to Contract Documents, that it is consistent with Contract Documents and will produce indicated results and is compatible with other portions of Work.
2. Detailed comparison of significant qualities of proposed product with those named in Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence 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.

3.2 SUPPLEMENT

A. The supplement listed below, following “End of Section,” is a part of this specification:
1. Affirmative Procurement Reporting Form.

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 with recycled content Pre-consumer	Total $ value with recycled content Post-consumer	Total $ value with 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 with fly ash						
Concrete with slag cement						
Concrete with low cement content						
Plastic lumber						
Building Insulation						
Rock Wool						
Fiber glass						
Cellulose						
Perlite Comp Board						
Plastic Rigid Foam						
Glass Fiber Reinforced Foam						
Phenolic Rigid Foam						
Ceramic tile						
Resilient flooring						
Floor Tiles/Rubber						
Floor Tiles/Plastic						
Running Tracks						
Carpet (PET)						
Paint						

Reprocessed Latex Paint White & Light Colors						
Reprocessed Latex Dark Colors						
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 71 13 - MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.1 SUMMARY

A. Mobilization

1. Mobilization shall include obtaining necessary permits; moving onto the site of all material and equipment; in-person inspections, and furnishing and erecting plants, temporary buildings, and other construction facilities, as required for the completion of the Work.

2. Contractor shall be aware of recent gravel pit inspections and only source material from locations that are listed as “PASSED”. Refer to the enclosed 2024-2025 Gravel Pit Inspections for Yellowstone National Park at the end of this section.

3. Mobilization shall include but not be limited to the following items:

   a. Moving on to the site all plant and equipment required.

   b. In-person inspections are required of any construction or maintenance equipment brought into Yellowstone National Park to perform off-road work. Refer to the enclosed 2024 Equipment Inspection Contact List at the end of this section.

   c. Installing temporary construction utilities and communications devices.

   d. Providing storage and staging facilities.

   e. Obtaining all required permits.

   f. Posting all OSHA required notices and establishment of safety programs.

B. Demobilization

1. Demobilization shall include moving off the site of all plant equipment, and surplus materials, grading and dressing of the Contractor’s equipment yard(s), final cleanup and all other project closeout items including all items referenced in Section 01 77 00 - Project Closeout.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EQUIPMENT CLEANING

A. All equipment mobilized to the site shall be thoroughly cleaned and decontaminated prior to mobilization. Cleaning shall completely remove all soil or plant residue from equipment. Equipment shall be thoroughly decontaminated to prevent transmission of invasive species. Cleaning shall be completed at no additional costs.

B. Contractor shall notify Contracting Officer at least 24-hours in advance of mobilization of new equipment to the site. Contracting Officer shall be granted the ability inspect equipment in lay-down areas. Any equipment which, in the opinion of the Contracting Officer, has not be sufficiently decontaminated will be denied access to the site until complete decontamination is complete.

3.2 SUPPLEMENT

A. The supplements listed below, following “End of Section,” are a part of this specification. Prior to the start of Construction, the Contractor shall verify with the Contracting Officer whether there have been any updates to these supplements:
   1. 2024-2025 Gravel Pit Inspections for Yellowstone National Park
   2. 2024 Equipment Inspection Contact List

2024 Equipment Inspection Contact List

(Yellowstone National Park – Resource Management Program)

In-person inspections are required of any construction or maintenance equipment brought into Yellowstone to perform off-road work. This does not include delivery vehicles transporting supplies unless delivery of these items requires off-road travel. The purpose of these inspections is to ensure equipment is clean and free of any plant debris or dirt, which has the potential to carry invasive plant material and seeds. Please ensure contractors, sub-contractors and equipment delivery personnel are aware of the need to have all equipment power-washed and completely free of dirt prior to arriving at any Yellowstone entrance for inspection.

Important: 24 HOUR NOTICE REQUIRED FOR ALL INSPECTIONS

Inspection personnel available Monday – Thursday, 7am-5pm ONLY

Please reach out to Primary contact first. If no response within 24 hrs, contact secondary.

Entering at **West Yellowstone/West Entrance:**

1) Vincent Nagashima
2) Alison Wright (not available Dec-March)

Entering at **Gardiner/North Entrance** or **Cooke City-Silver Gate/Northeast Entrance**

1) Pamela Schaefer
2) Vincent Nagashima

Entering at **Cody/East Entrance** or **Grand Teton NP/South Entrance**

1) Vincent Nagashima
2) Zach Cardosi (not available Dec-March)

Alternative Contact for all Entrances if primary/secondary not reached: Steven Bekedam

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Vincent Nagashima
Office: (307) 344-2603
Cell: (406) 595-0414
vincent_nagashima@nps.gov

Pamela Schaefer
Office: (307) 344-2653
Cell: (307) 250-5550
pamela_schaefer@nps.gov

Zach Cardosi
Office: (307) 344-2601
Cell: (815) 549-3139
zachary_cardosi@nps.gov

Alison Wright
Office: (307) 344-2802
Cell: (307) 250-3873
alison_wright@nps.gov

Steven Bekedam
Cell: (541)-760-7289
steven_bekedam@nps.gov

For Heavy Equipment/Oversized Load/Travel Regulations:

Yellowstone Visitor Services Office: (307)-344-2107

Yellowstone National Park 2024-2025 Gravel Pit Inspections							
Pit Name (operator)	**County/State**	**Location**	**Contact**	**2023-2024 Status**	**2024-2025**	**Inspected By** (contact for info)	**Expiration Date**
Fisher Livingston Pit (Fisher Sand and Gravel), permit #1268	Park / MT	91 Swingley Rd., Livingston, MT.	406-220-2305	PASSED	PASSED	Pam Schaefer (307) 250-5550	10/1/25
Durgan Pit (Durgan Rock Pile), permit # 3525	Park / MT	167 Pine Creek Rd. Livingston, MT	406-222-0525	Not inspected, contact Pam Schaefer for approval	Not inspected, contact Pam Schaefer for approval	Pam Schaefer (307) 250-5550	expired, contact P. Schaefer for approval
Alaska Pit (Knife River), permit #1412	Gallatin/MT	21730 Frontage Rd. Belgrade, MT 59714 (office location)	406-388-6832 Leo.zwemke@kniferiver	PASSED	PASSED	Pam Schaefer (307) 250-5550	10/1/25
Belgrade Pit (Knife River), permit # 1982	Gallatin/MT	21730 Frontage Rd. Belgrade, MT 59714	406-388-6832 Leo.zwemke@kniferiver	PASSED	PASSED	Pam Schaefer (307) 250-5550	10/1/25
Pipestone Quarry	Jefferson/MT	1 Delmoe Lake Road Whitehall, MT 59759	Bart Baumeister; 406-287-9153 406-498-0614 cell	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Willow Creek Pit (HK)	Bonneville/ ID	1523 East 49th North, Idaho Falls, ID 83401	208-270-1970	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Tower Pit (HK)	Bonneville / ID	7185 N 5th E Idaho Falls, ID 83401	208-523-6600	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Teton Pit (HK)	Fremont / ID	110 N. 2300 East Sugar City, ID 83405	208-270-1970	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Ashcraft Pit (HK)	Freemont/ID	210 N 2200 East St. Anthony, ID 83445; HK Office: 6350 S Yellowstone HWY, Idaho Falls, ID	208-270-1970	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Knife River Big Sky Pit	Gallatin / MT	Hwy 191, Big Sky, MT	406-388-6832	Not Inspected	Not Inspected	Vincent Nagashima (406) 595-0414	N/A
Spanish Peaks Pit (RCI Properties) permit # 3585	Gallatin/MT	1 Mile S of I-90 on E side of Alaska Rd S near Belgrade, MT.	Dwayne Rehbein: (406) 721-9267 dkrehbein@riversidecontracting.com	Not Inspected	PASSED	Pam Schaefer (307) 250-5550	10/1/25
Red Pole (North Fork Pit) (WY Dept of Transportation)	Park/WY	Across Hwy from North Fork Campground, Buffalo Bill State Park. West end of Buffalo Bill Reservoir; North of highway	307-568-3400	PASSED	FAILED	Vincent Nagashima (406) 595-0414	10/1/25
City of Cody Pit (Park County)	Park/ WY	Behind Stampede Rodeo Grounds, West end of the City of Cody, WY	307-587-2958	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Cody North Pit (Park County, WY)	Park / WY	Cody, WY 82414	307-527-8520	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Cody Stampede	Park / WY	41 Sunset Rim Cody, WY 82414	307-587-5155 307-587-4450	FAILED	FAILED	Vincent Nagashima (406) 595-0414	N/A

Hendricks Pit (Sunroc/Depatco)	Freemont/ ID	2287 East 200 North St. Anthony, ID 83445	208-458-4000	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Ashcraft Pit (Sunroc/Depatco)	Freemont/ID	2015 East 200 N St. Anthony, ID 83445	208-458-4000	PASSED	Not Inspected	Vincent Nagashima (406) 595-0414	N/A
Alota Sand and Gravel	Lincoln/WY	501 County Rd 101 Alpine, WY 83128	307-654-7558	Not Inspected	Not Inspected	Vincent Nagashima (406) 595-0414	N/A
Park County Redi-Mix (Croell Aggregates; Croell Inc.)	Park/WY	105 Rd 2AB Cody, WY 82414	307-899-5858	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Harris Pit (Croell Aggregates; Croell Inc.)	Park/WY	16 Rd 2BC Cody, WY 82414	307-899-5858	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Cody Lumber Pit/Redimix Pit (Bighorn Redimix/Canyon Concrete)	Park/ WY	North Hwy 120, north of Shone River Bridge, top of hill, right side of road	307-899-2992	PASSED	PASSED	Vincent Nagashima (406) 595-0414	10/1/25
Clark Pit #1 (Theil Construction/Little Rock Inc.)	Park/WY	PO Box 59 Meeteetse, WY 82433	307-868-9202 307-272-8837	PASSED	Not Inspected; contact Vincent for approval	Vincent Nagashima (406) 595-0414	N/A
Luckinbill Pit (Nicholson Dirt Contracting)	Park/WY	3747 Hwy 296 Cody, WY 82414	307-278-1278	PASSED	Not Inspected; contact Vincent for approval	Vincent Nagashima (406) 595-0414	N/A

If you had questions regarding gravel pit inspections or are seeking certification for a supplier not listed please contact:

Steven Bekedam
Supervisory Vegetation Specialist
steven_bekedam@nps.gov
cell: (541) 760-7289

Vincent Nagashima
District Vegetation Biologist
(Madison/ Lake and West Districts)
vincent_nagashima@nps.gov
cell: (406) 595-0414
office: 307-344-2603

Pam Schaefer
District Vegetation Biologist
(Mammoth/North District)
pamela_schaefer@nps.gov
cell: (307) 250-5550

SECTION 01 73 40 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general procedural requirements governing execution of Work including:

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

1.2 SUBMITTALS

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

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

C. Certified As-Built Surveys: Submit two copies signed by land surveyor.

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

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: Professional land surveyor legally qualified to practice in the States of Wyoming and Montana and is experienced in providing land-surveying services of kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: Existence and location of site improvements and other construction indicated as existing are not guaranteed.

1. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

2. Before construction, verify the location and points of connection of utility services.

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

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

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 COORDINATION WITH UTILITY SERVICE PROVIDERS

A. Coordination with Utility Service Providers: Contact following Utility Service providers, sufficiently in advance to avoid delaying the work, to coordinate Contractor’s portion of Work, testing requirements, inspections, etc.

1. Electrical: Service Contact: Contact Northwestern Energy (Canyon and Mammoth) and Flathead Energy (Northeast Entrance) to coordinate Electrical service requirements.

a. Contractor Responsibilities: Contractor is responsible for obtaining temporary construction power and coordinating temporary disruptions in power supply to affected customers.

2. Water Service Contact: Contact Park utilities staff to coordinate Water service requirements.

    a. Contractor Responsibilities: Contractor is responsible for coordinating construction water needs and minimizing disruptions to affected customers.

3. Wastewater Service Contact: Contact Park utilities staff to coordinate Wastewater service requirements.

    a. Contractor Responsibilities: Contractor is responsible for providing sanitary services for construction services.

4. Telephone and Internet Service Contact: Contact Centurylink as appropriate to coordinate Telephone and Internet service requirements.

    a. Contractor Responsibilities: Contractor is responsible for temporary phone and internet service for construction use.

3.3 PREPARATION

A. Field Measurements: Take field measurements as required to fit Work properly. Recheck measurements before installing each product. Where portions of Work are indicated fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying 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 need for clarification of the Contract Documents caused by differing field conditions outside control of Contractor, submit request for information to Contracting Officer in accordance with Section 01 31 00 "Project Management and Coordination."

3.4 CONSTRUCTION LAYOUT

A. Verification: Verify layout information shown on Drawings, in relation to the existing benchmarks before proceeding to lay out Work. Notify Contracting Officer promptly if discrepancies are discovered.

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

1. Establish benchmarks and control points to set lines and levels at each story 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 location, level and plumb, of every major element as Work progresses.
5. Notify Contracting Officer 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. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain 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 log available for review by National Park Service (NPS).

3.5 FIELD ENGINEERING

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

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

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks at each Project site (a minimum of two benchmarks each shall be established at Canyon, Mammoth and Northeast Government Areas), 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.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.6 INSTALLATION

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

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise 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 for 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 in excess of 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 parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Contracting Officer.
2. Allow for building movement, thermal expansion, and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors to be embedded in concrete or masonry. Deliver to Project site in time for installation.

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

I. Hazardous Materials: Use products, cleaners, and installation materials not considered hazardous.

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

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

3.7 PROGRESS CLEANING

A. General: Clean Project site, work areas, and common areas daily. 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 National Fire Protection Association (NFPA) 241 for removal of combustible waste materials and debris at the end of every work session.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degrees Fahrenheit.
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 level of cleanliness necessary for proper execution of Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of Work, broom-clean or vacuum 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 not hazardous to health or property and will not damage exposed surfaces.

1. Utilize non-toxic cleaning materials and methods.

a. Comply with Green Seal Standard (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. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. Clean and protect construction in progress and adjoining materials already in place during handling and installation. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

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

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

1. Provide final cleaning in accordance with ASTM E1971.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.9 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.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

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 specified condition.

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

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 40

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for:

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 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 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: Presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade utility of environment for aesthetic, cultural, or historical purposes.

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

H. Hazardous Materials: Material regulated as a hazardous material in accordance with 49 CFR 173 (Code of Federal Regulations), 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 potential to meet the definition of 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.

K. Single-use plastic products: Plastic items intended to be disposed of immediately after use, including plastic and polystyrene food and beverage containers, bottles, straws, cups, cutlery, and disposable plastic bags.

1.3 PERFORMANCE REQUIREMENTS

A. General: Project shall minimize creation of construction, deconstruction, and demolition waste to protect and restore natural habitat and resources. Minimize factors contributing to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, single-use plastic products, and contamination. A Waste Management Plan shall be developed to ensure that existing site and building materials are reused, salvaged, or recycled. Minimize waste disposal in landfills.

B. Salvage /Recycle Requirements: Develop waste management plan resulting 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 (oriented strand board), and particle board
4. Concrete (can be ground and used for fill on site)
5. Asphaltic concrete (can be ground and used for fill on site)
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 waste materials encountered during deconstruction/demolition or construction phase are found to contain lead, asbestos, polychlorinated biphenyls (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 deconstruction/demolition phase shall be reused in 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 quality standards set forth in these specifications. Contractor shall ensure 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 Contracting Officer 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. Government has established minimum goals for the following materials:

1. Cleared Vegetation: Stockpile debris for application subsequent to topsoil placement.
2. Timer: For trees larger than 2 inches in diameter, yard timber and haul to location approved by Contracting Officer. Salvaged timber shall remain the property of the Contracting Officer.
3. Topsoil: Strip and windrow or stockpile topsoil for re-application during surface restoration.
4. Existing Asphalt Pavement: Grind and strip asphalt pavement for reuse as road base during surface restoration.
5. Existing Road Base: Strip and reuse as recycled road base during surface restoration.
6. Existing Concrete Structures: For structures to be removed, dispose of concrete offsite. Demolish, crush and bury structures in-place where called for on the Drawings.
7. Existing Water Main and Appurtenances: Dispose of pipe, meters, hydrants, fittings, valves and all other existing water main appurtenances to be removed at a metal recycling facility.
8. Scrap metal can be recycled following 40 CFR 261.4.

1.4 SUBMITTALS

A. Waste Management Plan: After award of contract and prior to scheduled Pre-Construction Conference, Contractor shall submit a draft Waste Management Plan to Contracting Officer for approval. Submit three (3) copies of plan. Revise and resubmit Plan as required by Contracting Officer. Approval of Contractor’s Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.

B. Progress Documentation: Supplemental to Waste Management Plan, document solid waste disposal, diversion, and cost/revenue analysis and submit completed worksheet on a monthly basis. See Project Waste Management Plan Worksheet Sample, attached to the end of the Division 1 Specifications, and report totals to date for column headings.

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 organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether 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 an 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 a Project Waste Management Plan worksheet for solid waste disposal and diversion.

1.5 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with record of successful waste management coordination of projects with similar requirements.

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

C. Waste Management Meeting: Conduct separate meeting or cover in Pre-Construction Conference and comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including:

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 procedures for reduction of single-use plastic products on site.
6. 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 salvaged and reused in Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials sold to individuals and organizations, include list of names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials donated to individuals and organizations, include list of 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 used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
7. Reduction of single-use plastic products: Include methods for water distribution to include bottle refilling stations if available for personnel.

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:

1. Landfill tip fees per 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 Contracting Officer. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during entire duration of Contract.

B. Waste Management Coordinator: Engage waste management coordinator 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. Contractor shall establish contacts with local recycling and reuse companies to set up lines of responsibility. Contractor shall be responsible for coordination 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 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. Contractor shall designate and Contracting Officer shall approve specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.
2. Place waste and recycling bins near each other, and close to point of waste generation but out of traffic pattern.
3. Keep recycling and waste bin areas neat, clean, and clearly marked in order to avoid co-mingling of materials.
4. Protect bins during non-working hours from off-site contamination.
5. Check garbage dumpsters periodically for recyclables being thrown away and undocumented materials that could be recycled.

G. Materials handling procedures: Material to be recycled shall be protected from contamination and shall be handled, stored, and transported in a manner that meets requirements set by designated facilities for acceptance. Establish defined area for operations of each trade, especially woodcutting so off-cuts are 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 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 Governments Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Allow for inspection if necessary.
4. Store items in secure area until delivery to Government.
5. Transport items to storage area designated by Government.
6. Protect items from damage during transport and storage.

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: Contractor to identify approved recycling facilities.

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

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

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include 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 ground and protect from weather.
5. Remove recyclable waste off Government property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in dry location.

1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

I. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet and pad in closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

J. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

K. Plumbing Fixtures: Separate by type and size.

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

M. Lighting Fixtures: Separate lamps by type and protect from breakage.

N. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

O. Conduit: Reduce conduit to straight lengths and store by type and size.

P. Electronic Products: Ensure non-usable electronic products are reused, donated, sold, or recycled using environmentally sound management practices at end of life.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in 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 other waste as directed by Contracting Officer.

C. Wood Materials:

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

D. Gypsum Board: Stack large clean pieces on wood pallets and store in dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

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 in landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials to accumulate on-site.
2. Remove and transport debris in manner preventing spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

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

3.7 SUPPLEMENT

A. The supplement listed below, following “End of Section,” is a part of this specification:

B. 1. Project Waste Management Plan Worksheet

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including:

1. Project Record Drawings
2. Closeout Submittals
3. Substantial Completion and Final Inspection
4. Permit Closure and Transfer
5. Final Acceptance of the Work
6. Warranties

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 (NPS) 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 Contracting Officer for inspection at the time of monthly progress payment requests. If project record drawings are not current, Contracting Officer may retain an appropriate amount of progress payment.

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

1.3 CLOSEOUT SUBMITTALS

A. A list of closeout requirements has been attached at the end of the Division 1 Specifications for your convenience. The intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list. Submit the following before requesting final inspection:

1. Specific warranties, guarantees, workmanship bonds, final certifications, and similar documents.
2. NPS required forms for occupancy, Fire Sprinkler/Alarm acceptance, and other similar forms or certificates.

3. Project Record Documents, operation and maintenance manuals, final completion construction digital images recorded on CD-R (compact disc-recordable) or DVD-R (digital video disc-recordable) with index and descriptions, and similar final record information.
4. Environmental Record Documents:

    a. IAQ Management Plan: As specified in Section 01 57 19.11 **"**Indoor Air Quality (IAQ) Management".
    b. Product Data for filtration media: As specified in Section 01 57 19.11 "Indoor Air Quality (IAQ) Management".
    c. Moisture Control inspections and reports: As specified in Section 01 57 19.11 "Indoor Air Quality (IAQ) Management".
    d. Material Safety Data Sheet (MSDS) Data: As specified in Section 01 57 19.11 "Indoor Air Quality (IAQ) Management" and Section 01 67 00 "Product Requirements".
    e. Affirmative Procurement Reporting Form: As specified in Section 01 67 00 "Product Requirements".
    f. Environmental Product Data: As specified in Section 01 67 00 "Product Requirements".
    g. Chain-of-Custody Data: As specified in Section 01 67 00 "Product Requirements".
    h. Final Summary of Solid Waste Disposal and Diversion: As specified in Section 01 74 19 "Construction Waste Management and Disposal".

5. Posted Operating Instructions: As specified in individual sections. 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 manufacturer.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Contracting Officer. Label with manufacturer's name and model number where applicable.

    a. Special Tools: One set of special tools required to operate, adjust, dismantle, or repair equipment. Special tools are those not normally found in possession of mechanics or maintenance personnel.

7. Keys and Keying Schedule: Submit keys including duplicates. Wire keys for each lock securely together. Tag and plainly mark with lock number, equipment identification, or panel or switch number, and indicate location, building, and room name or number.
8. Make final changeover of permanent locks and deliver keys to Contracting Officer. Advise Park personnel of changeover in security provisions.
9. Approved pre-functional checklists and functional performance testing reports.
10. Test and balance report.
11. Terminate and remove temporary facilities, mockups, construction tools, and similar elements from Project site, complete final cleaning requirements, including touchup painting.
12. Touch up and repair and restore marred exposed finishes to eliminate visual defects.
13. Instruct NPS personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videos.

1.4 FINAL INSPECTION, SUBSTANTIAL COMPLETION AND ACCEPTANCE PROCEDURES

A. Request final inspection in writing when project or designated portion of project is substantially complete. Contracting Officer will proceed with inspection within 10 days of receipt of written request or will advise Contractor of items that prevent project from being substantially complete.

B. If work is determined substantially complete, following final inspection, Contracting Officer will prepare Punch List and issue a Letter of Substantial Completion.

C. If work is not determined substantially complete following final inspection, Contracting Officer will notify Contractor in writing. Contractor shall request new final inspection after completing work. Re-inspection costs may be charged against Contractor in accordance with Inspection of Construction contract clause.

D. Contractor shall complete Punch List within 30 calendar days, documented weather permitting.

E. If Contractor completes items of work on Punch List and contractually required items, Contracting Officer will issue Letter of final acceptance of work.

F. If Contractor fails to complete work within the time frame, Contracting Officer may correct work with an appropriate reduction in contract price or charge for re-inspection costs in accordance with Inspection of Construction contract clause.

1.5 PERMIT CLOSURE AND TRANSFER

A. When work covered by the permits is complete, create list of tasks required to close or transfer permits to Park. Submit to Contracting Officer for approval.

B. After substantial completion and Punch List completion, permits shall be closed and documented by Agency(ies) with Jurisdiction for the permit.

C. If responsibility for permits is to be transferred to Park, Park shall be informed of permit provisions completed and responsibilities transferring to Park staff.

1.6 WARRANTIES

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

B. Organize warranty documents into an orderly sequence based on table of contents of 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 paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product and name, address, and telephone number of Installer.

3. Identify each binder on front and spine with typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF (portable document format) file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. See Division 1 Specification Section 01 73 40 "Execution" for information on cleaning agents.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Conduct final 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. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete 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, including landscape development areas, 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 smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo, soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and vision-obscuring materials. Replace chipped or broken glass and transparent materials. Polish mirrors and glass.
k. Remove labels that are not permanent.
l. Touch up, 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.

1) Do not paint over "UL" (Underwriters Laboratories) and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment**,** and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out and noticeably dimmed bulbs, and defective or noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
r. Leave Project clean and ready for occupancy.

C. Pest Control: Engage experienced, licensed exterminator to make a final inspection and rid project of rodents, insects, and other pests. Provide Contracting Officer with report.

D. Waste Disposal: Comply with requirements of Section 01 74 19 "Construction Waste Management and Disposal."

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including:

1. Manuals, general
2. Emergency manuals
3. Operation manuals for systems, subsystems, and equipment
4. Maintenance manuals for care and maintenance of systems and equipment.

B. See Divisions 2 through 49 Sections for additional operation and maintenance manual requirements for Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit one electronic copy at least 15 days before final inspection. Contracting Officer will return copy or edit version with comments within 15 days of receipt.

B. Format: Submit operations and maintenance manuals in following format:

1. PDF (portable document format) electronic file. Assemble each manual into composite electronically indexed file. Submit on digital media acceptable to Contracting Officer.

   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.

2. Hard copy manual: In accordance with Part 2 of this Section.

3. Correct or modify each manual to comply with Contracting Officer’s comments. Submit four (4) copies of each corrected manual within 15 days of receipt of Contracting Officer’s comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system. Manual shall contain title page, table of contents, and manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include:

1. Project Title
2. Location
3. Park
4. Contract Number
5. Prime Contractor’s Name and Address
6. Date of Substantial Completion
7. Binder Volume Number

C. Table of Contents: List each product included in manual, identified by product name, indexed to content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. Assemble instructions for subsystems, equipment, and components of one system into a single binder if needed.

1. Binders: White, commercial quality, hard back, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11 inch paper; with clear plastic window sleeve on front and spine to hold label describing contents and pockets inside covers to hold folded oversize sheets.

a. Cover Sheet: Identify binders on front and spine, with project title, location, park, contract number, prime contractor's name and address, date of substantial completion, and binder volume number. Insert cover sheet into clear plastic view pocket on front of binder. Insert sheet into clear plastic view pocket on spine with title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Data: Fill binders to no more than 75 percent of capacity. Punch holes shall not obscure any data. When contents of a single tabbed section cover more than one item, provide colored paper sheets to separate the data for each item.

a. Manufacturers' Data: Provide originals for color or copyrighted data. Black and white data may be originals or clean, good quality reproductions. No copies produced by facsimile transmission and sheets with stamps, such as submittal approval stamps. Include only sheets that apply to items installed; cross out inapplicable data.
b. Vendor Furnished As-Built Drawings: Maximum 24 inch by 36 inch sheets with minimum character or lettering size of 1/8 inch. Reduced-size reproductions may be provided instead of full-size drawings if reproductions are clear and legible. If

reduced-size drawings are used, identify as "REDUCED SIZE" and provide graphic scales, if applicable.

c. Custom Data: Data supplemented by drawings and schematics necessary to describe systems adequately.
d. Equipment Data Sheet: Data, using form at end of this section.
e. Schedules: Schedules reflecting final, as-installed conditions.
f. Poorly reproduced or illegible data will be rejected.

3. Dividers: Divider sheets with Mylar reinforced edges and pre-printed numbered tabs aligned with numbers and title lines on index sheet. Include typed list of products and major components of equipment included in section on each divider, cross-referenced to Specification Section number and title of Project Manual.
4. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into separate sections for type of emergency, emergency instructions, and emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, flood, gas leak, water leak, power failure, water outage, equipment failure and chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of National Park Service (NPS) operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION AND MAINTENANCE MANUALS

A. Operation Requirements

1. Content: In addition to requirements in Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.

2. Descriptions: Include:

    a. Product name and model number
    b. Manufacturer's name
    c. Equipment identification with serial number of each component
    d. Equipment function
    e. Operating characteristics
    f. Limiting conditions
    g. Performance curves
    h. Engineering data and tests
    i. Complete nomenclature and number of replacement parts

3. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.
4. Systems and Equipment Controls: Describe sequence of operation, and diagram controls as installed.
5. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

B. Maintenance Requirements for Systems and Equipment

1. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, and equipment data sheets as described below.
2. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
3. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:
4. Maintenance Procedures: Test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training videotape if available, detailing essential maintenance and environmental procedures.
5. Maintenance and Service Schedules: Service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
6. Spare Parts List and Source Information: Lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
7. Warranties and Bonds: Copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include:

1. Product name and model number
2. Manufacturer's name
3. Color, pattern, and texture
4. Material and chemical composition
5. Reordering information for specially manufactured products

D. Environmental Requirements

1. Identify environmentally preferable products incorporated into Project. Include: product model; manufacturer’s name, address, phone, and website; and local technical representative.

a. Verify plastic products to be incorporated into Project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in Operation and Maintenance Manual.

1) Type 1: Polyethylene Terephthalate (PET, PETE)
2) Type 2: High Density Polyethylene (HDPE)
3) Type 3: Vinyl (Polyvinyl Chloride or PVC)
4) Type 4: Low Density Polyethylene (LDPE)
5) Type 5: Polypropylene (PP)
6) Type 6: Polystyrene (PS)
7) Type 7: Other. Use of this code indicates that package in question is made with a resin other than the six listed above or is made of more than one resin listed above and used in a multi-layer combination.

b. Describe maintenance procedures associated with environmentally preferable materials and systems. Provide cleaning recommendations in accordance with ASTM E1971 and approved Integrated Pest Management (IPM) plan.

1) Include potential environmental impacts of recommended maintenance procedures and materials.
2) Include potential indoor air quality impacts of recommended maintenance procedures and materials.
3) Where proposed maintenance procedures incorporate composting of plastics, assess potential effect of each type of plastic to be included in composting process in accordance with ASTM D5509 or ASTM D6002

c. Identify take-back programs and appropriate contact information for:

1) Carpet
2) Ceiling Tile
3) Office Equipment

d. Material Safety Data Sheets (MSDS): Include MSDSs as specified.

2. Develop environmental management programs for facility as follows:

a. Waste management program: Develop in accordance with ASTM E1609. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.
b. Indoor Air Quality (IAQ) management program: Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of VOCs (volatile organic compounds) in indoor air in accordance with ASTM D6345.
c. Water management program: Develop water monitoring program for surface and ground water on project site in accordance with ASTM D5851 and consistent with water management program utilized during construction operations.

E. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.

4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following and items detailing essential maintenance procedures:

1. Test and inspection instructions
2. Troubleshooting guide
3. Precautions against improper maintenance
4. Disassembly; component removal, repair, and replacement; and reassembly instructions
5. Aligning, adjusting, and checking instructions
6. Demonstration and training video recording

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

1. Include procedures and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 GENERAL

A. At start of project, begin accumulating operation and maintenance data and initiate index. Install and index data in binders within 30 days after delivery of items. As custom written data and test results are produced, add to operation and maintenance data file.

B. List of Operation and Maintenance requirements has been attached at end of the Division 1 Specifications for your convenience. Intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list.

C. Keep operation and maintenance data current. Make operation and maintenance binders available to Contracting Officer for inspection at time of monthly progress payment requests. If operation

and maintenance binders are not current, Contracting Officer may retain an appropriate amount of the progress payment.

3.2 MANUAL PREPARATION

A. Manual Types

1. Emergency Manual: Assemble complete set of emergency information indicating procedures for use by emergency personnel and by NPS operating personnel for types of emergencies indicated.
2. Product Maintenance Manual: Assemble complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into Work.
3. Operation and Maintenance Manuals: Assemble complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manual Contents: Including:

1. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark sheet to identify product or component incorporated into Work. If data include more than one item in a tabular format, identify each item using appropriate references from Contract Documents. Identify data applicable to Work and delete references to information not applicable.
2. Custom Written Data: For data not in manufacturer's standard literature, provide text, drawings, and schematics specifically applicable to installed systems. Include step-by-step descriptions of operating procedures; identification of individual components and their functions; descriptions of how system components relate to one another and operate together to accomplish a common process or function; and sequence of operation for system control circuits. For seasonally operated systems, provide start-up and shutdown instructions.
3. Equipment Data Sheets: For each item of equipment included in operation and maintenance data, provide Equipment Data Sheet using form at the end of this section. For equipment consisting of a driven machine and a driver (for example, a pump and a motor), equipment data shall cover both the driven machine and the driver. For similar type equipment (for example, multiple exhaust fans of the same model and type), provide a single equipment data sheet with an attached schedule listing individual equipment items.
4. Vendor Furnished As-Built Drawings: Provide for each electrical and each mechanical control system.

    a. For each control system, provide control circuit schematic drawings. Identify each wire and terminal block number. Show terminal numbers on control devices. Show control wires and devices remote from control panel.
    b. For each control panel, provide general arrangement drawing showing location of each control component and terminal block on the panel front and interior. Include materials list of panel-mounted control components as well as field-installed control components remote from the panel, identifying components, manufacturer, model number, and initial set points or sensing ranges of devices where applicable.
    c. For packaged equipment systems, provide general arrangement drawings showing interrelationships of the various items of equipment and components.

d. In addition to control wiring schematic, provide power wiring schematic drawing showing power flow to each motor. Identify each power conductor. Show over-current protection and motor starting devices.

C. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

3.3 SUPPLEMENTS

A. The supplement listed below, following “End of Section,” are a part of this specification:
   1. Equipment Data Sheet.

END OF SECTION 01 78 23

EQUIPMENT DATA SHEET	
Equipment Item: _____ Designation: _____ Function: _____ Location: _____ Project: _____ Model Number: _____ Serial Number: _____	
Manufacturer Address and Phone:	Supplier Address and Phone:
Preventive Maintenance Tasks:	
Nameplate Data:	
Spare Parts Furnished and Other Information:	

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing NPS personnel, including:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment, including environmental considerations.

B. See Divisions 2 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

C. Demonstration and training shall be provided as referenced in Divisions 2 through 49 Sections including but not limited to:
1. All mechanical, plumbing, and electrical equipment in the modular units
2. Fire suppression systems
3. Water meter reading systems
4. Any valves, hydrants, backflow devices, manholes, vaults or other appurtenances as requested by the Contracting Officer.
5. The grinder pump located on the pressure sanitary service line in the Mammoth Government Area

1.2 GENERAL REQUIRMENTS

A. List of System Demonstration and Training requirements has been attached at end of Division 1 Specifications for your convenience. Intent is to provide overall summary of requirements and not a comprehensive list. Terms and conditions of contract still require satisfaction of requirements of individual specification sections regardless of what is shown on list.

1.3 SUBMITTALS

A. Instruction Program: Submit one PDF copy of outline of instructional program for demonstration and training, including schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. For each training session, Contractor shall submit for approval a proposed outline of subjects to be covered. Training shall not be conducted until outline is approved.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: Firm or individual experienced in training or educating maintenance personnel in training program similar in content and extent for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: Factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Contracting Officer.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and:
   1. Environmental Topics
      a. Overview of environmental issues related to building industry.
      b. Overview of environmental issues related to Project.
      c. Review of site-specific procedures and management plans implemented during construction:
         1) Regulatory Requirements
         2) Indoor Air Quality (IAQ) Management
         3) Noise and Acoustics Management
         4) Environmental Management
         5) Construction Waste Management
      d. Review of site-specific procedures and management plans to be implemented during operation and maintenance.
         1) Include review of environmentally related aspects of Operations and Maintenance Manual.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include description of specific skills and knowledge that participant is expected to master. For each module, include instruction for:
   1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.

2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Diagnostic instructions and test and inspection procedures.
7. Maintenance: Inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

A. Facilitator: Engage qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Contracting Officer for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct NPS personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with NPS through Contracting Officer with at least 14 days' advance notice.
2. Conduct training sessions after equipment or system has been accepted and turned over to Government.
3. Individual sections specify duration of training required. If no duration is listed, provide training of sufficient duration to adequately cover subjects.

END OF SECTION 01 79 00

Project Waste Management Plan Worksheet Sample

National Park Service (NPS) - Denver Service Center (DSC) | 10-13-21

	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 (R), Salvage (S), or Reuse (Re)** (Specify R, S, or Re)	**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 60% diversion goal.

Closeout and Operation & Maintenance (O&M) Requirements

National Park Service (NPS) - Denver Service Center (DSC) | 1-27-21

Topic	Specification Section	Requirement	Submittal Date	Completed	Received by Park
Project Record Drawings	01 77 00	Final Record Drawings			
	01 73 40	Certified As-Built Survey			
	01 77 00	Environmental Record Documents			
	01 91 14	Record Documents and Drawings			
	26 50 00	Electrical Record Drawings			
System Demonstration and Training	01 79 00	Demonstration of Operation of Systems and Equipment			
	13 34 26	Mechinical, plumbing, electrical, fire suppression systems			
	33 14 00	Water meter reading systems, valves, hydrants, backflow devices, etc			
	33 30 00	Grinder Pump			
Tools Spare Parts Equipment	01 77 00	Tools and Spare Parts, etc.			
	33 14 00	Spare Pressure Reducing Valves			
Extra Stock					
Reports	01 32 33	Construction Closout Images			
	01 35 13	Plant Condition Inventory			
	01 74 19	Closeout Submittals			
	01 77 00	Closeout Letter and Final Walk-through			
Keys & Keying Schedule	01 77 00	Keys and Keying Schedule			
O&M Data Warranties Guarantees	01 77 00	Warranties			
	01 77 00	NPS Forms for Occupancy, Fire Sprinkler / Alarm Acceptance, Etc.			
	01 78 23	Emergency Manuals			
	01 78 23	O&M Manuals			
	01 78 23	Product Maintenance Manuals			
	01 78 23	Systems and Equipment Maintenance Manuals			
	01 91 14	Start-up Certificates, Systems Manuals			

SECTION 02 01 00 - MAINTENANCE OF EXISTING CONDITIONS

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to protection of property, maintaining access, coordination of work, utility locations, and adjustment of existing utility covers to finish grade.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. Conformance with the requirements of this section shall in no way relieve the Contractor from his/her responsibilities for compliance with laws, regulations, orders, and decrees, or responsibilities for public safety and convenience applicable to the Project, and the provisions of the Contract Documents.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 01 71 13– Mobilization and Demobilization
2. Section 01 50 00 – Temporary Facilities and Controls
3. Section 01 57 23 – Temporary Stormwater and Pollution Prevention
4. Section 31 11 00 – Clearing and Grubbing

1.3 DEFINITIONS

A. Not Used.

1.4 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24) dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.5 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Field verify all new and existing dimensions affecting the work of this contract before ordering products.

1.6 PROJECT CONDITIONS AND REQUIREMENTS

A. NPS reserves the right to do work with its own forces or to let other contracts for work on or contiguous to the work set forth in the Contract Documents. The Contractor shall protect and maintain the property and access (recreational, business, emergency, public and private accesses) to facilities located in and around the Project area vicinity.

B. The Contractor shall coordinate all activities with Yellowstone National Park, local jurisdiction (city/county), state highway department, private property owners, business owners, business managers, and each of the governing public utility companies/purveyors where applicable to the work.

1.7 TOLERANCES

A. Not Used.

PART 2 PRODUCTS

2.1 GENERAL

A. Any materials placed in the work shall conform to the Specifications, except as authorized by NPS.

B. Any new materials required shall be at least equal to or better than existing. The Contractor shall make efforts to match all existing and new materials for style, size, color, etc. and where applicable make any minor modifications to adjoin and blend differing materials for a neat and clean finish.

PART 3 EXECUTION

3.1 GENERAL

A. Confine operations to the limits shown on the Drawings and areas permitted by the permits and Contract Documents. The Contractor shall not perform any operations beyond the limits of work, except where authorized by NPS.

B. Occupy the public right-of-way only for purposes necessary to perform the work. Storage of materials within the public right-of-way is prohibited.

C. Conform to applicable provisions of Section 107, Legal Relations and Responsibility to the Public of the FP-24 Standard Specifications.

D. Wherever work includes removing, salvaging, reconstructing, abandoning, destroying, modifying, resetting or relocating, do not start such activities until the facility is no longer needed or not being used, or a temporary facility is to be installed. Development of a plan and coordination with the Contracting Officer is required for all temporary facilities.

E. Maintain temporary facilities until they are no longer needed.

F. Where portions of existing facilities are to remain in place, the facility must be protected, preserved, and maintained. If any damage occurs, the Contractor must repair or replace the damaged facility as directed by the Contracting Officer. The condition of the facility must be equal to or better in quality than before beginning the work. Remove all materials that are no longer part of the functioning facility.

G. Connections (or tie-in) to any existing public utilities, surface pavements, and other public or private improvements, as shown on the Drawings or as directed by the Contracting Officer, shall be in accordance with the Specifications and applicable facility owner standards and requirements.

3.2 PROPERTY AND FACILITY PRESERVATION

A. The Contractor is responsible for the protection of all existing lands, waterways, public utilities, public infrastructure, buildings, private improvements, landscape features, vegetation and all other existing facilities as may or may not be shown on the Drawings or as identified by the utility companies, public agencies, or NPS.

B. Any disturbance or damage to existing lands, waterways, public or private facilities, landscaping, vegetation, etc., not otherwise specified on the Drawings or in a contract item, shall be fixed or repaired at the Contractor's sole cost and no additional compensation shall be allowed for. Any replacement parts and materials including plants and vegetation shall be at least equal to or better than the pre-existing condition.

C. Prevent equipment which exceeds load limits from operating on existing or completed structures, piping, pavements or facilities.

D. Observe all state and local jurisdiction roadway and bridge weight limits and other special restrictions.

E. Protect all work until NPS has accepted and granted relief from maintenance.

3.3 UTILITY LOCATIONS

A. Prior to commencing construction operations, the Contractor is responsible for coordination with all utility companies for verification of the locations of existing facilities. The Contractor shall notify NPS and the appropriate regional notification center for operators of subsurface installations at least two (2) working days, but not more than fourteen (14) calendar days, prior to performing any potholing, excavation, or other underground work in an area known or reasonably should be known to contain any underground pipeline, conduit, duct, wire, or other subsurface installation. Contractor shall submit "inquiry identification number(s)" to NPS within five (5) days of issuance. Applicable Regional notification centers include the following:

Notification Center	Telephone
Underground Service Alert - (USA) North811 http://usanorth811.org/	(800) 227-2600

A. Storm drainage facilities, water systems and other local underground conduits and facilities within the vicinity of the project site may be under the control of Yellowstone National Park, local jurisdiction, city, county or state. Such facilities may not be a utility member of USANorth, and the Contractor will be required to contract them directly for locating services. The entity may charge a fee in an amount sufficient to cover the cost of providing locating and field marking services.

B. Contractor is responsible to maintain USA and other utility markings where applicable to the work, and have utility locates remarked as necessary.

C. Utility locations include laterals and other appurtenances that may be present as shown on utility grid maps and inferred from visible facilities such as buildings, utility poles, meters, utility boxes and vault structures.

D. Where a planned excavation or where potential conflict exists within the approximate location of subsurface utility, storm drainage or other subsurface facility, the Contractor shall pothole or otherwise determine the exact location and elevation (depth) of the subsurface facility by digging with hand tools.

E. In the event the Contractor discovers any underground utility facilities not identified in the Contract Documents, the Contractor shall immediately notify the Contracting Officer. The Contractor's failure to give said Notice within one business day of its discovery of said underground facilities shall constitute a waiver of all claims in connection therewith, whether direct or consequential in nature.

3.4 FIRE PREVENTION AND PROTECTION

A. A capable and qualified person shall be placed in charge of fire protection. The responsibilities shall include conformance with fire prevention measures identified in the Contract Documents, locating and maintaining fire protective equipment, and establishing and maintaining safe torch cutting and welding procedures.

B. Conform to all posted NPS fire restrictions, and preventative requirements.

C. Spark Arresters: Equip all gasoline or diesel powered equipment used in potential forest or grass fire locations with spark arresters approved by the NPS or Wyoming State Forestry Division.

D. Locate internal combustion equipment so that exhausts discharge well away from combustible materials.

E. Smoking within buildings or temporary storage sheds is prohibited.

F. Cutting by torch or welding shall be performed only when adequate fire protection is provided, permits are issued, and work is coordinated with NPS.

G. Hot Work Permits:

1. Coordinate directly with the Contracting Officer for issuance of hot work permits.

3.5 TRAVEL WAY

A. At the end of each working day if a difference in excess of 2-inches exists between the elevation of the existing pavement and the elevation of any excavation within 5-feet of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose; however, once the placing of the structural section commences, structural material shall be used.

1. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 6:1 (horizontal: vertical) or flatter to the bottom of the excavation. Treated base shall not be used for the taper.

B. Full compensation for placing backing material as noted above, regardless of the number of times it is required and subsequent removing or reshaping of the material to maintain its integrity and intended purpose shall be considered as included in the various contract items of work and no additional compensation will be allowed. No payment will be made for material placed in excess of that required for the structural section as identified in the Drawings.

C. Where applicable for public safety requirements and other provisions of the Contract documents, the use and design of any trench plates to properly support anticipated traffic, construction or other loadings is solely the responsibility of the Contractor, and he/she shall assume all liability for using any trench plating devices.

3.6 ADJUST EXISTING MANHOLES AND UTILITY BOXES TO GRADE

A. Adjustment of existing manhole, vault, junction box, utility box, valve cans, clean outs, hand hole, risers, frames, rims, covers, grates, etc. to grade within the project limits shall conform to the provisions in Section 604, Manholes, Inlets, and Catch Basins of the FP-24 Standard Specifications, and the provisions of the local jurisdiction, NPS, and/or the applicable utility purveyor.

B. Adjustment of said facilities shall not occur until final paving has been completed.

C. In paved areas, the finished grade of the frames, rims, covers, grates, etc shall be placed no less than one-eighth (1/8) inch and no greater than one-quarter (1/4) inch below the finished grade of the adjacent paved surface or concrete collar to protect the device from interference with snow plow operations. All work shall conform to local jurisdiction, and/or applicable utility purveyor specifications and standard plans.

END OF SECTION 02 01 00

SECTION 02 41 00 - DEMOLITION AND SALVAGE

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform any related work to prepare the project site to properly construct the project improvements as shown on the Drawings, conforming to the Specifications, and as otherwise directed by the Contracting Officer.

1. Obtain all required permits and furnish all equipment, tools, labor, materials and incidentals to perform the scope of work.
2. Furnish and install construction limit and tree protection fencing as indicated on the Drawings.
3. Install erosion control measures.
4. Sawcut and remove asphalt pavement as shown on the Drawings.
5. Removal of gravel driveway, wooden posts, wash house building, electrical boxes, pedestals, etc. as shown on the Drawings.
6. Tree removal as shown on the Drawings.
7. Abandon and plug utilities as shown on the Drawings. Removal of appurtenances as shown on the Drawings and appropriate disposal is the responsibility of the Contractor.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. Conformance with the requirements of this section shall in no way relieve the Contractor from his/her responsibilities for compliance with laws, regulations, orders, and decrees, or responsibilities for public safety and convenience applicable to the Project, and the provisions of the Contract Documents.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 01 50 00 – Temporary Facilities and Controls
2. Section 31 23 00 – Excavation and Fill
3. Section 31 23 19 – Dewatering
4. Section 31 25 00 – Erosion and Sedimentation Control
5. Section 31 50 00 – Excavation Support and Protection

1.3 DEFINITIONS

A. Not Used.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Provide schedule/plan of demolition, relocation, and reinstallation activities (and include/identify as distinct activities in project baseline schedule) including planned utility interruptions, interruptions of services and traffic control if required. Indicate limits and sequencing to be used. Identify any items to be kept for NPS salvage, reuse or retention.

C. Submit a statement documenting the nature and quantity of material processed or sold for recycling. Otherwise, submit a signed copy of disposal agreement before disposal begins.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to, Technical Conditions, Drawings, and Standard Specifications.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. Contractor shall be responsible for the management of salvaged materials, including storage, transport and/or preparation for re-incorporation into the work.

B. Unless directed otherwise by the Contracting Officer, any waste materials generated, including excavated earthen material, in conformance with this section and as shown on the Drawings shall become the property of the Contractor and disposed of in accordance with the Specifications and waste disposal requirements.

C. Promptly repair any items damaged during the progress of the work, including any damage to utilities, fence, signage, structures, pavements, walks, public roads or adjacent ground caused by transporting materials or equipment.

D. Bring to the Contracting Officer's attention, any facilities or obstructions discovered or which are not noted or shown on the Drawings or described herein. Protect such facilities until further direction is received from NPS. Additional work required due to unforeseen conditions shall be performed as directed by the Contracting Officer and will be paid for as extra work in accordance with the Contract Documents.

1.8 TOLERANCES

A. Not Used.

PART 2 PRODUCTS

2.1 GENERAL

A. Any materials placed in the work shall conform to the Specifications, except as authorized by the Contracting Officer.

B. Any new materials required shall be at least equal to or better than existing. The Contractor shall make efforts to match all existing and new materials for style, size, color, etc. and where applicable make any minor modifications to adjoin and blend differing materials for a neat and clean finish.

PART 3 EXECUTION

3.1 GENERAL

A. Conform to Section 203, Removal of Structures and Obstructions of the FP-24 Standard Specifications.

B. Conform to Section 31 50 00 - Excavation Support and Protection where applicable to site demolition work.

C. Conform to waste management plan and objectives for all NPS project work within the limits of the Park including the following:

1. Recycle or dispose of material legally off the project. Submit a statement documenting the nature and quantity of material processed or sold for recycling. Otherwise, submit a copy of disposal agreement before disposal begins.
2. Burning of waste materials on the project is prohibited.
3. Burying of waste materials on the project is prohibited.

D. Maintain temporary facilities and public safety devices until they are no longer needed.

E. Haul Routes: Haul routes may be limited to certain areas within the project site. The Contractor shall provide a hauling route to the Contracting Officer if so directed. The Contractor shall take all steps required to prevent spillage when transporting waste materials to a disposal site. The Contractor shall be solely responsible for any costs required for cleanup and damage resulting from the Contractor's haul spillage.

F. Wherever work includes removing, salvaging, reconstructing, abandoning, destroying, modifying, resetting or relocating, do not start such activities until the facility is no longer needed or not being used, or a temporary facility is to be installed. Development of a plan and coordination with the Contracting Officer is required for all temporary facilities.

G. Contractor is responsible for cutting, fitting, or patching as required to complete the work.

H. Where portions of (or complete) existing facilities are to remain in place, the facility must be protected, preserved, and maintained. If any damage occurs, the Contractor must repair or replace the damaged facility as directed by the Contracting Officer. The condition of the facility must be equal to or better in quality than before beginning the work. Remove all materials that are no longer part of the functioning facility.

I. Removing and resetting of fence, where applicable, shall conform to Section 619, Fences, Gates, Cattle Guards and Bollards of the FP-24 Standard Specifications.

J. All disturbed areas where pipe, vaults, structures, buildings, surface pavements, posts, signs, and other improvements are removed, shall be restored in like kind to match the pre-existing lines and grades and surrounding adjacent area, unless otherwise noted on the Drawings.

K. Trenches, holes, depressions and pits caused by the removal of existing improvements shall be backfilled with materials equal to or better in quality and to the same thicknesses and density as the surrounding materials. Structural fill and base courses shall conform to the Specifications.

3.2 UTILITIES

A. The Contractor shall coordinate with the affected utility companies and NPS prior to starting work.

B. Protect all utilities in place that are to remain.

C. All below-grade small diameter (4" or less) utility conduits/services not designated to remain shall be disconnected, capped/plugged, abandoned in-place, and location noted on the "as-built" drawings.

1. Remove all conductors or cables from underground conduits, and remove conduit terminations from any pull boxes, prior to abandonment of underground electrical or communication conduits.
2. Remove all conduits that are greater than four (4) inch diameter.

D. All above-grade utilities not designated to remain shall be removed and disconnected, capped and plugged below grade to a depth of 2 feet or to the main connection.

E. Remove and/or abandon all water system facilities, faucets, pipelines, valves and other associated water system facilities as designated on the Drawings, and/or as directed by NPS.

F. Remove and/or abandon all sewer system facilities, pipelines, cleanouts, and other associated facilities as designated on the Drawings, and/or as directed by NPS.

3.3 DEMOLITION OF ASPHALT AND PORTLAND CEMENT CONCRETE

A. Where trench or structure excavation requires the removal of curb and gutter, concrete sidewalks, or asphaltic or concrete pavement, the pavement or concrete shall be cut in a straight line parallel to the edge of the excavation by use of a spade-bitted air hammer, concrete saw or similar approved equipment to obtain a straight, square clean break. Pavement cuts shall be two (2) feet wider than the actual trench opening and centered over such trench.

3.4 BARRIER BOULDER/ROCKS/LOGS

A. Where possible and practical, the contractor shall salvage, stockpile and utilize existing rock or log barriers within the site.

B. Salvaged barrier rocks and logs shall be stockpiled for use within the limits of the Project area.

C. Excess barrier rock/boulders/logs (salvaged or rock boulders that are excavated during construction of the project – meeting the specified size/quality requirements) that are not identified for use within the Project area shall become the property of NPS. The Contracting Officer will identify the rocks/boulders that will become the property of NPS for stockpiling at a NPS designated quarry location. All other excess rock/boulders/logs will become the property of the Contractor, for removal and disposal at the Contractor's expense and no extra payment will be made.

3.5 CLEANUP AND DISPOSAL

A. Remove all existing and generated waste and debris as required to complete the work. Recycle or dispose of material legally off the project site.

B. During progress of the work, maintain the site in a presentable condition. Clean up spillage and debris at the site and on haul routes and public roads.

C. All disposal efforts shall conform to the waste management objectives for the project as may be specified elsewhere in the Contract Documents. All waste management shall conform to water pollution controls.

D. The Contractor is responsible for locating a permitted disposal site/facility and obtaining permissions and agreements for disposal, for complying with applicable laws and regulations for transport of materials to be disposed, and for appropriate disposal of materials off the project site.

E. Submit a statement documenting the nature and quantity of material processed or sold for recycling. Otherwise, submit a signed copy of disposal agreement before disposal begins.

F. No waste materials generated during demolition operations and from the Project work may be placed under embankments, in fill, buried, or otherwise placed in the work.

G. Dispose of asphalt or asphalt contaminated material in a manner consistent with state and local regulations

H. Combustible organic materials not designated for salvage and/or reuse in the work shall be properly disposed. Accumulation of flammable material is not allowed.

I. No waste materials generated during demolition operations and from the Project work may be disposed within the Park, nor is the responsibility of NPS. All waste materials shall be properly disposed, conforming to the Contract Documents.

END OF SECTION 02 41 00

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.02 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.03 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Contracting Officer's requested location.

1.04 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection. Indicate proposed locations and construction of barriers.

B. Predemolition photographs.

1.05 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

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

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

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

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

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

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other building.
3. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated on Drawings to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.02 PROTECTION

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

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

C. Remove temporary barricades and protections where hazards no longer exist.

3.03 SELECTIVE DEMOLITION

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

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least 4 hours after flame-cutting operations.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."

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

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

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

3.04 CLEANING

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

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

END OF SECTION 02 41 19

SECTION 03 11 13 - VOID FORMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Void forms.

B. Backfill retainer boards.

1.2 GENERAL REFERENCES

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Requirements noted in this Section are supplemental to the requirements of these General References.

1.3 SUBMITTALS

A. Action Submittals

B. Submit product data sheets on the void forms and backfill retainer boards to the Contracting Officer verifying compliance with this specification. Include documentation of the maximum lateral load resistance of the retainer board for each height of retainer board required. Submittals shall originate with the form manufacturer without modification by anybody, except for additions.

1.4 QUALITY ASSURANCE

A. Unless otherwise shown or specified, design, place, and maintain void forms or carton forms for cast-in-place concrete work in compliance with the latest edition of the American Concrete Institute Standard "Recommended Practice for Concrete Form Work", ACI 347.

1.5 DELIVERY, STORAGE AND HANDLING

A. Materials should be protected from moisture and other means of damage prior to installation. Material should be raised a minimum of six inches above the ground and covered with a suitable waterproof covering such as sheets of polyethylene. Do not install or use void form that has received damage due to water, improper use/handling, storage or improper installation.

1.6 SUMMARY DESCRIPTION

A. This Section consists of furnishing all the labor, materials, and services incidental to the installation of void forms and backfill retainers.

PART 2 - PRODUCTS

2.1 GENERAL

A. The Contracting Officer reserves the right to allow, at his/her discretion, the use of products and manufacturers not listed below.

2.2 VOID FORMS

A. Materials for void forms shall be the product of a reputable manufacturer regularly engaged in the commercial production of void forms. The void form composition must be of corrugated paper material with a moisture resistant exterior, with the remainder of the assembly composed of components constructed of, single or double faced, wax-impregnated (partially or fully) corrugated paper. Combining materials listed above into a single product to meet the required deterioration criteria below is required.

B. Design and maintain void forms to maintain all vertical, lateral and other loads that might be applied until such loads can be supported by the concrete structure. This includes, but is not limited to: working construction load, live load, dead load, weight of moving equipment, height of concrete drop, vibrator frequency, ambient temperature, soil pressures, and lateral stability.

C. Form material shall be designed to lose its strength upon prolonged contact with the moisture which normally accumulates beneath slabs and beams on grade. Sufficient deterioration to cushion uplift forces in soil shall take place within a maximum of eight weeks' time after placement of concrete.

D. The upper two-inch portion of each drilled pier must be properly formed and contained to the designated diameter, and must be correctly voided at the intersection with grade beams or structural slabs. Where supports for reinforcing steel are placed directly on void forms, protective hardboard cover sheets must be placed over void forms to distribute working load, bridge small gaps, and protect void material from puncture and other damage during concrete placement.

E. Forms of rectangular shape in cross section are detailed on contract drawings in conjunction with backfill retainers for grade beams. Trapezoidal forms may not be used.

2.3 BACKFILL RETAINER BOARDS

A. Backfill retainer boards shall be non-asbestos panels which are noncombustible and resistant to rot and termites. The panel material shall not deteriorate or become dimensionally unstable when exposed to water, concrete, or soil, and it shall have sufficient strength to resist the lateral loads that are applied by the soil.

1. Backfill retainer boards shall be precast concrete units. Design the mix to provide normal weight concrete with the following properties:

   a. 3,000 psi (minimum) at 28 days.
   b. 3/8-inch maximum coarse aggregate.

2. Refer to Division 3 Section, "Cast-In-Place Concrete" for other concrete properties and related materials. All products shall be required to have sufficient strength to resist the lateral loads that are applied by the soil.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Void Forms

1. There should be no capillary break below the void form unless otherwise directed by the Contracting Officer to ensure the proper absorption of moisture into void forms.
2. Forms to be assembled and placed in accordance with manufacturer's directions, and in a manner to provide tight joints that will prevent loss of paste during concrete placement. Tape joints as in accordance with manufacturer's recommendations.
3. End closures shall be provided at all openings and cut voids where concrete might enter void. Provide fill pieces around stub columns, piers, or other openings. Provide corrugated products that are pre-manufactured, sealed void forms, with curved, radial, vertically supported edges adjacent to all drilled piers, if these special forms are available from the manufacturer. Cutting the forms (field modifications) shall not cause damage to or allow damage to occur to the forms' interior supporting network during concrete placement. If pier intersections at slabs/beams require altering due to awkward field conditions, products manufactured for this specific purpose (with approved submittal) are acceptable for field-cutting or product modification, with the condition that the modified form shall be capable of supporting the loads required. Closures shall be vented where necessary to prevent cracking of concrete due to expansion of air in voids due to heat of hydration of the concrete.
4. Forms shall be properly placed and anchored to prevent displacement or flotation during placement of concrete.
5. Place a layer of protective cover board over void forms as necessary to distribute working load, bridge small gaps, and protect them from puncture and other damage during concrete placement.
6. Forms shall be protected from moisture prior to installation. If water soaked after installation and prior to placement of concrete, they must be replaced or allowed to dry before placement of concrete. Replace damaged pieces before placing concrete. Water should be prevented from entering the voids at all times. Maintain moisture and humidity levels beneath concrete structure to ensure proper strength loss.
7. Reinforcing steel to be supported on void forms shall be carried on slab bolsters with runners to prevent puncture of forms and consequent displacement of steel.

B. Backfill Retainer Boards

1. Install backfill retainer after forms are removed, and backfill as required.

2. Backfill retainers may be placed prior to concrete placement. The trench sides shall be straight and clean, and any gaps between the trench side and the backfill retainer that are greater than 3/4" shall be filled to prevent concrete from entering that gap.

3.2 GENERAL

A. Void forms are to be placed under grade beams, plinths, and first floor slabs as detailed on the Drawings, and are expected to be left in place after concrete placement.

END OF SECTION 03 11 13

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Form-facing materials.

B. Steel reinforcement.

C. Reinforcement accessories.

D. Concrete materials.

E. Waterstops.

F. Vapor retarders.

G. Chemical hardeners.

H. Curing materials.

I. Related materials.

J. Repair materials.

K. Concrete mixtures.

L. Fabricating reinforcement.

M. Concrete mixing.

1.2 GENERAL REFERENCES

A. Contract Documents: Refer to complete set of Contract Documents for requirements that are related to or may affect the work described in this Section.

1.3 RELATED REQUIREMENTS

A. Section 03 11 00 – Void Forms

B. Section 07 92 00 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.4 REFERENCE STANDARDS

ACI 117	Specification for Tolerances for Concrete Construction and Materials and Commentary; 2010.
ACI 301	Specifications for Structural Concrete for Buildings; 2020
ASTM A184/A184M	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2019.
ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
ASTM A706/A706M	Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2022a
ASTM C33/C33M	Standard Specification for Concrete Aggregates; 2023.
ASTM C94/C94M	Standard Specification for Ready-Mixed Concrete; 2023.
ASTM C150/C150M	Standard Specification for Portland Cement; 2022.
ASTM C260/C260M	Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
ASTM C494/C494M	Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
ASTM D471	Standard Test Method for Rubber Property--Effect of Liquids (2021)

1.5 SUBMITTALS

A. Action Submittals

1. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

    a. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
    b. For chemical-resistant waterstops, provide data on ASTM D471test results.
    c. For membrane-forming, moisture emission-reducing, curing and sealing compound, provide manufacturer's installation instructions.

2. Mix Design: Submit proposed concrete mix design.

    a. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
    b. Indicate proposed mix design complies with requirements of ACI CODE-318, Chapter 5 - Concrete Quality, Mixing and Placing.

c. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
d. Indicate proposed mix design complies with admixture manufacturer's written recommendations.
e. Indicate proposed mix design complies with expansive component manufacturer's written recommendations.

3. Test Reports: Submit report for each test or series of tests specified.
4. Test Reports: Submit termite-resistant sheet manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.
5. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
6. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
7. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 WARRANTIES

A. Slabs with Porosity Inhibiting Admixture (PIA) or Moisture Vapor Reducing Admixture (MVRA): Provide warranty to cover cost of flooring failures due to moisture migration from slabs for life of the concrete.

1. Include cost of repair or removal of failed flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system.
2. Provide warranty by admixture manufacturer matching terms of flooring adhesive or primer manufacturer's material defect warranty.

B. Moisture Emission-Reducing Curing and Sealing Compound, Membrane-Forming: Provide warranty to cover cost of flooring delamination failures for 10 years.

1. Include cost of repair or removal of failed flooring, remediation with a moisture vapor impermeable surface coating, and replacement of flooring with comparable flooring system.

C. Moisture Emission-Reducing Curing and Sealing Compound, Penetrating: Provide non-prorated warranty to cover cost of flooring delamination failures for 20 years.

1. Include cost of repair or removal of failed flooring, remediation with a moisture vapor impermeable surface coating, and replacement of flooring with comparable flooring system.

D. Termite-Resistant Vapor Barrier Sheet: Provide five year manufacturer's limited warranty.

1.7 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI CODE-318.

1. Maintain one copy of each document on site.

B. Follow recommendations of ACI PRC-305 when concreting during hot weather.

C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

D. For slabs required to include moisture vapor reducing admixture (MVRA), do not proceed with placement unless manufacturer's representative is present for every day of placement.

E. For slabs indicated to receive membrane-forming, moisture emission-reducing, curing and sealing compound, do not proceed with application unless manufacturer's representative is present for every day of placement.

PART 2 - PRODUCTS

2.1 GENERAL

A. Concrete

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

a. ACI 301.
b. ACI 117.

B. Source Quality Control

1. Concrete Batch Facility: The testing laboratory shall perform inspections of the concrete batching facility at intervals not to exceed one per 1,000 cubic yards of concrete placed or at least one each six months. The inspection shall include verification of the calibration of scales, aggregate analysis of the current stockpiles, verification of batching procedures, and compliance with the original mix design. First inspection shall take place before any concrete is placed. The cost of each inspection shall be paid by the testing allowance.

a. Test results will be reported in writing to Contracting Officer, ready mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests. If any breaks are below specified or expected strengths, the Testing Laboratory shall report any visible anomalies.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that 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.

3. Overlaid Finnish birch plywood.

B. 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.

C. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

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

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

F. Form-Release Agent: Commercially formulated form-release agent with a maximum of 450 g/l volatile organic compounds (VOCs) that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

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

1. Furnish units that leave no corrodible metal closer than 1 1/2 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, 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 dampproofing or waterproofing.

H. Expanded polystyrene (EPS) and Extruded polystyrene (XPS) Forms: Complies with ASTM D6817/D6817M, treated to resist insects and suitable for below grade applications; EPA registered treatment, meeting requirements of ICC-ES AC239, and recognized in an ISS ES report.

1. Minimum material requirements for EPS and XPS foams:

    a. Size: Largest practicable sizes.
    b. Thickness: As indicated.
    c. Density: As indicated (1.15 lb./cu. ft, min.)
    d. Compressive Strength: As indicated (5.8 psi at 1% deformation, min.)
    e. Deformation: 1% maximum.

2. Connector Plates: Manufacturer’s galvanized or stainless steel plates with two-sided multi-barbed design, capable of piercing geofoam and resisting lateral movement between blocks during installation.
3. Lateral Holding Strength: 60 lbs.

2.3 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

B. Reinforcing Bars: ASTM A615/A615M, Grade 60 and 75, deformed.

C. Low-Alloy-Steel Reinforcing Bars, including Deformed Bar Anchors: ASTM A706/A706M, deformed.

D. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60, deformed bars, assembled with clips.

E. Plain-Steel Wire: ASTM A1064/A1064M, as drawn.

F. Deformed-Steel Wire: ASTM A1064/A1064M.

G. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

H. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, ASTM A775/A775M epoxy coated.

C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.

D. Zinc Repair Material: ASTM A780/A780M.

E. 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 or plastic according to CRSI's "Manual of Standard Practice," and as follows:

1. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
2. 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.

2.5 CONCRETE MATERIALS

A. Regional Materials: Concrete shall be manufactured within 100 miles of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

B. 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.

C. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I, Type II. Type III cement may be used in lieu of Type I at contractor's option, when acceptable to the Contracting Officer.
2. Fly Ash: ASTM C618, Class F, or Class C.

D. Normal-Weight Aggregates: ASTM C33/C33M, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: As indicated in Article 2.12 “CONCRETE MIXTURES”.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling. Do not use aggregates containing soluble salts or other substrates such as iron sulfides, pyrite, marcasite, or ocher which can cause stains on exposed concrete surfaces.
4. Local aggregates not complying with ASTM C33/C33M that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Contracting Officer.
5. Alkali Silica Reactivity: Aggregate shall be considered non-reactive with a documented satisfactory service record for a minimum ten-year period used in concrete with similar cementitious material or with an alkali (Na2O eq.) content in concrete equal or higher than that in the proposed mixture. In the absence of service record the aggregate shall be tested and will be considered non-reactive if it passes on of the following two requirements – ASTM C1260 14-day expansion less than or equal to 0.10% or ASTM C1293 1-year expansion less than or equal to 0.040%. For aggregate that do not meet these criteria, mitigation measures shall apply in accordance with Article 2.12 “CONCRETE MIXTURES”.

E. Air-Entraining Admixture: ASTM C260/C260M.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do 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 C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
6. Water Reducing, Accelerating Admixture: ASTM C494/C494M, Type E.
7. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

G. 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 C494/C494M, Type C.

H. Water: ASTM C94/C94M and potable.

2.6 WATERSTOPS

A. Flexible Rubber Waterstops: COE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory-fabricate corners, intersections, and directional changes.

1. Profile: Flat dumbbell with center bulb at expansion joints and flat dumbbell without center bulb at construction joints.
2. Dimensions: Minimum of 4 inches by 3/16 inch thick at cold joints and 6 inches by 3/8 inch thick at expansion joints; non-tapered.

B. Flexible PVC Waterstops: COE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory-fabricate corners, intersections, and directional changes.

1. Profile: Flat dumbbell with center bulb at expansion joints and flat dumbbell without center bulb at construction joints.
2. Dimensions: Minimum of 4 inches by 3/16 inch thick at cold joints and 6 inches by 3/8 inch thick at expansion joints; non-tapered.

C. Preformed Plastic Adhesive Waterstops: It shall be supplied in extruded form of suitable cross section and of a size to seal the joint areas of concrete sections. The plastic waterstop shall be protected by a suitable removable two-piece wrapper. The two-piece wrapper shall be so designed that one half may be removed longitudinally without disturbing the other half, to facilitate application of the sealing compound.

D. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Provide manufacturer's recommended mastics and gusset tape at all joints, to create a continuous membrane.

2. Products for Slab-on-Grade:

a. Polyethylene sheet not less than 15 mils thick (must provide proof of compliance with ASTM E1745).

B. Bituminous Vapor Retarder: 110-mil- thick, semiflexible, seven-ply sheet membrane consisting of reinforced core and carrier sheet with fortified asphalt layers, protective weathercoating, and removable plastic release liner. Furnish manufacturer's accessories, including bonding asphalt, pointing mastics, and self-adhering joint tape.

1. Product:

a. Pre-moulded Membrane Vapor Seal with Plasmatic Core

2. Water-Vapor Permeance: 0.0011 grains/h x sq. ft. x inches Hg; ASTM E154/E154M.
3. Tensile Strength: 140 lb./in; ASTM E154/E154M.

2.8 CHEMICAL HARDENERS

A. Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicates per gal.

1. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.9 CURING MATERIALS

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

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 C171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

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

E. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109/C109M.

2.12 CONCRETE MIXTURES

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. Use a qualified testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures. Use qualified testing agency to develop supplementary performance test data for additional requirements identified in this specification.

B. Cementitious Materials - Unless otherwise indicated in the Contract Documents or as indicated below, concrete mixtures may use any cementitious materials listed in PART 2 section “Concrete Materials”.

1. Cementitious materials other than Portland cement shall not exceed the ACI 318/318R limits for the designated exposure classifications of each mix class.

C. Limit water-soluble, chloride-ion content in hardened concrete to following limits depending on the exposure category assigned to the structural member identified in this section of the specification or in the contract documents, whichever is more stringent. The limits are stated in terms of chloride ions in percent by weight of cement.

1. Prestressed and post-tensioned concrete for all exposure categories – 0.06%
2. Reinforced in Exposure Category C0 – 1.00%
3. Reinforced in Exposure Category C1 – 0.30%

D. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

1. Reinforced in Exposure Category C2 – 0.15%

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

1. Use water-reducing, high-range 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 w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

F. Air Content: Provide total air content for each class of concrete based on the nominal maximum size of aggregate and the assigned exposure class for resistance to freezing and thawing indicated in 2.12. Concrete for members categorized as Exposure Category F0 should be non-air entrained, unless noted otherwise on the Contract Documents.

Nominal Maximum Aggregate Size, inch	Total Air Content (%)	
	Exposure Class F2 and F3	Exposure Class F1
3/8	6.0 to 9.0%	4.5 to 7.5%
1/2	5.5 to 8.5%	4.0 to 7.0%
3/4	4.5 to 7.5%	3.5 to 6.5%
1	4.5 to 7.5%	3.0 to 6.0%
1-1/2	4.0 to 7.0%	3.0 to 6.0%
2	3.5 to 6.5%	2.5 to 5.5%
3	3.0 to 6.0%	2.0 to 5.0%

G. Slump – Provide documentation in submittal prior to commencement of Work of target slump or slump flow value for each class of concrete. Consistency of concrete shall be established to facilitate placement with minimized potential for segregation.

H. Alkali silica reactivity – For structural concrete members that will be moist in service and when it is determined as per Section 2.5B that the aggregate source used needs to include mitigative measures, submit documentation demonstrating that the proposed cementitious materials used with the aggregates by ASTM C1567 tests with an expansion after 14 days of exposure less than or equal to 0.1%.

I. The installer and manufacturer shall coordinate to establish properties of fresh concrete to facilitate placement and finishing with reduced potential for segregation and bleeding. Factors shall include but are not limited to slump or slump flow, setting time, method of placement, rate of placement, hot and cold weather placement, curing, and concrete temperature. Selection of fresh concrete properties shall be notified to the Contracting Officer in the submittal.

J. Contractor shall indicate reportable changes in sources of materials and quantities when such changes are necessary to ensure constructability, performance of concrete and compliance with the specification requirements. The contractor is permitted to make minor adjustments less than the reportable deviations noted in the original submittal to concrete mixtures to ensure uniformity of concrete without a re-submittal for review or approval.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

B. Identification: Deliver all reinforcement to the project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

C. Rejected Materials: Reinforcing with any of the following defects will not be permitted in the work:

1. Bar lengths, depths, and bends exceeding the specified fabrication tolerances. Bends or kinks not indicated on drawings or final shop drawings.
2. Bars with reduced cross section due to excessive rusting or other causes.

2.14 CONCRETE MIXING

A. General: Concrete may be mixed at batch plants, or it may be transit mixed as specified herein. Batch plants must comply with the requirements of ACI 304, with sufficient capacity to produce concrete of the quality specified, in quantities required to meet the construction schedule. All plant facilities are subject to the acceptance of the Contracting Officer. Plant facilities shall be calibrated by testing agencies specifically qualified for this as frequently as necessary to ensure accuracy to plus or minus 0.4% of the total capacity of the components of the plant, but at a frequency not to exceed 6 months.

B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, furnish batch ticket information, and as specified, provided the quantity and rate of delivery will permit unrestricted progress of the work in accordance with the placement schedule. Discharge of the concrete shall be completed within 90 minutes after water is added to the mix or by the time the drum has revolved 300 times, whichever occurs first.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 90 minutes to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Formwork

1. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of the structure during construction.
2. Construction loads, including reshoring loads, on in place construction shall at no time exceed the live load for which the in-place construction was designed. If the contractor is uncertain about the design live loads, it shall be his responsibility to obtain these from the Contracting Officer.
3. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
4. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

    a. Class A, 1/8 inch for smooth-formed finished surfaces.
    b. Class C, 1/2 inch for rough-formed finished surfaces.

5. Construct forms tight enough to prevent loss of concrete mortar.
6. Construct 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.

    a. Install keyways, reglets, recesses, and the like, for easy removal.
    b. Do not use rust-stained steel form-facing material.

7. 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.
8. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
9. Chamfer exterior corners and edges of permanently exposed concrete.
10. Forms for Exposed Concrete: Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.

    a. Do not use metal cover plates for patching holes or defects in forms.

11. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
12. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
13. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
14. Coat contact surfaces of forms with an approved, non-residual, low-VOC form-release agent, according to manufacturer's written instructions, before placing reinforcement.

    a. Do not allow excess form coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
    b. Coat steel forms with a nonstaining, rust preventative material. Rust-stained steel formwork is not acceptable.

B. Removing and Reusing Forms

1. 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 F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

    a. Formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place may be removed after cumulatively curing at not less than 50 deg F for 14 days (336 hours) and after the concrete has achieved at least 75 percent of its 28-day design compressive strength based on laboratory cured cylinders representative of concrete location or members. Contact the SEOR for form removal procedure of concrete placed during cold weather procedures, placed during hot weather procedures, or containing a retarding admixture.
    b. Formwork removal prior to meeting the requirements above requires submission of in-place average compressive strength greater than 75% f_c to the SEOR prior to form removal. Determine potential compressive strength of in place concrete by testing two 6 x 12 or three 4 by 8 field cured specimens representative of concrete location or members. Field cured samples shall be taken at the same intervals and locations as the laboratory cured cylinders. Refer to PART 3, Article "Field Quality Control" for field cured cylinder requirements. Formwork removal earlier than 4 days after placement will not be permitted.
    c. Form facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

2. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
3. 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 the Contracting Officer.

C. Vapor-Retarder

1. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E1643 and manufacturer's written instructions.

    a. Lap joints 6 inches and seal with manufacturer's recommended tape.

2. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

D. Steel Reinforcement

1. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

    a. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

2. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
3. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Contracting Officer to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

    a. Provide sufficient numbers of supports and of strength to carry the reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

4. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
5. 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.

E. Joints

1. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

    a. Locate construction joints, if required, but not shown so as to divide the slab into areas not in excess of 6000 sq. ft. (as close to square in configuration as possible), unless otherwise accepted by the Contracting Officer. Conform to slab placement, where shown. Before adjacent pour is made, the surface shall be roughened to an amplitude of a minimum of 1/4 inch except at exposed surfaces.
    b. 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.
    c. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete. Bulkheads designed and accepted for this purpose may be used for slabs. Keyways are to be horizontal or vertical as directed by the Contracting Officer. Install

preformed plastic adhesive waterstops in the keyway of all construction joints where vinyl, bulb type waterstops are not detailed.

d. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

e. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

f. Space vertical joints in walls as indicated in the Construction Documents. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

g. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

2. 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:

   a. Sawed 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 does not tear, abrade, or otherwise damage surface, dislodge aggregates, and before concrete develops random contraction cracks, but not longer than 12 hours after slab finishing.

   b. Formed Contraction Joints: Insert pre-moulded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured at least 7 days, remove inserts and clean groove of loose debris.

   c. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

   d. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

3. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

   a. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

5. Waterstop

   a. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

   b. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

F. Concrete Placement

1. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed. Notify other trades to permit installation of their work. Notify the Contracting Officer and Testing Laboratory 24 hours before placing concrete.
2. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

    a. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
    b. Do not use concrete which becomes non plastic and unworkable, or does not meet the requirements quality control limits, or which has been contaminated by foreign materials. Do not use re-tempered concrete. Remove rejected concrete from the project site and dispose of in an acceptable location.
    c. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is 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.

3. Concrete Conveying: Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practical by methods which will prevent segregation and loss of concrete mix materials.
4. Provide mechanical equipment of such size and design for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways above top of finished slab in all places for wheeled concrete conveying equipment for the concrete delivery point to the locations of final deposit. Do not wheel concrete directly over steel reinforcement. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.

    a. If for pumping requirements the mix design is other than specified, the Contractor shall furnish to the Contracting Officer a mix for approval not less than 15 days prior to the time required for its use. The laboratory will make and test this mix design. After the results of these tests are noted and approval is received, this mix can be used. Cost of this laboratory work shall be paid by the Contractor.
    b. Whenever concrete is placed by pumping, it is recommended a second pump complete with sufficient pipes and hose for a complete and independent set up, or other placement equipment, be at the job prior to any placing of concrete. The Contractor shall be responsible for any corrective work which results from deficient equipment.
    c. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
    d. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
    e. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
    f. 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.

5. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

    a. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
    b. Maintain reinforcement in position on chairs during concrete placement.

6. Screed slab surfaces with a straightedge and strike off to correct elevations.
7. Slope surfaces uniformly to drains where required.

    a. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

8. Bonding: Roughen surfaces of set concrete at all joints, except where bonding is obtained by use of a concrete bonding agent. Clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner to expose bonded aggregate uniformly and to not leave laitance, loose particles of aggregate, or damaged concrete at the surface.

G. Miscellaneous Concrete Item

1. 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.
2. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
3. Equipment Bases and Foundations:

    a. Coordinate sizes and locations of concrete bases with actual equipment provided.
    b. Construct concrete bases as indicated on the Contract Documents.
    c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
    d. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    e. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.2 FIELD QUALITY CONTROL

A. The Contractor is responsible for all quality control including testing and inspections in accordance with Section 01 40 00 - Quality Requirements. The Contractor shall retain a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. The testing laboratory shall monitor concrete properties at time of placement and report to the Contractor any deviation from the project specifications. It shall be the responsibility of the Contractor to control the concrete and comply with the project specifications. The cost of this service shall be paid for by the Contractor.

B. Perform testing and inspections as indicated on the Contract Documents and in accordance with the ACI.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M 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. One specimen tested at 7 days, three specimens tested at 28 days, and one specimen retained in reserve for later testing if required. Where six by twelve-inch cylinders are used, the 28-day cylinder number may be reduced to two specimens.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M; 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 C231/C231M, pressure method, for normal-weight concrete; ASTM C173/C173M, volumetric method, for structural lightweight 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 C1064/C1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C567/C567M, 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 C31/C31M.

    a. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
    b. For pumped concrete, one set of compression test cylinders shall be obtained at both the point of discharge and point of placement.

7. Curing of Compression Test Specimens: After preparation of the test cylinders, to prevent evaporation of water from the unhardened concrete, cover the cylinders immediately after finishing with a non-reactive plate or impervious plastic sheeting. Protect the outside surface of cardboard molds from any source of water for the first 24 hours after casting. Field curing procedures for test cylinders for 28-day compressive strengths are not the same as those for determining strength for form removal time.

    a. For test cylinders for 28 days compressive strength determination, during the first 24 hours after molding, store all test cylinders under conditions that maintain the temperature immediately adjacent to the cylinders in the range of 60 to 80 degrees

F. and prevent loss of moisture from the specimens. If the Contracting Officer or testing laboratory have questions concerning the storage temperature, they may require that the contractor provide a temperature record of the cylinders by means of maximum minimum thermometers. At the end of 20 hours plus or minus four hours, cylinders are to be transported to the laboratory, removed from the molds, and placed in a moist condition at 73.4 plus or minus 3 degrees F. until the moment of testing.

b. Cure test cylinders to be used for determining strength for form removal time as nearly as practical in the same manner as the concrete in the structure. Cylinders shall be stored in or on the structure as near the point of use as possible, and as far as is practical, with the same exposure to the elements. Remove test cylinders from field storage and store in lime water at 73.4 plus or minus 3 degrees F. for 24 hours plus or minus 4 hours immediately before testing.

c. Cylinders shipped from the field to the laboratory shall be packed in sturdy wood boxes or other suitable containers surrounded by wet sawdust or other suitable packing material and shall be protected from freezing during shipment.

8. Compressive-Strength Tests: ASTM C39/C39M; test one laboratory-cured specimens at 7 days, three specimens at 28 days, and retain one specimen in reserve for later testing if required. Where six by twelve-inch cylinders are used, the 28-day cylinder number may be reduced to two specimens.

   a. A compressive-strength test shall be the average compressive strength from a set of three specimens (or two 6x12 specimens) obtained from same composite sample and tested at age indicated.

   b. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to additional testing as herein specified.

9. 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.

10. 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.

11. Test results shall be reported in writing to the Contracting Officer, 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.

12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Contracting Officer but will not be used as sole basis for approval or rejection of concrete.

13. 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. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by the Contracting Officer.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E1155 within 48 hours of finishing.

E. Formed Concrete Dimensional Tolerances: Formed concrete having any dimension smaller than required, and outside the specified tolerance limits, will be considered deficient in strength and subject to additional testing as herein specified.

1. Formed concrete having any dimension greater than required will be rejected if the appearance or function of the structure is adversely affected, or if the larger dimensions interfere with other construction. Repair or remove and replace rejected concrete as required to meet the construction conditions. When permitted, accomplish the removal of excessive material in a manner to maintain the strength of the section without affecting function and appearance.

F. Strength of Concrete Structures: The strength of the concrete structure in place will be considered potentially deficient if it fails to comply with any of the requirements which control the strength of structure, including the following conditions:

1. Failure to meet compressive strength test requirements.
2. Concrete which differs from the required dimensions or location in such a manner to reduce strength.
3. Concrete subjected to damaging mechanical disturbances; particularly load stresses, heavy shock, and excessive vibration.
4. Poor workmanship and quality control likely to result in deficient strength.

3.3 CONCRETE PROTECTING AND CURING

A. 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.

B. 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 remainder of curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. 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 three 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 4-inch 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 3 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 does 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, followed by shading or moist curing adequate to keep temperature of the concrete at 80 degrees F or below during the curing period. 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 unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

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.
5. Temperature of Concrete During Curing: When the atmospheric temperature is 85 degrees F. and above, or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or moisture retaining covering. Protect the concrete continuously for the concrete curing period. Provide hot weather protection complying with the requirements 1.7 B.
6. Protection from Mechanical Injury: During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and damage caused by rain or flowing water. Protect all finished concrete surfaces from damage by subsequent construction operations. Concrete trucks, cranes, or excessive concentrations of loads will not be permitted on any slab without prior written approval of the Contracting Officer during the curing period or subsequent construction.
7. Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

3.4 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by the Contracting Officer. Remove and replace concrete that cannot be repaired and patched to Contracting Officer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1-part Portland cement to 2-1/2 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 1/4 inch in any dimension to solid concrete. Limit cut depth to 1 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 matches 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 the Contracting Officer.

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, popouts, honeycombs, rock pockets, crazing and cracks in excess of 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. 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.
5. 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.

E. Perform structural repairs of concrete, subject to Contracting Officer’s approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Contracting Officer’s approval. Under no circumstances will "dusting" of wet concrete be allowed during finishing operations.

END OF SECTION 03 30 00

SECTION 03 30 00 - MINOR CONCRETE

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing, placing, curing and protecting minor concrete for the construction of utility box and valve collars, concrete thrust blocks, sign/post footings, anchors and other miscellaneous uses as shown on the Drawings, conforming to the Specifications, and as otherwise directed by NPS.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 31 23 00 - Excavation and Fill

1.3 DEFINITIONS

A. Not Used.

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. A Concrete Mix Design shall be submitted to NPS no less than thirty (30) days prior to placement for review and acceptance. The concrete mix design submittal shall include supporting documentation to indicate the source and material properties conformance with the Specifications. NPS reserves the right to reject materials upon delivery to the site.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.

2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Finish and Texture: The Contractor is responsible for obtaining the finish and texture of all concrete work on the project that meets the approval of the Contracting Officer.

C. Testing Agency: NPS may engage a qualified independent geotechnical engineering and/or material testing agency/consultant to perform material acceptance testing.

D. Inspection: The Contractor shall coordinate with the Contracting Officer during all concrete operations to allow for access to the site as often as necessary for the performance of any special inspections and material testing for verification that the specifications are being met for the installation of materials. Frequency of material testing shall conform to the applicable Specifications, Standards, and Test Methods.

E. NPS may assure conformance to contract specifications by inspection of the Contractor's procedures, by oversight of the Contractor's quality control inspection and records, and by independent verification sampling and testing during concrete production and construction. Acceptance tests will be performed using similar test methods used for quality control testing.

F. Minor concrete will be accepted under Section 601.07, Acceptance of the FP-24 Standard Specifications.

1.7 CONTRACTOR QUALITY CONTROL

A. Contractor quality control process and documentation shall conform to Section 153, Contractor Quality Control of the FP-24 Standard Specifications and the Contract Documents.

B. Contractor shall provide quality control sampling, testing, and inspection for concrete work at specified rates sufficient to ensure materials and work conform to the Specifications.

C. The Contractor may witness acceptance sampling and testing performed by NPS. However, NPS is not required to formally notify the Contractor of anticipated sampling schedules or locations and will not delay sampling or testing if the Contractor is unable to attend. The Contractor shall not use samples taken by NPS for acceptance testing, for any testing and submittal as a quality control test result unless NPS authorizes split samples.

1.8 PROJECT CONDITIONS AND REQUIREMENTS

A. In confined linear areas where protection of existing infrastructure, vegetation, and/or soils is specified only equipment that can be safely operated in the confined construction corridor will be permitted.

1.9 TOLERANCES

A. Not Used.

PART 2 PRODUCTS

2.1 MINOR CONCRETE

A. Conform to Section 601, Minor Concrete Structures of the FP-24 Standard Specifications, unless otherwise shown on the Drawings.

B. Measuring and Batching: Depending on local conditions, or direction of the Contracting Officer the methods of mixing may be limited to one of the following:

1. Batching at a central plant and mixing enroute to the project in a transit mix truck.
2. Batching and mixing at a batch plant on the project site, or remote location with delivery to the project by truck
3. Batching and mixing at the site of the work using a dry, preproportioned, blended, and bagged mix meeting the requirements of ASTM C 387, according to the manufacturer's recommendations with an approved mechanical mixer.
    a. This method shall be limited to 1/3 cubic yard or less placements.

C. Regardless of the batching and mixing methods that are to be used on the project, the allowable tolerances for cement and water shall not exceed one (1) percent, two (2) percent for each aggregate, or one (1) percent for aggregate weighed cumulatively.

2.2 CURING MATERIALS

A. Curing material shall conform to Section 711, Concrete Curing Material and Additives of the FP-24 Standard Specifications.

B. Apply curing compounds as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

A. Excavation and backfill shall conform to Section 31 23 00, Excavation and Fill.

B. Design and construct forms, place and fasten reinforcing steel conforming to Section 601, Minor Concrete of the FP-24 Standard Specifications.

C. Batch, mix and transport concrete so slump will not increase nor decrease by more than 1 inch from design slump. The Contractor shall take care not to add water at the job site.

D. Do not apply water to plastic concrete surfaces during finishing operations.

3.2 EMBEDDED ITEMS

A. Before concreting, place all required sleeves, inserts, anchor bolts, and embedded items.

B. Give all trades whose work is related to the concrete ample notice and opportunity to introduce embedded items before concrete is placed.

C. Position expansion joint material and embedded items accurately and support them against displacement. Close and/or fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent the entry of concrete.

3.3 PLACEMENT

A. Provide 24-hours written notice prior to placement of any concrete. Sub-grade, forms, and steel reinforcements must be inspected and approved by the Contracting Officer prior to placement of concrete.

B. Discharge all concrete within the time limits noted in the Standard Specifications. These time limits are based on jobsite ambient air temperature, cement type, and admixture used.

C. Do not mix or place concrete when the jobsite ambient air temperature is, or is expected to be, less than 40 °F unless adequate provisions are made to protect the concrete.

D. Do not use aluminum pipe, conduit, or troughs for transporting concrete. When concrete is pumped, take samples from the discharge stream at the point of placement.

E. Place concrete to avoid segregation of material. Deposit concrete as near to its final position as possible to avoid segregation due to re-handling or flowing.

F. Use high-frequency internal vibrators for consolidating concrete in the forms. Operate vibrators to produce concrete free of voids, but do not hold them in one place long enough to result in segregation or formation of laitance on the surface.

3.4 FINISHING AND CURING

A. Finish concrete in conformance with Section 552.12, Finishing Plastic Concrete of the FP-24 Standard Specifications.

1. For exposed footings, provide a troweled and brushed finish.
2. For exposed surface slabs and/or pads, provide a sidewalk finish.

B. Cure concrete in conformance with Section 552.13, Curing Concrete of the FP-24 Standard Specifications. Cure concrete for at least 7 days. If high early strength cement is used, cure concrete for at least 3 days.

C. Where applicable or as directed, finish formed concrete surfaces in conformance with Section 552.14, Finishing Formed Concrete Surfaces of the FP-24 Standard Specifications, where applicable for a Class 1 – Ordinary Surface Finish.

3.5 PROTECTION

A. In cold weather, maintain the moisture conditions but also, by heating or covering, maintain temperature of the concrete between 50 degrees F and 70 degrees F for entire curing period.

B. In hot weather, take immediate steps to protect newly finished concrete from the drying effects of wind and sun, and maintain temperature of the air surrounding the concrete uniform within 5 degrees F in any one hour or 50 degrees F in any 24-hour period.

C. During curing period, protect concrete from mechanical damage, loading, shock, vibration and traffic or until concrete has attained the design compressive strength.

3.6 DAMAGED OR DEFECTIVE CONCRETE

A. Concrete that is deemed damaged or defective by the Contracting Officer shall be removed before completion and acceptance of the project work; and replaced with acceptable concrete as directed by NPS at the Contractor’s expense.

END OF SECTION 03 30 50

SECTION 03 30 53 – SPREAD AND CONTINUOUS FOOTINGS

PART 1 - GENERAL

1.1 GENERAL REFERENCES

A. Contract Documents: Refer to complete set of Contract Documents for requirements that are related to or may affect the work described in this Section.

1.2 SUMMARY DESCRIPTION

A. The Work of this Section consists of furnishing all labor, materials, equipment and services required for, or reasonably incidental to, the excavation for all concrete footings as shown on the drawings or indicated herein.

B. Related Requirements

1. Section 03 30 00 - Cast-In-Place Concrete for concrete and reinforcing steel used in footings.
2. Section 31 23 19 – Dewatering

PART 2 - PRODUCTS

2.1 GENERAL

A. Concrete and Related Materials: Reference Division 3 Section "Cast-in-Place Concrete" and the General Notes.

2.2 FABRICATION

A. All steel reinforcing shall be completely fabricated in a rigid fashion in or der to permit expeditious placement into the excavation by service equipment with a minimum time delay.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Footings shall extend to and penetrate bearing materials as shown on the Structural Plans. The bottom of all footings shall be level and on cleaned, undisturbed material.

B. Soils exposed at the bases of all satisfactory foundation excavations should be protected against any detrimental change in condition, such as disturbance from rain or frost. Surface run-off should be drained away from the excavations and not be allowed to pond.

C. Unauthorized excavation consists of removal of materials beyond indicated sub grade elevations or dimensions without specific direction of the Contracting Officer. Unauthorized excavation, as well as remedial work directed by Contracting Officer, shall be at Contractor's expense.

D. Fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Contracting Officer.

E. Additional Excavation: When excavation has reached required subgrade elevations, notify the Testing Laboratory, who will make an inspection of conditions. If the Testing Laboratory determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Contracting Officer.

3.2 CONCRETE PLACEMENT

A. Concrete shall be placed as soon as practical after the footing excavation has been completed and in no case shall the time lapse between completion of the excavations and concrete placement therein exceed twenty-four hours.

B. Placement of concrete in any individual footing shall be continuous from the beginning of concrete placement to the completion of any individual installation.

C. In cohesive material, footing sides do not require formwork as long as the sides can be maintained in a neat and vertical manner, “mushrooming” will not be allowed. Provide forms if sides cannot be maintained or if the excavation is larger than footing design dimensions.

END OF SECTION 03 30 53

SECTION 03 62 00 – NON-SHRINK GROUT

PART 1 - GENERAL

1.1 GENERAL REFERENCES

A. Contract Documents: Refer to complete set of Contract Documents for requirements that are related to or may affect the work described in this Section.

1.2 SUBMITTALS

A. Action Submittals

1. Product Data: Submit product data for the non-shrink grout verifying the products' compliance with this specification, and describing the manufacturer's placement recommendations.

1.3 SUMMARY DESCRIPTION

A. This specification describes non-shrink epoxy grout and non-shrink cement-based grout to be used wherever shown or implied on the drawings or called for in the specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Non-Shrink Epoxy Grout: All epoxy grout shall be a pourable, non-shrink, 100% solids epoxy system. The epoxy grout system shall be supplied in units consisting of three components: resin, hardener, and specially-blended aggregate, all premeasured and prepackaged.

1. Resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable.
2. Variation of component ratios is not permitted unless specifically recommended by the manufacturer.
3. The non-shrink epoxy grout shall exhibit the following properties:

a. Working life: The mixed epoxy grout system shall have a minimum "working life" of 45 minutes at 75 degrees F.
b. Compressive Strength: The hardened epoxy grout shall attain a minimum com pressive strength of 5,500 psi in 24 hours and 10,000 psi in seven days when tested according to ASTM C579 , Method B.

c. Thermal Coefficient: The epoxy grout shall exhibit a maximum thermal coefficient of .000030 -6 in./in./Fahrenheit when tested according to ASTM C531 or ASTM D696.
d. Effective Bearing Area: The epoxy grout shall exhibit a minimum effective bearing area of 95%.

B. Non-Shrink Cement-Based Grout: Non-Shrink grout shall consist of premeasured, prepackaged materials supplied by the manufacturer requiring only the addition of water. The manufacturer's instructions must be printed on the outside of each bag.

1. The non-shrink cement-based grout shall exhibit the following properties:

a. Non-Shrink: Grout shall comply with ASTMC1107/C1107M. No shrinkage (0.0 percent) and a maximum 4.A0% expansion when tested in accordance with ASTM C827/C827M. No shrinkage (0.0 percent), and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.
b. Compressive Strength: A minimum 28 day compressive strength of 5,000 psi when tested in accordance with ASTM C109/C109M.
c. Setting Time: A minimum initial set time of 60 minutes when tested in accordance with ASTM C191.

C. Water: Potable water.

D. Coarse Aggregate: Provide a clean, coarse aggregate conforming to ASTM C404 (maximum size 3/8") for grout thickness greater than three inches.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Formwork: Forms shall remain in full contact with the grout until it hardens.

1. Forms shall be watertight and capable of supporting the grout until it cures.
2. Wood forms must be sealed.

B. Non-Shrink Epoxy Grout:

1. Surface Dryness: All surfaces shall be kept completely dry before grouting.
2. Grout Removal: Surfaces from which grout is to be removed after placing shall be treated with a paste wax or release agent before placement.

C. Non-Shrink Cement-Based Grout:

1. Composition: For interior column base plates not exposed to weather, grout containing metallic particles such as aluminum powders or iron filings may be used. For any other applications, the grout shall not contain metallic particles such as aluminum powders or iron fillings or expansive cement.
2. Mixing: For grouting depths greater than three (3) inches, add 3/8" coarse aggregate to the mix following manufacturer's recommendations. Use the minimum water necessary

for proper installation in accordance with flowability requirements and manufacturers recommendations for specific applications.

D. Grouting Operation: Concrete surfaces shall be washed clean, then saturated with water for 24 hours prior to placement of cement-based grout. Excess water must be removed prior to grouting. The placement of grout should be rapid and continuous so as to avoid cold joints.

1. Protect grout from external vibration caused by operating machinery for at least 24 hours.
2. Curing: Cover all exposed grout with wet burlap immediately after placement. Keep area moist for a minimum of 48 hours.

3.2 GENERAL

A. Placing: The Contractor shall perform all mixing and placement in accordance with the manufacturer's recommendations.

B. Temperature: The temperature of the grouting surfaces and the grout shall be maintained between 50 degrees F and 90 degrees F during grouting and for a minimum of 24 hours thereafter.

C. Elimination of Voids: Grout placement shall proceed in a manner that will as sure the filling of all spaces and intimate contact of the grout with contact surfaces. Grout holes shall be used; location to be approved by Contracting Officer if not otherwise detailed.

3.3 SURFACE PENETRATION

A. Concrete Surfaces: The concrete on which the grout will bear shall have attained its design strength before grouting.

1. Concrete shall be sound and all surfaces to be in contact with the grout shall be entirely free of oil, grease, laitance, curing compounds, and other deleterious substances.
2. Surfaces shall be roughened by chipping, sandblasting or other mechanical means to assure bond of the grout to the existing concrete.

B. Metal Surfaces: All metal surfaces which are to be in direct contact with the grout shall be thoroughly cleaned to bare metal immediately before grouting. Cool down hot base plates with cold water. Heat cold base plates with hot water.

C. Adjacent Surfaces: Treat adjacent surfaces and formwork with a bond breaking material to prevent bonding of excess grout.

END OF SECTION 03 62 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Loose bearing and leveling plates.
3. Metal plate shutters.
4. Downspout guards.

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete.
2. Steel weld plates and angles for casting into concrete.

PART 2 - PRODUCTS

2.01 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Plates: ASTM A283/A283M

D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.

E. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

2.02 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening stainless steel.

B. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

C. Post-Installed Anchors: Torque-controlled expansion anchors.

D. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

E. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.03 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 09 91 13 "Exterior Painting." Section 09 91 23 "Interior Painting."

B. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

G. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.04 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.05 MISCELLANEOUS FRAMING AND SUPPORTS

A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

B. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes as required by manufacturer or fabricator.

1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as needed. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

2.06 LOOSE BEARING & LEVELING PLATES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize and prime shelf angles located in exterior walls.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.07 DOWNSPOUT GUARDS

A. Fabricate downspout guards from 3/8-inch- thick by 12-inch- wide, steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between downspout and downspout guard. Drill each end for two 3/4-inch anchor bolts.

B. Galvanize and prime steel downspout guards.

C. Prime steel downspout guards with zinc-rich primer.

2.08 WINDOW STORM SHUTTERS

A. Fabricate from 1/8-inch (3.2-mm) rolled-steel floor plate with fTr 1-inch- (25-mm-) diameter holes for water drainage and for lifting.

B. Provide Hing welded to plate
   1. 5 knuckle, ball bearing, heavy weight unit.
   2. Steel metal
   3. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
   4. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

2.09 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

2.10 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
   1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
   1. Shop prime with primers specified in Section 09 91 13 "Exterior Painting" unless zinc-rich primer is needed.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
   1. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or similar construction.

3.02 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.

C. Anchor shelf angles securely to existing construction with anchor bolts.

D. Support steel girders on concrete or steel pipe columns. Secure girders with anchor bolts embedded in concrete or with bolts through top plates of pipe columns.

3.03 INSTALLATION OF BEARING AND LEVELING PLATES

A. Clean concrete bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.04 REPAIRS

A. Touchup Painting:

B. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION 05 50 00

SECTION 05 73 00 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Aluminum decorative railings.

1.02 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.03 ALUMINUM DECORATIVE RAILINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Feeney Inc.
2. Hollaender Mfg. Co.
3. Superior Aluminum Products, Inc.
4. Trex Commercial Products, Inc.
5. VIVA Railings, LLC.

B. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

C. Extruded Bars and Shapes , Including Extruded Tubing: ASTM B221, Alloy 6063-T5/T52.

D. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.

1. Provide Standard Weight pipe unless otherwise indicated.

E. Plate and Sheet: ASTM B209, Alloy 6061-T6.

2.04 FASTENERS

A. Fastener Materials:

1. Aluminum Railing Components: Type 304 stainless steel fasteners.

B. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.

2.05 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Cast-aluminum, center of handrail 2-1/2 inches from face of railing.

B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.06 FABRICATION

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Connections: Fabricate railings with welded or mechanical connections unless otherwise indicated.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

D. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

E. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.

F. Form changes in direction as follows:

1. As detailed.

G. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

H. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

I. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.

J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.

2.07 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.02 ANCHORING POSTS

A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout , mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

D. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.03 ATTACHING RAILINGS

A. Attach handrails to walls with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

B. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

3.04 CLEANING

A. Clean aluminum by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

END OF SECTION 05 73 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with timber.
3. Framing with engineered wood products.
4. Shear wall panels.

B. Related Requirements:

1. Section 06 16 00 "Sheathing" for sheathing, subflooring, and underlayment.

1.02 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. OSB: Oriented strand board.

E. Timber: Lumber of 5 inches nominal size or greater in least dimension.

F. Lumber grading agencies, and abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
4. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber:

1. Boards: 15 19 percent.
2. Dimension Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness unless otherwise indicated.
3. Timber. 19 percent .

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.02 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
3. After treatment, redry dimension lumber to 19 percent maximum moisture content.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat all rough carpentry unless otherwise indicated. items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.03 FIRE-RETARDANT TREATMENT

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece] [or] [omit marking and provide certificates of treatment compliance issued by testing agency.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat all rough carpentry unless otherwise indicated. items indicated on Drawings, and the following:

1. Concealed blocking.
2. Framing for non-load-bearing partitions.
3. Framing for non-load-bearing exterior walls.
4. Roof construction.
5. Plywood backing panels.

2.04 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions by Grade: Construction or No. 2 grade.

1. Application: .
2. Species:

a. Hem-fir (north); NLGA.
b. Spruce-pine-fir; NLGA.
c. Hem-fir; WCLIB, or WWPA.
d. Western woods; WCLIB or WWPA.

B. Load-Bearing Partitions by Grade: Construction or No. 2 grade.

1. Application: Exterior walls interior load-bearing partitions.
2. Species:

a. Douglas fir-larch; WCLIB or WWPA.
b. Douglas fir-south; WWPA.
c. Hem-fir; WCLIB or WWPA.

C. Machine Stress-Rated (MSR) Lumber Partitions: Any species of MSR dimension lumber with a grade of not less than 2400f-2.0E 2100f-1.8E 1650f-1.5E.

1. Application: Exterior walls interior load-bearing partitions.

D. Load-Bearing Partitions by Performance: Any species and grade with a modulus of elasticity of at least 1,500,000 psi 1,300,000 psi 1,100,000 psi 1,000,000 psi 900,000 psi and an extreme fiber stress in bending of at least 1000 psi 850 psi 700 psi 600 psi 500 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.

1. Application: Exterior walls interior load-bearing partitions.

E. Ceiling Joists: Construction or No. 2 grade.

1. Species:

a. Hem-fir (north); NLGA.
b. Southern pine; SPIB.
c. Douglas fir-larch; WCLIB or WWPA.
d. Douglas fir-larch (north); NLGA.
e. Southern pine or mixed southern pine; SPIB.
f. Spruce-pine-fir; NLGA.
g. Hem-fir; WCLIB or WWPA.
h. Douglas fir-south; WWPA.
i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
j. Northern species; NLGA.
k. Eastern softwoods; NeLMA.
l. Western woods; WCLIB or WWPA.

F. Joists, Rafters, and Other Framing by Grade: Select Structural No. 1 No. 2 Construction or No. 2 Construction, Stud, or No. 3 grade.

1. Species:

a. Hem-fir (north); NLGA.
b. Southern pine; SPIB.
c. Douglas fir-larch; WCLIB or WWPA.
d. Southern pine or mixed southern pine; SPIB.
e. Spruce-pine-fir; NLGA.
f. Douglas fir-south; WWPA.
g. Hem-fir; WCLIB or WWPA.
h. Douglas fir-larch (north); NLGA.
i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

G. Joists, Rafters, and Other Framing by Performance: Any species and grade with a modulus of elasticity of at least 1,500,000 psi 1,300,000 psi 1,100,000 psi 1,000,000 psi 900,000 psi and an extreme fiber stress in bending of at least 1000 psi 850 psi 700 psi 600 psi 500 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.

H. Exposed Framing Indicated to Receive a Stained or Natural Finish: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

2.05 TIMBER FRAMING

A. Comply with the following requirements, according to grading rules of grading agency indicated:

1. Maximum Moisture Content: 20 23 percent.
2. Additional Restriction: Free of heart centers.

2.06 ENGINEERED WOOD PRODUCTS

A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.

1. Extreme Fiber Stress in Bending, Edgewise: 3100 psi 2900 psi 2600 psi 2250 psi Insert value for 12-inch nominal- depth members.
2. Modulus of Elasticity, Edgewise: 2,000,000 psi 1,800,000 psi 1,500,000 psi Insert value.
3. Horizontal Shear: 285 psi 225 psi Insert value.
4. Tension Parallel to Grain: 1950 psi 1500 psi 1100 psi Insert value.

C. Moisture Protection:

1. For western species (Douglas fir/hemlock), factory end and edge seal laminated veneer lumber with opaque moisture barrier.
2. For southern and eastern species (southern yellow pine, yellow poplar), factory seal laminated veneer lumber on face, edge, and ends.

D. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.

1. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members.
2. Modulus of Elasticity, Edgewise: 2,200,000 psi.

E. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D5055.

1. Web Material: Either OSB or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1 Plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1 Plywood, complying with DOC PS 1, Exterior grade.
2. Structural Properties: Depths and design values not less than those indicated.
3. Comply with APA PRI-400. Factory mark I-joists with APA-EWS trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA-EWS standard.

F. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.

1. Manufacturer: Provide products by same manufacturer as I-joists.
2. Material: All-veneer product glued-laminated wood product made from any combination solid lumber, wood strands, and veneers.
3. Thickness: 1 inch 1-1/8 inches 1-1/4 inches.

4. Comply with APA PRR-401, rim board grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

G. Insulated Rim Boards: Insulated product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.

1. Manufacturer: Provide products by same manufacturer as I-joists.
2. Rim Board Material: All-veneer product glued-laminated wood product made from any combination solid lumber, wood strands, and veneers.
3. Rim Board Thickness: 1 inch 1-1/8 inches 1-1/4 inches.
4. Insulation: 1-1/2-inch- thick polyisocyanurate foam complying with ASTM C1289.
5. Inside Facing: 7/16-inch- thick OSB.
6. Comply with APA PRR-401, rim board grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

2.07 SHEAR WALL PANELS

A. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

B. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized-steel panel, steel top and bottom plates, and wood studs.

C. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.08 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329 of Type 304 stainless steel.
2. For pressure-preservative-treated wood, use stainless steel fasteners.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 ICC-ES AC308 as appropriate for the substrate.

2.09 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304 Type 316.

1. Use for exterior locations and where indicated.

E. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.

1. Thickness: 0.050 inch 0.062 inch.

F. I-Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.

1. Thickness: 0.050 inch 0.062 inch.

G. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

1. Strap Width: 1-1/2 inches 2 inches.
2. Thickness: 0.050 inch 0.062 inch.

H. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.

I. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

J. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

1. Width: 3/4 inch 1-1/4 inches.
2. Thickness: 0.050 inch 0.062 inch.
3. Length: 16 inches 24 inches As indicated.

K. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick.

L. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

M. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

N. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

1. Bolt Diameter: 5/8 inch 3/4 inch.
2. Width: 2-1/2 inches 3-3/16 inches.
3. Body Thickness: 0.108 inch 0.138 inch.
4. Base Reinforcement Thickness: 0.108 inch 0.239 inch.

O. Wall Bracing:

1. T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.
2. Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick with hemmed edges.

2.10 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets:

1. Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

D. Install shear wall panels to comply with manufacturer's written instructions.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

G. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

H. Do not splice structural members between supports unless otherwise indicated.

I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

J. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

K. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

L. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

M. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

N. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

O. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

P. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.02 INSTALLATION OF WALL AND PARTITION FRAMING

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.

1. For exterior walls, provide 2-by-6-inch nominal-size wood studs spaced 16 inches o.c. unless otherwise indicated.
2. For interior partitions and walls, provide 2-by-4-inch nominal- size wood studs spaced 16 inches o.c. unless otherwise indicated.
3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

D. Provide diagonal bracing in exterior walls, at both walls of each external corner] [walls, at locations indicated, at 45-degree angle, full-story height unless otherwise indicated. metal wall bracing, let into studs in saw kerf.

3.03 INSTALLATION OF FLOOR JOIST FRAMING

A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:

1. Where supported on wood members, by toe nailing or bY using metal framing anchors.
2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.

B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches and do not embed more than 4 inches.

C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.

D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than one-third depth of joist; do not locate closer than 2 inches from top or bottom.

E. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.

F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.

G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c., extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.

H. Provide solid blocking between joists under jamb studs for openings.

I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.

1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

J. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.

1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- size lumber, double-crossed and nailed at both ends to joists.
2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.04 INSTALLATION OF CEILING JOIST AND RAFTER FRAMING

A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate, and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.

B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.

C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.05 INSTALLATION OF TIMBER FRAMING

A. Install timber beams with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.

B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch airspace at sides and ends of wood members.

C. Install wood posts using metal anchors indicated.

D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.06 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Sheathing joint and penetration treatment.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.02 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.03 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat plywood as indicated on Drawings.

2.04 WALL SHEATHING

A. Plywood Wall Sheathing: Either DOC PS 1 or DOC PS 2, Exposure 1, Structural I sheathing.

B. Oriented-Strand-Board Wall Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.

C. Paper-Surfaced Gypsum Wall Sheathing: ASTM C1396/C1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.

1. Type and Thickness: Regular, 1/2 inch thick.

D. Glass-Mat Gypsum Wall Sheathing: ASTM C1177/C1177M.

1. Type and Thickness: Regular, 1/2 inch thick.

2.05 ROOF SHEATHING

A. Oriented-Strand-Board Roof Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.

2.06 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M, unless Type 304 stainless steel is required by manufacturer or fabricator for application.

2. For roof and wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.

2.07 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail or staple to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 06 16 00

SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wood roof trusses.
2. Wood floor trusses.

1.02 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Fabricator Qualifications: Shop that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design metal-plate-connected wood trusses.

B. Structural Performance: Metal-plate-connected wood trusses are to be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.

C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.

D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.02 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Provide dry lumber with 15 percent maximum moisture content at time of dressing.

B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 06 10 00 "Rough Carpentry."

2.03 METAL CONNECTOR PLATES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Simpson Strong-Tie Co, Inc.

B. Fabricate connector plates to comply with TPI 1.

C. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

1. Use for interior locations unless otherwise indicated.

2.04 FASTENERS

A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
2. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

2.05 METAL FRAMING ANCHORS AND ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Simpson Strong-Tie Co., Inc.

B. Allowable design loads, as published by manufacturer, are to comply with or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

2.06 FABRICATION

A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

F. Securely connect each truss ply required for forming built-up girder trusses.

G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

1. Install bracing to comply with Section 06 10 00 "Rough Carpentry."
2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

H. Install wood trusses within installation tolerances in TPI 1.

I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

J. Replace wood trusses that are damaged or do not comply with requirements.

END OF SECTION 06 17 53

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Exterior trim.
2. Siding.
3. Soffits.

1.02 DEFINITIONS

A. MDO: Plywood with a medium-density overlay on the face.

B. PVC: Polyvinyl chloride.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of inspection agency, indicating grade, species, moisture content at time of surfacing, and mill.
2. For exposed lumber, mark grade stamp on end or back of each piece.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: ANSI A135.4.

2.02 EXTERIOR TRIM

A. Lumber Trim for Clear Finish:

1. Species and Grade:

a. Redwood; RIS Heart B.
b. Western red cedar; NLGA, WCLIB, or WWPA Clear Heart.

2. Finger Jointing: Allowed if made with wet-use adhesive complying with ASTM D5572.

3. Face Surface: Surfaced (smooth).

2.03 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.

1. For face-fastening siding, provide ringed-shank siding nails or hot-dip galvanized-steel siding nails.
2. For redwood, provide hot-dip galvanized-steel fasteners.
3. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
4. For pressure-preservative-treated wood, provide hot-dip galvanized-steel fasteners.
5. For applications not otherwise indicated, provide hot-dip galvanized-steel fasteners.

B. Sealants: Latex, complying with ASTM C834 Type OP, Grade NF and applicable requirements in Section 07 92 00 "Joint Sealants," and recommended by sealant and substrate manufacturers for intended application.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed.

1. Cut to required lengths and prime ends.
2. Comply with requirements in Section 09 91 13 "Exterior Painting."

3.02 INSTALLATION, GENERAL

A. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut exterior finish carpentry to fit adjoining work.
3. Refinish and seal cuts as recommended by manufacturer.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate exterior finish carpentry with materials and systems in or adjacent to it.
6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.03 INSTALLATION OF STANDING AND RUNNING TRIM

A. Install flat-grain lumber with bark side exposed to weather.

B. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.

1. Use scarf joints for end-to-end joints.
2. Stagger end joints in adjacent and related members.

C. Fit exterior joints to exclude water.

1. Cope at returns and miter at corners to produce tight-fitting joints, with full-surface contact throughout length of joint.
2. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.04 INSTALLATION OF SIDING

A. Install siding to comply with manufacturer's written instructions and warranty requirements.

B. Finish: Apply finish within two weeks of installation.

END OF SECTION 06 20 13

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior trim, including non-fire-rated interior door frames.
2. Shelving and clothes rods.

1.02 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

C. PVC: Polyvinyl chloride.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber, mark grade stamp on end or back of each piece.

2.02 INTERIOR TRIM

A. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Red oak White maple; NHLA .
2. Maximum Moisture Content: 13 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Not allowed.
5. Veneered Material: Use for lumber trim wider than 6 inches.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

2.03 SHELVING AND CLOTHES RODS

A. Shelving: Closet Shelving: made from , 3/4 inch thick:

1. Softwood Boards:

a. Kiln-dried eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; NeLMA, NLGA, or WWPA C Select (Choice).

B. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.

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

a. A&M Hardware, Inc.
b. EPCO, Engineered Products Co.
c. Knape & Vogt Manufacturing Company.

C. Wood Clothes Rods: 1-1/2-inch- diameter, clear, kiln-dried Douglas fir or southern pine.

2.04 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.02 INSTALLATION, GENERAL

A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.

3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.03 INSTALLATION OF STANDING AND RUNNING TRIM

A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.

1. Do not use pieces less than 24 inches long, except where necessary.
2. Stagger joints in adjacent and related standing and running trim.
3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
4. Use scarf joints for end-to-end joints.
5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
7. Install trim after gypsum-board joint finishing operations are completed.
8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

3.04 INSTALLATION OF SHELVING AND CLOTHES RODS

A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.

1. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled.
2. Space fasteners not more than 16 inches o.c. Use two fasteners at each framing member or fastener location for cleats 4 inches nominal in width and wider.
3. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing.
4. Remove adhesive that is squeezed out after fastening shelf cleats in place.

B. Install shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

C. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches o.c.

D. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. and within 6 inches of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

E. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.

1. Install shelves, fully seated on cleats, brackets, and supports.
2. Fasten shelves to cleats with finish nails or trim screws, set flush.
3. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

F. Install rod flanges for rods as indicated.

1. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
2. Install rods in rod flanges.

END OF SECTION 06 20 23

SECTION 07 14 16 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cold-applied rubberized asphalt waterproofing.
2. Protection course.
3. Molded-sheet drainage panels.

1.02 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

PART 2 - PRODUCTS

2.01 COLD-APPLIED RUBBERIZED ASPHALT WATERPROOFING

A. Single-Component, Rubberized Asphalt Waterproofing: Single-component, silyl-terminated polyether complying with ASTM C836/C836M.

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

a. Henry Company.
b. W.R. Meadows, Inc.

2. Elongation at Break: 360 percent minimum; ASTM D412.
3. Water Vapor Permeance: 0.03 perm(1.72 ng/Pa x s x sq. m), maximum, ASTM E96/E96M.
4. Hydrostatic-Head Resistance: 60 psi average; ASTM D5385/D5385M.

2.02 AUXILIARY MATERIALS

A. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated.

B. Sheet Flashing: 50-mil- minimum, nonstaining, uncured sheet neoprene.

1. Adhesive: Manufacturer's recommended contact adhesive.

C. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric.

D. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.

E. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; and as recommended by manufacturer for substrate and joint conditions.

1. Backer Rod: Closed-cell polyethylene foam.

2.03 PROTECTION COURSE

A. Protection Course, Core or Extruded-Polystyrene Board Insulation, Both Sides with Plastic Film: Fan folded, nominal thickness of 1/4 inch, with compressive strength of not less than 8 psi in accordance with ASTM C1621/C1621M and maximum water absorption by volume of 0.6 percent in accordance with ASTM C272/C272M.

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

a. Kingspan Insulation Limited.
b. Owens Corning.

2.04 MOLDED-SHEET DRAINAGE PANELS

A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft..

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

a. American Hydrotech, Inc.
b. BASF Corporation.
c. Carlisle Coatings & Waterproofing Inc.
d. CETCO, a Minerals Technologies company.
e. GCP Applied Technologies Inc.
f. ISI Building Products.
g. Polyguard Products, Inc.
h. Urethane Polymers International, Inc.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.

E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

F. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898Mand ASTM C1471/C1471M.

G. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

H. Prepare, treat, rout, and fill joints and cracks in substrate in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M. Before coating surfaces, remove dust and dirt from joints and cracks in accordance with ASTM D4258.

I. Install sheet flashing and bond to deck and wall substrates where required in accordance with waterproofing manufacturer's written instructions.

3.02 INSTALLATION OF WATERPROOFING

A. Apply waterproofing in accordance with manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M.

B. Reinforced Waterproofing Applications.

1. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases and pinholes, with an average dry film total thickness of 80 mils.

C. Install protection course with butted joints over waterproofing before starting subsequent construction operations.

1. For horizontal applications, install protection course loose laid over fully cured membrane.
2. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.
3. Molded-sheet drainage panels may be used in place of a separate protection course for vertical applications when approved in writing by waterproofing manufacturer.

3.03 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, in accordance with manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. For vertical applications, install thermal insulation specified in Section 07 21 00 "Thermal Insulation" before installing drainage panels.

3.04 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION 07 04 16

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Graphite-polystyrene foam-plastic board insulation.
3. Polyisocyanurate foam-plastic board insulation.
4. Mineral-wool board insulation.

PART 2 - PRODUCTS

A. Extruded Polystyrene Board Insulation, Type IV A003: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced.

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

    a. DiversiFoam Products.
    b. Dow Chemical Company (The).
    c. Kingspan Insulation Limited.
    d. Owens Corning.

2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.02 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. Polyisocyanurate Board Insulation, Foil Faced A003: ASTM C1289, foil faced, Type I, Class 1 or 2.

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

    a. Atlas Molded Products; a Division of Atlas Roofing Corporation.
    b. Atlas Roofing Corporation.
    c. Carlisle Coatings & Waterproofing Inc.
    d. Dow Chemical Company (The).

e. Firestone Building Products.
f. Hunter Panels.
g. Johns Manville; a Berkshire Hathaway company.
h. Rmax, Inc.

2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.03 MINERAL-WOOL BOARD INSULATION

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 70 percent.

B. Mineral-Wool Board Insulation, Type II, Faced A003: ASTM C612, Type II; faced on one side with foil-scrim or foil-scrim-polyethylene vapor retarder.

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

a. Johns Manville; a Berkshire Hathaway company.
b. SPI, LLC dba, SPI ? Specialty Products & Insulation.
c. Thermafiber, Inc.; an Owens Corning company.

2. Nominal Density: 6 lb/cu. ft..
3. Flame-Spread Index: Not more than 15 when tested in accordance with ASTM E84.
4. Smoke-Developed Index: Not more than zero when tested in accordance with ASTM E84.
5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.04 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

D. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.02 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.03 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION 07 21 00

SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam.

1.02 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.01 CLOSED-CELL SPRAY POLYURETHANE FOAM

A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of 1.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F.

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

a. Demilec (USA) LLC.
b. Icynene-Lapolla; Icynene.
c. Johns Manville; a Berkshire Hathaway company.

2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

END OF SECTION 07 21 19

SECTION 07 26 00 - VAPOR RETARDERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Reinforced-polyethylene vapor retarders.

PART 2 - PRODUCTS

2.01 REINFORCED-POLYETHYLENE VAPOR RETARDERS

A. Reinforced-Polyethylene Vapor Retarders: Sheet with outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 20 lb/1000 sq. ft., with maximum permeance rating of 0.1 perm and a minimum thickens of 10 mils.

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

a. Insulation Solutions, Inc.
b. Raven Industries Inc.
c. Reef Industries, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION OF VAPOR RETARDERS IN CRAWL SPACES

A. Install vapor retarders over prepared grade. Lap joints a minimum of 12 inches and seal with manufacturer's recommended tape. Install second layer over pathways to equipment.

B. Extend vapor retarder over footings and seal to foundation wall or grade beam with manufacturer's recommended tape.

1. Extend vapor retarder vertically minimum 24 inches above top of footing.

C. Seal around penetrations such as utilities and columns in order to create a monolithic, airtight membrane at grade surface, perimeter, and all vertical penetrations.

END OF SECTION 07 26 00

SECTION 07 41 13.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.

1.02 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.03 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Energy Performance:

1. Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for steep-slope roof products.
2. Provide roof panels according to one of the following when tested according to CRRC-1:

a. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
b. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.

C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings G000.
2. Other Design Loads: As indicated on Drawings G000.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

F. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.

G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.02 STANDING-SEAM METAL ROOF PANELS

A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

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

    a. Berridge Manufacturing Company.
    b. MBCI; Cornerstone Building Brands.
    c. McElroy Metal, Inc.
    d. Morin - A Kingspan Group Company.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

    a. Nominal Thickness: 0.034 inch.
    b. Exterior Finish: Three-coat fluoropolymer.
    c. Color: As selected by Contracting Officer from manufacturer's full range.

3. Clips: Two-piece floating to accommodate thermal movement.
4. Material:

    a. 0.0625-inch-] thick, stainless steel sheet.

5. Joint Type: Double folded.
6. Panel Coverage: 16 inches.
7. Panel Height: 2.0 inches.

2.03 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. GCP Applied Technologies Inc.
    b. Owens Corning.
    c. Polyglass U.S.A., Inc.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.04 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels.

E. Panel Fasteners: Self-tapping screws designed to withstand design loads.

F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.05 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.06 FINISHES

A. Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.

PART 3 - EXECUTION

3.01 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.02 INSTALLATION OF UNDERLAYMENT

1. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
2. Apply over the entire roof surface.
3. Apply over the roof area indicated below:

    a. Roof perimeter for a distance up from eaves of 36 inches beyond interior wall line.
    b. Valleys, from lowest point to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches.
    c. Rake edges for a distance of 18 inches.
    d. Hips and ridges for a distance on each side of 12 inches.
    e. Roof-to-wall intersections for a distance from wall of 18 inches.
    f. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of 18 inches.

B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.

3.03 INSTALLATION OF STANDING-SEAM METAL ROOF PANELS

A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Watertight Installation:

    a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.04 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07 41 13.16

SECTION 07 46 46 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes fiber-cement siding soffit.

PART 2 - PRODUCTS

2.01 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following or equal:

a. James Hardie Building Products, Inc.
b. Nichiha USA, Inc.
c. Allura USA.

B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Nominal Thickness: Not less than 5/16 inch.

D. Horizontal Pattern: Boards 6-1/4 to 6-1/2 inches wide in plain style.

1. Texture: Wood grain.

E. Panel Texture: 48-inch- wide sheets with wood-grain texture.

F. Factory Priming: Manufacturer's standard acrylic primer.

2.02 FIBER-CEMENT SOFFIT

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following or equal:

a. James Hardie Building Products, Inc.

b. Nichiha USA, Inc.
c. Allura USA.

B. Nominal Thickness: Not less than 5/16 inch.

C. Pattern: 12-inch- wide sheets with smooth texture.

D. Factory Priming: Manufacturer's standard acrylic primer.

2.03 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer’s recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Finish for Aluminum Flashing: High-performance organic finish.

C. Fasteners:

1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
3. For fastening fiber cement, use stainless-steel fasteners.

D. Insect Screening for Soffit Vents: Aluminum, 18-by-16 mesh.

E. Continuous Soffit Vents: Aluminum, hat-channel shape.

1. Net-Free Area: 6 sq. in./linear ft..
2. Finish: Insert requirement.

F. Round Soffit Vents: Stamped aluminum louvered vents, 2-1/2 inches in diameter.

1. Finish: Insert requirement.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Install fasteners no more than 24 inches o.c.

B. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and to produce a weathertight installation.

3.02 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 46

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Latex joint sealants.

1.02 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

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

a. Adfast.
b. GE Construction Sealants; Momentive Performance Materials Inc.

c. Sika Corporation; Joint Sealants.

2.02 NONSTAINING SILICONE JOINT SEALANTS

A. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

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

a. Pecora Corporation.
b. Sika Corporation; Joint Sealants.
c. Tremco Incorporated.

2.03 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.

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

a. Sika Corporation; Joint Sealants.
b. Pecora Corporation.
c. Tremco Incorporated.

2.04 MILDEW-RESISTANT JOINT SEALANTS

A. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

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

a. Adfast.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Pecora Corporation.
d. Soudal USA.
e. The Dow Chemical Company.
f. Tremco Incorporated.

2.05 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

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

a. Adfast.
b. Alcot Plastics Ltd.
c. Construction Foam Products; a division of Nomaco, Inc.
d. Master Builders Solutions.

B. Cylindrical Sealant Backings: ASTM C1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.06 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.02 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
4. Provide flush joint profile trim in accordance with Figure 8B in ASTM C1193.
5. Provide recessed joint configuration of recess depth in accordance with Figure 8C in ASTM C1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

H. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.03 JOINT-SEALANT SCHEDULE

A. Exterior joints in horizontal traffic surfaces JS-1:

1. Joint Locations:

    a. Isolation and contraction joints in cast-in-place concrete slabs.
    b. Joints between plant-precast architectural concrete paving units.
    c. Joints in stone paving units, including steps.
    d. Tile control and expansion joints.
    e. Joints between different materials listed above.
    f. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, M, P, 50, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2:

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Joints in exterior insulation and finish systems.
c. Joints between metal panels.
d. Joints between different materials listed above.
e. Perimeter joints between materials listed above and frames of doors windows and louvers.
f. Control and expansion joints in overhead surfaces.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Interior joints in horizontal traffic surfaces JS-3:

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.

2. Joint Sealant: Urethane, S, P, 25, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-4:

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Vertical joints on exposed surfaces of concrete walls and partitions.

2. Joint Sealant: Urethane, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-5:

1. Joint Locations:

a. Control joints on exposed interior surfaces of exterior walls.
b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-6:

1. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

G. Concealed mastics JS-7:

1. Joint Locations:

    a. Aluminum thresholds.
    b. Sill plates.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00

SECTION 08 14 33 - STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood doors, stile and rail design; fire rated and non-fire rated.

B. Panels of wood, glass, and louvers.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

A. AWI (QCP) - Quality Certification Program.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
   1. Company with at least one project within past five years with value of woodwork within at least 20 percent of cost of woodwork for this project.
   2. Accredited participant in specified certification program prior to commencement of fabrication and throughout duration of project.

B. Quality Certification:
   1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
   2. Provide labels or certificates indicating that installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   3. Provide designated labels on shop drawings as required by certification program.
   4. Provide designated labels on installed products as required by certification program.
   5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.05 WARRANTY

A. Interior Doors: Provide manufacturer's warranty for the life of the installation.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 DOORS

A. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless otherwise indicated.

B. Interior Doors: 1-3/8 inches thick unless otherwise indicated; solid lumber construction; mortise and tenon joints. Transparent or opaque finish as indicated on drawings.

2.02 DOOR AND PANEL FACINGS

A. Veneer Facing for Transparent Finish: Natural Birch, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Transom Panels: Continuous match to door.
   2. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.

B. Adhesive: Type I - Waterproof.

2.03 DOOR CONSTRUCTION

A. Astragals for Double Doors: Aluminum, Flat shaped, overlapping and recessed at face edge, specifically for double doors.

B. Vertical Exposed Edge of Stiles: Of same species as veneer facing.

C. Fit door edge trim to edge of stiles after applying veneer facing.

D. Panels: Raised, 2-ply solid wood.

E. At exterior doors, provide aluminum flashing at the top and bottom rail for full thickness and width of door.

F. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

G. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
   1. Exception: Doors to be field finished.

H. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

I. Factory install glazing in doors in compliance with quality standards specified, using manufacturer's standard elastomeric glazing sealant.

J. Cut and configure exterior door edge to receive recessed weatherstripping devices. Provide edge clearances in accordance with referenced quality standards.

K. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 FINISHES

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Stain: As selected by Contracting Officer.
      c. Sheen: Flat.
   2. Opaque:

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with color sealer to match door facing.

2.05 ACCESSORIES

A. Glazing: See Section 08 80 00.

B. Panel or Glass Retention Molding: Wood of same species as door facing, flat bead stop, with butted corners; prepared for countersink style tamper proof screws.

C. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standards.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Machine cut for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

END OF SECTION 08 14 33

SECTION 08 16 13 - FIBERGLASS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the following:

1. FRP door panels, molded, seamless.
2. FRP fire-rated door panels, molded, seamless.
3. Glazing installation.

B. Products Installed But Not Supplied Under This Section:

1. Glazing is furnished under Section 08 80 00 "Glazing."

C. Related Sections include the following

1. Section 08 80 00 "Glazing" for glass lites set in FRP doors.
2. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

a. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg.

2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for basic protection.

1. Large-Missile Test: For glazed openings located within 30 feet of grade.

D. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.28 deg Btu/F x h x sq. ft. when tested according to ASTM C518.

2.02 FRP Surface-Burning Characteristics: As follows; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

A. Flame-Spread Index: 25 or less when tested according to ASTM E84.

B. Burning Rate or Extent: Self-extinguishing when tested according to ASTM D 635

2.03 MANUFACTURERS

A. Source Limitations: Obtain FRP doors and frames through one source from a single manufacturer.

2.04 DOORS AND FRAMES

A. Construct FRP doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Transom Frames: Fabricated from same material and material thickness as adjacent door frame.

C. FRP Doors, Molded, Seamless:

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

a. Waudena.
b. Chase Doors.
c. Chem-Pruf, a Senneca Co.
d. Corrim Company.
e. Special Lite.

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Waudena; Timberline Series.
b. Chase Doors; Fib-R-Dor.
c. Chem-Pruf, a Senneca Co.; Standard Door Series.
d. Corrim Company; Corrim FRP Doors.
e. Special-Lite; Special

3. Type: Flush panel and as indicated in the Door and Frame Schedule.

4. Thickness: 1-3/4 inches.
5. Construction: Separately molded one-piece fiber reinforced plastic faces assembled over core material with edges continuously bonded and machined to produce a door panel with no visible joints or seams on faces or edges.

    a. Glass Fiber to Resin Ratio: Not less than 30 percent glass fiber.
    b. Face Construction: One-piece panel, molded of resin saturated fiber glass mat nominally 1/8 inch thick with exposed surface coated with minimum 15 mil gel coat.
    c. Edge Construction: Minimum 3 layers of resin saturated fiber glass mat nominally 3/8 inch thick.
    d. Hinge Reinforcement: Stainless-steel embedded in fiberglass matrix of door edges.

6. Edge Bevel: Provide manufacturer's standard beveled or square edges.
7. Core: Either of following:

    a. Manufacturer's standard.
    b. Polypropylene honeycomb.
    c. Polyisocyanurate.

8. Exposed Finish:

    a. Face Texture: As selected by Contracting Officer from manufacturer's full range.
    b. Color: As selected by Contracting Officer from manufacturer's full range.
    c. Sheen: As selected by Contracting Officer from manufacturer's full range.

9. USDA Acceptance: Furnish FRP doors and frames accepted for food-processing applications.

D. FRP Frames, Molded, Solid Profile:

1. Product: Subject to compliance with requirements, provide frames by manufacturer of door panels furnished for Project.
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Waudena; Timberline Series.
    b. Chase Doors; Fib-R-Dor.
    c. Chem-Pruf, a Senneca Co.; Standard Door Series.
    d. Corrim Company; Corrim FRP Doors.
    e. Special-Lite; SpecialChem-Pruf

2.05 MATERIALS

A. Stainless-Steel Sheet: ASTM A 666, austenitic stainless steel, Type indicated.

B. Fiberglass Mat Weight: Minimum 1.5 ounces per square foot.

C. Resins: Manufacturer's formulation for fabricating units to meet specified requirements.

D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching stainless-steel door frames of type indicated.

E. Fasteners: Stainless steel.

F. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

2.06 FASTENERS, ANCHORS AND REINFORCEMENT

A. Fasteners: Unless otherwise indicated, provide Type 316 stainless-steel fasteners. Select fasteners for type, grade, and class required.

1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads.

B. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Exterior Locations: Alloy Group 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

C. Rivet Nuts: Type 316 stainless-steel.

D. Jamb Anchors: Formed from stainless steel type indicated above.

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick Type 316 stainless-steel.
2. Compression Type for Slip-on Frames: Adjustable compression anchors.

E. Ceiling Struts: Minimum 3/8-inch-thick by 2-inch- wide Type 304 stainless-steel.

2.07 LIGHT FRAMES

A. Lite Frames in Non-rated Doors:

1. Stops: Pultruded fiberglass reinforced plastic construction.
2. Sizes: Indicated on Drawings.
3. Fasteners: Stainless steel screws.

2.08 TRANSOMS

A. Fiberglass Reinforced Plastic (FRP) Transoms: Match adjacent door construction and color.

2.09 DOOR HARDWARE

A. Door Hardware: Comply with requirements in Section 08 71 00 "Door Hardware."

2.10 FABRICATION

A. FRP Frames:

1. Hole Reinforcing: Reinforce fastener holes with stainless-steel rivet nuts, except at locations reinforced with stainless steel backing plate.
2. Miter jamb-to-head joints to produce hairline joint.

B. Stainless-Steel Anchors and Reinforcing: Fabricate to be concealed from view in finished installation.

1. Floor Anchors: Fabricate to field fasten to bottom of jambs in door stop recess.

C. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

1. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
2. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare FRP doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Section 08 71 00 "Door Hardware."

1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of FRP doors and frames.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of FRP frame connections before frame installation.
2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Fabricate spreader bars with length matching inside dimension of header in accordance with manufacturer's written instructions.

B. Frame Assembly: Field assemble FRP frames in compliance with manufacturer's written instructions. Install fasteners from finished face-side of frame, through FRP frame into metal reinforcement. Select fastener length so that not less than 2 full screw threads are exposed on back side of metal reinforcement.

1. Connect head-to-jamb miter joints to produce hairline joints with exposed faces smooth and flush. Fasten concealed stainless steel joint reinforcement using not less than 2 stainless-steel screws straddling each side of miter joint. Fasten both faces at each miter joint.
2. Floor Anchors: Fasten anchors to bottom of jambs with not less than 2 stainless-steel screws.

C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install FRP doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. FRP Frames: Install FRP frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-protection-rated openings, install frames according to NFPA 80.
b. Install frames with removable glazing stops located on secure side of opening.
c. Install door silencers in frames before grouting.
d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
e. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb that extends to floor and secure with postinstalled expansion anchors.

a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches in height.
2) Four anchors per jamb from 60 to 90 inches in height.
3) Five anchors per jamb from 90 to 96 inches in height.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

b. Compression Type: Not less than two anchors in each jamb.
c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

4. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
5. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
7. Installation Tolerances: Adjust FRP door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. FRP Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated FRP Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work including FRP doors or frames that are warped, bowed, or otherwise unacceptable.

B. Clean grout and other bonding material from surfaces of FRP doors and frames immediately after installation.

END OF SECTION 08 16 13

SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Access doors and frames.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection and temperature-rise limit ratings indicated, according to NFPA 252 or UL 10B.

2.02 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Exposed Flanges A101, B101, C101, & D101:

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

    a. Activar Construction Products Group, Inc. - JL Industries.
    b. ACUDOR Products, Inc.
    c. Babcock-Davis.

2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Optional Features: Piano hinges.
4. Locations: Insert location or substrate.
5. Stainless Steel Sheet for Door: Nominal 0.062 inch, 16 gage, ASTM A480/A480M No. 4 finish.
6. Frame Material: Same material, thickness, and finish as door.
7. Latch and Lock: Cam latch, key operated.

B. Flush Access Doors with Concealed Flanges A101, B101, C101, & D101:

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

    a. Activar Construction Products Group, Inc. - JL Industries.
    b. ACUDOR Products, Inc.

c. Babcock-Davis.

2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Optional Features: Piano hinges.
4. Locations: Ceiling.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage factory primed and finished.
6. Frame Material: Same material and thickness as door.
7. Latch and Lock: Cam latch, screwdriver operated.

2.03 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

B. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.

C. Stainless Steel Flat Bars: ASTM A666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.

D. Frame Anchors: Same material as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.04 FABRICATION

A. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

C. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.
3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 08 71 00 "Door Hardware."

2.05 FINISHES

A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.

    a. Color: As selected by Contracting Officer from full range of industry colors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Adjust doors and hardware, after installation, for proper operation.

3.02 FIELD QUALITY CONTROL

A. Inspection Agency: Contractor will engage a qualified inspector in accordance with Section 01 40 00 – Quality Requirements to perform inspections and to furnish reports to Contracting Officer.

B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

END OF SECTION 08 31 13

SECTION 08 36 13 - SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead sectional doors.

B. Electrical controls.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

C. DASMA 102 - American National Standard Specifications for Sectional Doors.

D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.

F. NFPA 70 - National Electrical Code.

G. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
   1. Manufacturer's label certifying compliance with specified windload.

PART 2 PRODUCTS

2.01 INSULATED STEEL SECTIONAL DOORS

A. Acceptable Manufacturers (Medium Duty Door) or equal:
   1. Clopay: 3715 Series.
   2. Overhead Door Co: Thermacore 593 Series
   3. Wayne Dalton Door Co: Thermospan TS15 Series.

B. Characteristics:
   1. Size: As indicated on the drawings.
   2. Type: Metal/foam/metal sandwich panel construction, with EPDM thermal break and ship-lap design with rounded water channels.

3. Panels:
   a. Metal Facer: Nominal 26 gauge galvanized steel, stucco embossed.
   b. Panel Thickness: nominal 1 5/8 inch.
   c. Finish: Manufacturer's standard baked-on polyester coat. Color: White.
   d. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
   e. Thermal Values: Minimum R-value of 16.
4. Operation:
   a. Truck Doors: Manual pull rope operated. Mount on left side of door.
   b. Drive-In Doors: Electric motor operated. Mount on left side of door. Provide backup chain hoist.
5. Lift: Full vertical, unless otherwise indicated.
6. Hardware:
   a. Counterbalance: Heavy duty torsion springs mounted on cross header shaft. Minimum 25,000 cycles.
   b. Tracks: 3 inch.
   c. Provide lift handles on inside face.
   d. Lock: Provide inside only slide bar lock – mount at 5 feet AFF on driver side of door.
   e. Hinges: heavy duty.
   f. Provide spring bumpers.
7. Weatherstripping: EPDM rubber tube seals fitted inside joints between sections. EPDM rubber bulb-type strip at bottom. Header seal and jamb weatherstripping.
8. Wind Load Design: Withstand positive and negative wind loads when tested in accordance with ASTM E 330. Total test duration for each test direction shall be one minute at design pressure. Include pressure equal to 1.5 times the design pressure for 10 seconds during each test.
   a. Design Loads: See Structural Drawings for Component and Cladding, Service Loads.
   b. Design door to avoid use of wind bracing, use increase door thickness or concealed brace as much as possible.

2.02 COMPONENTS

A. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.

B. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

C. Head Weatherstripping: EPDM rubber seal, one piece full length.

D. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

E. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

2.03 ELECTRIC OPERATION

A. Electrical Characteristics:

1. 1/2 hp; manually operable in case of power failure, transit speed of 12 inches per second.
2. 115 volts, single phase, 60 Hz.

B. Electric Operators: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.
1. Mounting: Side mounted on cross head shaft.
2. Motor Enclosure:
3. Motor Rating: 1/3 hp; continuous duty.
4. Motor Voltage: 120 volts, single phase, 60 Hz.
5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
6. Controller Enclosure: NEMA EN 10250, Type 1.
7. Opening Speed: 12 inches per second.
8. Brake: Adjustable friction clutch type, activated by motor controller.
9. Manual override in case of power failure.

C. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

E. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
1. 24 volt circuit.
2. Surface mounted, at interior door jamb.
3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

F. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

F. Install perimeter trim.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.

B. Maximum Variation from Level: 1/16 inch.

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.04 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.05 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION 08 36 13

SECTION 08 54 13 - FIBERGLASS WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Fiberglass-framed windows of following operating types:

a. Single hung.
b. Fixed.

2. Glass and glazing for windows
3. Insect screens.

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating fiberglass windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: An installer acceptable to fiberglass window manufacturer for installation of units required for this Project.

1.03 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace fiberglass windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Duxton Windows and Doors.
2. Fibertec Window and Door Manufacturing.
3. Inline Fiberglass Ltd.
4. Milgard Windows, Inc.
5. Pella Corporation.
6. Serious Materials Inc.
7. Thermotech Windows Ltd.

B. Source Limitations: Obtain fiberglass windows from single source from single manufacturer.

2.02 WINDOW PERFORMANCE REQUIREMENTS, GENERAL

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: WDMA certified with label attached to each window.

2.03 SINGLE HUNG FIBERGLASS WINDOWS

A. Provide in locations indicated on Drawings.

B. Performance Requirements:

1. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

   a. Minimum Performance Class: CW.
   b. Minimum Performance Grade: 30.

2. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.28 Btu/sq. ft. x h x deg F.
3. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.30.
4. Sound Transmission Class (STC): Rated for not less than 26 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
5. Outside-Inside Transmission Class (OITC): Rated for not less than 26 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

C. Frames and Sashes: Pultruded fiberglass complying with AAMA/WDMA/CSA 101/I.S.2/A440 and with exposed exterior fiberglass surfaces finished with manufacturer's standard enamel coating complying with AAMA 623.

1. Exterior Color: Color selected by Contracting Officer from manufacturer's full range.
2. Interior Finish: Wood veneer clad, oak.

D. Glass and Glazing:

1. Glass for fiberglass windows is specified under Section 08 80 00 "Glazing."

2. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock fiberglass windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As selected by Contracting Officer from manufacturer's full range.
2. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
3. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
4. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.

F. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

G. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

H. Insect Screens: Provide half, outside for single-hung sashes.

2.04 FIXED FIBERGLASS WINDOWS

A. Provide in locations indicated on Drawings.

B. Performance Requirements:

1. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

a. Minimum Performance Class: CW.
b. Minimum Performance Grade: 30.

2. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.28 Btu/sq. ft. x h x deg F .
3. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.30.
4. Sound Transmission Class (STC): Rated for not less than 26 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
5. Outside-Inside Transmission Class (OITC): Rated for not less than 26 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

C. Frames and Sashes: Pultruded fiberglass complying with AAMA/WDMA/CSA 101/I.S.2/A440 and with exposed exterior fiberglass surfaces finished with manufacturer's standard enamel coating complying with AAMA 623.

1. Exterior Color: Color selected by Contracting Officer from manufacturer's full range.
2. Interior Finish: Wood veneer clad, oak.

D. Glass and Glazing:

1. Glass for fiberglass windows is specified under Section 08 80 00 "Glazing."

2. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

E. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.05 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash indicated. Screen wickets are not permitted.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
2. Finish for Interior Screens: Baked-on organic coating in color selected by Contracting Officer from manufacturer's full range.
3. Finish for Exterior Screens: Baked-on organic coating in color selected by Contracting Officer from manufacturer's full range.

C. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch- diameter, coated aluminum wire.

1. Wire-Fabric Finish: Black.

2.06 FABRICATION

A. Fabricate fiberglass windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze fiberglass windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor shall engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
2. Air-Infiltration Testing:

a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
b. Allowable Air-Leakage Rate: Air infiltration rate of not greater than 0.3 cubic feet per minute per square foot.

3. Water-Resistance Testing:

a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three mockup windows of each type as selected by Contracting Officer and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Remove and replace noncomplying windows and retest as specified above.

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.

3.04 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 54 13

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:

a. Swinging doors.
b. Sliding doors.

1.02 PREINSTALLATION MEETINGS

A. Keying Conference: Conduct conference at Project site.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor and Contracting Officer about door hardware and keying.

1. Scheduling Responsibility: Preparation of door hardware and keying schedule.
2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC)

1.04 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested in accordance with UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft.at the tested pressure differential of 0.3-inch wg of water.

C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design” the ABA standards of the Federal agency having jurisdiction, ICC A117.1"

2.02 HINGES

A. Hinges: BHMA A156.1.

2.03 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

2.04 CONTINUOUS HINGES

A. Pin-and-Barrel-Type Hinges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allegion plc.
b. Hager Companies.
c. McKinney Products Company; an ASSA ABLOY Group company.
d. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.05 MECHANICAL LOCKS AND LATCHES

A. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Locks: Minimum 3/4-inch latchbolt throw.
2. Deadbolts: Minimum 1-inch bolt throw.

B. Lock Trim:

1. Description: As indicated on Drawings.
2. Levers: Wrought.
3. Escutcheons (Roses): Wrought.
4. Dummy Trim: Match lever lock trim and escutcheons.

C. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

D. Mortise Locks: BHMA A156.13; Security Grade 1; stamped steel case with steel or brass parts; Series 1000.

E. Locks shall be capable of accepting Best, or equivalent, key cores. General Contractor and Modular Home Manufacturer shall coordinate with Owner at required locations. Best or other cores may be used in multiple manufacturers' locks and can centralize the use and fabrication of cores.

2.06 AUXILIARY LOCKS

A. Mortise Auxiliary Locks: BHMA A156.36; Grade 1; with strike that suits frame.

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

a. Allegion plc.
b. Hager Companies.
c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

B. Push-Button Combination Locks: BHMA A156.36; cylindrical; Grade 1; lock opens by entering a one- to five-digit code by pushing correct buttons in correct sequence; automatically relocks when door is closed; with strike that suits frame.

1. Manufacturers: Subject to compliance with requirements, [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Kaba Ilco Corp.

2.07 SELF-CONTAINED ELECTRONIC LOCKS

A. Self-Contained Electronic Locks: BHMA A156.25, mortise; with internal, battery-powered, self-contained electronic locks; consisting of complete lockset, motor-driven lock mechanism, and actuating device; enclosed in zinc-dichromate-plated, wrought-steel case, and strike that suits frame. Provide key override, low-battery detection and warning, LED status indicators, and ability to program at the lock.

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

    a. Allegion plc.
    b. Best Access Systems; Stanley Security Solutions, Inc.
    c. Kaba Ilco Corp.
    d. Marks USA.
    e. SARGENT Manufacturing Company; ASSA ABLOY.
    f. Yale Security Inc; an ASSA ABLOY Group company.

2.08 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

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

    a. Allegion plc.
    b. Hager Companies.
    c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.09 CONCEALED CLOSERS

A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

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

    a. Allegion plc.
    b. DORMA USA, Inc.
    c. Norton Door Controls; an ASSA ABLOY Group company.
    d. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
    e. SARGENT Manufacturing Company; ASSA ABLOY.

2.10 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

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

a. Allegion plc.
b. Architectural Builders Hardware Mfg., Inc.
c. DORMA USA, Inc.
d. Hager Companies.
e. INOX by Unison Hardware, Inc.
f. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
g. SARGENT Manufacturing Company; ASSA ABLOY.

2.11 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

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

a. Hager Companies.
b. Legacy Manufacturing.
c. M-D Building Products, Inc.
d. National Guard Products, Inc.
e. Pemko; an ASSA ABLOY Group Company.
f. Reese Enterprises, Inc.
g. Sealeze.
h. Zero International; an Allegion brand.

B. Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:

1. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.

2.12 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

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

a. Hager Companies.
b. Legacy Manufacturing.
c. M-D Building Products, Inc.
d. National Guard Products, Inc.
e. Pemko; an ASSA ABLOY Group Company.

f. Reese Enterprises, Inc.
g. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
h. Sealeze.
i. Zero International; an Allegion brand.

2.13 SLIDING DOOR HARDWARE

A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.

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

a. Arthur Cox & Sons, Inc.
b. Hager Companies.
c. Hettich America L.P.
d. Johnson, L. E., Products, Inc.
e. K.N. Crowder Mfg. Inc.
f. PC Henderson Inc.
g. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.14 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Contracting Officer.

1. Configuration: Provide one power supply for each door opening with electrified door hardware.

E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."

F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

H. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

I. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.02 ADJUSTING

A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.03 DOOR HARDWARE SCHEDULE

A. Hardware Sets See drawings

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Insulating glass.
2. Glazing sealants.
3. Glazing tapes.
4. Miscellaneous glazing materials.

1.02 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.03 QUALITY ASSURANCE

A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.04 WARRANTY

A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazing.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Snow Loads: As indicated on Drawings G000.
2. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Windborne-Debris-Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for basic protection.

1. Large-Missile Test: For glazing located within 30 feet of grade.
2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
2. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
3. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

F. Acoustic Performance:

1. Exterior Glazing: 28 OITC.

2.02 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.03 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with polyisobutylene and silicone primary and secondary sealants.
2. Perimeter Spacer: Aluminum with mill or clear anodic finish Silicone with integral desiccant and vapor barrier.

3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.04 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Contracting Officer from manufacturer's full range of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.05 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

2.06 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks:

1. Silicone with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

C. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

D. Edge Blocks:

1. EPDM with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

PART 3 - EXECUTION

3.01 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

3.02 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.03 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.04 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.05 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.06 INSULATING GLASS SCHEDULE

A. Low-E-Coated, Clear Insulating Glass Type A005A, A005B, A005C, A005D, A006C, & A006D:

1. Basis-of-Design Product: Solarban 60 by Virto Architectural Glass, SunGuard SN 54 by Guardian Glass, R-Series by Tecnoglass, or equal.
2. Overall Unit Thickness: 5/8 inch.
3. Minimum Thickness of Each Glass Lite: 4 mm.
4. Outdoor Lite: float glass.
5. Interspace Content: Argon.
6. Indoor Lite: float glass.
7. Low-E Coating: Pyrolytic or sputtered on second surface.
8. Safety glazing required.

END OF SECTION 08 80 00

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.
4. Texture finishes.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.02 GYPSUM BOARD, GENERAL

A. Recycled Content: Postconsumer recycled content plus one-half of PR consumer recycled content not less than 20 percent.

B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.03 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

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

a. American Gypsum.
b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. National Gypsum Company.
e. PABCO Gypsum.

f. USG Corporation.

2. Thickness: 1/2 inch.
3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

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

a. American Gypsum.
b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. National Gypsum Company.
e. PABCO Gypsum.
f. Panel Rey SA.
g. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

C. Flexible Gypsum Board: ASTM C1396/C1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

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

a. Continental Building Products, LLC.
b. Georgia-Pacific Gypsum LLC.
c. National Gypsum Company.
d. PABCO Gypsum.
e. USG Corporation.

2. Thickness: 1/4 inch.
3. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C1396/C1396M.

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

a. American Gypsum.
b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. National Gypsum Company.
e. PABCO Gypsum.
f. USG Corporation.

2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

E. Foil-Backed Gypsum Board: ASTM C1396/C1396M.

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

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Continental Building Products, LLC.
    c. Georgia-Pacific Gypsum LLC.
    d. National Gypsum Company.
    e. USG Corporation.

2. Core: As indicated on Drawings, Type X as required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

F. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

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

    a. American Gypsum.
    b. Continental Building Products, LLC.
    c. Georgia-Pacific Gypsum LLC.
    d. National Gypsum Company.
    e. PABCO Gypsum.
    f. USG Corporation.

2. Core: As indicated on Drawings 5/8 inch, Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

G. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

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

    a. American Gypsum.
    b. Continental Building Products, LLC.
    c. Georgia-Pacific Gypsum LLC.
    d. National Gypsum Company.
    e. PABCO Gypsum.
    f. USG Corporation.

2. Core: As indicated on Drawings.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
6. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements according to test in Annex A1.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

H. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

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

   a. American Gypsum.
   b. Continental Building Products, LLC.
   c. Georgia-Pacific Gypsum LLC.
   d. National Gypsum Company.
   e. PABCO Gypsum.
   f. USG Corporation.

2. Core: As indicated.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.04 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.

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

   a. American Gypsum.
   b. Continental Building Products, LLC.
   c. Georgia-Pacific Gypsum LLC.
   d. National Gypsum Company.
   e. PABCO Gypsum.
   f. Panel Rey SA.
   g. USG Corporation.

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

2.05 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Exterior Gypsum Soffit Board: ASTM C1396/C1396M, with manufacturer's standard edges.

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

    a. American Gypsum.
    b. Continental Building Products, LLC.
    c. Georgia-Pacific Gypsum LLC.
    d. PABCO Gypsum.
    e. USG Corporation.

2. Core: As indicated.

B. Glass-Mat Gypsum Sheathing Board: ASTM C1177/C1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

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

    a. American Gypsum.
    b. Continental Building Products, LLC.
    c. Georgia-Pacific Gypsum LLC.
    d. National Gypsum Company.
    e. PABCO Gypsum.
    f. Panel Rey SA.
    g. USG Corporation.

2. Core: As indicated.

2.06 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.

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

    a. CertainTeed Corporation; Saint-Gobain North America.
    b. Georgia-Pacific Gypsum LLC.
    c. National Gypsum Company.
    d. USG Corporation.

2. Core: As indicated on.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

B. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

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

a. C-Cure.
b. CertainTeed Corporation; Saint-Gobain North America.
c. Custom Building Products.
d. FinPan, Inc.
e. James Hardie Building Products, Inc.
f. National Gypsum Company.
g. USG Corporation.

2. Thickness: 1/2 inch
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.07 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet Galvanized or aluminum-coated steel sheet or rolled zinc Paper-faced galvanized-steel sheet.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Exterior Trim: ASTM C1047.

1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.08 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping drying-type, all-purpose compound.
4. Finish Coat: For third coat, use setting-type, sandable topping drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound drying-type, all-purpose compound high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.09 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

E. Vapor Retarder: As specified in Section 07 26 00 "Vapor Retarders."

2.10 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.

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

a. CertainTeed Corporation; Saint-Gobain North America.
b. National Gypsum Company.
c. USG Corporation.

2. Texture: Light Orange Peel.

PART 3 - EXECUTION

3.01 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Comply with ASTM C840.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

E. Prefill open joints and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

4. Level 5: Where indicated on Drawings.

a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

H. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

I. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

J. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.02 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

3.03 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Porcelain tile.
2. Tile backing panels.
3. Crack isolation membranes.

1.02 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of large format tile.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.02 TILE PRODUCTS

A. Porcelain Tile Type A101, B101, C101, & D101: Unglazed.

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

a. Crossville, Inc.
b. Daltile.
c. Florida Tile, Inc.

2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: 11-13/16 by 11-13/16 inches.

4. Thickness: 3/8 inch.
5. Face: Plain with square or cushion edges.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Tile Color, Glaze, and Pattern: As selected by Contracting Officer from manufacturer's full range.
8. Grout Color: As selected by Contracting Officer from manufacturer's full range.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. External Corners: Surface bullnose, module size same as adjoining flat tile.

2.03 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A.

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

    a. C-Cure.
    b. Custom Building Products.
    c. FinPan, Inc.
    d. Georgia-Pacific Gypsum LLC.
    e. USG Corporation.

2. Thickness: 1/2 inch.

2.04 CRACK ISOLATION MEMBRANES

A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Crack Isolation Membrane, Fabric-Reinforced, Fluid-Applied: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

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

    a. Custom Building Products.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.

C. Crack Isolation Membrane, Fluid-Applied: Liquid-latex rubber or elastomeric polymer.

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

    a. Custom Building Products.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.

D. Crack Isolation Membrane and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both a crack isolation membrane and tile-setting adhesive in a two-step process.

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

    a. Boiardi Products Corporation; a QEP company.
    b. Bostik, Inc.
    c. Laticrete International, Inc.

2.05 SETTING MATERIALS

A. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.

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

    a. Custom Building Products.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.

2. Provide prepackaged, dry-mortar mix to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.
4. For wall applications, provide nonsagging mortar.

B. EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar (Thinset): ANSI A118.11.

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

    a. Custom Building Products.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.

2. Provide prepackaged, dry-mortar mix to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.

2.06 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.

B. High-Performance Tile Grout: ANSI A118.7.

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

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.

2. Polymer Type:

a. Dry, redispersible form, prepackaged with other dry ingredients.
b. Liquid-latex form for addition to prepackaged dry-grout mix.

2.07 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.

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

a. Blanke Corporation.
b. Ceramic Tool Company, Inc.
c. Schluter Systems L.P.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed, or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.03 INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

    a. Exterior tile floors.
    b. Tile floors in wet areas.
    c. Tile swimming pool decks.
    d. Tile floors in laundries.
    e. Tile floors consisting of tiles 8 by 8 inches or larger.
    f. Tile floors consisting of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Tile: 1/4 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

K. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

L. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

M. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

3.04 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Wood Subfloor:

1. TCNA F150 or TCNA F160 TL-1: Thinset mortar on exterior-glue plywood.

a. Ceramic Tile Type: TL-1.
b. Thinset Mortar: EGP (exterior glue plywood) latex-Portland cement mortar.
c. Grout: High-performance sanded grout.

END OF SECTION 09 30 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Solid vinyl floor tile.

PART 2 - PRODUCTS

2.01 SOLID VINYL FLOOR TILE (See A101A-D for locations)

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

1. Armstrong World Industries, Inc; Pro Mark Distressed Driftwood.
2. Mannington Mills, Inc.; ADURA®Flex Sausalito Bridgeway.
3. Shaw Contract Group; a Berkshire Hathaway company; Terrain II Timber.

B. Tile Standard: ASTM F 1700.

1. Class: Class I, Monolithic Vinyl Tile.
2. Type: A, Smooth Surface.

C. Thickness: 0.120 inch.

D. Size: Insert dimensions.

E. Colors and Patterns: Insert colors and patterns.

2.02 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturers for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

D. Before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.02 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

H. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply one coat(s).

END OF SECTION 09 65 19

SECTION 09 68 16 - SHEET CARPETING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Tufted carpet.

1.02 WARRANTY

A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.

B. Special Warranty for Carpet Cushion: Manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.01 TUFTED CARPET (See A101A-D for locations).

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Mannington Mills, Inc; Collection Dwellings: Haven.
2. Mohawk Group (The); Mohawk Carpet, LLC; Collective Harmony.
3. Shaw Contract Group; a Berkshire Hathaway company; Comforting I.

B. Color: As selected by Contracting Officer from manufacturer's full range.

C. Pattern: As selected by Contracting Officer from manufacturer's full range.

D. Fiber Content: 100 percent nylon 6, 6.

E. Pile Characteristic: Cut or Cut-and-loop Frieze pile.

F. Yarn Twist: 5.0 to 7.0 TPI.

G. Yarn Count: 3,000 to 4,000.

H. Density: 36 to 40 oz./cu. yd..

I. Pile Thickness: 0.5 to 0.75 inches for finished carpet.

J. Stitches: 10 to 12 stitches per inch.

K. Gage: 1/8 inch (8 ends per inch).

L. Face Weight: 30 to 40 oz./sq. yd..

M. Total Weight: 70 to 90 oz./sq. yd. for finished carpet.

N. Primary Backing: Nonwoven, polypropylene or polyester.

O. Secondary Backing: Nonwoven, polypropylene or polyester.

P. Backcoating: SBR latex.

Q. Backing System: Insert proprietary name.

R. Roll Width: 12 feet.

S. Applied Treatments:

1. Applied Soil-Resistance Treatment: Manufacturer's standard material.
2. Antimicrobial Treatment: Manufacturer's standard material.

    a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

T. Sustainable Design Requirements:

1. Sustainable Product Certification: Silver level certification according to ANSI/NSF 140.

U. Performance Characteristics:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D7330.
2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
3. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.
4. Tuft Bind: Not less than 8 lbf according to ASTM D1335.
5. Delamination: Not less than 4 lbf/in. according to ASTM D3936.
6. Noise Reduction Coefficient (NRC): according to ASTM C423.
7. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
8. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
9. Electrostatic Propensity: Less than Insert number kV according to AATCC 134.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Wood Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

3.02 PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet manufacturer's written installation instructions for preparing substrates.

B. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.03 INSTALLATION

A. Comply with the Carpet and Rug Institute's CRI 104 and carpet and carpet cushion manufacturers' written installation instructions for the following:

1. Direct-glue-down installation.
2. Double-glue-down installation.
3. Carpet with attached-cushion installation.
4. Preapplied adhesive installation.
5. Hook-and-loop installation.
6. Stretch-in installation.
7. Stair installation.

B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

1. Stretch-in Carpet Installation: Install carpet cushion seams at 90-degree angle with carpet seams.

C. Install pattern parallel to walls and borders.

D. Install borders with mitered corner seams.

E. Do not bridge building expansion joints with carpet.

F. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

G. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

H. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

I. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer and carpet cushion and adhesive manufacturers.

END OF SECTION 09 68 16

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Primers.
2. Finish coatings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore & Co.
2. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
3. Sherwin-Williams Company (The).

2.02 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: As selected by Contracting Officer from manufacturer's full range.

2.03 PRIMERS

A. Exterior, Latex Wood Primer: White, waterborne-emulsion primer formulated for resistance to extractive bleeding, mold, and microbials; for hiding stains; and for use on exterior wood subject to extractive bleeding.

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

a. Behr Paint Company; Behr Process Corporation.

b. Benjamin Moore & Co.
c. Sherwin-Williams Company (The).

B. Exterior, Alkyd/Oil Wood Primer: Alkyd/oil-based primer that is resistant to extractive bleeding when applied to wood substrates with less than 15 percent moisture content; formulated for sag, mold, and microbial resistance; for hiding stains; and for use on exterior wood subject to extractive bleeding.

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

a. Benjamin Moore & Co.
b. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
c. Sherwin-Williams Company (The).

C. Quick-Drying, Alkyd Metal Primer: Corrosion-resistant, solvent-based, modified-alkyd primer; lead and chromate free; formulated for quick-drying capabilities and for use on cleaned, exterior steel surfaces.

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

a. Benjamin Moore & Co.
b. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
c. Sherwin-Williams Company (The).

D. Water-Based, Galvanized-Metal Primer: Corrosion-resistant, pigmented, acrylic primer; formulated for use on cleaned/etched, exterior, galvanized metal to prepare it for subsequent water-based coatings.

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

a. Behr Paint Company; Behr Process Corporation.
b. Benjamin Moore & Co.
c. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
d. Sherwin-Williams Company (The).

2.04 FINISH COATINGS

A. Exterior Latex Paint, Semigloss: Water-based, pigmented emulsion coating formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as masonry, portland cement plaster, and primed wood and metal.

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

a. Behr Paint Company; Behr Process Corporation.
b. Benjamin Moore & Co.
c. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
d. Sherwin-Williams Company (The).

2. Gloss Level: Manufacturer's standard semigloss finish.

B. Exterior, Water-Based, Light Industrial Coating, Semigloss: Corrosion-resistant, water-based, pigmented, emulsion coating formulated for resistance to blocking (sticking of two painted surfaces), water, alkalis, moderate abrasion, and mild chemical exposure and for use on exterior, primed, wood and metal surfaces.

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

a. Behr Paint Company; Behr Process Corporation.
b. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
c. Sherwin-Williams Company (The).

2. Gloss Level: Manufacturer's standard semigloss finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

B. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.

3.03 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions.

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.04 CLEANING AND PROTECTION

A. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Contracting Officer, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.05 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Water-Based, Light Industrial Coating System:

    a. Prime Coat: Epoxy metal primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Exterior, water-based, light industrial coating, semigloss.

2. Alkyd System:

    a. Prime Coat: Alkyd metal primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Exterior alkyd enamel.

B. Dressed-Lumber Substrates: Trim Architectural woodwork.

1. Latex over Latex Primer System:

    a. Prime Coat: Exterior, latex wood primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Exterior latex paint, semigloss.

2. Latex over Alkyd Primer System:

a. Prime Coat: Exterior, alkyd/oil wood primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Exterior latex paint, semigloss.

3. Alkyd System:

a. Prime Coat: Exterior, alkyd/oil wood primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Exterior alkyd enamel.

C. Cementitious Composition Board Substrates: Panels.

1. High-Build Latex System: Dry film thickness of not less than 10 mils.

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Exterior, high-build latex paint.

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.03 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Behr Paint Company; Behr Process Corporation.
2. Benjamin Moore & Co.
3. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
4. Sherwin-Williams Company (The).

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.02 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. VOC Emissions: For field applications inside the building, wall paints shall contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit or 33 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.

D. Colors: As selected by Contracting Officer from manufacturer's full range.

2.03 PRIMERS

A. Interior, Institutional Low-Odor/VOC Primer Sealer: Water-based primer sealer with low-odor characteristics and a VOC of less than 10 grams per liter for use on new interior plaster, concrete, and gypsum wallboard surfaces that are subsequently to be painted with latex finish coats.

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

    a. Behr Paint Company; Behr Process Corporation.
    b. Benjamin Moore & Co.
    c. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
    d. Sherwin-Williams Company (The).

2.04 WATER-BASED FINISH COATS

A. Interior, Latex, Institutional Low Odor/VOC, Eggshell: White or colored latex paint with low-odor characteristics and a VOC of less than 10 grams per liter, for use in areas, such as hospitals and other occupied buildings, where the odor and VOC levels of conventional latex products would preclude their use.

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

    a. Behr Paint Company; Behr Process Corporation.

b. Benjamin Moore & Co.
c. Sherwin-Williams Company (The).

2. Gloss and Sheen Level: Manufacturer's standard eggshell finish.

B. Interior, Latex, Institutional Low Odor/VOC, Semigloss: White or colored latex paint with low-odor characteristics and a VOC of less than 10 grams per liter, for use in areas, such as hospitals and other occupied buildings, where the odor and VOC levels of conventional latex products would preclude their use.

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

a. Behr Paint Company; Behr Process Corporation.
b. Benjamin Moore & Co.
c. Sherwin-Williams Company (The).

2. Gloss Level: Manufacturer's standard semigloss finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Fiber-Cement Board: 12 percent.
2. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.03 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Equipment, including panelboards and switch gear.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Metal conduit.
e. Tanks that do not have factory-applied final finishes.

f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Other items as directed by Contracting Officer.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.04 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.05 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Contracting Officer, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 INTERIOR PAINTING SCHEDULE

A. Spray-Textured Ceiling Substrates:

1. Latex, Flat System: Spray applied:

a. Prime Coat: Matching topcoat.

2. Latex System: Spray applied:

a. Prime Coat: Matching topcoat.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex.

B. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Interior, institutional low-odor/VOC primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, eggshell semigloss.

END OF SECTION 09 91 23

SECTION 10 14 00 - SIGNAGE

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing and installing traffic control and accessible parking signs and markers as shown on the Drawings, and as otherwise directed by NPS.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 31 11 00 - Clearing and Grubbing
2. Section 31 23 00 - Excavation and Fill

1.3 DEFINITIONS

A. MUTCD: Manual on Uniform Traffic Control Devices (Federal Highway Administration)

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. Submit supporting documentation, certificates of compliance, and supplier information at least fourteen days (14) prior to ordering materials or placement in the work for each proposed material and product, for review and acceptance of NPS for conformance to the material specifications.

C. Submit shop drawings and sign panel proofs (including sign layout and wording, colors, sizes of members, dimensional cuts, hardware, and material types), supplier details, and installation instructions for each type of signage facility to be installed in the work.

D. Submit manufacturers' product data sheets for sign panels and posts.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24) dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. American Wood Protection Association (AWPA).

D. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

E. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

F. A code not specified as a federal code is a Wyoming code.

G. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

H. Federal Highway Administration Manual on Uniform Traffic Control Devices, 2023 FHWA MUTCD, 11th Edition).
http://mutcd.fhwa.dot.gov/

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Field verify all new and existing dimensions affecting the work of this contract before ordering products.

C. Comply with the quality control and assurance requirements, per the applicable FP-24 Standard Specifications for materials to be used in the work.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. Conform to the project Permit(s), regulatory requirements, environmental mitigation measures, and local jurisdiction codes and traffic laws.

B. Confine all operations to work / grading limits of the project and prevent damage to natural features and surroundings.

C. Designate a traffic control supervisor who shall be responsible for initiating, installing and maintaining all traffic control devices, and conformance to the Contract Documents. Contractor shall provide all temporary traffic control required for completion of the work.

D. Existing utilities shown on the Drawings are approximate. The Contractor is responsible for ascertaining the location of, and protection for, all utilities to be encountered in the performance of the required work.

E. Treated wood products and preservative treatments shall conform to the latest American Wood Protection Association (AWPA) Standards.

F. Conform to federal and state environmental protections for water and lands, in handling and construction of treated wood materials.

G. Implement protective measures and conform to permit requirements for all sawing/ cutting of treated wood and painting/finishing operations.

H. Control and properly dispose of all treated wood product wastes (including cuttings) generated from construction according to federal and state regulations. Recycle or dispose of treated wood product wastes only at certified facilities approved to recycle or receive such materials.

1.8 TOLERANCES

A. Comply with the tolerance requirements, per the applicable FP-24 Standard Specifications for materials and their application, to be used in the work.

B. Horizontal locations, grades and mounting heights for signage facilities are to be established from referenced benchmarks, as shown on the Drawings, or as directed by the Contracting Officer for best fit to field conditions.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials shall conform to sizes, qualities and quantities as shown on the Drawings or described in the specifications.

B. All signage components of a similar material type shall be from a single manufacturer, who is fully experienced, reputable and qualified to provide continuous quality control through plant inspection and certification of materials.

C. Materials shall be from new stock, delivered in good condition, and no used or damaged stock is allowed.

2.2 TRAFFIC CONTROL AND ACCESSIBLE PARKING SIGNAGE

A. Where applicable for jurisdiction, conform to MUTCD and approved state supplements.

B. Furnish the sign panel, post, fasteners, hardware, paint, and preservative treatment materials shown on the Drawings for the applicable item of work.

C. Make dimensional cuts, shape and finish posts for a uniform fit and complete sign as shown on the Drawings. Treat all post field cuts with copper naphthenate (or approved equal).

D. Traffic control devices/posts shall be crashworthy applicable to the location and roadway design speeds.

E. For required materials as shown on the Drawings, conform to Section 718, Traffic Signing and Marking Material of the FP-24 Standard Specifications.

PART 3 EXECUTION

3.1 GENERAL

A. Contractor shall not install any signage until the locations and/or layout have been staked/marked in the field by Contractor and accepted by the Contracting Officer.

3.2 EXCAVATION AND FILL

A. Applicable construction operations for earthwork, excavation and fill shall conform to Section 31 23 00, Excavation and Fill.

B. Excavation widths and depths shall be as shown on Drawings but should be no wider than what is required to safely place and compact the backfill material around the post.

C. After setting posts in position, fill any void space around the base with native material or clean well drained inorganic granular material (free of rock). Thoroughly tamp and water fill material as necessary to secure post in place.

3.3 TRAFFIC CONTROL AND ACCESSIBLE PARKING SIGNS

A. Grade and contour existing ground around sign location as needed to allow for level area for sign installation as directed by the Contracting Officer.

B. Furnish and install traffic control devices/signage where applicable to jurisdiction according to MUTCD and state regulations at locations shown on the Drawings.

1. Sign locations may be changed to fit field conditions where authorized by NPS.

C. Construct and install traffic control signage and devices under Section 633, Permanent Traffic Control of the FP-24 Standard Specifications.

1. Materials shall also conform to Section 718, Traffic Signing and Marking Material of the FP-24 Standard Specifications.

D. Make dimensional cuts, shape and finish posts for a uniform fit and complete sign as shown on the Drawings. Treat all post field cuts with copper naphthenate (or approved equal).

E. Install signposts plumb and straight, oriented properly for sign panel face. Backfill shall be as shown on the Drawings.

F. Attach sign panels with hardware of the types and sizes shown on the Drawings, conforming to the Specifications. Use antitheft fasteners.

3.4 PROTECTION

A. The Contractor shall protect newly installed facilities for the duration of the work.

B. Repair and replace any damaged parts with new materials.

C. Repair protective coatings and paints per the manufacturer requirements to retain all warranties.

END OF SECTION 10 14 00

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Private-use bathroom accessories.

1.02 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist 360 lbf applied in any direction and at any point.

2.02 PRIVATE-USE BATHROOM ACCESSORIES

A. Private-Use Toilet Tissue Dispenser: provide 1 unit per Bath.

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

a. AJW Architectural Products.
b. American Specialties, Inc. (ASI).
c. Basco, Inc.
d. Bobrick Washroom Equipment, Inc.
e. Bradley Corporation.
f. Brey-Krause Manufacturing Co.

g. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
h. GAMCO Specialty Accessories; a division of Bobrick.
i. Ginger by Brasstech, Inc.; a Masco company.
j. Seachrome Corporation.
k. Taymore Industries USA Inc.
l. Tubular Specialties Manufacturing, Inc.

2. Description: Single-roll dispenser with the following features:

a. Hood.

3. Mounting: Surface mounted.
4. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

B. Private-Use Shower Curtain Rod: provide 1 unit per Bath.

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

a. AJW Architectural Products.
b. American Specialties, Inc. (ASI).
c. Basco, Inc.
d. Bobrick Washroom Equipment, Inc.
e. Bradley Corporation.
f. Brey-Krause Manufacturing Co.
g. GAMCO Specialty Accessories; a division of Bobrick.
h. Ginger by Brasstech, Inc.; a Masco company.
i. Seachrome Corporation.
j. Tubular Specialties Manufacturing, Inc.

2. Description: 1-inch- outside diameter, curved rod.
3. Configuration: As indicated on Drawings
4. Mounting Flanges: Designed for exposed fastening, in in material and finish matching rod.
5. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Features: Integral chrome-plated brass glide hooks.

C. Private-Use Folding Shower Seat: provide 1 unit per Bath where required per ABAAS.

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

a. AJW Architectural Products.
b. American Specialties, Inc. (ASI).
c. Bobrick Washroom Equipment, Inc.
d. Bradley Corporation.
e. Brey-Krause Manufacturing Co.

f. GAMCO Specialty Accessories; a division of Bobrick.
g. Seachrome Corporation.
h. Tubular Specialties Manufacturing, Inc.

2. Configuration: L-shaped seat, designed for wheelchair access.
3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect Stainless steel, ASTM A480/A480M No. 4 finish (satin); 0.05-inch-minimum nominal thickness; with single-piece, pan-type construction and edge seams welded and ground smooth.
4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

D. Private-Use Medicine Cabinet: 2 units located in 3 Bedroom Bath 01.

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

a. AJW Architectural Products.
b. American Specialties, Inc. (ASI).
c. Basco, Inc.
d. Bobrick Washroom Equipment, Inc.
e. Bradley Corporation.
f. Brey-Krause Manufacturing Co.
g. GAMCO Specialty Accessories; a division of Bobrick.
h. Ketcham Cabinets & Accessories; division of Fred Silver & Company, Inc.
i. Seachrome Corporation.
j. Tubular Specialties Manufacturing, Inc.

2. Mounting: Surface mounted.
3. Size: 24 by 36 inches.
4. Door: Framed mirror door concealing storage cabinet equipped with continuous hinge and spring-buffered, rod-type stop and magnetic door catch.
5. Shelves: Three, adjustable.
6. Material and Finish:

a. Cabinet: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

E. Private-Use Robe Hook: provide 1 unit per Bath.

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

a. AJW Architectural Products.
b. American Specialties, Inc. (ASI).
c. Basco, Inc.
d. Bobrick Washroom Equipment, Inc.
e. Bradley Corporation.
f. Brey-Krause Manufacturing Co.
g. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.

h. GAMCO Specialty Accessories; a division of Bobrick.
i. Ginger by Brasstech, Inc.; a Masco company.
j. Seachrome Corporation.
k. Taymore Industries USA Inc.
l. Tubular Specialties Manufacturing, Inc.

2. Description: Single-prong unit.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

F. Private-Use Towel Bar Insert drawing designation:

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

a. AJW Architectural Products.
b. American Specialties, Inc. (ASI).
c. Basco, Inc.
d. Bobrick Washroom Equipment, Inc.
e. Bradley Corporation.
f. Brey-Krause Manufacturing Co.
g. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
h. GAMCO Specialty Accessories; a division of Bobrick.
i. Ginger by Brasstech, Inc.; a Masco company.
j. Seachrome Corporation.
k. Taymore Industries USA Inc.
l. Tubular Specialties Manufacturing, Inc.

2. Description: 3/4-inch- round tube with circular end brackets.
3. Mounting: Flanges with exposed fasteners.
4. Length: 30 inches.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

G. Private-Use Towel Rack: provide 1 unit per Bath.

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

a. AJW Architectural Products.
b. Basco, Inc.
c. Taymore Industries USA Inc.
d. Tubular Specialties Manufacturing, Inc.

2. Description: Surface-mounted, guest-towel unit with approximately 1/4-inch- diameter wire rings welded to upright wire bracket.
3. Capacity: Two sets of bath towels, hand towels, and washcloths.
4. Nominal Height: 17 inches.
5. Material and Finish: Insert material and finish.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Shower Seats: Install to comply with specified structural-performance requirements.

END OF SECTION 10 28 00

SECTION 11 30 13 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cooking appliances.
2. Kitchen exhaust ventilation.
3. Refrigeration appliances.
4. Cleaning appliances.

1.02 WARRANTY

A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.02 RANGES

A. Electric Range A101A, A101B, A101C, & A101D: Freestanding range with one oven(s) and complying with AHAM ER-1.

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

a. Amana; a division of Whirlpool Corporation.
b. BSH Home Appliances Corporation (Bosch).
c. Dacor, Inc.
d. Electrolux Home Products (Frigidaire).
e. Fisher & Paykel Appliances Limited.
f. General Electric Company (GE Appliances).
g. General Electric Company (Hotpoint).
h. Jenn-Air; a division of Whirlpool Corporation.
i. KitchenAid; a division of Whirlpool Corporation.
j. LG Electronics.
k. Maytag; a division of Whirlpool Corporation.

l. Samsung.
m. Sears Brands LLC (Kenmore).
n. Viking Range, LLC; a company of the Middleby Corporation.
o. Whirlpool Corporation.

2. Electric Burner Elements: Four induction-type burners.
3. Anti-Tip Device: Manufacturer's standard.
4. Material: Stainless steel with ceramic-glass cooktop.

2.03 MICROWAVE OVENS

A. Microwave Oven A101A, A101B, A101C, & A101D:

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

a. Amana; a division of Whirlpool Corporation.
b. BSH Home Appliances Corporation (Bosch).
c. BSH Home Appliances Corporation (Gaggenau).
d. BSH Home Appliances Corporation (Thermador).
e. Dacor, Inc.
f. DCS Appliances, Inc.; a susidiary of Fisher and Paykel Appliances Limited.
g. Electrolux Home Products (Frigidaire).
h. Fisher & Paykel Appliances Limited.
i. General Electric Company (GE Appliances).
j. General Electric Company (Hotpoint).
k. Jenn-Air; a division of Whirlpool Corporation.
l. KitchenAid; a division of Whirlpool Corporation.
m. LG Electronics.
n. Maytag; a division of Whirlpool Corporation.
o. Samsung.
p. Sears Brands LLC (Kenmore).
q. Sharp Electronics Corp.
r. Sub-Zero, Inc. (Sub-Zero and Wolf).
s. Viking Range, LLC; a company of the Middleby Corporation.
t. Whirlpool Corporation.

2. Mounting: Undercabinet A101A & A101C and Freestanding A101B & A101D.
3. Capacity: 1.5 cu. ft..
4. Exhaust Fan: Two -speed fan, vented to outside and with manufacturer's standard capacity.
5. Microwave Power Rating: 1000 W.
6. Material: Stainless steel.

2.04 KITCHEN EXHAUST VENTILATION

A. Overhead Exhaust Hood A101A, A101B, A101C, & A101D:

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

    a. Amana; a division of Whirlpool Corporation.
    b. BSH Home Appliances Corporation (Bosch).
    c. BSH Home Appliances Corporation (Gaggenau).
    d. BSH Home Appliances Corporation (Thermador).
    e. Dacor, Inc.
    f. DCS Appliances, Inc.; a susidiary of Fisher and Paykel Appliances Limited.
    g. Electrolux Home Products (Frigidaire).
    h. Fisher & Paykel Appliances Limited.
    i. General Electric Company (GE Appliances).
    j. General Electric Company (Hotpoint).
    k. Jenn-Air; a division of Whirlpool Corporation.
    l. KitchenAid; a division of Whirlpool Corporation.
    m. Maytag; a division of Whirlpool Corporation.
    n. Miele, Inc.
    o. Sears Brands LLC (Kenmore).
    p. Sub-Zero, Inc. (Sub-Zero and Wolf).
    q. Viking Range, LLC; a company of the Middleby Corporation.
    r. Whirlpool Corporation.

2. Type: Wall-mounted, exhaust-hood system.
3. Exhaust Fan: Two -speed fan built into hood and with 500-cfm capacity.

    a. Venting: Nonvented, recirculating type with charcoal filter.

4. Finish: Stainless steel.

2.05 REFRIGERATOR/FREEZERS

A. Refrigerator/Freezer A101A, A101B, A101C, & A101D: Two-door, side-by-side refrigerator/freezer and complying with AHAM HRF-1.

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

    a. Amana; a division of Whirlpool Corporation.
    b. BSH Home Appliances Corporation (Bosch).
    c. BSH Home Appliances Corporation (Gaggenau).
    d. BSH Home Appliances Corporation (Thermador).
    e. Dacor, Inc.
    f. DCS Appliances, Inc.; a susidiary of Fisher and Paykel Appliances Limited.
    g. Electrolux Home Products (Frigidaire).
    h. Fisher & Paykel Appliances Limited.
    i. General Electric Company (GE Appliances).
    j. General Electric Company (Hotpoint).
    k. Jenn-Air; a division of Whirlpool Corporation.

l. KitchenAid; a division of Whirlpool Corporation.
m. LG Electronics.
n. Maytag; a division of Whirlpool Corporation.
o. Samsung.
p. Sears Brands LLC (Kenmore).
q. Sub-Zero, Inc. (Sub-Zero and Wolf).
r. Viking Range, LLC; a company of the Middleby Corporation.
s. Whirlpool Corporation.

2. Type: Freestanding.
3. Storage Capacity:

a. Refrigeration Compartment Volume: 15.6 cu. ft..
b. Freezer Volume: 5.13 cu. ft..

4. General Features:

a. Dispenser in door for ice cold water.
b. Interior light in refrigeration compartment.
c. Automatic defrost.
d. Interior light in freezer compartment.
e. Automatic icemaker and storage bin.

5. Front Panel(s): Stainless steel.

2.06 DISHWASHERS

A. Dishwasher A101A, A101B, A101C, & A101D: Complying with AHAM DW-1.

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

a. Amana; a division of Whirlpool Corporation.
b. BSH Home Appliances Corporation (Bosch).
c. BSH Home Appliances Corporation (Gaggenau).
d. BSH Home Appliances Corporation (Thermador).
e. Jenn-Air; a division of Whirlpool Corporation.
f. KitchenAid; a division of Whirlpool Corporation.
g. LG Electronics.
h. Maytag; a division of Whirlpool Corporation.
i. Whirlpool Corporation.

2. Type: .
3. Front Panel: Wood panel to match kitchen cabinets.

2.07 CLOTHES WASHERS AND DRYERS

A. Clothes Washer A101A, A101B, A101C, & A101D: Complying with AHAM HLW-1.

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

    a. Amana; a division of Whirlpool Corporation.
    b. BSH Home Appliances Corporation (Bosch).
    c. Electrolux Home Products (Frigidaire).
    d. General Electric Company (GE Appliances).
    e. General Electric Company (Hotpoint).
    f. LG Electronics.
    g. Maytag; a division of Whirlpool Corporation.
    h. Samsung.
    i. Whirlpool Corporation.

2. Type: Freestanding Stacking, front-loading unit.
3. Capacity: 3.8 cu. ft..
4. Pedestal: Manufacturer's standard height laundry pedestal with storage drawer, matching appliance finish.
5. Appliance Finish: Stainless steel.
6. Front-Panel Finish: Stainless steel.

B. Clothes Dryer A101A, A101B, A101C, & A101D: Complying with AHAM HLD-1.

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

    a. Amana; a division of Whirlpool Corporation.
    b. BSH Home Appliances Corporation (Bosch).
    c. Electrolux Home Products (Frigidaire).
    d. General Electric Company (GE Appliances).
    e. General Electric Company (Hotpoint).
    f. LG Electronics.
    g. Maytag; a division of Whirlpool Corporation.
    h. Samsung.
    i. Whirlpool Corporation.

2. Type: Freestanding Stacking, frontloading, unit.
3. Capacity: 7.0 cu. ft..
4. Features:

    a. Interior drum light.
    b. Pedestal: Manufacturer's standard height laundry pedestal with storage drawer, matching appliance finish.

5. Appliance Finish: Stainless steel.
6. Front-Panel Finish: Stainless steel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

3.02 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After installation, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

B. An appliance will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 11 30 13

SECTION 12 24 13 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Manually operated roller shades with single rollers.

1.02 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

PART 2 - PRODUCTS

2.01 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hunter Douglas Contract.
2. Lutron Electronics Co., Inc.
3. MechoShade Systems, Inc.

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Chain-Retainer Type: Chain tensioner, jamb mounted.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of interior face of shade.
2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

2.02 SHADEBAND MATERIALS

A. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: Roller shade manufacturer.
2. Type: PVC-coated polyester.
3. Weave: Basketweave.
4. Thickness: 0.018 to 0.030 inches.
5. Weight: 10 to 14 oz./sq. yd..
6. Roll Width: 36 inches or 48 inches.
7. Orientation on Shadeband: Up the bolt.
8. Openness Factor: 3 percent.
9. Color: As selected by Contracting Officer from manufacturer's full range.

B. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.

1. Source: Roller shade manufacturer.
2. Type: Polyester-cotton blend.
3. Thickness: 0.020 to 0.040 inches.
4. Weight: 12 to 18 oz./sq. yd..
5. Roll Width: 36 inches or 48 inches.
6. Orientation on Shadeband: Up the bolt.
7. Features: Washable Antistatic treatment.
8. Color: As selected by Contracting Officer from manufacturer's full range.

2.03 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.01 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

D. Replace damaged roller shades that cannot be repaired, in a manner approved by Contracting Officer, before time of Substantial Completion.

END OF SECTION 12 24 13

SECTION 12 35 30 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Kitchen and vanity cabinets.

PART 2 - PRODUCTS

2.01 CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Woodmark Corp.
2. KraftMaid Cabinetry, Inc.
3. MasterBrand Cabinets, Inc.
4. Medallion Cabinetry Inc.; an Elkay company.
5. Omega Cabinetry.

B. Quality Standard: Provide cabinets that comply with KCMA A161.1.

1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with KCMA A161.1.

C. Certified Wood: Wood products shall certified wood tracked through a chain-of-custody process. Certified wood documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59 or the World Trade Organization's "WTO Agreement on Technical Barriers to Trade."

D. Door and Drawer Face Style: Flush overlay.

1. Door and Drawer Fronts:

a. Solid-wood stiles and rails, 5/8 inch thick, with 3/4-inch- thick, solid-wood center panels.

E. Cabinet Style: Face frame.

1. Face Frames:

a. 5/8-inch- thick particleboard with plastic laminate on exposed and semiexposed surfaces.

F. Exposed Cabinet End Finish: Wood veneer.

2.02 CABINET MATERIALS

A. Hardwood Lumber: Kiln dried to 7 percent moisture content.

B. MDF: Medium-density fiberboard, ANSI A208.2, Grade MD.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

C. Exposed Materials:

1. Exposed Wood Species: Alder.

a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
b. Staining and Finish: As selected by Contracting Officer from manufacturer's full range.

D. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces.

E. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; MDF; or hardboard.

2.03 CABINET HARDWARE

A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Contracting Officer from manufacturer's full range.

B. Pulls: Surface-mounted decorative pulls Back-mounted decorative pulls.

C. Hinges: Concealed European-style, self-closing hinges.

D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.

E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.

1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
2. Drawers: Provide one bumper on back side of drawer front at each corner.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install casework with no variations in adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework.

B. Install casework without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.

C. Install casework level and plumb to a tolerance of 1/8 inch in 8 feet.

D. Fasten casework to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c.

a. Fasteners: No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

E. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

F. Clean casework on exposed and semiexposed surfaces. Touch up as required to restore damaged or soiled areas to match original factory finish, as approved by Contracting Officer.

END OF SECTION 12 35 30

SECTION 12 36 23.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad countertops.

1.02 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: AWI's Quality Certification Program accredited participant.

B. Installer Qualifications: AWI's Quality Certification Program accredited participant.

1.03 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install wood countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations with Humidity Control: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

PART 2 - PRODUCTS

2.01 FABRICATORS

A. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:

1. The Countertop Factory.
2. L.E. Smith Company.
3. Wilsonart.
4. Formica Corporation.

2.02 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI WI certification program indicating that countertops comply with requirements of grades specified.

B. Grade: Economy.

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Contracting Officer from manufacturer's full range in the following categories:

a. Solid colors, matte finish.
b. Patterns, matte finish.

D. Edge Treatment: 2.0-mm PVC edging.

E. Core Material: Particleboard or MDF.

F. Core Material at Sinks: Particleboard made with exterior glue MDF made with exterior glue or exterior-grade plywood.

G. Core Thickness: 1-1/8 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

H. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.03 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.

1. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
2. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.
3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

4. Softwood Plywood: DOC PS 1.

2.04 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.05 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
2. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

F. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 12 36 23.13

SECTION 13 34 26 - RESIDENTIAL MODULAR BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Construction requirements for wood frame.
2. Installation requirements for Metal roof panels.
3. Installation requirements for Siding d panels.
4. Installation requirements for Thermal insulation.
5. Installation requirements for Personnel doors and frames.
6. Installation requirements for Windows.
7. Accessories.

B. Related Requirements:

1. Section 03 30 00 Cast–In-Place Concrete: for foundation requirements
2. Section 05 73 00 “Decorative Metal Railings”. For aluminum railings to be included in building as indicated on drawings
3. Section 08 14 33 “Stile and Rail Wood Doors” For interior doors to be included in building as indicated on drawings
4. Section 08 16 13 “Fiberglass Doors and Frames” For exterior and interior doors to be included in building as indicated on drawings
5. Assembly and finish materials specified throughout the project manual
6. Equipment and systems specified throughout the project manual

C. Except as otherwise noted, and excluding site infrastructure, the modular housing design shown herein is provided for reference purposes only and is not intended to be suitable for construction. Shop drawings must be provided by building manufacturer, see specifications. Final building design must be approved by NPS.

D. Contractors, modular housing manufacturers, and all parties proposing to furnish construction documents, pricing, or construction services are solely responsible for providing complete and compliant solutions in accordance with applicable jurisdictional requirements and NPS standards.

E. Any inconsistencies, omissions, or discrepancies identified within the reference materials shall be promptly brought to the attention of the Contracting Officer for clarification. Failure to identify such discrepancies does not relieve the proposing party of the responsibility for a complete and compliant solution.

1.2 DEFINITIONS

A. Residential Modular Building Systems: Prefabricated structures bult in a factory setting and transported to the site for assembly on a permanent foundation.

B. Modular Home Builders Association. National organization serving modular home builders and manufacturers.

C. National association of Home Builders: represents the largest network of craftsmen, innovators and problem solvers dedicated to building and enriching communities.

1.3 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to metal building systems including, but not limited to, the following:

    a. Condition of foundations and other preparatory work performed by other trades.
    b. Structural load limitations.
    c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
    d. Required tests, inspections, and certifications.
    e. Unfavorable and forecasted weather conditions and impact on construction schedule.

2. Review methods and procedures related to roof panel assemblies including, but not limited to, the following:

    a. Flashings, special roof details, roof drainage, roof penetrations, and condition of other construction that will affect metal roof panels.
    b. Roof observation and repair after metal roof panel installation.

3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

    a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
    b. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
    c. Temporary protection requirements for metal wall panel assembly during and after installation.

1.5 ACTION SUBMITTALS

A. Provide submittals for products included in other sections

B. Product Data: For each type of metal building system component.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

    a. Roof panels.
    b. Wall sidings.
    c. Soffit panels.
    d. Thermal insulation and vapor-retarder facings.
    e. Doors, frames and associated hardware.
    f. Windows.
    g. Decorative shutters
    h. Louvers.
    i. Decorative handrails
    j. Fire suppression Delegated Design documents
    k. Fire Alarm Delegated Design documents.

C. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:

1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach building to foundation. Indicate column reactions at each location.
2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings.
3. Metal Roof Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

    a. Show roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
    b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.

4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8):

    a. Flashing and trim.
    b. Gutters.
    c. Downspouts.

5. Cabinetry layouts, Plans Details and elevations.

D. Samples for Initial Selection: For units with factory-applied finishes.

E. Samples for Verification: For the following products:

1. Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Vapor-Retarder Facings: Nominal 6-inch- (150-mm-) square Samples.

4. Windows: Full-size, nominal 12-inch- (300-mm-) long frame Samples showing typical profile.
5. Accessories: Nominal 12-inch- (300-mm-) long Samples for each type of accessory.
6. Interior finishes, cabinet Plastic laminate, flooring wall & ceiling paint.

F. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.

1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
2. Keying Schedule: Detail Contracting Officer's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

G. Delegated Design Submittals: For Residential Modular building systems.

1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For erector, For manufacturer, For surveyor.

B. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:

1. Name and location of Project.
2. Order number.
3. Name of manufacturer.
4. Name of Contractor.
5. Building dimensions including width, length, height, and roof slope.
6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
7. Governing building code and year of edition.
8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

C. Erector Certificates: For qualified erector, from manufacturer.

D. Field quality-control reports.

E. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

F. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Schedule and conduct sample review meeting. Before finish installation at a time convenient to Contracting Officer at Residential building manufacturer.

1. Invite the following
   a. NPS
   b. Contracting Officer
   c. Installation Contractor Project Manager and Superintendent.
   d. Manufacturer.
   e. Testing Agency.
   f. Others as appropriate.
2. Agenda:
   a. Project Coordination: Designation of responsible personnel
   b. Interior Finish samples.
   c. Exterior Finish samples
   d. Housekeeping procedures.
   e. Scheduling.

B. Manufacturer Qualifications: A qualified manufacturer.

1. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

C. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of foam-plastic materials as rapidly as possible in each area of construction.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.10 WARRANTY

A. Warranty: Provide not less than one year warranty on modular building, systems and accessories that fail in materials and workmanship from date of Substantial Completion.

B. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain Residential Modular Building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

2.2 SYSTEM DESCRIPTION

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

B. Primary-Frame Type:

1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
2. Rigid Modular: Solid-member, structural-framing system with interior columns.
3. Truss-Frame Modular: Truss-member, structural-framing system with interior columns.
4. Lean-to: Solid- or truss-member, structural-framing system, designed to be partially supported by another structure.

C. Roof Slope: Manufacturer's standard for frame type required.

D. Roof System: Manufacturer's standard standing-seam, vertical-rib metal roof panels.

1. Liner Panels: Tapered rib.

E. Exterior Wall System: Manufacturer's standard siding panels.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design metal building system.

B. Structural Performance: Residential Modular building systems to withstand the effects of gravity loads and the following loads and stresses within limits on drawings.

1. Design Loads: As indicated on Drawings.

C. Seismic Performance: Provide factory built, prefabricated structures and shelters capable of withstanding the effects of earthquake motions determined according to:
1. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads".

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces

E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 or ASTM E108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

F. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 285 fire test.

G. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.

H. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lb./sq. ft. (75 Pa).

I. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lb./sq. ft. (137 Pa) in "Water Penetration for Metal Wall Panels" Paragraph below indicates that "water contained within drainage flashings, gutters, and sills is not considered failure."

J. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

K. Energy Star Listing: Roof panels that are listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for steep-slope roof products.

L. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:

1. Three-year, aged, solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
2. Three-year, aged, Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.

M. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum R-values when tested according to ASTM C1363 or ASTM C518:

N. Prefabricated structures specified herein shall be handicapped accessible in accordance with ICC/ANSI A117.1 and other state and local requirements as applicable.

O. Electrical Devices: Devices UL listed with wiring bearing UL classification and conforming to the current NEC.

2.4 STRUCTURAL FRAMING

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.
2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Structural Steel:

1. Steel Sections: ASTM A36/A36M.
2. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
3. Plates: ASTM A283/A283M.
4. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

C. Slotted Channel Fittings: ASTM A1011/A1011M.

D. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

E. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
2. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch (76-by-51-mm), fabricated from zinc-coated (galvanized) steel sheet.
3. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

F. Materials:

1. W-Shapes: ASTM A992/A992M; ASTM A572/A572M, Grade 50 or 55 (345 or 380); or ASTM A529/A529M, Grade 50 or 55 (345 or 380).
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55 (345 or 380); or ASTM A529/A529M, Grade 50 or 55 (345 or 380).
3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55 (345 or 380); or ASTM A529/A529M, Grade 50 or 55 (345 or 380).
4. Steel Pipe: ASTM A53/A53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), Grades 30 through 55 (205 through 380), or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70 (310 through 480); or cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), Grades 25 through 80 (170 through 550), or HSLAS, Grades 45 through 70 (310 through 480).
7. High-Strength Bolts, Nuts, and Washers, Grade A490 (Grade A490M): ASTM F3125/F3125M, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
8. Interior Woodwork Items: Moldings, Bases, Casings, and Miscellaneous Trim: White birch; prepare for paint finish.

9. Hardwood Lumber: white birch species, plain sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
10. Grading: In accordance with NHLA G-101 Grading Rules; www.nhla.orgThreaded Rods: ASTM A572/A572M, Grade 50 (345).

    a. Nuts: ASTM A563 (ASTM A563M) heavy-hex carbon steel.
    b. Washers: ASTM F436 (ASTM F436M) hardened carbon steel.
    c. Finish: Hot-dip zinc coating, ASTM F2329, Class C.

G. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

1. Clean and prepare in accordance with SSPC-SP2.
2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil (0.025 mm).

    a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil (0.013 mm) on each side.

2.5 METAL ROOF PANELS

A. As specified in Section 07 41 13.16 Standing Seam Metal Roof Panels

B. Standing-Seam, Vertical-Rib, Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

    a. Exterior Finish: Two-coat fluoropolymer
    b. Color: As selected by Contracting Officer from manufacturer's full range.

2. Clips: One-piece fixed to accommodate thermal movement.
3. Joint Type: Panels snapped together.
4. Panel Coverage: 16 inches (406 mm)
5. Panel Height: 2 inches (51 mm**)**.

C. Finishes:

1. Exposed Coil-Coated Finish:

    a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare,

pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a minimum dry film thickness of 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.6 WALL PANELS

A. As specified in Section 07 46 46 Fiber Cement Siding

2.7 SOFFIT PANELS

A. As specified in Section 07 46 46 Fiber Cement Siding

2.8 THERMAL INSULATION

A. Mineral-Fiber-Blanket Insulation: ASTM C665, type indicated below; consisting of fibers manufactured from glass, slag wool, or rock wool.

1. Nonreflective Faced: Type II (blankets with nonreflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
2. Reflective Faced: Type III (blankets with reflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
3. Unfaced: Type I (blankets without membrane covering), passing ASTM E136 for combustion characteristics.

B. Faced, Polyisocyanurate Board Insulation: ASTM C1289, Type I (foil facing), Class 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core. Provide units tested for interior exposure without an approved thermal barrier.

C. Retainer Strips: For securing insulation between supports, 0.025-inch (0.64-mm) nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

D. Vapor-Retarder Facing: ASTM C1136, with permeance not greater than 0.02 perm when tested according to ASTM E96/E96M, Desiccant Method.

1. Composition:

a. White metallized-polypropylene film facing, fiberglass scrim reinforcement, and kraft-paper backing.
b. Aluminum foil facing, elastomeric barrier coating, fiberglass scrim reinforcement, and kraft-paper backing.

c. White polypropylene film facing and fiberglass-polyester-blend fabric backing.

E. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.9 PERSONNEL DOORS AND FRAMES

A. As specified in Sections 08 14 33 “Style and Rail Wood Doors” and 08 16 13” Fiberglass Doors and Frames”.

B. Door Hardware as specified in Section 08 71 00 “Door Hardware”.

C. Swinging Personnel Doors and Frames:

1. As specified in Section 08 14 33 "Style and Rail Wood Doors."
2. Building system manufacturer's standard doors and frames; prepared and reinforced at strike and at hinges to receive factory- and field-applied hardware according to BHMA A156 Series.

a. Glazing Frames: Steel frames to receive field-installed glass.
b. Glazing: As specified in Section 08 80 00 "Glazing."
c. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.
d. Hardware:

1) Provide hardware for each door leaf, as follows:

a) Hinges: BHMA A156.1. Three antifriction-bearing, standard-weight, full-mortise, stainless steel or bronze, template-type hinges; 4-1/2 by 4-1/2 inches (114 by 114 mm), with nonremovable pin.
b) Lockset: BHMA A156.2. Key-in-lever cylindrical type.
c) Exit Device: BHMA A156.3. Touch- or push-bar type.
d) Threshold: BHMA A156.21. Extruded aluminum.
e) Silencers: Pneumatic rubber; three silencers on strike jambs of single door frames and two silencers on heads of double door frames.
f) Closer: BHMA A156.4. Surface-applied, standard-duty hydraulic type.
g) Weather Stripping: Vinyl applied to head and jambs, with vinyl sweep at sill.

2) Provide each pair of double doors with the following hardware in addition to that specified for each leaf:

a) Astragal: Removable type.
b) Surface Bolts: Top and bottom of inactive door.

e. Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A123/A123M.
f. Fabrication: Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.

D. Materials:

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
2. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, CS, Type B; free of scale, pitting, or surface defects; pickled and oiled.
3. Metallic-Coated Steel Sheet: ASTM A653/A653M, CS, Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating designation.

E. Finishes for Personnel Doors and Frames:

1. Prime Finish: Factory-apply manufacturer's standard primer immediately after cleaning and pretreating.

    a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2. Veneer Facing for Transparent Finish: Natural Birch, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face

    a. Transom Panels: Continuous match to door.
    b. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.

2.10 HORIZONTAL SLIDING DOORS

A. Horizontal-Sliding Doors: Manufacturer's standard horizontal-sliding door assembly including structural frame, door panels, brackets, guides, tracks, hardware, and installation accessories.

1. Door Frames: Channels and zees; metallic-coated steel sheet or structural-steel shapes, 0.060-inch (1.52-mm) nominal uncoated steel thickness.
2. Door Panels: Same material and finish as metal wall panels.
3. Hardware: Manufacturer's standard metallic-coated steel track, bottom guides, lock angles for side closure, and brackets. Support each door leaf by two four-wheel trolleys. Provide metallic-coated steel handle for each leaf, and slide bolt or padlock hasp. Flash top of track with metallic-coated steel sheet hood.

2.11 SECTIONAL DOORS

A. See Section 08 36 13 “Sectional Doors”.

2.12 WINDOWS

A. Fiberglass Windows: See Section 08 54 13 “Fiber Glass Windows”.

B. Glazing: Comply with requirements specified in Section 08 80 00 "Glazing."

C. Provide Decorative shutters applied to side of windows.

2.13 ACCESSORIES

A. General: Provide accessories as standard with Residential modular building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Heating, ventilation and air conditioning.

    a. Plumbing supply, vents and fixtures.
    b. Electrical, including outlets, switches, ceiling fans, and lighting.
    c. Garage door, including operator and controls.
    d. Appliances.
    e. Interior walls, floors, ceilings, and finishes.
    f. Millwork and trim.
    g. Access Panels.
    h. Toilet Accessories.
    i. Blocking on walls for incidental wall mounted items.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
4. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch (25-mm) standoff; fabricated from extruded polystyrene.

C. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

D. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

1. Gutter Supports: Fabricated from same material and finish as gutters.
2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

E. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- (3-m-) long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters.

F. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch (1.21-mm) nominal uncoated steel thickness; finished to match metal wall panels. Form blades from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.036-inch (0.91-mm) nominal uncoated steel thickness; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.

1. Blades:

    a. Fixed.
    b. Adjustable type, with weather-stripped edges, and manually operated by hand crank or pull chain.

2. Free Area: Not less than 7.0 sq. ft. (0.65 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
3. Mounting: Exterior face of louvers.
4. Vertical Mullions: Provide mullions at spacings recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.

G. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

H. Materials:

1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
2. Fasteners for Metal Roof Panels:

    a. Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless steel cap or zinc-aluminum-alloy head and EPDM sealing washer.

3. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.

4. Blind Fasteners: High-strength aluminum or stainless steel rivets.
5. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
6. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
7. Sealants:

    a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
    b. Joint Sealant: ASTM C920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by building system manufacturer.

2.14 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members to be free of cracks, tears, and ruptures.

B. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

2.15 SOURCE QUALITY CONTROL

A. Special Inspection: Contractor will retain a Special Inspector in accordance with Section 01 45 33 - Special Inspections and Testing to perform source quality control inspections and to submit reports.

1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.

    a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect Residential modular building system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

H. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

I. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
2. Tape joints and ruptures in vapor retarder and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Between-Joist Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Hold in place with bands and crossbands below insulation.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

2. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

D. Board Wall Insulation: Extend board insulation in thickness indicated to cover entire wall. Hold in place by metal wall panels fastened to secondary framing. Comply with manufacturers' written instructions.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete wall siding assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar materials contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Tie downspouts to underground drainage system indicated.

E. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07 92 00 "Joint Sealants" for sealants applied during louver installation.

F. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Contractor will retain a Special Inspector in accordance with Section 01 45 33 - Special Inspections and Testing to perform field quality control special inspections and to submit reports.

B. Product will be considered defective if it does not pass tests and inspections.

3.7 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.

D. Adjustable Louvers: After completing installation, including work by other trades, lubricate, test, and adjust units to operate easily, free of warp, twist, or distortion as needed to provide fully functioning units.

1. Adjust louver blades to be weathertight when in closed position.

3.8 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.

1. Immediately before final inspection, remove protective wrappings from doors and frames.

F. Windows: Clean surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.

G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Contracting Officer, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

3.9 DEMONSTRATION AND TRAINING

A. The Contractor shall provide demonstration and training on the operation and maintenance of mechanical, plumbing, electrical and fire suppression systems within the modular units to the NPS. The training shall be completed by factory-authorized service representatives.

END OF SECTION 13 34 19

SECTION 26 50 00 – SITE ELECTRICAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The work shall include providing all labor, materials, tools and equipment necessary for the Electrical and Illumination Systems complete and fully operational in every respect. This includes, but is not limited to, the following:

1. Provisions for Primary Electrical Service Extensions.
2. Secondary Electrical Services Complete.
3. Residence Electrical Metering.
4. Power and Communication Vaults.
5. Wiring, conduit, junction boxes, handholes, trenching, grounding etc.
6. Communications Backboard.
7. Testing of the entire system.

1.2 CODES AND ORDINANCES

A. All equipment and work performed shall be in accordance with national, state and city electrical codes, established safety codes and other applicable local codes and ordinances.

1.3 PERMITS

A. The Contractor shall obtain all required permits. The NPS will pay all permit fees.

1.4 CONNECTION FEES

1. The Contractor shall note the sample agreement for Northwestern Energy (Canyon and Mammoth Government Areas) provided with the Contract Documents as Appendix G. The Park has an agreement with Northwestern Energy and will pay direct for the connection work that the Contractor will coordinate.
2. There is no current agreement between Flathead Electric (Northeast Entrance Government Area) and the NPS. At the Northeast Entrance Government Area, the Contractor will be responsible for coordinating directly with Flathead Electric and paying all temporary and permanent connection fees.

1.5 EXAMINATION OF SITE AND DOCUMENTS

A. The bidder is required to examine carefully the site of the proposed work, the proposal, plans and specifications and contract forms before submitting a bid. Upon submission of a bid, it is mutually agreed that the bidder is aware of all conditions which will affect his work.

1.6 CLEAN-UP

A. Upon substantial completion of the work and before final approval and payment, the contractor shall, at his own expense, remove from the site and adjoining property, and dispose of all surplus and discarded materials, rubbish, temporary buildings, equipment and debris which may have accumulated during the execution of the work. All fixtures and equipment shall be left thoroughly cleaned and in proper operating condition.

1.7 WORKMANSHIP

A. All workmanship shall be the best approved method of the trade.

1.8 SUBMITTALS

A. The successful Contractor shall submit, WITHIN 14 CALENDAR DAYS after award of the Contract, a list of all material to be furnished. In addition, six copies of shop drawings of vaults, metering, boxes and all other major equipment shall be furnished to the Contracting Officer for approval before ordering. Submittals will be "Approved for Design Only". This shall mean the Contracting Officer has reviewed said submittal and finds no objection (except as noted) to the inclusion of the items into the construction, if it complies with contract drawings and specifications as to quantities, space requirements, dimensions, non-interference with other trades and other affected contract requirements.

1.9 RECORD DRAWINGS

A. Work done shall be recorded as actually installed. One set of prints showing this shall be furnished to the Contracting at the completion of the work and shall be available for inspection during the work. A separate marked up print of the site plan shall be provided showing all underground conduits in their actual installed locations with precise dimensions to existing elements.

1.10 GUARANTEE

A. The Contractor shall guarantee his workmanship and the materials and equipment he furnishes for a period of one year after the date of physical completion of the project. Any item which fails during the guarantee period because of defects in material or workmanship shall be promptly and properly replaced by the Contractor after notification from the Contracting Officer.

PART 2 MATERIALS AND EQUIPMENT

2.1 DESCRIPTION

A. All materials and equipment shall be new, of proven quality and be a standard product of a reputable manufacturer. Storage at the job site shall be in a manner which will prevent any damage or corrosion.

2.2 CONDUIT AND FITTINGS

A. All raceways above grade shall be rigid galvanized steel with zinc protected threads. Fittings shall be of the same material with hot dipped galvanized finish. Field cut threads shall be protected and damaged galvanizing repaired per the conduit manufacturer's recommendations.

B. Conduit used in underground runs shall be Schedule 40 heavy wall rigid PVC, UL labeled with fittings of the same material.

C. The conduits shall be capped during construction by means of manufactured seals to prevent entrance of water and debris. The conduits shall be cleaned before pulling of the wire. Spare conduits shall include a nylon pull rope.

2.3 JUNCTION BOXES AND HANDHOLES

A. Junction boxes for the underground circuit runs shall be concrete with bolt down metal lid designed to withstand a 20,000-pound static load. They shall be suitable for use in driveway, parking lot and road shoulder applications that may be subject to occasional, non-deliberate heavy vehicles. Covers shall be labeled “Electric” and “Comm”. They shall be manufactured by Oldcastle Concrete Products or similar. The handhole shall be in accordance with the following table.

Type	Number	Size
II	1324	14" x 24" x 18"
III	1730	18" x 30" x 18"

B. Each conduit entering the box shall be neatly upswept and shall terminate not less than 5 inches or more than 10 inches below the lid

C. All junction boxes shall be set on a 6-inch free draining, compacted pea gravel base and be leveled to match grade. The lid shall be set flush with finish grade. Conduits into the junction boxes and service cabinet foundations shall have bell ends installed. Enough slack wire shall be provided to enable the splice to be raised a minimum of 18 inches outside of the box.

2.4 CONDUCTORS

A. All wire and cable shall conform to the NEC and meet applicable ICEA specifications. Conductors shall be copper, No. 12 AWG or larger and all conductors No. 10 or larger shall be stranded. Insulation shall be Type THHN/THWN, 600 Volt minimum rated 75° C. and be color coded in a consistent manner. Each conductor shall be identified by Circuit and Phase Number at every handhole and junction box by a PVC wiring marking sleeve.

B. Splices below grade shall be made with compression type connectors, be plastic tie-wrapped and made watertight with an epoxy splice kit, heat shrinkable medium wall flexible Polyolefin tubing or similar products.

C. Splices above grade shall made with screw type connectors and be plastic tie-wrapped.

2.5 VAULTS

A. Primary, Secondary, Transformer and Communication vaults shall be heavy duty concrete and meet all requirements of the serving utility. Manufacturers shall be Glacier Precast Concrete, H2 Precast or prior approved equal. Contractor shall submit shop drawings of all vaults to the Contracting Officer for approval.

2.6 MISCELLANEOUS ELECTRICAL EQUIPMENT

A. Additional electrical equipment is required including receptacles, switches etc. This equipment shall be as shown and specified on the drawings.

PART 3 INSTALLATION METHODS

3.1 PRIMARY SERVICE

A. The existing primary electrical service(s) shall be extended. The Contractor shall coordinate all scheduling of utility work with the serving utility. The utility shall provide trenching\boring, conduit, conductors and trench backfilling as shown on the drawings. The Contractor shall provide all restoration and coordination with utility crews for inspections and utility installation of primary conductors.

For the Canyon and Mammoth Government Areas, NPS has an existing agreement with Northwestern Energy. The Contractor shall coordinate with Northwestern Energy and the NPS will pay all fees related to the connection. For the Northeast Entrance Government Area, there is no currently established agreement with the NPS. Therefore, the Contractor will coordinate with Flathead Electric and be responsible for any connection charges from the utility.

B. The Contractor shall meet all serving utility requirements and coordinate all work with the NPS and utility.

3.2 VAULT

A. The Contractor shall coordinate all scheduling of utility work with the serving utility. The utility shall provide power vaults and lids. Excavation, backfill, restoration and coordination with utility shall be provided by the Contractor.

3.3 SECONDARY SERVICE

A. The Contractor shall provide trenching from the pad mounted transformers to each residence. The serving utility will provide conduit and conductors in the trench. The Contractor shall provide trench backfilling and restoration. The Contractor shall provide combination meter sockets\disconnects in accordance with utility Metering Department requirements as appropriate.

3.4 DEPTH OF BURIAL

A. All underground runs for the electrical distribution system shall be a minimum of 24 inches below grade. Provide a minimum cover of 36 inches for primary and secondary conduit as shown on the Drawings.

3.5 GROUNDING

A. Provide a complete grounding system with grounding continuity throughout the system. Ground rods shall be copper clad 3/4" by 10'. Ground wire shall be bare stranded copper.

3.6 TRENCHING, EXCAVATION AND BACKFILLING

A. Provide all trenching, excavation and backfilling required for the installation of items included in this Contract. Provide a plastic Marker Tape the entire length of all underground conduit runs. The Marker Tape shall be 3” minimum width, bright red or yellow color installed a minimum of 12” above the top conduit run.

B. Contact the Contracting Officer before trenching in any area. In trenching through sodded areas, remove the sod and replace after backfilling and compaction. In trenching through non- sodded earth areas, the Contractor shall compact to 90% and top dress with topsoil in accordance with the Drawings and Section 32 90 00 – Restoration. Underground runs through asphalt or concrete areas shall be neatly cut, the backfill fully tamped to 95% compaction and the area repaired to match the existing.

C. Underground utilities exist at all the sites. Contact the NPS and call for utility locate to ascertain the location of all underground systems before trenching or excavating. The Contractor shall make his best effort to locate all underground systems before trenching or excavating. If damage still occurs, the underground systems shall be repaired to original condition at the Contractor's expense and be approved by the Contracting Officer before backfilling.

3.7 TESTING

A. Each circuit shall be tested with a megohm meter. A reading in excess of two (2) megohms shall be deemed satisfactory. The Contractor shall provide a written report of the results of his testing. The written report shall be provided to the Contracting Officer prior to final acceptance of the project. Testing and operation of the entire system shall be performed. The Contractor shall provide manpower and equipment as necessary to correct any defects as may be directed by the Contracting Officer.

END OF SECTION

SECTION 31 11 00 - CLEARING AND GRUBBING

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to stripping, clearing and grubbing for the removal of all objectionable and unacceptable natural or artificial materials from within the right-of-way lines or construction area project limit lines, and disposal of said material, in order to prepare the site for construction of the proposed facilities and project improvements. Any stripping and salvage of select materials as part of the clearing and grubbing operations shall be as specified elsewhere in the specifications.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections which includes, but is not limited to:

1. Section 01 11 00 - Summary of Work
2. Section 31 13 00 - Selective Tree and Shrub Removal and Trimming
3. Section 31 23 00 - Excavation and Fill
4. Section 31 25 00 - Erosion and Sedimentation Control
5. Section 32 00 00 – Tree Protection
6. Section 32 90 00 - Restoration
7. Section 32 92 00 - Grasses

1.3 DEFINITIONS

A. Clearing: The removal of all natural or artificial materials and obstructions from the designated areas above original ground which shall interfere with construction operations including such items as grass, weeds, plants, brush, logs, upturned stumps, downed trees and otherwise dead material, in addition to rubbish, lumber, fences, walls, concrete, masonry, and other remnant items which are not designated for protection or relocation.

B. Tree DBH: The diameter of a tree at breast height is to be measured at a point 4.5 feet above the prevailing existing ground surface on the uphill side of the tree.

C. Grubbing: The removal of all objectionable material below the ground surface remaining after clearing, to a designated depth (12-inch minimum) as necessary to construct the project improvements including such items as buried logs, wood or root matter, rocks (larger than 6-inches), man-made deposits, industrial waste, sludge or landfill, and other remnant items which

are not designated for protection or relocation. The depth of grubbing shall be as designated for the type of overlying improvement, as specified in Part 3, Execution.

D. Stripping: The removal, disposal and/or salvage of all duff, mulch, topsoil, organic sod, grasses and grass roots, and other organic materials prior to commencement of clearing and grubbing from the areas designated to be stripped. The depth of stripping is estimated to be no greater than 6-inches, but the actual required depth for stripping will be dependent on actual site conditions as identified on the Drawings or as otherwise directed by the Contracting Officer. Salvage of any stripped materials shall be as specified elsewhere in the specifications.

E. Subgrade: Surface or elevation remaining after completing excavation, or top surface of backfill immediately below topsoil, or other subsequent fill materials.

F. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and generally defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated on the Drawings or directed by the Contracting Officer; excluding stream channel work.

G. Unsatisfactory Materials: Earthen materials classified by ASTM D 2487 as OL, OH, MH, CH, and PT are unsatisfactory in-situ and as fill. Unsatisfactory materials also include those materials containing roots and other organic matter, trash, debris, frozen materials, and stones larger than 6 inches. Fill materials containing stones larger than 3 inches shall not be used in the uppermost 2 feet.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Disposal Plan

1. Describe how material will be handled, loaded, and transported to the disposal facility. Include the name and address of the facility where the material will be taken. Measures may include additional steps or precautions for handling and disposal of hazardous materials.

C. Submit a statement documenting the nature and quantity of material processed or sold for recycling. Otherwise, submit a signed copy of the disposal agreement before disposal begins.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Striping, clearing and grubbing operations shall result in a uniform and stable in-situ subgrade void of all specified natural, artificial or unsatisfactory materials and obstructions to the specified depth which may interfere with construction operations.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. All temporary fencing and other protective measures shall be in place as shown on the Drawings or specified, and the limits of grading shall be flagged, staked or otherwise identified within the construction limits for the protection of existing vegetation to the extent feasible; for review and acceptance of the Contracting Officer prior to the start of any tree removal or clearing and grubbing operations.

B. Do not commence earthwork operations until temporary fencing, erosion and sedimentation control measures are in place and a Pre-Grade Inspection has been completed and temporary controls accepted or corrective actions taken as directed by the Contracting Officer and any regulatory representative.

1.8 TOLERANCES

A. Not Used

PART 2 PRODUCTS

2.1 SOIL MATERIALS FOR FILL

A. Acceptable soil and aggregate materials for placement in the work are specified in Section 31 23 00 - Excavation and Fill.

B. If acceptable soil materials are not available on-site, Contractor shall submit documentation for review and acceptance of the Contracting Officer prior to use of any borrow/import soil materials from off-site. All imported material shall be sourced from an approved pit with current certification from the Park.

PART 3 EXECUTION

3.1 PROTECTION OF TREES, VEGETATION, AND EXISTING FACILITIES

A. Prior to commencing clearing and grubbing operations, trees and vegetation to remain shall be protected from damage. Clearing and grubbing shall only occur in areas showing proposed improvements and where grading work and other significant ground disturbing activities are designated to occur on the Drawings.

B. Environmental protection:

1. Protect trees, plant growth, and features designated to remain.
2. Construction equipment shall minimize travel under drip lines of trees to be protected.
3. Fence/flag construction limits of protected areas to assure isolation and explain limits in field to all equipment operators.
4. Whitebark pine trees shall not be disturbed, unless approved by the Contracting Officer for removal. The location of known whitebark trees is shown on the Drawings.
5. Protection of whitebark trees shall be completed in accordance with the Drawings, Section 01 11 00 - Summary of Work, and Section 32 00 00 - Tree Protection of these Specifications.

C. Protect benchmarks from damage and displacement.

D. Temporary and permanent stockpiles shall be coordinated with the Contracting Officer.

E. The Contractor shall flag the limits of clearing shown on the drawings by accurate field survey with marked stakes or other means acceptable to the Contracting Officer. The Contracting Officer shall be notified a minimum of five (5) working days prior to scheduled commencement of clearing operations to review the flagged limits. Adjust the clearing limits as directed by the Contracting Officer.

F. Before clearing begins, protect designated trees to remain with tree protection fencing to the approximate diameter of foliage (dripline of the tree) to prevent damage to the trunk, foliage and root system by construction equipment and procedures.

G. Place tree protection fencing as required to protect other plants, adjacent property areas to remain uncleared, monuments, and existing improvements from damage.

H. The Contractor shall repair or replace immediately any damage to existing trees or root systems that are indicated to remain. The Contractor shall employ an arborist licensed in the jurisdiction of the Project, State of Wyoming, to determine the repair, replacement needs and methods for approval by the Contracting Officer.

I. Replace damaged shrubs and other vegetation designated to remain with the same size and species.

J. The tree protection fencing shall be maintained for the duration of construction operations. The work shall include immediate replacement of any damaged fence. Fencing shall be removed from the site at the completion of construction operations. The fencing disposal shall be in accordance with local, state, and federal laws and regulations for the disposal of the material.

K. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Contracting Officer.

L. All existing facilities to remain shall be located and protected from damage during clearing and grubbing operations. Additional requirements are specified in the Division 1 - General Requirements.

M. All areas disturbed by the Contractor's operations shall be restored and revegetated as specified in Section 32 90 00 - Restoration and Section 32 92 00 - Grasses.

N. Locate, check and test existing water facilities to remain in place or to be relocated. Coordinate with property or facility owner. The Contracting Officer must be present during testing and determines the test cycle lengths. Check for deficiencies including missing parts, damaged components, and improper operation. Submit a report to the Contracting Officer, where applicable, to document deficiencies and quality of existing conditions.

1. Upon completion of work, only correct existing deficiencies as directed. Such correction of deficiencies or as directed upgrades is change order work.

O. Existing facilities, to be preserved, may be lowered and protected and restored upon completion of the work.

3.2 WATERING

A. Watering for dust control shall also conform to the provisions in Section 31 25 00 – Erosion and Sedimentation Control.

3.3 STRIPPING

A. Stripping and salvage of the existing topsoil/organic layer (up to 6 inches) shall be completed prior to any clearing and grubbing. The generated topsoil/organic soil material shall be salvaged and stockpiled for use as part of the revegetation requirements as specified in Section 32 90 00 - Restoration.

B. Any material that is deemed to be organic matter and/or topsoil may not be used as backfill or placed in subgrades below proposed improvements.

3.4 STOCKPILING

A. Store topsoil for as short a time as possible to prevent loss of seed and root viability, loss of organic matter, and degradation of the soil microbial community. Unless otherwise approved by the Contracting Officer, topsoil cannot be stockpiled for more than:

1. Two months in rabbitbrush / sagebrush zones
2. Four months in grass dominated zones
3. Six months in forested zones
4. Stockpiling topsoil over the winter is not permitting.

B. Stockpile separately ecologically specific topsoil. Topsoil originating from sagebrush, wetland or lodgepole dominate habitat type shall be separated. Install temporary signs identifying each type of topsoil and location of origination. Redistribution of topsoil types shall be synonymous with the habitat type from which it originated. Place wetland topsoil and sods over the same general area(s) that the wetland topsoil and sods were conserved from.

C. Do not mix topsoil with subsoil.

D. Do not compact or operate equipment on stripped topsoil windrows or stockpiles. Use best management practices to prevent topsoil contaminations and wasting.

E. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Enclose stockpile area with silt fence and adhere to all provisions of the SWPPP.

1. Limit height of topsoil stockpiles to 36 inches.
2. Grade and shape stockpiles to allow unimpeded drainage of surface water.
3. Do not stockpile within the drip lines of trees.
4. Stockpile surplus topsoil to allow for respreading a thicker layer of topsoil, or utilization in areas with a topsoil deficit.
5. Stockpile away from excavations and future work areas.
6. Stockpile soil in the vicinity of where it was removed for future replacement in the same area.

F. Staging and stockpiling areas shall be located in previously disturbed areas and/or on hard surfaces in approved areas away from wetlands.

G. All herbicide spraying, including topsoil stockpiles, shall be completed by the NPS through their revegetation contractor. The Contractor shall notify the Contracting Officer if the topsoil shall be stockpiled for more than 1 month, so the Contracting Officer can coordinate any needed herbicide treatment.

H. Store and handle wetland topsoil in accordance with the following:

1. If the hydric soils are to be stockpiled for longer than 14 calendar days, they shall be covered with impermeable material or otherwise protected from desiccation in a manner approved by the Contracting Officer.
2. Water wetland topsoil to ensure survivability when dry to the touch if wetland topsoil is stockpiled longer than 24 hours.

3.5 CLEARING AND GRUBBING

A. The designated areas on the Drawings, which are to be flagged and marked in the field by the Contractor for review and acceptance of the Contracting Officer, shall be cleared and grubbed in order to prepare the site for construction operations.

B. Clear and grub before performing earthwork in an area.

C. Do not injure plants, trees, vegetation, and improvements shown or directed to be protected.

D. Necessary removal of shrubs and trees not specifically designated on the Drawings are to be considered part of the clearing and grubbing work.

E. Trees designated for removal on the Drawings are to be removed as specified in Section 31 13 00 - Selective Tree and Shrub Removal and Trimming.

F. Existing trees that are in or adjacent to the construction area and are greater than 10 inch DBH (measured 4.5ft above ground level) shall remain in place and be protected from damage unless shown to be removed on the Drawings.

G. Cut trees so they fall within the clearing limits.

H. The depth of grubbing in non-structural areas shall be as necessary to remove the objectionable material to a depth of no less than 1 foot from the proposed subgrade plane.

I. The depth of grubbing in structural areas, or where in conflict with project improvements shall be as necessary to completely remove the objectionable material, or to a depth of no less than 2 feet from the proposed subgrade plane where authorized by the Contracting Officer.

J. In non-structural embankment areas where the proposed subgrade plane is 2 feet or more above original ground, the depth of grubbing shall be no less than 6 inches

K. Clear and grub to the following limits, except where trees and vegetation to remain are to be protected from damage:

1. To 3 feet outside of proposed structures
2. To outside limits of slopes where slopes are shown to be rounded
3. To 3 feet outside of excavation and embankment slope lines where slopes are not to be rounded

3.6 FILL OF DEPRESSIONS AND VOIDS

A. Fill depressions caused by clearing and grubbing operations to the level of surrounding grade with accepted native soil material unless further excavation or earthwork is indicated on the Drawings.

B. All associated backfill, and areas over excavated shall be compacted in accordance with Section 204 of the FP-24 Standard Specifications and as shown on the Drawings.

3.7 DISPOSAL OF MATERIALS

A. Recycle or dispose of material legally off the project site.

B. All disposal efforts shall conform to the waste management objectives for the project as may be specified elsewhere in the Contract Documents. All waste management shall conform to water pollution controls.

C. The Contractor is responsible for locating a permitted disposal site/facility and obtaining permissions and agreements for disposal, for complying with applicable laws and regulations for transport of materials to be disposed, and for appropriate disposal of materials off the project site.

D. Submit a statement documenting the nature and quantity of material processed or sold for recycling. Otherwise, submit a signed copy of the disposal agreement before disposal begins.

E. All merchantable timber and waste materials generated during clearing and grubbing operations shall become the property of the Contractor, except where noted elsewhere in these specifications for salvage and placement in the work (i.e. barrier logs). All waste materials shall be properly disposed outside the project limits and right-of-way.

F. No waste materials generated from the Project work may be placed under embankments, in fill, buried, nor otherwise placed in the work.

G. Combustible organic materials not designated for salvage and/or reuse in the work shall be properly disposed daily. Accumulation of flammable material is not allowed.

H. Burning of waste materials on the project is prohibited.

I. No waste materials generated from the Project work may be disposed within the Park, nor is the responsibility of NPS. All waste materials shall be properly disposed, conforming to the Contract Documents.

END OF SECTION 31 11 00

SECTION 31 13 00 - SELECTIVE TREE AND SHRUB REMOVAL AND TRIMMING

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to the removal and disposal of designated tree(s) as shown on the Drawings, selective trimming, root mitigation, and disposal of any associated slash and waste.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of the Contracting Officer.

C. Whitebark trees shall not be disturbed unless approved for removal by the Contracting Officer. If any whitebark trees are in conflict with the construction limits and require trimming or removal, approval from the Contracting Officer must be obtained in writing prior to any disturbance.

D. Removed trees shall remain the property of the NPS. The Contractor shall haul felled trees to a location within the Park approved by the Contracting Officer.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 01 11 00 – Summary of Work
2. Section 01 57 23 – Temporary Storm Water Pollution Prevention
3. Section 31 11 00 – Clearing and Grubbing
4. Section 31 25 00 – Erosion and Sediment Control
5. Section 32 00 00 – Tree Protection

1.3 DEFINITIONS

A. Tree DBH: The diameter of a tree at breast height is to be measured at a point 4.5 feet above the prevailing existing ground surface on the uphill side of the tree.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and generally defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated on the Drawings or directed by the Contracting Officer; excluding stream channel work.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Contractor to submit product information and specifications for tree wound paint.

C. Certified Silviculturist credentials and certifications.

D. Disposal Plan.

1.5 REFERENCES

A. ANSI A300 Standards, developed by Tree Care Industry Association (TCIA). https://treecareindustryassociation.org/business-support/ansi-a300-standards/

1.6 QUALITY ASSURANCE

A. Not used.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. Construction area demarcation (orange construction limit fencing) shall be installed as shown on the Drawings, and the limits of grading shall be flagged, staked or otherwise identified for review and acceptance of the Contracting Officer prior to commencing tree removal operations.

B. Do not commence tree removal operations until temporary erosion and sedimentation control measures are in place and a Pre-Grade Inspection has been completed and accepted by the Contracting Officer and other applicable regulatory agency(s).

C. Contractor shall be responsible for all traffic control during tree removal operations in accordance with the Contractor's accepted Traffic Control Plan, per Section 01 50 00 Temporary Facilities and Controls.

D. Following any excavation work within the immediate vicinity of any tree which is cause for damage to its existing tree root system, the Contracting Officer shall be notified to allow for inspection of the area and tree root system. Any additional trees that are required for removal must be authorized by NPS.

1.8 TOLERANCES

A. Not Used

1.9 PROFESSIONAL SERVICES

A. The Contractor shall retain the services of a Certified Silviculturist (or Certified Arborist - ISA, International Society of Arboriculture only upon acceptance of NPS) to provide professional consultation for any required tree trimming, root mitigation, grade changes, and tree removal considerations as part of the work.

B. Up to 24 hours of on-site field time by the Certified Silviculturist shall be made available for professional consultation with the Contractor and NPS, and is considered to be part of the work, and no additional compensation shall be allowed for.

PART 2 PRODUCTS

2.1 SOIL MATERIALS FOR FILL

A. Acceptable soil materials for placement in the work are specified in Section 31 23 00 - Excavation and Fill.

B. If acceptable soil materials are not available on-site, Contractor shall submit documentation for review and acceptance of the Contracting Officer prior to use of any borrow/import soil materials from off-site.

2.2 TREE WOUND PAINT

A. Tree wound paint shall be bituminous based paint of standard manufacture specifically designated for use on tree wounds and cuts as accepted by the Contractors Certified Silviculturist and the Contracting Officer.

PART 3 EXECUTION

3.1 PROTECTION OF TREES, VEGETATION, AND EXISTING FACILITIES

A. Prior to commencing tree removal operations, trees and vegetation to remain shall be protected from damage.

B. All areas disturbed by the Contractor’s operations shall be restored as specified in Section 32 90 00 - Restoration.

C. All existing facilities to remain shall be located and protected from damage during tree removal operations.

D. Existing facilities, to be preserved, shall be lowered and protected and restored upon completion of the work.

E. The Contractor shall be liable for damage to utility service lines, fences or other structures. Trees shall be felled within the project limits, and in a manner to minimize disturbance to surrounding vegetation and traffic flow.

3.2 WATERING

A. Watering for dust control shall also conform to the provisions in Section 31 25 00 - Erosion and Sediment Control.

3.3 TREE REMOVAL

A. Do not injure plants, trees, vegetation, and improvements shown or directed to be protected.

B. Shrubs and Trees not specifically called out for removal on Drawings, are to be considered part of the clearing and grubbing work.

C. Trees to be removed shall be conspicuously marked by NPS with paint and/or flagging. The Contractor shall give the Contracting Officer ten (10) working days' notice in requesting trees to be marked for removal.

D. Cut trees so they fall within the clearing limits, and do not damage existing facilities, other trees, or environmental resources.

E. All felled trees must be removed from the site within the same work week or five (5) calendar days, whichever is least to reduce potential for accumulation or spread of insects and disease. Contractor is responsible for complete site cleanup. No slash, stumps and other green waste generated from tree removal operations may be burned or stored on site.

F. Where indicated on the Drawings or as specified by the Contracting Officer, the Contractor shall completely remove trees including stumps and root balls.

G. Except where required for placement in the work (e.g. barrier logs), no residual or unused timbers, logs, woody debris or slash may be left on-site, buried in embankments, or burned on site.

3.4 HAZARD TREES

A. Removal of hazard trees shall only occur as directed, or Contractor request, where authorized by the Contracting Officer.

B. The intent is to remove hazard trees for improved safety during construction operations and post project use of the new project facility by the public.

C. Hazard trees to be removed shall be conspicuously marked by NPS with paint and/or flagging. The Contractor shall give the Contracting Officer at least ten (10) working days' notice in requesting hazard trees to be marked for removal.

D. Designated hazard trees may be felled in place where outside the limits of the project improvements.

3.5 FILL OF DEPRESSIONS AND VOIDS

A. Fill depressions and voids with backfill material as specified in Section 31 23 00 – Excavation and Fill.

B. All associated backfill, and areas over excavated shall be compacted in conformance with Section 204 of the FP-24 Standard Specifications and as shown on the Drawings.

3.6 TRIMMING

A. Trees and shrubs located near trails, access routes, campsites, roadways or adjacent to the proposed project improvements and facilities with branches in the clearing limits or that interfere with the work shall be trimmed as specified on Drawings, or as necessary to prevent damage by equipment.

B. Trees and shrubs with branches that are located within the horizontal and vertical clearing limits (as specified on the Drawings) shall be trimmed to eliminate any obstructions.

C. Branches shall be cut near the bole of the tree or adjacent branch. Cuts shall be neatly made, without splintering or tearing the branch. Cuts on branches larger than 1-1/2 inch diameter shall be painted with accepted tree wound paint.

D. Branches for trimming shall be flagged or otherwise identified in the field by the Contractor and verified by the Contracting Officer prior to performing the work. No branches shall be trimmed without acceptance from the Contracting Officer. Consultation with the Certified Silviculturist may be required at the determination of the Contracting Officer.

E. Conform to latest edition of ANSI A300 Standards, part 1, Pruning.

F. Within the same work week or five (5) calendar days, whichever is least, all woody slash and other green waste generated from trimming operations shall be disposed at a location approved by the Contracting Officer.

3.7 UNDERSTORY CLEARING

A. Clearing and removal of understory brush, shrubs and small trees (<10-inch diameter) for site distance mitigation improvements (where designated on the Drawings) shall be considered part of clearing and grubbing work operations.

B. The limits of understory clearing for site distance mitigation improvements is generally shown on the Drawings and must be flagged or authorized in the field by the Contracting Officer prior to start of the work.

3.8 ROOT MITIGATION

A. During excavation and grading operations, mitigation for impacts to tree roots will be required. Performance of such root mitigation will be performed under the direction of a Certified Silviculturist. The Certified Silviculturist shall instruct Contractor personnel on the proper root mitigation procedure at the initial consultation. Following initial consultation, the Certified Silviculturist need not be present during subsequent root mitigation activities, so long as Contractor personnel performing the root mitigation were instructed at the initial consultation by the Certified Silviculturist, unless requested by the Contracting Officer.

B. The roots of trees (to remain, within vicinity of the work) over four inches in diameter shall not be severed, if avoidable.

C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible, unless otherwise directed by Certified Silviculturist. At minimum conform to the following measures, unless otherwise directed:

1. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with construction operations or proposed facilities.
2. Cut roots with sharp pruning instruments; do not break or chop.
3. Place permanent fill as soon as possible.
4. Do not allow exposed roots to dry out before placing permanent fill. Cover exposed roots with burlap and keep moist, as needed.

5. Temporarily support and protect roots from damage, as needed.
6. Coat cut faces of roots (more than 1-1/2 inch diameter) with tree wound paint or other approved coating formulated for use on damaged plant tissues.
7. Place permanent fill as soon as possible.

D. Conform to latest edition of ANSI A300 Standards, part 8, Root Management Standard.

3.9 DISPOSAL OF MATERIALS

A. The Contractor shall remove and dispose of all waste material in accordance with all local, regional, state and federal requirements.

B. Recycle or dispose of material legally off the project site.

C. All disposal efforts shall conform to the waste management objectives for the project as may be specified elsewhere in the Contract Documents. All waste management shall conform to water pollution controls.

D. The Contractor is responsible for locating a permitted disposal site/facility and obtaining permissions and agreements for disposal, for complying with applicable laws and regulations for transport of materials to be disposed, and for appropriate disposal of materials off the project site.

E. All merchantable timber generated during the tree removal operations shall remain the property of the NPS. The Contractor shall haul all removed trees to a location within the Park approved by the Contracting Officer.

F. All waste materials shall be properly disposed outside the project limits and right-of-way.

G. No waste materials generated during tree removal operations may be placed under embankments, in fill, buried, nor otherwise placed in the work.

H. Combustible organic materials not designated for salvage and/or reuse in the work shall be properly disposed. Accumulation of flammable material is not allowed.

I. Burning of waste materials on the project site is prohibited.

J. No waste materials generated during tree removal operations may be disposed within the Park nor is the responsibility of NPS. All waste materials shall be properly disposed, conforming to the Contract Documents.

END OF SECTION 31 13 00

SECTION 31 23 00 - EXCAVATION AND FILL

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to subgrade preparation, excavation, and embankment and grading of earthen materials as it relates to the following for installation and construction of the project improvements:

1. Roadway and parking areas and ditch / channel excavation
2. Grading, sloping, shaping, and finishing subgrades
3. Embankment and slope construction, finishing
4. Trench excavation and backfill
5. Structure excavation and backfill
6. Building and structure pad embankments
7. Backfill, structural fill, and compaction
8. Excavating and removing unsuitable material
9. Rock excavation (as directed or authorized)
10. Finish grading

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. Refer to Section 01 35 23 – Safety Requirements for special safety considerations for working in a geothermally active area. The Contractor is responsible for adhering to all site specific safety considerations associated with Yellowstone National Park.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections which includes, but is not limited to:

1. Section 01 35 23 – Safety Requirements
2. Section 01 57 23 – Temporary Storm Water Pollution Prevention
3. Section 31 11 00 – Clearing and Grubbing
4. Section 31 25 00 – Erosion and Sediment Control
5. Section 31 37 00 – Riprap
6. Section 31 50 00 – Excavation Support and Protection

1.3 DEFINITIONS

A. Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Contracting Officer. Unauthorized excavation, as well as remedial work directed by the Contracting Officer, shall be at the Contractor's expense.

C. Backfill: Soil used to achieve design grades for the project.

D. Initial Backfill or Pipe Zone Backfill: Backfill placed beside and over pipe or culverts (up to 1-foot above) in a trench, including haunches to support facility.

E. Final Backfill: Backfill placed over initial backfill to fill a trench.

F. Structure Backfill: Backfill placed to bring excavations for structures to subgrade.

G. Borrow: Satisfactory material generated on-site (local) or obtained from sources (imported), that comply with the project specifications and are suitable for the purpose intended. Only imported material obtained from approved pits with current certification by the Park shall be allowed. Prior approval from the Contracting Officer shall be required for all imported material.

H. Riprap: Material placed over bedding material for slope protection as shown on the Drawings.

I. Bedding: Material placed over excavated or filled subgrade as shown on the Drawings as a bedding layer to provide uniform support and grade.

J. Topsoil: Excavated material conserved from clearing/grubbing within the work limits of the site that is suitable for growth of grass, cover crops, or native vegetation.

K. Embankment construction. Embankment construction consists of placing and compacting backfill. This work includes:

1. Preparing foundation for embankment;
2. Constructing roadway embankments;
3. Benching for side-hill embankments;
4. Filling of subexcavated areas, holes, pits, and other depressions.

L. Finish Grade: The final surface of the completed grading as noted on the Drawings.

M. Rock: For the purposes of classified excavation, rock shall be defined as material that cannot be dislodged by a heavy duty track-type tractor (*Caterpillar Model D-8 or similar*), rated at not less than 300 hp flywheel power and equipped with a single or multi shank hydraulic ripper, capable of exerting not less than 50,000 lbs breakout force. Rock excavation includes up to 6 inches over-excavation below the required excavation depth. Excavated rock shall be quantified by measuring the volume of removed rock and reducing this amount by 35%. This definition of rock does not include materials such as hardpan, loose rock or boulders, concrete or other materials that can be removed by means other than drilling and blasting or mechanical hammers.

N. Satisfactory Materials: Materials classified by ASTM D 2487 as CL, ML-CL, and SC are satisfactory as fill for grading. Satisfactory material shall be free of any refuse and organic matter.

O. Excavation Soil: Soil material excavated from the site in cut sections or from below the original groundline in embankment sections.

P. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a backfill immediately below topsoil, or other subsequent fill materials.

Q. Trench Rock: For the purposes of classified excavation, trench rock shall be defined as material encountered in trench excavation that cannot be dislodged by a medium duty track-type hydraulic excavator (*Caterpillar Model 320 or similar*), equipped with a heavy duty rock ripping (RR) bucket, rated at not less than 135 hp flywheel power with bucket digging force of not less than 28,000 lbs and stick digging force of not less than 18,000 lbs. Trench rock excavation includes up to 6 inches over-excavation below the required excavation depth. Rock shall be quantified by measuring the extent of rock in the trench, not by measuring the volume of removed rock. This definition of trench rock does not include materials such as hardpan, loose rock or boulders, concrete or other materials that can be removed by means other than drilling and blasting or mechanical hammers.

R. Unsuitable Material: Earthen material encountered below the natural ground surface in embankment areas or below the grading plane in excavation areas determined to be.

1. Insufficient for structural stability or inappropriate for planned use.
2. Of such unstable nature that it cannot be compacted to the specified density using ordinary methods at optimum moisture content.
3. Too wet to be properly compacted and cannot be dried before incorporation into the work.

S. Unsatisfactory Materials: Earthen materials classified by ASTM D 2487 as OL, OH, MH, CH, and PT are unsatisfactory in-situ soil. Unsatisfactory materials also include those materials containing roots and other organic matter, trash, debris, frozen materials, and stones larger than 6 inches. Fill materials containing stones larger than 3 inches shall not be used in the uppermost 2 feet.

T. Waste: Excess and unsuitable excavated material that cannot be used.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Submit a Work Plan based on the Contractor's proposed work schedule and construction sequence of earthwork and grading operations to accommodate construction loads and protection of improvements including underground facilities (e.g. conduits, pipes, culverts) and subgrade deterioration.

C. Submit an Excavation and Backfill Plan which shall address excavation shoring and bracing.

D. At least 14 days prior to placement of materials in the work, Contractor shall submit test reports and supporting documentation to indicate the source and material properties for all bedding, backfill, and other soil materials to be placed in the work as part of the earthwork operations, including:

1. Soil classification test report (ASTM D 2487) on borrow soil material proposed for placement in the work.

2. Laboratory optimum moisture-maximum density curves (ASTM D1557) for each on-site, borrow, and backfill soil material proposed for placement in the work.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24) dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. Subgrade preparation and site grading shall be in accordance with the subsequent sections of this Specification Section 31 23 00.

D. Other reports that may be prepared by the Contractor's professional services team or geotechnical engineer for supplemental information for site grading, subgrade preparation, and/or backfills shall be provided to NPS.

E. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

F. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

G. A code not specified as a federal code is a Wyoming code.

H. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to, Technical Conditions, Drawings, and Standard Specifications.

B. Sampling and testing requirements shall be in conformance with Table 204-1, 208-1 and 209-1 in the FP-24 Standard Specifications. Frequency of material testing shall also conform to the applicable Wyoming Test Methods or equivalent ASTM test method.

C. Testing Agency: The Contractor shall retain a qualified independent geotechnical engineering and/or material testing agency to perform third-party acceptance testing.

D. The Contractor shall be responsible for all quality control and acceptance testing.

E. Inspection: The Contractor shall coordinate with NPS during all earthwork operations to allow for access to the site as often as necessary for the performance of any special inspections and

material testing for verification that the specifications are being met for the installation of materials.

F. Proceed with subsequent earthwork only after test results for previously completed work complies with requirements.

G. Drainage: The Contractor shall be responsible for the proper drainage of the site during construction of the Work. Water shall not be allowed to accumulate in any of the excavated areas. Storm or ground water collecting on site during construction shall be removed by pumping, ditching, or other suitable means in conformance with the Specifications and Project Permits.

H. Inclement Weather: When earthwork operations are ceased due to weather (rain, freezing, snow, etc.), construction shall not be resumed until NPS (who may retain the services of a Geotechnical Engineer) has verified soil strength has not been adversely affected. If soil strength has been decreased, the affected portion of fill shall be re-scarified, moistened, or dried as required and recompacted to the specified density.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. Do not commence earthwork operations until temporary fencing, erosion and sedimentation control measures are in place and a Pre-Grade Inspection has been completed by the Contracting Officer and other applicable regulatory agency(s).

B. Prior to starting work on the Project, the Contractor shall notify 811, one week prior to the start of work for location of recorded underground utilities in and near the construction zone. The Contractor is responsible for ascertaining the location of, and protection for, all utilities to be encountered in the performance of the required work.

C. All articles of archaeological interest that may be uncovered by the Contractor during the progress of the work shall be reported immediately to NPS, and work stopped in the immediate vicinity of the find. Further operations of the Contractor with respect to the findings will be decided under the direction of NPS. In no case shall any archaeological findings result in any claim to be made by the Contractor including, but not limited to, project delay.

D. In the event that the Contractor discovers hazardous materials or physical conditions of any unusual nature while excavating, the Contracting Officer shall be notified immediately and work stopped in the immediate vicinity of the find. NPS shall promptly investigate such conditions and shall issue a contract change order, if required or not covered elsewhere in these Specifications. In the event of a dispute caused by such conditions the Contractor shall not be excused from performance of the contract work.

E. Protection of Persons and Property:

1. All open excavations shall be backfilled at the end of each day's work, or properly covered with "traffic rated" trench plating, securely fastened to the ground in accordance with state of Wyoming requirements, and barricades.
2. The Contractor shall protect structures, utilities, sidewalks, pavements, trees and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

3. The Contractor shall protect, maintain and restore benchmarks, monuments, and other reference points affected by this work. If bench marks, monuments or other permanent reference points are displaced or destroyed, points shall be re-established and markers reset under supervision of a licensed Land Surveyor in the State of Wyoming.

F. Traffic: Minimize interference with adjoining roads, streets, walks, trails and other adjacent occupied or used facilities during earthwork operations.

1. Do not close or obstruct streets, drives, walks, or other adjacent occupied or used facilities without permission from NPS and authorities having jurisdiction.
2. Provide temporary controls and alternate routes around obstructed or closed traffic ways in conformance with authorities having jurisdiction, and Section 01 55 00 - Temporary Facilities and Controls.

G. Blasting activities shall not be allowed as part of the work.

H. Excavation Safety shall be conducted in accordance with OSHA safety regulations and Section 31 50 00 - Excavation Support and Protection.

1.8 TOLERANCES

A. Conform to tolerances as specified in the FP-24 Standard Specifications.

B. All earthwork limits shall be constructed within a minimum tolerance of 1 inch for horizontal layout or dimensions and within a minimum tolerance of 1 inch for vertical layout with reference to elevation or grade with the following additional requirements:

1. Minimum thicknesses and slopes shall be as shown on the Drawings.
2. All grading shall be performed to maintain slopes and drainage as shown on the Drawings.
3. Completed slopes must be within 1 inch from the grade shown on the Drawings.
4. Flowlines must be graded to drain and must be within 1 inch from the grade shown on the Drawings.

PART 2 PRODUCTS

2.1 GENERAL

A. Conform to the following sections of the FP-24 Standard Specifications, unless otherwise shown on the Drawings:

1.	Backfill material	704.01
2.	Select borrow	704.02
3.	Unclassified borrow	704.01
4.	Bedding material	704.01
5.	Foundation fill	704.01
6.	Water	725.01

B. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. Only imported material obtained from approved pits with current certification by the Park shall be allowed. Prior approval from the Contracting Officer shall be required for all imported material.

C. All imported material shall be from weed-free sources.

D. All fill materials shall be free from mud, refuse, construction debris, organic material, rock or stones greater than 6 inches in any dimension, frozen or otherwise unsuitable or unsatisfactory material. Local borrow material for fills shall be secured from excavation after rejection of any unsuitable materials. Materials from other sources may be used upon acceptance by NPS.

E. All fill materials in the uppermost 2 feet shall not have any rocks larger than 3 inches in diameter.

F. Material for use in replacing undercut areas or in construction of embankments shall conform to the specifications herein, and shall be accepted by NPS and obtained from approved sources.

G. Duff and topsoil shall be stripped and salvaged as required in Section 31 11 00 - Clearing and Grubbing, without contamination with subsoil and stockpiled convenient to areas for later application or at locations specified by NPS.

2.2 BACKFILL MATERIAL

A. Backfill material shall conform to the specifications herein and Section 704.01 of the FP-24 Standard Specifications.

B. Backfill material shall be a suitable, well-graded, compactable material that, for structures and pipes other than plastic pipe, has a maximum particle size of 3 inches and a soil classification, AASHTO M 145, of A-1, A-2, or A-3, and for reinforced soil slopes and plastic pipe has a maximum particle size of 1½ inches and a soil classification, AASHTO M 145, of A-1, A-2-4, A-2-5, or A-3.

2.3 STRUCTURE BACKFILL

A. Structural backfill material shall conform to the specifications herein, and Section 704.01 of the FP-24 Standard Specifications.

B. Structural backfill shall be suitable, free-draining material with a maximum particle size of 3 inches, a maximum of 5 percent material passing No. 200 sieve, AASHTO T 27 and AASTO T 11, and a plasticity index of a maximum of 6, AASTO T 90.

C. Native soils for structure backfill may only be placed where shown on the Drawings and used only as allowed or accepted by the Contracting Officer.

2.4 SITE BORROW MATERIAL

A. Site borrow material shall conform to the specifications herein and Section 704.02 pf the FP-24 Standard Specifications.

B. Material shall be well-graded according to table 704-2 of the FP-24 Standard Specifications and shall have a liquid limit (AASHTO T 89, Method A) of 30 max.

C. Material generated on-site from earthwork shall conform to the definitions specified herein for the specific usage of the material (backfill).

2.5 IMPORTED BORROW

A. Material imported from a different source shall conform to the definitions specified herein for the specific usage of the material (backfill). The Contractor shall use all suitable material available on site before importing borrow. Only imported material obtained from approved pits with current certification by the Park shall be allowed. Prior approval from the Contracting Officer shall be required for all imported material.

B. Clean, readily compactable soils or soil-aggregate, with all particles passing a 3-inch square opening and not more than 35 percent passing a No. 200 sieve, as determined by AASHTO T88-81. The portion of the material passing a No. 40 sieve shall have a plasticity index of not more than 10, as determined by AASHTO T90-81. Use all suitable existing embankment material available on site before importing borrow.

2.6 RIPRAP MATERIAL

A. Riprap material shall conform to the specifications herein.

B. Refer to Section 31 37 00 - Riprap for further details.

2.7 BEDDING MATERIAL

A. Bedding material shall conform to the specifications herein and Section 704 of the FP-24 Standard Specifications.

B. Bedding material shall be a sandy, well-graded, free draining material free of excess moisture, muck, frozen lumps, roots, sod, or other deleterious material with a maximum particle size or 1/2 inch or half the corrugation depth of subject pipe material, whichever is smaller and maximum of 10 percent material passing No. 200 sieve, AASHTO T 27 and T 11.

C. Bedding material for small diameter or smooth wall plastic piping (e.g. PVC, HDPE) shall be a nonplastic sand material free of clay, organic matter or other deleterious materials, conforming to Section 703.14 of the FP-24 Standard Specifications.

2.8 FOUNDATION FILL

A. Foundation fill material shall conform to the specifications herein, and Section 704.01 of the FP-24 Standard Specifications.

B. Foundation fill shall be a suitable material with a maximum particle size of 2 inches and a soil classification, AASHTO M 145, of A-1-a, and maximum of 6.0 percent material passing No. 200 sieve, AASHTO T 27 and AASHTO T 11.

2.9 TOPSOIL MATERIAL

A. Topsoil material shall conform to the specifications herein.

B. Topsoil material shall be obtained from stripping and shallow excavations, and shall consist of organic friable native soils, free from subsoil, clay lumps, gravel, stones, and other undesirable material and objects more than 2-inches in average diameter, free of weeds, and capable of supporting growth of native vegetation. Manufactured topsoil is not acceptable. Topsoil should not be obtained from bogs, marshes or designated wetlands. Refer to Sections 32 90 00 – Restoration and 32 92 00 - Grasses for further details.

C. Imported topsoil shall not be allowed.

2.10 COMPACTION EQUIPMENT

A. General – Compaction equipment shall conform to the manufacturer's specifications and will be maintained in good working condition at all times.

B. Embankment Compaction – Equipment for compaction will consist of self-propelled compactors with the ability to perform vibratory compaction. The compactors should be sufficient in size to meet the specified compaction densities in no more than 8 passes. If standard compaction equipment is unable to operate effectively on the steeper slopes, the use of special compaction equipment (described below) shall be used to achieve the required compaction density for backfill.

1. Vibratory compaction shall be used when the backfill is at or near its optimum moisture content as determined by ASTM D1557. Vibratory compaction should be applied only on slopes shown on the drawings as 4H:1V. Vibratory compaction shall not be used within 15 feet of the existing abutments.
2. Non-vibratory compaction shall be used for all other slopes that do not meet the criteria listed above for vibratory compaction. The use of special compaction equipment (described below) shall be used when standard equipment cannot effectively operate on the steeper slopes.

C. Special Compaction – Use hand operated power tampers/plate compactors having a minimum static weight of 300 lbs. and a minimum dynamic force of 1,000 lbs., or other special compaction equipment including tracked equipment, walk-behind rollers, or other slope compatible equipment such as a track-hoe with bucket or heavy dozer to be approved by the contracting officer. Use special compaction equipment adjacent to concrete structures, in restricted spaces, and in any locations where other compactors specified in this section cannot operate effectively.

PART 3 EXECUTION

3.1 GENERAL

A. Prior to starting earthwork operations, all target areas to receive surface improvements shall be striped, cleared and grubbed conforming to Section 31 11 00 - Clearing and Grubbing.

B. Conserve, sort, and stockpile suitable organic matter and topsoil materials.

C. Temporary slopes and excavations shall be compatible with the soil type, and meet the minimum requirements identified in a project geotechnical report where provided. Conform to Section 31 50 00 - Excavation Support and Protection.

D. Rock Excavation

1. Blasting is not allowed as part of the work.
2. Rock or trench rock excavation/cut may be completed by use of pneumatic or hydraulic hammers, single shank hydraulic ripper, and/or heavy-duty rock ripping bucket.
3. Expansive demolition grout "chinese dynamite" may be used where applicable upon approval of the Contracting Officer.

3.2 PROTECTION OF TREES, VEGETATION, AND EXISTING FACILITIES

A. Prior to commencing earthwork operations, trees and vegetation to remain shall be protected from damage as specified in Section 01 11 00 – Summary of Work.

B. Earthwork operations shall only occur in areas showing proposed improvements and where grading work and other significant ground disturbing activities are designated to occur on the Drawings.

C. All areas disturbed by the Contractor's operations shall be restored and stabilized as specified in Section 32 90 00 - Restoration.

D. All existing utilities and facilities to remain shall be located and protected from damage during earthwork operations.

3.3 STORAGE OF MATERIALS

A. Soil materials may only be stockpiled at staging and storage areas identified on the Drawings and in accordance with the SWPPP and Project Permits and shall not be stockpiled in a manner that destroys or damages existing vegetation in areas not shown on Drawings for excavation or grading.

1. Place, grade, and shape stockpiles to drain surface water.
2. Stockpile materials away from edge of excavations. Do not store within drip line of trees to remain.
3. Cover all stockpiles at the end of each day's work, and when operations are inactive to prevent windblown dust or erosion from precipitation.

B. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing.

C. The stockpiles shall also be protected from contamination with unsatisfactory excavated material or other material that may destroy the quality and fitness of the suitable stockpiled material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced with satisfactory on site or imported material from approved sources at no additional cost to NPS.

D. Any areas disturbed by the stockpiling of materials outside of designated staging and storage areas shall be revegetated at the Contractors expense, and no additional compensation will be allowed.

3.4 WATERING

A. Contractor shall be responsible for obtaining any permit, license, agreement, certification, or any combination of these, and pay all associated fees in order to develop a suitable water supply for construction operations.

B. Contractor must have one (1) mobile unit available at all times.

C. No chemical additives, binder, or dust palliative shall be permitted for any watering/dust controls operations without prior written acceptance of NPS.

D. Each water storage tank and distribution system must be equipped with positive shut-off valves.

E. Watering for dust control shall also conform to the provisions in Section 31 25 00 - Erosion and Sediment Control.

3.5 UNSUITABLE MATERIALS

A. Any unsuitable material encountered during excavation and subgrade preparation work such as organic matter, clay, swampy material or other which cannot provide for a stable trench or be properly compacted, dispose at designated sites or legally off of the project.

B. Unsuitable material which is encountered below finished subgrade shall be excavated to a depth required by the Contracting Officer, disposed of and replaced with backfill, as so directed and accepted by the Contracting Officer in writing.

C. In addition, and at the discretion of the Contracting Officer, geotextile material may be required to stabilize the bottom of the excavation or trench area.

D. Over excavation and removal of unsuitable material, and replacement with satisfactory material shall be considered as change order work.

3.6 SURPLUS MATERIAL

A. The NPS will retain any clean soil or rock material as approved by the Contracting Officer. Excess or surplus material shall be reviewed by the Contracting Officer prior to hauling or removal. If the Contracting Officer specifies material to remain the property of the NPS, the Contractor shall haul and place material at the location designated by the Contracting Officer. Any material rejected by the Contracting Officer shall be disposed of by the Contractor.

B. Ensure enough material is available to complete the fills and embankments before placing the material at other locations on the job site or disposing of it.

C. If surplus material is prematurely disposed and it is later discovered there is a material shortage, the Contractor must replace with a satisfactory material accepted by the Contracting Officer.

D. Dispose of excess material at designated sites or legally off the project.

3.7 DEFICIENCY MATERIAL

A. If the quantity of acceptable material from excavation is not enough to construct the fill and embankments, the quantity of material needed to complete the work must consist of local or imported borrow.

B. Local borrow is to be considered as part of the excavation work, and no additional compensation shall be allowed for.

C. Imported borrow not used in the work shall not be paid for. Disposal of any surplus imported borrow shall not be paid for.

3.8 SUBGRADE PREPARATION

A. The ground surface in areas to be graded and/or receive overlying improvements, shall be stripped, cleared and grubbed under Section 31 11 00 - Clearing and Grubbing.

B. Any material that is deemed to be organic matter and/or topsoil may not be used as backfill or placed in sub-grades below proposed improvements.

C. Exposed ground surfaces shall be kept moist during subgrade preparations. Native soils shall be scarified to a minimum depth of six (6) inches, moisture conditioned, and compacted in conformance with Section 204 of the FP-24 Standard Specifications and as shown on the Drawings.

3.9 ROADWAY EXCAVATION

A. Perform roadway excavation, embankment, and compaction according to the applicable provisions of Section 204, Excavation and Embankment of the FP-24 Standard Specifications.

B. Shape to drain and compact the work area to a uniform cross-section at the end of each day's operations.

C. Remove unsuitable material from the roadbed and replace it with suitable material.

D. Finish roadbeds to be smooth and uniform and shaped to conform to the specified sections. Finish roadbeds to the tolerance listed in Subsection 1.08, Tolerances, herein.

E. Dispose of unsuitable or excess excavation material according to Section 02 41 00, Selective Site Demolition and Salvage. Replace shortage of suitable material caused by premature disposal of roadway excavation.

F. Place roadway structural base sections and aggregate courses under Section 32 11 00, Base Courses.

3.10 ROAD SHOULDER RECONDITIONING

A. Conform to Section 303, Road Reconditioning of the FP-24 Standard Specifications.

B. Clear vegetation, repair soft and unstable areas, and reshape to slopes as shown on the plans.

C. Road shoulder backing material shall be aggregate base, grading D as shown on the plans conforming to Section 32 11 00, Base Courses.

3.11 TRENCH EXCAVATION AND BACKFILL

A. Perform trench excavation and backfill according to the applicable provisions of Section 209, Structure Excavation and Backfill of the FP-24 Standard Specifications.

B. For pipelines or culverts, excavate to widths as specified or as needed to effectively achieve compaction requirements.

C. Compact trench backfill according to subsection 209.10 of the FP-24 Standard Specifications, unless otherwise specified on the Drawings.

D. Remove safety features when no longer necessary.

3.12 EXCAVATION FOR FORMWORK AND STRUCTURES

A. Perform structure excavation according to the applicable provisions of Section 208, Structure Excavation and Backfill for Selected Major Structures of the FP-24 Standard Specifications.

B. Excavate to foundation grade without disturbing the trench or foundation surface. Foundation grade is the elevation at the bottom of the bedding for installing the structure.

3.13 EMBANKMENT CONSTRUCTION

A. Construct embankments according to the applicable provisions of Section 204, Excavation and Embankment of the FP-24 Standard Specifications, unless otherwise specified on the Drawings.

B. Incorporate only suitable excavation or specified fill material into the embankment.

C. At the end of each day's operations, shape to drain and compact the embankment surface to a uniform cross-section. Eliminate ruts and low spots that could hold water.

D. In structural areas and within the roadway prism, place material in horizontal layers not exceeding 8 inches in compacted thickness.

E. For embankment outside of structural areas or roadway prism, place material in horizontal layers not exceeding 12 inches in compacted thickness.

F. Compact embankment according to subsection 204.11 of the FP-24 Standard Specifications, unless otherwise specified on the Drawings.

3.14 DITCH EXCAVATION

A. Excavate, shape, and slope ditches to the lines and grades shown on the Drawings.

B. Construct ditches in accordance with applicable provisions of subsection 204.12 in the FP-24 Standard Specifications.

C. Remove projecting roots, stumps, rock, or similar matter. Any areas excavated below grade are to be backfilled according to the specifications herein.

D. Compact each layer according to subsection 204.11 of the FP-24 Standard Specifications, unless otherwise specified on the Drawings.

E. Maintain ditches in an open condition and without sticks, and other debris.

3.15 BACKFILL AND COMPACTION NEAR WALLS

A. Complete backfill and compaction according to the applicable provisions of Section 209, Structure Excavation and Backfill of the FP-24 Standard Specifications, unless noted otherwise herein.

B. Place backfill layers evenly on all sides of the structure. Extend each layer to the limits of the excavation, natural ground or proposed improvement. Place backfill material in compacted layers not exceeding 6 inches (loose thickness).

C. Do not place backfill material against fresh concrete until 80 percent of the design strength is achieved.

D. Compact backfill according to subsection 209.11 of the FP-24 Standard Specifications:

1. Determine optimum moisture content and maximum dry density of backfill material according to AASHTO T 99, Method C. Adjust the moisture content of the backfill material to a moisture content suitable for compaction.
2. Compact material placed in all layers to at least 95 percent of the maximum density. Determine the in place density and moisture content according to AASHTO T 310 or other approved test procedures.
3. Do not apply density requirements as measured by AASHTO T 310 to material incapable of being tested or compacted to maximum values determined by AASHTO T 99. For these material, fill the voids around the rock in each layer with earth or other fine material. Compact each layer until there is no visible evidence of further consolidation.

3.16 SLOPING, SHAPING AND GRADING

A. Complete sloping, shaping and grading according to the applicable provisions of Section 204, Excavation and Embankment of the FP-24 Standard Specifications.

B. Complete slopes, waterbars, drainage channels, ditches, culverts, riprap, and other underground structures and facilities before placing aggregate courses.

C. Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated on the Drawings.

1. Cut out soft spots, fill low spots, and trim high spots to achieve required grading and comply with required surface tolerances.
2. Provide a smooth transition between adjacent existing grades and new grades.
3. All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded.
4. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes.

D. If a slide or slipout occurs on a cut or embankment slope, remove or replace the material and repair or restore damage to the work. Bench or key the slope to stabilize the slide. Reshape the cut or embankment slope to an acceptable condition.

E. Slope grades to direct water away from facilities and to prevent ponding.

F. Low areas resulting from removal of unsuitable material or from excavation of rock shall be brought up to required grade with satisfactory materials or proposed fill material as shown on the Drawings.

G. Construct slopes to the lines and grades shown on the Drawings. Slope tolerances are measured perpendicular to the planned slope.

H. Round the tops of excavation slopes and ends of excavations to gently blend with adjacent grades and facilities.

I. The Contractor may be directed in the field to vary the angle of slopes to achieve a natural appearance. No additional compensation for this varying sloping will be considered.

J. No portion of a slope may encroach on a roadway, walkway, or trail.

K. Maintain completed slopes and graded areas true and smooth for the duration of project work, until overlying materials are place, and/or final revegetation activities are complete and the project work is accepted. Repair slope damage caused by traffic, disturbance, tracking, or erosion regardless of amount or extent.

3.17 RIPRAP SLOPE PROTECTION

A. Riprap shall be placed for slope protection as shown on the Drawings. Refer to Section 31 37 00 for further information.

3.18 FINISHED GRADES

A. All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified.

B. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes and noticeable breaks. At the ends of cuts and at intersections of cuts and embankments, adjust slopes in the horizontal and vertical planes to blend into each other or into the natural ground.

C. Drainage ways shall be finished to permit adequate drainage and avoid ponding.

D. Areas to receive topsoil or revegetation treatments shall be set to the proper grade to allow for placement of topsoil and/or incorporation of amendments, and application of mulches as part of the finish work.

3.19 TOPSOIL PLACEMENT

A. In areas to receive topsoil, the subgrade shall be scarified to a 2 inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry.

3.20 PROTECTION

A. The Contractor shall protect newly graded areas from traffic, erosion and any settlement or washing away that may occur due to subsequent construction, disturbance and weather conditions.

B. Repair and reestablish grades to required elevations, slopes and specified tolerances where completed or partially completed surfaces become disturbed. Scarify or remove and replace soil material to depth as directed by the Contracting Officer; reshape and recompact.

END OF SECTION 31 23 00

SECTION 31 23 19 - DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. The section covers dewatering requirements to perform work. The Contractor is responsible for designing, installing and operating a dewatering system as necessary for the safe and efficient construction of the project.

B. The Contractor is responsible for obtaining all required permits to complete the work including but not limited to NPDES dewatering permits.

C. Related Sections:
1. Section 31 23 00 - Excavation and Fill
2. Section 31 50 00 - Excavation Support and Protection

1.2 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Water Control Plan and Dewatering Systems.

C. Discharge permits.

D. Discharge permit reporting requirements.

1.3 WATER CONTROL PLAN

A. At a minimum, include:

1. Descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment; methods; standby equipment and power supply, pollution control facilities, discharge locations to be utilized, and provisions for immediate temporary water supply as required by this section.
2. Drawings showing locations, dimensions, and relationships of elements of each system.
3. Design calculations demonstrating adequacy of proposed dewatering systems and components.

B. Water Control Plan and Dewatering Systems shall be prepared by a Groundwater Control Specialist: A licensed professional engineer currently registered in the State of Wyoming with a minimum of 5 years of experience designing dewatering plans and systems. Contracting Officer’s

review and acceptance of the submittal does not imply approval by the Contracting Officer of the associated Water Control Plan and Dewatering Systems. The Contractor will be solely responsible for designing, installing, operating, and maintaining the system(s) required to satisfactorily perform all necessary dewatering.

C. If system is modified during installation or operation revise or amend and resubmit Water Control Plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. Continuously control water during course of construction, including weekends and holidays and during periods of work stoppages, and provide adequate backup systems to maintain control of water.

3.2 SURFACE WATER CONTROL

A. See Section 01 57 23 - Temporary Storm Water Pollution Prevention and Section 31 25 00 - Erosion and Sedimentation Control.

B. Remove surface runoff controls when no longer needed.

3.3 DEWATERING SYSTEMS

A. Provide, operate, and maintain dewatering systems of sufficient size and capacity to permit excavation and subsequent construction in dry and to lower and maintain groundwater level a minimum of 3 feet below the lowest point of excavation. Continuously maintain excavations free of water, regardless of source, and until backfilled to final grade.

B. Design and Operate Dewatering Systems:
1. To prevent loss of ground as water is removed.
2. To avoid inducing settlement or damage to existing facilities, completed Work, or adjacent property.
3. To relieve artesian pressures and resultant uplift of excavation bottom.

C. Provide sufficient redundancy in each system to keep excavation free of water in event of component failure.

D. Provide emergency power backup with automatic startup and switchover in event of electrical power failure.

E. Provide supplemental ditches and sumps only as necessary to collect water from local seeps. Do not use ditches and sumps as primary means of dewatering.

3.4 DISPOSAL OF WATER

A. Obtain discharge permit for water disposal from authorities having jurisdiction.

B. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.

C. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed work, or adjacent property.

D. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.

3.5 PROTECTION OF PROPERTY

A. Make assessment of potential for dewatering induced settlement. Provide and operate devices or systems, including but not limited to reinjection wells, infiltration trenches and cutoff walls, necessary to prevent damage to existing facilities, completed work, and adjacent property.

B. Securely support existing facilities, completed work, and adjacent property vulnerable to settlement due to dewatering operations. Support shall include, but not be limited to, bracing, underpinning, or compaction grouting.

END OF SECTION 31 23 19

SECTION 31 25 00 – EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnishing, installing, and maintaining temporary soil erosion controls and temporary sedimentation controls
2. Dust control practices during construction
3. Tree protection
4. Mulching

B. Related Sections:

1. Section 01 11 00 – Summary of Work
2. Section 31 11 00 – Clearing and Grubbing
3. Section 32 90 00 – Restoration
4. Section 32 92 00 – Grasses

1.2 DEFINITIONS

A. Temporary erosion controls shall include mulching, watering, and all applicable best management practices to ensure that erosion during construction will be either eliminated or minimized, and that no disturbed soils enter existing ditches or wetlands, storm sewers or culverts, and that no soil leaves the project site.

1.3 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Product data for all materials utilized for erosion and sedimentation control.

C. The Contractor shall review the construction documents and identify any additional erosion control measures to be employed, along with a construction sequencing plan and schedule as necessary to meet federal, state and local regulations. The Contractor shall properly maintain and operate the erosion prevention and sedimentation control plan, inspect the construction activity as necessary by local and state regulations/permits, and take any needed corrective actions.

D. Storm Water Operator Qualifications

1. Contractor shall submit name of their Storm Water Operator for the project.
2. Storm Water Operator shall have all required state and/or federal certifications and will be responsible for all required site inspections and documentation.

1.4 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24) dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.5 QUALITY ASSURANCE

A. Provide erosion control methods in accordance with methods as indicated on the erosion prevention and sedimentation control plan and requirements of authorities having jurisdiction. Comply with National Pollution Discharge Elimination System (NPDES) rules and regulations in terms of both installation and maintenance during construction.

B. The Contractor shall make application for the project NPDES Permit. Contractor will familiarize themselves with the requirements of this permit and be responsible for execution of these requirements.

C. Erosion control devices as shown on the drawings are the minimum effort required based upon the finished grades for the site. Contractor is responsible for adhering to all applicable storm water regulations. Contractor is responsible for providing ongoing maintenance of all erosion control measures and provide additional devices for erosion protection at the Contractor's expense to minimize sediment leaving the site or entering rivers, caves, wetlands, or ditches during all phases of activity.

D. The Contractor's Storm Water Operator shall inspect the construction activity at least once per week, and within 24 hours after every precipitation event that results in a discharge from the site, to determine if any corrective actions are needed. The Contractor shall promptly take all necessary corrective actions. The Storm Water Operator shall keep a log of the inspection and corrective actions available, for inspection by the Contracting Officer and the public at the construction site at all times. The Contractor shall retain the log on file for a period of 3 years from the date of the latest inspection or corrective action. The Contractor shall also furnish a copy of this log to the Contracting Officer upon completion of the project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Damaged packaging containing product is not acceptable.

PART 2 - PRODUCT

2.1 SILT-FENCE

A. Silt fence material shall be industry approved woven geotextile.

B. The silt fence geotextile fabric shall be installed as shown on the Drawings and meet the following requirements:

1. Grab Strength (ASTM D1682): 100 LBS minimum
2. Width:4 FT minimum
3. Bursting Strength (ASTM D751): 150 PSI minimum
4. Flow Rate (ASTM D5141): 0.3 GAL/SF
5. Retention Efficiency (ASTM D5141): 75%

2.2 CONSTRUCTION LIMIT AND TREE PROTECTION FENCING

A. Orange plastic fence, minimum height, 3 feet as shown on Drawings.

B. 6 foot chain link fence may be used as an alternative in some locations as approved by the Contracting Officer.

2.3 WATTLES

A. Wattles shall be coconut husk filled and installed with wooden stakes (minimum of 1inches x 2 inches x 24 inches) embedded a minimum of 1 feet as shown on the Drawings.

B. Wattles shall be trenched a minimum depth of 1/2 the diameter of the wattle.

1. If more than one wattle is placed in a row in slope application, the wattles shall be overlapped a minimum of 12 inches to prevent flow and sediment from passing through the field joint.

2.4 STABILIZED TEMPORARY CONSTRUCTION ENTRANCE

A. Temporary construction entrances shall be constructed of a minimum of 12 inch thick layer of 3 to 6 inch angular rock as shown on the Drawings.

B. Geotextile filter fabric for separation and/or stabilization shall conform to Section 714, Geosynthetic Material of the FP-24 Standard Specifications.

PART 3 – EXECUTION

3.1 PROTECTION

A. Locate, identify, and protect park features that remain from damage.

B. Protection of Wetlands, Streams, Drainage ways: Contractor shall be responsible for protection of NPS contiguous land to the project work zone. If any erosion of fill or cut slopes start migrating outside the works, the Contractor shall notify the Contracting Officer immediately and the Contracting Officer shall identify corrective action that needs to take place. Corrective action will be dependent on condition but can range from placing rip rap on slope to prevent further erosion to installing a silt fence.

C. Erosion Control and Dust Control: Contractor shall be responsible for dust control until final construction operations are complete.

D. Environmental protection: Comply with any applicable permits.

E. Protect benchmarks from damage and displacement.

3.2 GENERAL

A. The Contractor shall construct the sedimentation control devices prior to clearing and grubbing the site to ensure complete silt control.

B. Check dams, silt dams, traps, barriers, and appurtenances shall be installed and shall be maintained in place for duration of construction. This is done by periodically replacing silted structures or removing the silt from the upgradient side of it, and until permit is released.

C. Erosion and sedimentation controls shall be maintained in a condition which will retain unfiltered water.

D. The Contractor shall be solely responsible for ensuring that no silt or debris leaves the construction site or enters protected wetlands, streams, or drainage ditches. Any silt or debris that does leave the immediate site shall be immediately cleaned up, and the area disturbed shall be returned to its natural state as directed by the Contracting Officer at the Contractor's expense.

E. The Contractor shall be responsible to clean-up all silt debris built up on the site and for the removal of all erosion control measures at the appropriate times as directed by the Contracting Officer.

F. Upon completion of construction the contractor shall be responsible for removing all temporary erosion control measures and installing final erosion control measures including erosion control blanket.

3.3 CONSTRUCTION LIMIT AND TREE PROTECTION FENCING

A. Install as shown on Drawings.

3.4 TEMPORARY CONSTRUCTION ENTRANCE

A. Contractor is responsible for establishing and maintaining temporary access roads necessary for construction operations. Include applicable information in the specified Construction Access Plan.

B. Any temporary access roads shall be limited to the established work areas and construction limits as shown on the Drawings, and otherwise directed by the Contracting Officer.

C. Temporary access roads shall be bordered with temporary fencing, and vicinity of existing public facilities or other public access points to reduce potential for construction equipment/public conflict points and improve site safety.

D. Clearing of brush and small trees (<10-inch), and minor grading for establishment of temporary access roads may be required at locations authorized by the Contracting Officer.

E. A temporary construction entrance BMP (dirt and sediment tracking controls) must be installed for each point of access from paved and/or public roads to temporary access roadways, as shown on the Drawings and conforming to Section 01 57 23 – Temporary Storm Water Pollution Prevention.

3.5 MULCHING

A. If needed for stabilization, apply 1 to 2 inches of mulch to disturbed areas outside of proposed improvement areas. Mulching material shall meet the requirements of Section 32 90 00 – Restoration.

3.6 DUST CONTROL

A. Dust control shall conform to the provisions in Section 158, Watering for Dust Control of the FP-24 Standard Specifications; project Permits(s), environmental mitigation measures, and the Contract Documents, including all local, regional, state, and federal regulations.

B. The Contractor is responsible for the control of dust due to his/her operations. In conditions where earthen material or other debris is tracked off-site, the Contractor shall sweep, clean, and provide dust control measures on all impacted public/private roads and travel ways. The control of dust caused by public traffic, as result of the Contractor's operations or negligence, shall not be considered change order work.

C. No chemical additives, binder, or dust palliative shall be permitted for any watering/dust control operations without prior written acceptance of NPS.

D. Contractor shall be responsible for obtaining any permit, license, agreement, certification, or any combination of these, and pay all associated fees in order to develop a suitable water supply for construction operations. It should be expected that any connection to a potable water service would require a certified (annually) reducing pressure backflow device and meter.

E. Contractor must have at least 1 mobile watering unit available at all times. The unit must have a capacity of at least 1,000 gallons. Each water storage tank and distribution system must be equipped with positive shut-off valves.

F. When sustained wind speeds result in visible dust emissions in excess of the standards noted above, despite the application of dust mitigation measures, grading and earthmoving operations except water trucks shall be suspended.

END OF SECTION 31 25 00

SECTION 31 37 00 - RIPRAP

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing and placement of rock or stone material for bank or slope protection, rock dissipaters and erosion control measures for a complete section or facility as shown on the Drawings, conforming to the Specifications, and as otherwise directed by NPS.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections which includes, but is not limited to:

1. Section 31 11 00 - Clearing and Grubbing
2. Section 31 23 00 - Excavation and Fill

1.3 DEFINITIONS

A. Not Used.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Stone Data:

1. Prior to installation, the Contractor shall obtain from the quarry and submit to the Contracting Officer a certificate indicating the following:
   a. Stone classification
   b. Stone weight per cubic foot
   c. The stone furnished will meet the requirement of Part 2 of these Specifications
   d. Gradation and durability

C. Filter Fabric

1. Product Data including securing pins.

2. Certification of cloth: All filter cloth to be used shall be tested for compliance with these Specifications. Before installing the filter fabric, the Contractor shall submit a certificate or affidavit signed by a legally-authorized representative of the company manufacturing the fabric. The certificate shall state that the chemical, physical, and manufacturing requirements of this Specification are met. In addition, evidence of a service record of the filter fabric shall be submitted proving successful performance in projects of similar scope.

D. A sample of the of the proposed type of riprap material (approximately 1/3 cu-ft) shall be submitted to NPS no less than fifteen (15) days prior to placement in the work for review and acceptance. The riprap submittal shall include supporting documentation to indicate the source and material properties conformance with the Specifications. NPS reserves the right to reject materials upon delivery to the site.

1. Substitution of locally sourced or local borrow rock/riprap material generated onsite (i.e. not imported from offsite commercial quarry) shall be authorized by NPS prior to placement in the work.

E. A 12 by 12 inch sample of the filter fabric shall be provided for verification.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Please refer to Section 01 27 00 – Definition of Contract Line Items.
2. . In case of conflict with the FP-24 Standard Specification, the more stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. In confined linear areas where protection of existing infrastructure, vegetation, and/or soils is specified only equipment that can be safely operated in the confined construction corridor will be permitted.

1.8 TOLERANCES

A. Riprap stones shall be placed (not dumped) to create a uniform and sound structure, with minimal voids. Localized surface irregularities must not vary from the planned lines and grades more than 1/2 the diameter of the median rock size (D_{50}) of the material placed as measured at right angles to the slope.

PART 2 PRODUCTS

2.1 ROCK RIPRAP

A. Rock Riprap shall conform to the specifications herein, unless shown otherwise on the Drawings.

B. Substitution of locally sourced or local borrow rock/riprap material generated onsite (i.e. not imported from offsite commercial quarry) shall be reviewed for acceptance by NPS prior to placement in the work. Locally sourced rock/riprap material is preferred, where generally conforming to the material specification for quality and size/gradation requirements.

C. Rock shall be of the size and gradation for each improvement type and area as shown on the Drawings. Gradation by Class shall conform to Section 705.02, Riprap of the FP-24 Standard Specifications.

1. An equivalent gradation class of material, per Wyoming Department of Transportation (WYDOT) Standards, may be substituted based on available supply, review, and acceptance of submittals.

D. The Contractor shall use stone that is free of weak cleavages and is hard, sound and durable against disintegration under conditions to be met in handling and placing; and is hard and tenacious and otherwise of a suitable quality resistant to abrasion, weathering, and water action to ensure permanency in the specified kind of work. Material properties shall conform to:

Rock Material Properties

Property	Value	Test Method
Apparent Specific Gravity, min.	2.40	AASHTO T 85
Absorption, max (%)	4.0	AASHTO T 85
Durability Index, min	52	AASHTO T 210
Los Angeles Abrasion, max (%)	50	AASHTO T 96
Soundness of Aggregate (using sodium sulfate), max (%) loss	12	AASHTO T 104 (5 cycles)

E. Stone shall be angular and of such shape to form a stable protection structure for the required section or feature. Flat or elongated shapes will not be accepted unless the thickness of the individual pieces is at least 1/3 of the length.

F. Shale, rock with shale seams, or other fissile or fissured rock will not be accepted.

G. Stones shall be uniform in color indigenous to the area. All stone material shall be clean and free from deleterious impurities, including alkali, earth, clay, refuse, and adherent coatings. Stones shall be free of machine-made scratches, mars, or other damage to the visible surface.

2.2 FILTER FABRIC OR UNDERLAYMENT

A. Geotextile filter fabric for separation and/or stabilization shall conform to Section 714, Geosynthetic Material of the FP-24 Standard Specifications.

PART 3 EXECUTION

3.1 EARTHWORK, EXCAVATION, AND EMBANKMENT

A. Applicable construction operations for earthwork, excavation and embankment shall conform to Section 31 23 00 - Excavation and Fill.

B. Excavation width shall be as shown on the Drawings but should be no wider than what is required to safely place and compact the stone and adjacent backfill material.

C. The bottom of the excavation shall be graded, compacted and prepared as shown on the Drawings to provide a firm and uniform bearing for the rock. Unsuitable materials shall be addressed as specified in Section 31 23 00 - Excavation and Fill.

D. Geosynthetics shall be as shown on the Drawings, in conformance with the Specifications, and as otherwise directed by the Contracting Officer.

E. Any associated backfill, bedding material, or accepted native soils, as shown on the Drawings, conforming to the Specifications, and as otherwise directed by the Contracting Officer

F. Fill adjacent to rock sections shall meet the top of rock and blend with existing grades for a natural appearance. Finish grading and any topsoil placement shall meet the lines and grades as shown on the Drawings, and be prepared to receive any revegetation treatments as specified.

G. Dewatering is required as necessary to properly complete the work. The excavation and general work area shall be sufficiently dry to allow for the proper construction and inspection of the excavation, subgrade, bedding and backfill materials, and installation of facilities for a complete job in place.

3.2 ROCK RIPRAP

A. Placement of riprap for bank protection, slope protection and erosion control shall be in accordance with the applicable requirements of Section 251, Riprap of the FP-24 Standard Specifications. All materials shall be placed to the lines, grades, and dimensions as shown on the Drawings, and directed by the Contracting Officer.

B. Placement of geotextile shall be in accordance with the applicable requirements of Section 207, Earthwork Geosynthetics of the FP-24 Standard Specifications. All materials shall be placed to the lines, grades, and dimensions as shown on the Drawings, and directed by the Contracting Officer.

C. Prepare subgrade within limits indicated in accordance with section 31 23 00 – Excavation and Fill. Bring areas that are below allowable minus tolerance limit to grade by filling with material and compacting the subgrade to the density as specified in section 31 23 00 – Excavation and Fill.

D. For rock lined ditch in natural areas, the subgrade shall be undisturbed native soils (or compaction of 95% of the Modified Proctor Maximum Dry Density if in fill condition) unless otherwise shown on the Drawings.

E. Obtain approvals of subgrade prior to placing riprap.

F. Place geotextile filter fabric, bedding material, and riprap on prepared subgrade to required thickness and grades as shown on the drawings; and to produce a well-graded mass of stone with minimum percentage of voids. Place to full thickness in a single operation to avoid displacing the underlying material.

G. Place riprap in a method in which gradation of material is maintained and stone sizes are evenly distributed; avoid segregation. Hand placement and manipulation of rock should be expected, as directed by the Contracting Officer, to achieve the required configuration of the improvement and to achieve a natural appearance.

H. All rock is to be placed to minimize the potential for movement when flow is induced, which shall be accomplished by interlocking the angular nature of the rock with itself.

I. Backfill, trim and dress all areas to required cross sections, and finish grades.

J. Prevent mixture of earthen embankment and stone/riprap revetment materials.

K. The Contractor shall take all necessary measures to protect any fabric, underlayment, or blanket from damage (if such material is damaged the product shall be repaired per the manufactures recommendations, and as directed by the Contracting Officer).

3.3 PROTECTION

A. The Contractor shall protect newly installed facilities for the duration of the work.

B. Protect finished product from damage and avoid operating construction equipment or vehicles directly over a rock riprap structure.

C. Repair and replace any displaced or damaged parts with new materials to the required lines and grades.

END OF SECTION 31 37 00

SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to installing and maintaining shoring, sheeting, bracing, and sloping necessary to support the sides of excavations, to keep and to prevent any movement, which may damage adjacent facilities, or endanger life and health. Install and maintain shoring, sheeting, bracing, and sloping as required by OSHA, Wyoming OSHA, and other applicable governmental regulations and agencies.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. The Contractor shall be solely responsible for making all excavations in a safe manner. Provide appropriate measures to retain excavation side slopes and prevent rock falls to ensure that persons working in or near the excavation are protected along with any adjacent structures.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 01 50 00 – Temporary Facilities and Controls
2. Section 31 23 00 - Excavation and Fill
3. Section 31 37 00 – Riprap
4. Section 33 14 00 – Water Utility Transmission and Distribution
5. Section 33 30 00 – Sanitary Sewerage
6. Section 33 40 00 – Stormwater Utilities

1.3 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Submit detailed plan, shop drawings, and calculations as necessary to conform to the provisions of this section and showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. This plan shall be prepared by a registered civil or structural engineer registered in the States of Montana and Wyoming.

C. Qualification Data: For qualified professional engineer.

1.4 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Please refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.5 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Preinstallation Conference: Conduct conference at Project site with Contracting Officer.

1. Review methods and procedures related to excavation support and protection system including, but not limited to, the following:
   a. Geotechnical report.
   b. Existing utilities and subsurface conditions.
   c. Proposed excavations.
   d. Proposed equipment.
   e. Monitoring of excavation support and protection system.
   f. Working area location and stability.
   g. Abandonment or removal of excavation support and protection system.

1.6 PROJECT CONDITIONS AND REQUIREMENTS

A. When required, as determined by the Contractor, design and construct temporary shoring with consideration of maintenance of traffic requirements.

B. Only remove safety features when no longer necessary.

C. Where support, shield of other protective systems are to be used, design the shoring according to Section 562 of the FP-24 Standard Specifications and the provisions of this section.

D. Interruption of Existing Utilities: Do not interrupt any utility serving park facilities or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Contracting Officer no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Contracting Officer written permission.

E. Project-Site Information: Geotechnical reports have been prepared for past projects in the Canyon and Northeast Entrance Government Areas and are available for information only. These reports, Geotechnical Engineering Report Canyon Housing Upgrades, YELL 309913 Predesign Services, Yellowstone National Park, WY and Geotechnical Engineering Report Northeast Entrance Housing Upgrades, YELL 309913 Predesign Services, Yellowstone National Park, WY, both dated November 23, 2020 and prepared by Terracon Consultants, Inc are included as appendices. The opinions expressed in this report are those of the geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by the geotechnical engineer. The Contracting Officer will not be responsible for interpretations or conclusions drawn from the data.

1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.

F. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Contracting Officer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Contracting Officer and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.

D. Excavated material shall be used for backfilling and constructing embankments over and around the structure. The Contractor shall dispose of surplus or unsuitable material in a place and manner such that it will not affect or re-enter waterways or otherwise impair the structure.

E. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

F. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 EXCAVATION SAFETY

A. Follow United States Department of Labor Occupational Safety and Health Administration (OSHA) safety regulations (29 CFR, Part 1926, Subpart P, Excavations) for sloping, shoring, bracing, or other safety features for excavations, in addition to the following:

1. For trench excavation exceeding five (5) feet in depth, provide adequate safety system meeting requirements of applicable state and local construction safety orders and federal requirements.

B. Nothing in this Section shall be construed to impose tort liability on the State, NPS, Engineer of Record, or any of their officers, agents, representatives, or employees.

3.3 TRENCH PLATING

A. All open trenches, pipe sections, and/or other structure excavations shall be completely backfilled or covered, and braced, with “traffic rated” trench plating by the end of each working day so as not to present a hazard to the public or traffic.

B. The use and design of any trench plates and shoring systems that must support anticipated traffic, construction or other loadings is solely the responsibility of the Contractor, and he/she shall assume all liability for using any trench plating devices.

C. Based on accessibility and exposure risks to the public or traffic, all trench plates shall be properly secured/braced in place (i.e. cold patch, plate locks, spikes, etc) in order to prevent accidental movement of trench plates.

D. Where trench plating is used in areas open to traffic, the Contractor shall “cold patch” all edges of the plate to provide a smooth transition between the plate and the existing traveled way.

E. All use of trench plates shall be in full compliance with all local and state applicable rules, regulations and standards, and the project permits.

3.4 INSPECTIONS

A. The Contractor shall notify the Contracting Officer and request his inspection and approval after each excavation has been completed.

3.5 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support lateral loading from soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Completely remove excavation support and protection systems.
2. Fill voids immediately with approved backfill compacted to density specified in Section 31 23 00 – Excavation and Fill.
3. Repair or replace, as approved by Contracting Officer, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION 31 50 00

SECTION 32 00 00 - TREE PROTECTION

PART 1 - GENERAL

1 .1 WORK SUMMARY

A. This section specifies the labor and material requirements necessary to protect, repair and/or replace trees that are marked to be saved within the construction limits.

1 .2 REFERENCES

A. Related Sections:

1. Section 01 11 00 – Summary of Work
2. Section 01 35 13 – Natural Resources Protection
3. Section 31 11 00 – Clearing and Grubbing
4. Section 31 13 00 – Selective Tree Removal and Trimming

B. The Contractor shall comply with applicable requirements and recommendations of the most current versions of the following standards and guidelines. Where these guidelines conflict with other specified requirements, the more restrictive requirement shall govern.

1. ANSI Z133.1-2006: American National Standard for Tree Care Operations.

2. ANSI A300: Tree, Shrub, and Other Woody Plant Management – Standard Practices.

3. Guide for Plant Appraisal – Current Edition: Authored by the Council of Tree and Landscape Appraisers; published by the International Society of Arboriculture.

1 .3 DEFINITIONS

A. Diameter at Breast Height (DBH): Tree diameter measured 4.5 feet above the ground.

B. Drip Line: The outermost edge of the tree’s canopy or branch spread. The area within a tree’s drip line is all the ground under the total branch spread.

C. Critical Root Zone: The area around the tree encompassing either the drip line or 1.5 times the tree’s DBH from the trunk, whichever is greater.

D. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and generally defined by the drip line of individual trees

or the perimeter drip line of groups of trees, unless otherwise indicated on the Drawings or directed by NPS; excluding stream channel work.

1 .4 GENERAL REQUIREMENTS

A. All tree trimming required by this project shall be performed in consultation with the Contracting Officer.

B. Special requirements, mitigations and conservation measures for whitebark pine trees are included in Section 01 11 00 - Summary of Work. Whitebark trees of any size not designated for removal must be protected at all times during the project. Whitebark seedlings, if required to be disturbed, shall be relocated per consultation with NPS Resources staff.

C. If it appears that construction may cause damage to the branches of any tree not marked for removal, the Contractor shall notify the Contracting Officer. The Contracting Officer will make a determination as to whether such damage is unavoidable.

D. To prevent or minimize soil compaction, designated routes for equipment and foot traffic by work crews shall be determined prior to commencing construction activities and shall be indicated in the tree protection plan to be submitted by the Contractor prior to construction.

E. Materials and supplies shall not be stockpiled or stored within the tree protection area or within locations where damage to trees, shrubs, or roots may occur. Under no circumstances shall any objects or materials be leaned against or supported by a tree’s trunk, branches, or exposed roots.

1 .5 SUBMITTALS

A. Tree Protection Plan: Submit a tree protection plan for approval by the Contracting Officer. Identify equipment and foot traffic routes, material stockpile locations, and planned tree protection measures in the plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3 .1 CONSTRUCTION REQUIREMENTS

A. This section provides standards and guidelines for the retention and protection of trees and shrubs throughout the duration of construction.

B. If required by the Contracting Officer, install ground protecting mats. Use and place mats according to the manufacturer's recommendations. Contractor shall replace mats damaged during construction at no cost to the Government.

C. Steps to Mitigate Damage to Roots Due to Excavation:

1. Take steps (as called for below) to mitigate damage to tree roots due to excavation, wherever the following circumstances apply:

   a) Wherever excavation must take place within the drip line of whitebark pine regardless of diameter.

   b) Wherever excavation must take place within the drip line of trees other than whitebark pine, for all trees 12 inches or larger in diameter.

2. Following are the steps which are required to mitigate damage to roots due to excavation:

   a) Excavate carefully where tree roots might be encountered. Where roots 2 inches and larger are encountered, hand excavate as required to prevent damage to roots. Tunnel under roots to be saved, hand excavating as necessary.

   b) Do not cut roots over 2-inch in diameter without approval of Contracting Officer.

   c) Cleanly saw-cut roots between 1-inch and 2-inch-in-diameter where they interfere with work; do not cut roots except as necessary. Roots between 1-inch and 2-inch-in-diameter which must be cut shall be cleanly saw-cut near the edge of trench closest to the tree to prevent roots from being dislodged from soil by equipment.

3. If trenching will occur within 18 inches of the trunk of trees that do not meet the criteria under paragraph 3.3C.1.k. above, the tree/shrub shall be removed from the construction area and replanted in its original location. Plants shall be removed by certified nursery personnel or arborist, with their roots pruned and balled as appropriate for their size.

3 .2 TREE PROTECTION

A. Prior to construction the Contracting Officer will clearly mark trees to be saved.

B. For trees identified as requiring protection, the Contractor shall install an approved protective fencing around the tree protection area or wider to protect from accidental damage due to construction activities.

C. Tree protection fences shall be constructed of one of the following:

1. Galvanized Chain-link – Six feet (6’) in height. Posts shall be installed no less than ten feet (10’) on center, a depth of thirty-six inches (36”) minimum. Installation of posts shall not result in injury to tree surface roots, root flares, or branches.

2. Colored (orange), molded plastic construction fencing – forty-eight inches (48”) in height.

D. Tree protection fencing shall be installed prior to any site activity and shall remain until its removal is authorized by the Contracting Officer.

3 .3 DEMOLITION OF EXISTING SITE FEATURES

A. Caution shall be used during removal of existing site features during demolition, to minimize injury to tree root systems.

B. Removal shall be done in a manner that will minimize ground disturbance and vibration.

C. Site features within designated tree protection areas shall be removed by hand. When removing, care shall be taken to avoid injury to roots located under, over, or adjacent to paved surfaces.

D. Exposed roots shall be covered by wet burlap to prevent them from drying out.

3 .4 ROOT PRUNING

A. Tree roots shall not be pruned or cut unless their removal is unavoidable or absolutely necessary. The Contracting Officer shall be notified prior to any operation known or suspected to involve cutting of roots.

B. Upon approval by the Contracting Officer, prior to excavation, removal of concrete, or other activity that will result in removal of soil and tree roots, all tree roots within a designated area will be pruned to a depth of fourteen inches (14”). Pruning shall be done by hand with approved pruning tools.

3 .5 TREE DAMAGE

A. All damage to roots greater than 2" in diameter, branches, or bark shall be reported to the Contracting Officer immediately.

B. All existing trees which have been damaged due to construction activities shall be replaced or repaired by a certified arborist, or by the Contractor under the direction of the Contracting Officer, at no additional cost to the government.

END OF SECTION 32 00 00

SECTION 32 11 00 - BASE COURSES

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to the operations to furnish, transport, place, grade and compact subbase and aggregate base (AB) materials for all the applications as shown on the Drawings and as specified for the work.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. At the Contractors option, and acceptance of the Contracting Officer, applications for base courses may include work for pulverizing an existing asphalt pavement and base in-place, adding crushed aggregate to supplement the pulverized material to meet specified traffic index requirements, mixing to produce a homogenous full depth structural mixture, and spreading, shaping and compacting to produce a recycled aggregate base section for roadways as specified for the work. Compensation for pulverization or production of recycled base on-site, including full installation, shall be considered included in costs paid for other items of work involved and no additional compensation provided.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 03 30 00 - Cast In Place Concrete
2. Section 03 30 50 - Minor Concrete
3. Section 31 23 00 - Excavation and Fill
4. Section 31 37 00 - Riprap
5. Section 32 12 00 - Flexible Paving
6. Section 32 16 00 - Concrete Curbs, Sidewalks, Aprons, and Pads

1.3 DEFINITIONS

A. Not Used.

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. At least 14 days prior to placement of any subbase or aggregate base in the work, the Contractor shall submit supporting documentation to indicate the source and material properties for each

subbase or aggregate base material to be placed in the work meets the Specification requirements, including laboratory optimum moisture-maximum density curves (AASHTO T 180) necessary for field quality control testing.

C. Provide copies of certifications for material testing personnel and laboratories to be used for Contractor Quality Control.

D. Provide required documentation for all Contractor Quality Control material testing as noted in the Specifications.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Conform to the sampling, testing and acceptance requirements of Sections 301.08 and 304.09 of the FP-24 Standard Specifications, for the materials that applies.

C. Testing Agency: The Contractor shall engage a qualified independent geotechnical engineering and/or material testing agency/consultant to perform field quality-control acceptance testing.

D. Inspection: The Contractor shall coordinate with the Contracting Officer during all earthwork and base course operations to allow for access to the site as often as necessary for the performance of any special inspections and material testing for verification that the specifications are being met for the installation of materials. Frequency of material testing shall conform to the applicable Specifications, Standards and Test Methods.

E. NPS may assure conformance to contract specifications by inspection of the Contractor's procedures, by oversight of the Contractor's quality control inspection and records, and by independent verification sampling and testing during concrete production and construction. Acceptance tests will be performed using similar test methods used for quality control testing.

F. All Contractor required 'Quality Control' materials testing shall be based upon applicable ASTM and AASHTO Test Methods referenced herein for the materials specified. All equipment, material, and labor necessary for Quality Control testing shall be supplied by and all costs borne by the Contractor.

1. Provide copies of all applicable testing procedures and standards (per ASTM and/or AASHTO).
2. Provide certifications for calibration of all field testing equipment.
3. A report of any field test results and laboratory testing shall be furnished.
4. All deficiencies, which become present from testing shall be rectified, and the materials retested until passed, or materials replaced where non-conforming.
5. All tests shall be performed in the presence of the Contracting Officer or designated representative.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. All imported base courses and aggregate materials shall be sourced from an accepted supplier, meeting the contract compliance requirements, and certified weed free. Do not change suppliers during course of work unless authorized by NPS.

1.8 TOLERANCES

A. Conform to surface tolerance requirement of Section 301.06 of the FP-24 Standard Specifications

B. Minimum thicknesses and slopes shall be as shown on the Drawings.

C. The surface of the finished AB material at any point shall not vary more than 0.05 feet above or below the grade shown on the Drawings.

D. Where HMA is to be placed, the grading plane at any point shall not be more than 0.05 foot above the grade shown on the Drawings.

E. Where PCC pavement or structures is to be placed, the grading plane at any point shall not be more than 0.05 foot above the grade shown on the Drawings.

PART 2 PRODUCTS

2.1 SUBBASE AND AGGREGATE BASE

A. Conform to Section 703.05, Subbase, Base, and Surface Course Aggregate of the FP-24 Standard Specifications.

B. In addition to the aggregate quality characteristics specified in the FP-24 Standard Specifications, conform to the following:

1. Subbase
    a. Sand equivalent (min), AASHTO T176 — 21
    b. Resistance (R-value, min), AASHTO T 190 — 50
2. Aggregate Base (AB)
    a. Plastic limit, AASHTO T 90 — nonplastic
    b. Sand equivalent (min), AASHTO T176 — 25
    c. Resistance (R-value, min), AASHTO T 190 — 78

C. Aggregate "Grading Designation" shall be as specified for each improvement type and area as shown on the Drawings. Grading Designation shall conform to Table 703-2, Target Value Ranges for Subbase and Base Gradation of Section 703.05(b) of the FP-24 Standard Specifications.

1. An equivalent gradation class of material, per WYDOT Standards, may be substituted based on available supply, review, and acceptance of submittals.

PART 3 EXECUTION

3.1 GENERAL

A. Applicable construction operations for earthwork, excavation and fill shall conform to Section 31 23 00 - Excavation and Fill.

B. Conform to Section 301, Untreated Aggregate Courses of the FP-24 Standard Specifications.

C. All subbase and AB material used for the work shall be of the class/grading for each improvement type and area as shown on the Drawings and as specified in these Specifications.

D. Contractor shall furnish, transport, place, shape, compact, grade, and otherwise apply all subbase and AB material as necessary to construct and complete all project improvements involved as shown on the Drawings, as specified in these Specifications, and as otherwise directed by NPS.

E. Maintain base courses with sufficient moisture, and avoid rutting from excess travel impacts. Correct any irregularities or depressions by adding additional bases course materials, smooth, and compact to maintain a uniform finish to the required tolerances.

3.2 STORAGE OF MATERIALS

A. Subbase and AB materials may only be stockpiled at staging and storage areas identified on the Drawings and in accordance with the SWPPP and Project Permits and shall not be stockpiled in a manner that destroys or damages existing vegetation in areas not shown on Drawings for excavation or grading.

1. Place, grade, and shape stockpiles to drain surface water.
2. Stockpile materials away from edge of excavations. Do not store within drip line of trees to remain.
3. Cover all stockpiles at the end of each day's work, and when operations are inactive to prevent windblown dust or erosion from precipitation.

B. Any stockpiles of subbase and AB material shall be protected from contamination with earthen or other unsatisfactory material that may destroy the quality and fitness of the suitable stockpiled material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced at no additional cost to NPS.

C. Areas disturbed by the stockpiling of materials outside of designated staging and storage areas shall be revegetated at the Contractors expense, and no additional compensation will be allowed.

3.3 SUBGRADE PREPARATION

A. Preparation of the subgrade and/or surface on which aggregate courses are placed shall conform to Section 301.03 of the FP-24 Standard Specifications.

B. Before placement and spreading of any subbase or AB materials, the subgrade or underlying materials must comply with the specified compaction, elevation tolerance, and slopes for the material involved and be free from loose or extraneous material.

C. Ruts or soft yielding spots in the subgrade, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and compacting to specified density requirements.

D. The finished subgrade or underlying surface shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

E. If the finished subgrade or underlying surface are lower than the grade shown on the Drawings, the applicable overlying material may be placed to fill the low areas. Any subbase or AB placed to fill low areas is not included in the quantity for payment.

3.4 SPREADING

A. Mixing and spreading of aggregate courses shall comply with Section 301.04 of the FP-24 Standard Specifications.

B. Subgrades must be inspected and approved by the Contracting Officer prior to placing base course.

C. Deliver uniform mixtures of subbase or AB material to the specified location and deposit in layers or windrows.

D. Spread and shape subbase or AB to such thickness that after watering and compacting, the completed section is within the tolerances specified.

E. When subbase or AB is spread the moisture content must be uniform and sufficient to obtain required compaction. Moisture conditioning loose materials before compaction to within at least 2 percent of optimum moisture will yield best results.

F. Avoid material segregation. Subbase or AB materials must be free from pockets of coarse or fine material. Upon visual inspection, correction of deficiencies may be required.

G. Where the shown subbase or AB finished thickness is 0.5 foot or less you may spread and compact the material in one layer. Where the shown finished thickness is more than 0.5 foot, spread and compact the material in 2 or more layers approximately equal in thickness; the compacted thickness of any one layer must not exceed 0.5 foot.

3.5 COMPACTING

A. Compaction of aggregate courses shall conform to Section 301.05 of the FP-24 Standard Specifications.

B. Compact materials to no less than the specified in-place density (AASHTO T 310) as specified on the Drawings.

C. Compact the full width and depth of the fill and embankment to the limits of the work as shown on the Drawings. Rolling patterns shall progress from the sides to the center.

D. For trench compaction, flooding or jetting will not be allowed.

E. The finished surface shall be within the tolerances specified, at the grade shown on the Drawings.

F. Proof Rolling: Upon completion of the subject layer and any density testing, the Contractor shall demonstrate to the Contracting Officer, upon request, that the exposed layer does not contain unidentified soft areas by proof rolling. Proof rolling shall consist of rolling the entire surface with approved mechanical equipment while observing the grade for displacement or deformation.

G. When testing or proof rolling indicates that materials have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace to depth required; compact and retest until specified compaction is obtained.

3.6 FULL DEPTH RECLAMATION, MECHANICAL STABILIZATION & ROAD GRADING

A. Where Drawings identify or Contractor elects to pulverize existing roadway in place, conform to Section 304, Full Depth Reclamation of the FP-24 Standard Specifications.

B. Roadway grading shall conform to Section 31 23 00 - Excavation and Fill. Surplus earthen, subgrade or structural backfill material generated from roadway grading operations shall not be prematurely disposed to ensure enough material is available to complete the fills and embankments at other locations on the job site.

C. Any pulverized roadway material is to be windrowed and/or stockpiled as necessary to facilitate roadway grading to the profile, cross slope, lines and grades as shown on the Drawings.

D. Material sampling, testing and structural pavement design for acceptance and conformance of a pulverized roadway base material and establishment of any required crushed aggregate supplement to meet a minimum Traffic Index (TI=6.0) is the responsibility of the Contractor.

1. Material sampling and testing performed by the Contractor, shall conform to Section 153, Contractor Quality Control of the FP-24 Standard Specifications. Material testers, inspectors and laboratories must be certified under National Institute for Certification in Engineering Technologies (NICET) and a regional certification program, or equivalent, to perform the required ASTM and/or AASHTO test methods.

E. Add crushed aggregate to pulverized material where required (based on structural pavement design results) to meet the minimum Traffic Index. Crushed aggregate shall conform to Section 703.06 of the FP-24 Standard Specifications. Moisture condition and mix the pulverized and crushed aggregate materials to produce a homogenous full depth material mixture.

F. Spread, shape and compact the material mixture uniformly across the roadbed to meet the lines and grades shown on the Drawings to produce a complete roadway base structural section.

END OF SECTION 32 11 00

SECTION 32 12 00 - FLEXIBLE PAVING

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing, placing, spreading and compacting asphalt materials and hot mix asphalt (HMA) to produce a finished flexible paving section as shown on the Drawings, conforming to the Specifications, and as otherwise directed by the Contracting Officer.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 31 23 00 - Excavation and Fill
2. Section 32 11 00 - Base Courses
3. Section 32 17 00 - Pavement Specialties

1.3 DEFINITIONS

A. HMA – Hot Mix Asphalt

B. JMF – Job Mix Formula

C. RAP - Reclaimed Asphalt Pavement

D. Substitution Rate – amount of RAP aggregate substituted for virgin aggregate in (%)

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. Comply with the submittal requirements and provide certifications, testing and samples as specified herein and per the applicable FP-24 Standard Specifications for materials to be used in the work.

C. Asphalt binder suppliers must comply with the WYDOT Authorized Suppliers Performance Graded Asphalt Binder List. For a copy of the certification program, go to the WYDOT

Authorized Suppliers website.
https://www.dot.state.wy.us/home/engineering_technical_programs/materials--testing/authorized-asphalt-and-concrete-suppliers.html

D. Certificates of Compliance for asphaltic emulsions must include:

1. Shipment number and shipment date
2. Source refinery, consignee, and destination
3. Type and description of material with specific gravity and quantity
4. Contract or purchase order number
5. Signature by the manufacturer of the material and a statement that the material complies with the Contract

E. Contractor Mix Design Proposal

1. The Contractor shall submit for NPS's review and acceptance, a proposed HMA mix design (JMF) for each HMA mixture to be used in the work before production of that HMA.
2. Allow NPS up to 10 business days from a complete JMF submittal for document review.
3. The HMA mix design including aggregate quality and HMA mix requirement test results shall be no more than 12 months old when production of the HMA starts.
4. The Contractor may only start production if NPS has reviewed and accepted the proposed JMF for compliance with the specifications.
5. Submit a new JMF if you change any of the following:
   a. Target asphalt binder percentage greater than ±0.2 percent
   b. Asphalt binder supplier
   c. Combined aggregate gradation
   d. Aggregate sources
   e. Antistrip additive producer or dosage
   f. Average binder content in a new processed RAP stockpile by more than ±2.00 percent from the average RAP binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form

F. Contractor Quality Control Plan

1. The Contractor shall establish, implement and maintain a quality control (QC) plan for asphalt paving work. Submit a QC Plan according to the provisions of Section 153, Contractor Quality Control of the FP-24 Standard Specifications.
2. The QC plan must describe the organization and procedures you will use to:
   a. Control the quality characteristics for aggregate, asphalt binder, additives, HMA production, and paving operations.
   b. Identify sampling locations.
   c. Determine when corrective actions are needed, and action limits.
   d. Procedures to implement corrective actions.
3. Include a Work Plan based on the Contractor's proposed work schedule and construction sequence to accommodate construction loads and protection of improvements throughout the sequence of construction including underground facilities (pipes and culverts), sub-grade deterioration and rutting, aggregate base structural section deterioration and rutting, and final pavements.
4. Submit QC plan when submitting mix designs (JMF) for review and acceptance.

5. Do not start production of HMA until NPS has authorized the QC plan.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Testing Agency: The Contractor shall engage a qualified independent geotechnical engineering and/or material testing agency/consultant to perform material acceptance testing.

C. Inspection: The Contractor shall coordinate with the Contracting Officer during all HMA paving operations to allow for access to the site as often as necessary for the performance of any special inspections and material testing for verification that the specifications are being met for the installation of materials. Frequency of material testing shall conform to the applicable Specifications, Standards, and Test Methods.

D. NPS may assure conformance to contract specifications by inspection of the Contractor's procedures, by oversight of the Contractor's quality control inspection and records, and by independent verification sampling and testing during HMA production and construction. Acceptance tests will be performed using similar test methods used for quality control testing.

E. Acceptance criteria for HMA produced and finished product constructed shall conform to applicable provisions of FP-24 Standard Specifications for the materials to be used in the work.

1.7 CONTRACTOR QUALITY CONTROL

A. Contractor quality control process and documentation shall conform to Section 153, Contractor Quality Control of the FP-24 Standard Specifications and the Contract Documents.

B. The Contractor is responsible for all quality control and acceptance testing. The Contractor shall provide quality control sampling, testing, and inspection for flexible paving at specified rates sufficient to ensure materials and work conform to the Specifications. The Contractor shall submit all test results to NPS.

1.8 PROJECT CONDITIONS AND REQUIREMENTS

A. Hold a pre-paving conference to discuss the methods of performing the paving work and quality control procedures, including the Contractor's QC Plan.

B. The JMF mix design shall be prepared by a laboratory (or laboratories) whose proficiency has been reviewed and qualified in conformance with WYDOT, has been AASHTO accredited, or is otherwise approved by NPS.

1.9 TOLERANCES

A. The lower specification limit for HMA compaction is 92 percent of the theoretical maximum specific gravity (density) determined according to AASHTO T166 and AASHTO T209.

B. Determine HMA pavement roughness / smoothness using a 10-foot straightedge to meet the requirements per Section 403.11, Pavement Straightedge Measurement of the FP-24 Standard Specifications.

C. Correct defective areas per the applicable provisions of FP-24 Standard Specifications. Obtain approval for the method of correction. Any pay reductions will conform to the Standard Specifications and Contract Documents.

PART 2 PRODUCTS

2.1 HOT MIX ASPHALT

A. HMA shall conform to Type I of the provisions in Section 403, Asphalt Concrete of the FP-24 Standard Specifications.

B. All asphalt shall conform to the specifications of AASHTO MP320, PG58-28.

C. Changes from one mix design to another shall not be made during the progress of the work unless permitted by NPS. However, changes in proportions to conform to the approved job formula mix design shall not be considered changes in mix design.

2.2 TACK COAT

A. Tack coat shall conform to Section 412, Asphalt Tack Coat of the FP-24 Standard Specifications.

2.3 AGGREGATE

A. Aggregate shall be composed of coarse and fine aggregates combined in the proper proportions to meet the grading requirements for Grading W noted in Table 803.4.4-1 of the Wyoming Department of Transportation 2021 Standard Specifications. Aggregate shall be clean, tough, durable fragments free from an excess of flat, elongated, soft or disintegrated pieces and free from fragments coated with dirt or other objectionable matter.

B. Coarse Aggregate - Coarse Aggregate shall be crushed stone, crushed gravel, or natural gravel. Unless otherwise indicated in the Contract Documents, the material shall have a percentage of wear of not more than 50 when tested in accordance with AASHTO T 96. The sodium sulfate soundness loss shall not exceed 12% in accordance with AASHTO T 104.

C. Fine Aggregate – Fine Aggregate shall consist of crushed stone, crushed gravel, or natural sand. The fraction passing the #200 (75mm) sieve shall not be greater than two-thirds of the fraction passing the #40 (425mm) sieve. The fraction passing the #40 (425mm) sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 3, except that when the plasticity index is nonplastic (NP) the liquid limit shall be not more than 30.

Table 803.4.4-1
Gradation Requirements: Subbase and Base

Sieve	Grading				
	J	GR	L	K	W
	% Passing				
2 in [50 mm]	100	–	–	–	–
1½ in [37.5mm]	90 to 100	–	100	100	100
1 in [25 mm]	–	100	90 to 100	90 to 100	90 to 100
¾ in [19 mm]	–	90 to 100	–	–	–
½ in[12.5 mm]	–	65 to 85	60 to 85	–	60 to 85
⅜ in [9.50 m]	–	–	–	–	–
No. 4 [4.75 mm]	35 to 75	50 to 78	35 to 55	40 to 65	45 to 65
No. 8 [2.36 mm]	–	37 to 67	25 to 50	30 to 55	33 to 53
No. 30 [600 µm]	–	13 to 35	10 to 30	–	–
No. 200 [75 µm]	0 to 15	4 to 15	3 to 15	3 to 15	3 to 12

PART 3 EXECUTION

3.1 GENERAL

A. Materials and construction of asphalt concrete pavement using HMA shall conform to Section 401, Asphalt Concrete Pavement by Gyratory Mix Design Method of the FP-24 Standard Specifications.

B. All existing facilities to remain shall be located and protected from damage during paving operations. Additional requirements are specified in Section 02 01 00 - Maintenance of Existing Conditions.

C. Existing facilities, to be preserved, may be lowered and protected and restored upon completion of the work.

D. The Contractor shall be responsible for adjusting (raising or lowering) all frames for manhole covers, valve box covers, utility vault boxes, pull boxes, hand holes, monument covers, environmental test well covers, etc., to an elevation of no less than one-eighth (1/8) inch and no greater than one-quarter (1/4) inch below the finished grade of the adjacent paved surface to protect the device from interference with future snow plow, sweeping and/or maintenance operations.

3.2 PRODUCTION & MIXING PLANT

A. The mixing plant and production of HMA shall conform to applicable provisions of the FP-24 Standard Specifications for the materials to be used in the work.

B. Storage or stockpiling of completed HMA mixtures in any manner other than through the use of a batch plant pugmill or storage silo discharging directly into a haul vehicle, and discharging of the haul vehicle directly into the paving operation shall not be allowed unless approved by NPS. Any request to store or handle the HMA mixture in an alternate manner not specifically allowed for in these Specifications or the Standard Specifications shall address temperature control, mechanical and thermal segregation control, and contamination control for any proposed change.

3.3 SUBGRADE AND TACK COAT

A. The subgrade to receive HMA shall comply with the compaction and elevation tolerance specifications for the material involved, and approved by NPS prior to starting paving operations.

B. HMA shall not be placed when the underlying layer or surface is frozen, wet, saturated or pumping, or when weather conditions will prevent proper handling, finishing or compaction of the mixture.

C. Subgrade (prepared or existing) must be free of loose and extraneous material. Remove loose particles, dirt, organic matter, and other extraneous material by sweeping, blowers or other appropriate means which shall not damage the subgrade.

D. All existing asphalt concrete or concrete structures that will adjoin new asphalt concrete surfaces shall be neat, clean flat surfaces. Existing asphalt concrete at driveways, transition paving, or other joint locations shall be neatly saw cut. If saw cut pavement is damaged prior to paving, the Contractor shall re-cut any damaged portions prior to paving.

E. In advance of spreading HMA over an existing base, surfacing or bridge deck, if there is a Contract item for leveling or if ordered by the Contracting Officer, HMA shall be spread by mechanical means that will produce a uniform smoothness and texture. HMA (leveling) shall include, but not be limited to, the filling and leveling of irregularities and ruts and changing the cross slope or profile of an existing surface.

F. Apply an asphalt tack coat to contact surfaces of pavements, curbs, gutters, manholes, and other structures in conformance with Section 412, Asphalt Tack Coat of the FP-24 Standard Specifications.

G. Tack coat shall be applied in advance of placing the HMA only as far as that day's scheduled work or as otherwise directed by the Contracting Officer. When asphaltic emulsion is used as tack coat, the HMA shall not be placed until the applied asphaltic emulsion has cured (completely changed color from brown to black).

3.4 EQUIPMENT

A. Paving equipment shall conform to Section 401.05, Equipment of the FP-24 Standard Specifications.

1. When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 0.01 foot tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner the screed was controlled when placing the initial mat.
2. If the automatic screed controls fail to operate properly during a day's work, the Contractor may use manual control of the spreading equipment for the remainder of that day. However, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before starting another day's work.

B. Hauling vehicles shall conform to Section 401.11, Hauling of the FP-24 Standard Specifications. Material transfer vehicle (MTV) is not required for the work.

C. Compacting equipment shall conform to Section 401.14, Compacting of the FP-24 Standard Specifications.

1. A sufficient number of rollers shall be provided to obtain the specified compaction and surface finish; consistent with Contractor's submitted and accepted QC Plan. Rollers shall be sized to achieve the required results.
2. Pneumatic-tired rollers may be used depending on the compatibility of the mix. Pneumatic-tired rollers shall be skirted to retain heat in the pneumatic tires, use of a release agent and other accepted methods to minimize their tendency to pick up fine aggregate from the surface.

D. The use of equipment that leaves ridges, indentations or other objectionable marks in the HMA shall be discontinued.

E. If the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the specifications and tolerances, the paving operations shall be discontinued and the Contractor shall modify the equipment or methods, or furnish substitute equipment.

3.5 TRANSPORTING, SPREADING AND COMPACTING

A. Paving operations shall conform to Section 401, Asphalt Concrete Pavement by Gyratory Mix Design Method of the FP-24 Standard Specifications.

B. Do not use mixes produced from different plants.

C. Comply with the weather limitations specified in Section 401.07, Weather Limitations of the FP-24 Standard Specifications.

D. HMA shall be placed and compacted in such a manner that cracking, shoving, and/or displacement will be avoided. HMA must be free of segregation, coarse or fine aggregate pockets, or hardened lumps.

E. HMA shall be deposited on the roadbed at a uniform quantity per linear yard, as necessary to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture.

F. During transporting, spreading and compacting, petroleum products such as diesel fuel or kerosene shall not be used as a release agent on trucks, spreaders or compactors in contact with the HMA mixture.

G. Unless otherwise designated on the Drawings or allowed by NPS, HMA shall be spread and compacted in the layers and thicknesses indicated in the following table:

Hot Mix Asphalt Layers and Thickness

Total Thickness Shown on the Plans	Minimum Number of Layers	Top Layer Thickness (Inches)		Next Lower Layer Thickness (Inches)		Other Lower Layers Thickness (Inches)	
		Min.	Max.	Min.	Max.	Min.	Max.
3" or less	1	----	-----	----	----	----	----
3.1" through 3.5"	2	1.5	2	1.5	2	----	----
3.51" through 5.3"	2	2	2.5	2	3	----	----
5.31" or more	*	2	2.5	2	3	2	5

* At least three (3) layers if total thickness is more than 5.31 inches and less than 10 inches. At least four (4) layers if total thickness is 10 inches or more.

H. Layers shall be spread with an asphalt paver, unless otherwise specified or approved by the Contracting Officer. Asphalt pavers shall be operated in such a manner as to ensure continuous and uniform movement of the paver.

I. Unless otherwise shown in the Drawings or directed by the Contracting Officer, additional HMA surfacing material shall be placed along the edge of the surfacing at road connections, private drives or other highway and non-highway facilities, tapered or feathered if necessary, and compacted to form smooth tapered conforms.

J. At locations where HMA is to be placed over areas inaccessible to standard mechanical spreading and rolling equipment, the HMA shall be spread by practical means to obtain specified results and shall be compacted thoroughly to the required lines, grades, and cross sections by means of a plate compactor, pneumatic tamper or equivalent to produce thorough

compaction of the layer. Reduce layer thickness as necessary to achieve compaction. Care shall be taken to ensure adequate temperature for compaction of the HMA is maintained until compaction is complete.

K. Compacting shall conform to Section 401.14, Compacting of the FP-24 Standard Specifications.

L. Rolling patterns must progress from the lower edge and progress toward the highest part.

M. If using a vibratory roller as a finish roller, turn vibrator off for finishing.

N. Rolling must leave the completed surface compacted and smooth without tearing, cracking or shoving. The completed HMA surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Ridges, indentations or other objectionable marks left in the surface of the HMA by blading or other equipment shall be eliminated by rolling or other suitable means.

3.6 JOINTS, EDGES AND CLEANUP

A. Conform to Section 401.15, Joints, Trimming Edges, and Cleanup of the FP-24 Standard Specifications.

B. Tack coat and heat all vertical edge cold joints when paving is resumed.

C. Use a step taper for longitudinal joints. Offset the longitudinal joint of one layer at least 6 inches from the joint in the layer immediately below. Make the longitudinal joint in the top layer along the striped centerline of two-lane roadways or at the lane lines of roadways with more than two lanes.

1. Compacting longitudinal joints should be accomplished by rolling from the hot side of the asphalt. The steel wheel roller is placed with the majority of the drum on the hot, newly placed asphalt, with approximately 6" of the drum extending over the cold asphalt.

D. The end of the paving mat should be cut off vertically for transverse joints to allow the subsequent full lift thickness to be placed against it. Lumber may be used as bulkhead or use a papered transverse joint.

E. NPS may, at their discretion, test the density of longitudinal or transverse joints with a calibrated nuclear density gauge or through the use of 6-inch diameter cores obtained directly on the longitudinal joint.

F. The Contractor shall be responsible for the cleanup of all asphalt spoils generated from the project. Cleaning out of any paving equipment by spreading of asphalt concrete spoils on unpaved surfaces is not allowed. Fuel or other hazardous material spills shall be documented and cleaned up immediately.

END OF SECTION 32 12 00

SECTION 32 16 00 - CONCRETE CURBS, SIDEWALKS, APRONS, AND PADS

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing, placing, curing and protecting concrete for the construction of concrete curb, valley gutters or pans, aprons, pads, and other concrete flatwork as shown on the Drawings, conforming to the Specifications, and as otherwise directed by NPS.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 31 23 00 - Excavation and Fill
2. Section 32 11 00 - Base Courses

1.3 DEFINITIONS

A. Not Used.

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. A Concrete Mix Design shall be submitted to NPS no less than fourteen (14) days prior to placement for review and acceptance. The concrete mix design submittal shall include supporting documentation to indicate the source and material properties conformance with the Specifications. NPS reserves the right to reject materials upon delivery to the site.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.

2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Finish and Texture: The Contractor shall be solely responsible for obtaining the finish and texture of all concrete work on the project that meets the approval of the Contracting Officer.

C. Testing Agency: The Contractor shall engage a qualified independent geotechnical engineering and/or material testing agency/consultant to perform material acceptance testing.

D. Inspection: The Contractor shall coordinate with the Contracting Officer during all concrete operations to allow for access to the site as often as necessary for the performance of any special inspections and material testing for verification that the specifications are being met for the installation of materials. The Contractor is responsible for all acceptance and quality control testing. Frequency of material testing shall conform to the applicable Specifications, Standards, and Test Methods.

E. NPS may assure conformance to contract specifications by inspection of the Contractor's procedures, by oversight of the Contractor's quality control inspection and records, and by independent verification sampling and testing during concrete production and construction. Acceptance tests will be performed using similar test methods used for quality control testing.

F. Concrete for curbs, valley gutters, sidewalks, aprons, pads and other flatwork will be accepted under Section 552.18, Acceptance of the FP-24 Standard Specifications. See Table 552-10 for sampling, testing, and acceptance requirements.

G. If the 28-day compressive strength tests fail to meet specified requirements, NPS may require that core samples be retaken and tested at Contractor’s expense. If the core tests are below strength, if there is evidence of damage by freezing, or if the concrete fails in other ways to meet specifications, NPS may require that the defective concrete be removed and replaced at no additional expense to NPS.

1.7 CONTRACTOR QUALITY CONTROL

A. Contractor quality control process and documentation shall conform to Section 153, Contractor Quality Control of the FP-24 Standard Specifications, Section 01 40 00 – Quality Requirements, and the Contract Documents.

B. The Contractor is responsible for all quality control and acceptance testing. The Contractor shall provide quality control sampling, testing, and inspection for concrete work at specified rates sufficient to ensure materials and work conform to the Specifications.

1.8 PROJECT CONDITIONS AND REQUIREMENTS

A. In confined linear areas where protection of existing infrastructure, vegetation, and/or soils is specified only equipment that can be safely operated in the confined construction corridor will be permitted.

1.9 TOLERANCES

A. Maintain forms within the following:

1. Top of Form: Plus or minus 1/8-inch in 10-feet and no abrupt variations; at required elevation to plus 3/8-inch.
2. Face of Form: Plus or minus 1/8-inch in 10-feet longitudinal and no abrupt variations; perpendicular to surface plus or minus 1/8-inch.

B. Concrete shall be placed to the lines, grades, and cross sections shown on the Drawings. Finish surface shall have a maximum 0.02 foot variation in 10 feet, except at grade changes. At no point shall the surface fail to drain.

PART 2 PRODUCTS

2.1 CONCRETE FOR CURBS, SIDEWALKS, APRONS, PADS AND OTHER FLATWORK

A. Conform to the applicable provisions of Section 609, Curb and Gutter, and Section 610, Sidewalks, Pads, and Paved Medians of the FP-24 Standard Specifications, unless otherwise shown on the Drawings.

B. Concrete materials shall conform to Section 601, Minor Concrete of the FP-24 Standard Specifications, except for the following revisions to the composition and cementitious material requirements shown in the tables below.

Composition of Concrete

Property	Specification
Cement Content	611 pounds per cubic yard minimum
Water/Cementitious Material Ratio	0.45 maximum
Slump	AASHTO T 119 4 inches maximum
Air Content	5.0% minimum 7.0% maximum
Coarse Aggregate Size Number	AASHTO M 43 57 and 67
28-day Compressive Strength	AASHTO T 22 4,000 psi minimum

Cementitious Material Requirements for Concrete

Cementitious Material	Maximum Percent of Total Cementitious Material by Mass
Fly ash or other pozzolans, AASHTO M 295	25
Slag, AASHTO M 302	50
Silica fume, AASHTO M 307	10
Total fly ash or other pozzolans, slag, and silica fume	50 (1)
Total fly ash or other pozzolans and silica fume	35 (1)

(1) Limit fly ash or other pozzolans to no more than 25 percent of the total mass of cementitious material and limit silica fume to no more than 10 percent of the total mass of cementitious material.

C. Measuring and Batching: Depending on local conditions, or direction of the NPS Representative, the methods of mixing may be limited to one of the following:

1. Batching at a central plant and mixing enroute to the project in a transit mix truck.
2. Batching and mixing at a batch plant on the project site, or remote location with delivery to the project by truck.

D. Regardless of the batching and mixing methods that are to be used on the project, the allowable tolerances for cement and water shall not exceed one (1) percent, two (2) percent for each aggregate, or one (1) percent for aggregate weighed cumulatively.

2.2 CURING MATERIALS

A. Curing material shall conform to Section 711, Concrete Curing Material and Admixtures of the FP-24 Standard Specifications.

B. Apply curing compounds as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

A. Excavation and backfill shall conform to Section 31 23 00 - Excavation and Fill.

B. Conform to applicable portions of Section 552, Structural Concrete of the FP-24 Standard Specifications for weather limitations, handling, storing, batching, and mixing material and delivering concrete.

C. Batch, mix and transport concrete so slump will not increase nor decrease by more than 1 inch from design slump. The Contractor shall take care not to add water at the job site.

D. Do not apply water to plastic concrete surfaces during finishing operations.

E. Construct curb under Section 609, Curb and Gutter of the FP-24 Standard Specifications.

F. Construct aprons, pad and other flatwork under Section 610, Sidewalks, Pads, and Paved Medians of the FP-24 Standard Specifications.

3.2 EMBEDDED ITEMS

A. Before concreting, place all required sleeves, inserts, anchor bolts, and embedded items.

B. Give all trades whose work is related to the concrete ample notice and opportunity to introduce embedded items before concrete is placed.

C. Position expansion joint material and embedded items accurately and support them against displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent the entry of concrete.

3.3 SURFACE PREPARATION, SETTING FORMS, AND REINFORCING

A. Prepare the subgrade and structural base according to Section 32 11 00 - Base Courses. Maintain the surface to avoid the development of loose and uncompacted material.

B. Design and construct forms, place and fasten reinforcing steel conforming to Section 601, Minor Concrete Structures of the FP-24 Standard Specifications.

C. Set and align forms to the plan dimensions and elevations. Securely brace forms so they will not bulge or warp during concrete placement. Apply form release agent or form oil to the inside form faces.

3.4 PLACEMENT

A. Provide 24-hours written notice prior to placement of any concrete. Grading, forms, and steel reinforcements must be inspected and approved by the Contracting Officer prior to placement of concrete.

B. Discharge all concrete within the time limits noted in the Standard Specifications. These time limits are based on jobsite ambient air temperature, cement type, and admixture used.

C. Do not mix or place concrete when the jobsite ambient air temperature is, or is expected to be, less than 40 °F unless adequate provisions are made to protect the concrete.

D. Do not use aluminum pipe, conduit, or troughs for transporting concrete. When concrete is pumped, take samples from the discharge stream at the point of placement.

E. Deposit concrete between the forms to a uniform height. Deposit concrete as near to its final position as possible to avoid segregation due to re-handling or flowing

F. Consolidate concrete to remove voids and air pockets. Use high-frequency internal vibrators for consolidating concrete in the forms.

1. Operate vibrators to produce concrete free of voids, but do not hold them in one place long enough to result in segregation or formation of laitance on the surface.
2. Do not move concrete horizontally with vibrators.

G. Carry a slight excess of concrete in front of the leading edge of the template or screed. After strikeoff and before bleed water appears on the surface, float to the required grade and cross-section.

H. Construct concrete joints for curb under Section 609.05 of the FP-24 Standard Specifications.

I. Construct concrete joints for sidewalks, aprons and pads under Section 610.04 of the FP-24 Standard Specifications.

3.5 FINISHING AND CURING

A. Finish concrete in conformance with Section 552.12, Finishing Plastic Concrete of the FP-24 Standard Specifications.

1. For aprons, pads and other flatwork, provide a sidewalk finish.
2. For curbs provide a broom finish parallel to the cub line.

B. Cure concrete for at least 7 days. If high early strength cement is used, cure concrete for at least 3 days. Cure concrete in conformance with Section 552.13, Curing Concrete of the FP-24 Standard Specifications.

3.6 PROTECTION

A. When rain is threatening during concrete operations, stop operations and protect the concrete from rain with plastic sheeting or other methods approved by the Contracting Officer. Remove, replace, or repair pavement damaged by rain or hail as directed by and at no cost to NPS.

B. In cold weather, maintain the moisture conditions but also, by heating or covering, maintain temperature of the concrete between 50 degrees F and 70 degrees F for entire curing period.

C. In hot weather, take immediate steps to protect newly finished concrete from the drying effects of wind and sun, and maintain temperature of the air surrounding the concrete uniform within 5 degrees F in any one hour or 50 degrees F in any 24-hour period.

D. During curing period, protect concrete from mechanical damage, loading, shock, vibration and traffic or until concrete has attained the design compressive strength.

3.7 DAMAGED OR DEFECTIVE CONCRETE

A. Concrete that is deemed damaged or defective by the Contracting Officer shall be removed before completion and acceptance of the project work; and replaced with acceptable concrete as directed by the Contracting Officer at the Contractor’s expense.

END OF SECTION 32 16 00

SECTION 32 17 00 - PAVING SPECIALTIES (TRAFFIC STRIPING AND MARKINGS)

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing materials and applying traffic striping and pavement markings as shown on the Drawings, required in the Specifications, and as otherwise directed by the Contracting Officer.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 01 50 00 - Temporary Facilities and Controls
2. Section 02 01 00 - Maintenance of Existing Conditions
3. Section 31 11 00 - Clearing and Grubbing
4. Section 32 12 00 - Flexible Paving

1.3 DEFINITIONS

A. MUTCD: Manual on Uniform Traffic Control Devices (Federal Highway Administration)

B. Pavement Marking: A transverse marking such as a limit line, stop line/bar or cross walk, or a word, symbol or other standard marking.

C. Traffic Striping: A longitudinal centerline or lane line used for separating traffic lanes in the same direction of travel or opposing direction of travel, or longitudinal edge line used for delineating the edge of the traveled way.

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. Submit manufacturer’s MSDS and product data sheets for waterborne paint and glass beads for review and approval at least 7 days before applying pavement markings.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Sectio 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

G. Federal Highway Administration Manual on Uniform Traffic Control Devices, 2023 FHWA MUTCD, 11th Edition).
http://mutcd.fhwa.dot.gov/

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Comply with the quality control and assurance requirements, per the applicable FP-24 Standard Specifications for materials to be used in the work.

C. Field verify all new and existing dimensions affecting the work of this contract before ordering products.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. Conform to the project Permit(s), regulatory requirements, environmental mitigation measures, and local jurisdiction codes and traffic laws.

B. Designate a traffic control supervisor who shall be responsible for initiating, installing and maintaining all traffic control devices, and conformance to the Contract Documents. Contractor shall provide all temporary traffic control required for completion of the work.

C. Any existing traffic striping and pavement markings that are partially or completely destroyed or damaged during construction by the Contractor's operations shall be replaced in accordance with the Specifications, local jurisdiction requirements, and as directed by the Contracting Officer.

D. Existing utilities shown on the Drawings are approximate. The Contractor is responsible for ascertaining the location of, and protection for, all utilities to be encountered in the performance of the required work.

E. Conform to federal and state environmental protections for water and lands, in handling and construction of treated wood materials.

F. Implement protective measures and conform to permit requirements for all painting/finishing operations.

1.8 TOLERANCES

A. Comply with the tolerance requirements, per the applicable FP-24 Standard Specifications for materials and its application, to be used in the work.

B. Horizontal locations, grades and mounting heights for signage facilities are to be established from referenced benchmarks, as shown on the Drawings, and as otherwise directed by the Contracting Officer for best fit to field conditions.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials shall conform to sizes, qualities and quantities as shown on the Drawings or described in the specifications.

B. All experienced, reputable and qualified to provide continuous quality control through plant inspection and certification of materials.

C. Materials shall be from new stock, delivered in good condition, and no used or damaged stock is allowed.

2.2 TRAFFIC PAINT

A. Paint for traffic striping and pavement markings shall be waterborne traffic paint and conform to Section 718.10 of the FP-24 Standard Specifications.

B. Application rates shall be as specified in Section 634.05 of FP-24.

C. Provide materials that are compatible with one another and with substrates.

2.3 GLASS BEADS

A. Glass beads applied to traffic paint shall conform to Section 718.14 of the FP-24 Standard Specifications.

B. Application rates shall be as specified in Section 634.05 of FP-24.

PART 3 EXECUTION

3.1 GENERAL

A. Contractor shall not install signage nor apply pavement striping/marking paints until the locations, layout, colors, and placement of traffic control devices and pavement striping/markings has been verified and accepted by the Contracting Officer.

B. The Contractor shall sand blast unwanted existing striping and markings that interfere with the work prior to application of new traffic striping and pavement markings.

3.2 TRAFFIC STRIPING AND MARKINGS

A. Install pavement striping/markings where applicable to jurisdiction according to MUTCD and state regulations at locations shown on the Drawings.

B. Conform to Section 634, Permanent Pavement Markings of the FP-24 Standard Specifications.

1. Materials shall conform to Section 718, Traffic Signing and Marking Material of the FP-24 Standard Specifications.
2. Current state approved pavement marking material may be used, when approved by NPS. Submit proof of compliance with state specifications.

C. Establish marking patterns or locations according to the MUTCD, plans, or state requirements.

1. Layout of pavement striping and markings must be reviewed and accepted by NPS prior to applying paint. Contractor is responsible to schedule field review meeting with NPS, a minimum of three (3) days advance notice.

D. Clean and prepare surfaces to receive traffic paints and markings.

E. Apply waterborne traffic paint (Type B) and Type 1 glass beads on the paint at specified rates.

F. Glass beads shall be uniformly incorporated in all coats of paint concurrently with the application of the paint.

G. On new asphalt pavements or new asphalt surface treatments, apply two coats.

H. On single lane roads apply pavement markings according to the manufacturer’s recommendations and in a direction consistent with safe application.

3.3 CLEANUP & PROTECTION

A. Drips, overspray and improper markings tracked by traffic shall be immediately removed from the pavement surface by blast cleaning or other methods approved by the Contracting Officer. All such removal work, including re-application, shall be at the Contractor’s expense.

B. The Contractor shall protect newly installed facilities for the duration of the work.

C. Repair and replace any damaged parts with new materials.

D. Repair protective coatings and paints per the manufacturer requirements to retain all warranties.

END OF SECTION 32 17 00

SECTION 32 17 13 – PARKING BUMPERS

PART 1 GENERAL

1.1 SUMMARY:

A. This work consists of procuring and installing preformed parking bumpers (wheel stops) as shown on the Drawings.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 01 50 00 - Temporary Facilities and Controls
2. Section 32 17 00 – Paving Specialties

1.3 Submittals

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. Submit product data sheets for parking bumpers.

PART 2 PRODUCTS

2.1 Precast wheel stops shall comply with the following:

A. Shall be made with reinforced concrete with minimum compressive strength of 4,000 psi.

B. Size: 5” Height x 7” Width x 6’ Length.

C. Mooring holes for lag bolts or rebar (minimum 2).

D. Include installation hardware.

PART 3 EXECUTION

3.1 INSTALLATION

A. Concrete wheel stops should be installed per the manufacturer’s specifications and installation instructions.

3.2 ACCEPTANCE

A. Acceptance of wheel stops shall be by visual inspection.

END OF SECTION 32 17 13

SECTION 32 32 00 - RETAINING WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modular block retaining walls.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product including modular blocks, drainage zone fill, drain pipe and geotextile fabric.

B. Shop Drawings:

1. Show sizes, profiles, coursing, and locations of retaining wall units; including backfill and leveling base materials.

2. Show drain pipe, geotextile fabric placement and drainage zone fill.

3. Signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples: Manufacturer's standard color sheets, showing full range of available colors and textures for retaining wall units.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Certificates: For each type of retaining wall unit from manufacturer.

1. Include test data for shear strength between retaining wall units in accordance with ASTM D6916.

C. Test and Evaluation Reports:

1. Product test reports.
2. Research reports.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

1.4 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24) dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/
   1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
   2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.5 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to General Conditions, Special Conditions, Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Comply with the quality control and assurance requirements, per the applicable FP-24 Standard Specifications for materials to be used in the work.

PART 2 - PRODUCTS

2.1 RETAINING WALL UNITS

A. Concrete Units: ASTM C1776 and shall have an average 28-day compressive strength of no less than 4,000 psi.
   1. Provide units that comply with requirements in ASTM C1776 for freeze-thaw durability.
   2. Provide units in the sizes shown on the Drawings.
   3. Provide units that interlock with courses above and below.

B. Color: As selected and approved by the Contracting Officer from the manufacturer’s listings.

C. Shape and Texture:
   1. Provide units with basic shape, dimensions, and face texture as approved by the Contracting Officer.

2.2 INSTALLATION MATERIALS

A. Leveling Base: A leveling pad of 6 inches minimum thickness shall be installed in accordance with Drawings. The leveling base shall comprise of either unreinforced concrete or Class E Aggregate conforming to Section 703.05, Subbase, Base, and Surface Course Aggregate of the FP-24 Standard Specifications.

B. Drainage Zone Fill: ¾ crushed stone as shown on Drawings.

C. Nonreinforced-Soil Fill: Comply with requirements in Section 31 23 00 – Excavation and Fill for satisfactory soils.

D. Drainage Geotextile: Non-woven geotextile fabric conforming to Section 714.01 (c), Geotextile Filter of the FP-24 Standard Specifications.

E. Drain Pipe:
   1. Conform to Section 708, Plastic Pipe of the FP-24 Standard Specifications.
   2. Perforated pipe shall be 4 inches in diameter, minimum 3-hole perforated or slotted PVC pipe.
   3. The perforated pipe shall be manufactured in accordance with ASTM D3034 for PVC pipe and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION OF RETAINING WALLS

A. General: Place units in accordance with retaining wall unit manufacturer's written instructions.

B. Do not use units with chips, cracks, or other defects that are visible at a distance of 20 feet where such defects are exposed in the completed Work.

C. Leveling Base: Place and compact Class E aggregate base material to thickness indicated on the Drawings and compact to 95% modified dry density.

D. First Course: Place first course of retaining wall units for full length of wall. Place units in firm contact with each other and base material and properly aligned and level.

   1. Tamp units into leveling base as necessary to bring tops of units into a level plane.

E. Subsequent Courses: Remove excess fill and debris from tops of units in course below. Place units in firm contact, properly aligned, and directly on course below.

F. Fill voids between units with ¾ inch crushed rock as shown on the Drawings.

G. Cap Units: Place cap units and secure with cap adhesive.

3.2 FILL PLACEMENT

A. General: Comply with requirements in Section 31 23 00 – Excavation and Fill and retaining wall unit manufacturer's written instructions.

B. Fill voids between and within units with drainage zone fill. Place fill as each course of units is laid.

C. Place, spread, and compact drainage zone fill and soil fill in uniform lifts for full width and length of embankment as wall is laid. Place and compact fills without disturbing alignment of units. Where both sides of wall are indicated to be filled, place fills on both sides at same time. Begin at wall, and place and spread fills toward embankment.

1. Use only hand-operated compaction equipment within 48 inches of wall or one-half of height above bottom of wall, whichever is greater.
2. Compact nonreinforced-soil fill to comply with Section 31 23 00 – Excavation and Fill.

D. Place drainage geotextile against back of wall, and place layer of drainage fill at least 12 inches wide behind drainage geotextile to within 12 inches of finished grade. Place another layer of drainage geotextile between drainage fill and soil fill.

E. Drain Pipe:
1. Drain pipe shall be installed conforming to Section 602, Culverts and Drains of the FP-24 Standard Specifications.
2. Any pipe fittings, couplers, adapters, connections, etc. as required for the proper construction of the project shall be as specified by the pipe manufacturer and shall be at least equal to that of the pipe joint performance requirements. Where applicable, the Contracting Officer shall review methods and materials proposed for connections to existing structures or pipes of differing material and/or sizes.
3. Wrap pipe in a non-woven geotextile fabric conforming to Section 714.01 (c), Geotextile Filter of the FP-24 Standard Specifications.
4. Install in the drainage zone behind the retaining wall as shown on the Drawings.
5. Pipe shall not be backfilled until the Contracting Officer has approved the installation.
6. The Contractor shall clean the interior of the pipeline as work progresses and the pipeline shall be clear and free of debris and sediment before acceptance.

F. Place native fill over top edge of drainage fill layer in accordance with the Drawings.

G. Slope grade at top of wall away from wall unless otherwise indicated. Slope grade at wall base away from wall. Provide uniform slopes that prevent ponding.

3.3 FIELD QUALITY CONTROL

A. The Contractor is responsible for proper installation and quality control of the retaining wall.

B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

C. Comply with requirements in Section 31 23 00 – Excavation and Fill for field quality control.

D. Tests and Inspections:
   1. In each compacted backfill layer, perform at least one field in-place compaction test for each 24 inches of fill depth and each 20 feet or less of retaining wall length.
   2. Retaining wall system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 32 32 00

SECTION 32 90 00 - RESTORATION

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to any topsoil salvage, soil loosening and site preparation, topsoil placement and preparation for seeding, mulch application for soil stabilization, and restoration of disturbed areas resulting from the project work and Contractor's operations.

B. Stripping and salvage of existing duff, topsoil, and organic matter during clearing and grubbing operations, stockpiling of material, and stabilization of material, for reuse as part of soil stabilization and restoration work is required.

C. Temporary erosion control and soil stabilization required for erosion and water pollution controls in work areas that are considered inactive (i.e. excess of 14 days) or before forecast storm events shall conform to Section 01 57 23 – Temporary Storm Water Pollution Prevention and Section 31 25 00 – Erosion and Sediment Control of these Specifications. Temporary erosion control includes stabilization of any topsoil stockpiles.

D. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

E. The Contractor shall provide at least 14 days' notice to the Contracting Officer before expected completion of topsoil placement and grading to coordinate seeding work by Park.

F. Topsoil placement by the Contractor and seeding by NPS shall be completed between September 15 and June 15.

G. All herbicide spraying will be completed by the NPS through their revegetation contractor.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections which include, but is not limited to:

1. Section 31 11 00 – Clearing and Grubbing
2. Section 31 13 00 – Selective Tree and Shrub Removal and Trimming
3. Section 31 23 00 – Excavation and Fill
4. Section 32 92 00 – Grasses

1.3 DEFINITIONS

A. Topsoil: Material obtained from stripping and shallow excavations, suitable for topsoil shall consist of organic friable native soils, free from, subsoil, clay lumps, gravel, stones, and other undesirable material and objects more than 2-inch in avg. diameter, free of weeds, and capable of supporting growth of native vegetation. Manufactured topsoil is not acceptable. Do not obtain from bogs, marshes, or designated wetlands.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Provide a noxious and invasive weed plan.

C. Submit 15 pound sample of mulch to be used for stabilization of disturbed areas.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto.
https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Please refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 PROJECT CONDITIONS AND REQUIREMENTS

A. The Contractor shall prepare a Noxious and Invasive Weed Plan for surveying, preventing, reporting, controlling and monitoring noxious and invasive weeds within the Contractor's area of responsibility. The Contractor shall be required to meet all of the requirements of this plan. These measures may include, where appropriate, equipment inspection for soil, seeds, and vegetative matter, equipment cleaning, general housekeeping, and use of noxious and invasive weed-free materials (i.e. soil, aggregates, mulch, amendments, etc.). A copy of the Noxious and Invasive Weed Plan shall be submitted to the Contracting Officer for review and acceptance, prior to implementation in the contract work. A current list of noxious and invasive weeds of concern is available from NPS.

B. Care shall be taken at all times to minimize disturbance and protect and prevent any unnecessary disturbance to soil and vegetation. Under no circumstances shall any disturbance be allowed to occur outside the work areas identified on the Drawings. Any soil disturbance or vegetation damaged during construction (where not identified or allowed on the Drawings) shall be restored, revegetated and/or be repaired and damaged vegetation replaced at Contractor's expense as directed by Contracting Officer.

C. Soil stabilization and applicable revegetation materials shall not be applied during windy conditions. Windy conditions are defined as a sustained wind of eight (8) miles per hour or more, gusts where the difference between the ambient and the increased velocity is more than four (4) mph, or any conditions that may cause dispersal of revegetation and erosion control material or application to be difficult or inaccurate. The Contractor is responsible for providing certified instruments, or data from certified instruments, in case of a claim or conflict.

PART 2 PRODUCTS

2.1 SALVAGED TOPSOIL/ORGANIC LAYER

A. Stripping and salvage of the existing topsoil/organic layer (up to 6 inches) where present and as directed, shall be completed in accordance with Section 31 11 00 - Clearing and Grubbing. The generated topsoil/organic soil material shall be salvaged and stockpiled for use as part of the soil stabilization and restoration requirements.

B. To the extent possible, salvaged topsoil shall be free and clear of, branches or cones, large roots (greater than 1/2 inch diameter), cobbles and/or gravel exceeding two (2) inches in size, nor any waste, trash or deleterious debris.

C. Salvaged topsoil/organic layer shall not be intermixed with other materials or soils and shall be stockpiled separately. Conform to the stockpile management provisions as specified herein.

2.2 MULCH

A. Mulch shall be placed as needed for stabilization of disturbed or scarified areas not proposed for improvements.

B. Mulch shall consist of a mixture of fibrous fir bark and fibrous, shredded Western Red cedar ranging in size from 1/8 inch minus to 6 inches in length. A ratio of 2/3 fir bark and 1/3 red cedar shall be provided. The mixture shall be free from weed seeds, harmful bacteria or disease spores, and substances toxic to plant growth.

2.3 SEED

A. Seeding shall be completed by NPS.

PART 3 EXECUTION

3.1 GENERAL

A. Soil stabilization and restoration operations shall not commence until all other construction work is completed within the vicinity of the target area, except as authorized by the Contracting Officer.

B. Soil stabilization and restoration operations shall occur in late summer/fall, except where authorized by the Contracting Officer.

C. Prior to commencing soil stabilization and restoration operations, trees and vegetation to remain shall be protected from damage.

D. All areas disturbed by the Contractor's operations shall be stabilized. Areas of disturbance outside of the specified grading limits, shall be restored at the Contractor's expense.

E. Use appropriate sized equipment for the work and space limitations present.

F. All existing facilities to remain and new project work shall be located and protected from damage during soil stabilization and restoration operations. As required, facilities to be preserved may be lowered, protected and restored upon completion of the work.

3.2 STOCKPILE MANAGEMENT

A. Contractor is responsible for maintaining all stockpile locations where designated on the Drawings, specified herein, or as authorized by the Contracting Officer.

B. Refer to additional stockpile requirements in Section 31 11 00 – Clearing and Grubbing.

C. All necessary water pollution control, erosion control, BMPs, etc. shall be the responsibility of the Contractor for the duration of the project work.

D. Temporary storage (windrow or stockpile) of any salvage material (duff, topsoil, organic matter, etc.) shall be done so in a manner that does not impair drainage or construction operations, and is not cause for any additional damage to existing lands.

3.3 EARTHWORK, EXCAVATION, AND FILL

A. Applicable construction operations for earthwork, excavation and fill shall conform to Section 31 23 00 - Excavation and Fill.

3.4 SITE PREPARATION

A. Before placement and spreading of available salvaged topsoil, the subgrade or underlying materials to receive topsoil application must be set to the specified grades and slopes, and comply with the specified compaction and elevation tolerances for the material involved and otherwise be prepared to ensure finish grades and work conform to the Drawings and Specifications.

B. If the finished subgrade or underlying materials are lower than the grade established by the Contracting Officer and as shown on the Drawings, suitable native material or import accepted by the Contracting Officer shall be placed to fill the low areas.

C. The subgrade shall be inspected by the Contracting Officer for conformance to the project requirements, and Contractor must receive authorization prior to application of any topsoil or other soil stabilization materials. The subgrade surface shall be free of large rocks (no greater

than 3 inch diameter) and must be free of loose or extraneous material that will interfere with soil stabilization and restoration operations.

D. Loosen any compacted subgrade areas to a depth of no less than 12 inches, depending on existing conditions as directed by the Contracting Officer. All non-vehicular compacted soils (ie. trails and campsites) shall be scarified to a depth of 6 inches. Use hand tools, agricultural disc, or rippers as required; cross ripping or other methods may be necessary to break large clumps or loosen heavily compacted areas. Clumps of soil shall be no more than 2 inches in any dimension. Deep tilling of soils is prohibited.

E. Following completion of soil loosening and inspection/acceptance of the Contracting Officer, evenly apply available salvaged topsoil across target areas to a uniform depth. Incorporate topsoil with underlying soils to a depth of 2-3 inches, or to a depth as directed by the Contracting Officer, to generate a suitable upper soil layer and natural seed bed.

1. Where possible all salvaged topsoil should be re-applied within 500 feet of the original topsoil salvage location prior to its disturbance/construction. Coordination and discussion of stockpile options with the Contracting Officer is required.
2. Any excess topsoil shall be spread within the project area at direction of Contracting Officer.
3. Install mulch over disturbed and scarified areas not proposed for improvements as needed for stabilization.

F. The finish grade of upper soil layer shall be relatively uniform with a natural appearance and conform to the grades established by the Contracting Officer and as shown on the Drawings.

3.5 SEED APPLICATION

A. Seeding shall be completed by NPS.

3.6 PROTECTION

A. All restored and mulched areas shall be protected from disturbance and any impacts from traffic, equipment and construction operations.

END OF SECTION 32 90 00

SECTION 32 92 00 – GRASSES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fine grading with topsoil to contours shown on the Drawings for finish landscaping and seeding.
2. All seeding work will be completed by NPS. Contractor is responsible for soil preparation as shown in Drawings.
3. Seeding shall be completed by the NPS between September 15 and June 15.
4. Following seeding by NPS, the Contractor shall be responsible for mulching all reseeded areas.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections which include, but is not limited to:

1. Section 31 11 00 - Clearing and Grubbing
2. Section 31 23 00 - Excavation and Fill
3. Section 31 25 00 – Erosion and Sediment Control
4. Section 32 90 00 – Restoration

1.3 DEFINITIONS

A. Weeds: Undesirable ground cover species that can be controlled by commercially available selective herbicides or any species of ground cover other than the one intended for the grassed areas.

1.4 SUBMITTALS

A. The following shall be submitted in accordance with the Contracting Requirements, Drawings and Specifications including Section 01 33 23 – Submittal Procedures.

B. Submit 15 pound sample of mulch to be used for reseeded areas.

1.5 COORDINATION

A. Coordinate the work of this section with Section 31 23 00 - Excavation and Fill and 32 90 00 - Restoration.

B. The Contractor shall provide the Contracting Officer with 14 days' notice of completion of topsoil preparation so NPS can coordinate seeding activities.

C. The Contractor shall provide and install approved mulch over all seeded areas within 8 hours of completion of seeding activities.

PART 2 - PRODUCTS

2.1 GRASS MATERIALS (NOT USED)

2.2 TOPSOIL

A. Topsoil shall be stripped from site construction areas and stockpiled on site for reuse in lawn areas and landscape areas in accordance with Section 31 11 00 – Clearing and Grubbing.

B. To the extent possible, salvaged topsoil shall be free and clear of branches or cones, large roots (greater than ½ inch diameter), cobbles and/or gravel exceeding two (2) inches in size. Salvaged topsoil shall also be fee of waste, trash or deleterious debris.

C. Imported topsoil shall not be allowed.

2.3 Mulch Material

A. Protective mulch for seeded areas shall be approved by NPS for use in the Park. Straw shall not be allowed.

B. Mulch shall consist of a mixture of fibrous fir bark and fibrous, shredded Western Red cedar ranging in size from 1/8 inch minus to 6 inches in length. A ratio of 2/3 fir bark and 1/3 red cedar shall be provided. The mixture shall be free from weed seeds, harmful bacteria or disease spores, and substances toxic to plant growth.

2.4 Fertilizer

A. No fertilizer will be used in any revegetation work unless requested by the Contracting Officer. If requested, the Contracting Officer will specify the composition of the fertilizer.

PART 3 - EXECUTION

3.1 TOPSOIL SPREADING

A. Examination and Acceptance:

1. Verify backfilling has been completed and checked for proper grade and compaction.
2. Verify subgrade has been contoured and loosened in accordance with Section 32 90 00 - Restoration.
3. Verify that prepared soil base is ready to receive the work of this section.

4. Beginning of installation means acceptance of existing site conditions.

B. Subgrade Preparation:

1. Fine grade area to eliminate uneven areas and low spots.

C. Placing Topsoil:

1. Place topsoil in areas where seeding is scheduled to a depth of 2-4 inches minimum, or to a depth as directed by the Contracting Officer. Place topsoil during dry weather.
2. Fine grade topsoil eliminating rough or low areas. Maintain profiles and contour of subgrade.

D. Tolerances: Surface Grade of Topsoil: Plus, or minus 1/10 foot.

E. Protection: Protect landscaping and other features remaining as final work.

3.2 SEED BED PREPARATION

A. Fine grade areas to be seeded to smooth, even surface with loose uniformly fine texture. Roll, rake, and drag areas to be seeded. Remove ridges and fill depressions as required to meet finish grades.

B. Prepared seed bed shall be friable topsoil, free from subsoil clay lumps, brush, weeds, and other litter, and shall be free of roots, stumps, stones, and gravel.

C. Remove any grass, vegetation, weeds, or turf and dispose of such material legally offsite. Do not turn over into soil being prepared for seeding.

1. If seed bed has become muddy, hard or excessively dry, re-till to a smooth, friable, uniform condition; free from stones or lumps. Re-grade all settling prior to seeding. Fertilize and seed immediately after bed preparation.
2. Prior to seeding, Contracting Officer will review prepared seed bed and accept that seed bed has been prepared per this specification.

3.3 MULCHING

A. Contractor shall be responsible for mulching after seeding is complete.

B. The seeded area shall be mulched within 8 hours of completion of seeding.

C. Mulching shall not be installed when surface water is present resulting from rain, melting snow, irrigation or other cause.

D. Mulch shall be spread at a loose depth of 1 inch along road edges and open areas and up to 3 inches under trees for moisture retention.

E. Areas not properly mulched, or any damage that may occur during construction is the responsibility of the Contractor and shall be repaired and re-mulches in an acceptable manner at the Contractor's expense. Mulching removed by wind, rain or other causes prior to acceptance shall be re-established by the Contractor at their own expense.

3.4 POST CONSTRUCTION CLEANUP

A. Protect landscape work and materials from damage due to landscape operations and operations by other Contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

B. Remove all excess hydraulic and mulch from fences, poles, pavements, and other improvements.

END OF SECTION 32 92 00

SECTION 33 14 00 - WATER UTILITY TRANSMISSION AND DISTRIBUTION

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing and installing waterlines, valves, meters, fire hydrants, other appurtenances, enclosures, and waterline drains for a complete water system as shown on the Drawings, and as otherwise directed by NPS.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. Contractor shall provide all cleaning, flushing, disinfection and testing services, unless noted otherwise.

D. This section does not apply to irrigation systems nor plumbing systems within buildings, unless noted otherwise.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 03 30 50 - Minor Concrete
2. Section 31 23 00 - Excavation and Fill
3. Section 31 50 00 - Excavation Support and Protection
4. Section 32 16 00 - Concrete Curbs, Sidewalks, Aprons, and Pads

1.3 DEFINITIONS

A. Not used.

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. Submit supporting documentation, certificates of compliance, shop drawings, and supplier or manufacturer information prior to ordering materials or placement in the work for each proposed material and product, for review and acceptance of NPS for conformance to the material specifications.

C. Submittals include but are not limited to construction methods, manufacturer's descriptive literature, performance and test data, and manufacturer's data for sizes, pressure rating, rated capacity, listing/approval stamps, labels and other marking on equipment made to the specified standards for materials and settings of selected models for the following:

1. Pipe and fittings
2. Gaskets, couplings, sleeves, casing spacers, and assembly bolts and nuts
3. Gate valves and ball valves
4. Air release and vacuum valves
5. Pressure reducing valves
6. Backflow preventers
7. Clean outs and drains
8. Valve boxes, frames, covers, and grates
9. Service saddles and corporation stops
10. Water meters and boxes. Water meter product data shall include information on the radio read system and confirmation that the meters will be compatible with the Park's existing FlexNet radio read system.

D. Provide the following test reports where applicable.

1. Water Pressure Report: Contractor shall perform or engage a qualified testing service to conduct or complete a flow test of the existing supply system. Provide date and location of test, type and method of test performed, static pressure and residual pressure in psig, observed flow in gpm, and orifice size.
2. Hydrostatic Pressure Testing: Provide copy of standard test procedures; and certified test results to NPS for compliance. Provide records of calibrated testing equipment and gauges. For failing tests, provide proposed corrective actions to NPS for review and approval.
3. Bacteriologic (Bac-T) Testing: Provide copies of the test results indicating water sample meets Wyoming Drinking Water Standards.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Wyoming Public Works Standard Specifications (WPWSS), 2023 Edition.

C. Applicable ASTM, AASHTO, American Water Works Association (AWWA), American National Standards Institute (ANSI), and Underwriters Laboratory (UL) standards.

D. Uniform Plumbing Code, 2024 Edition (International Association of Plumbing and Mechanical Officials, IAPMO/ANSI UPC1-2024).

E. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

F. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

G. A code not specified as a federal code is a Wyoming code.

H. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. The Contractor shall furnish manufacturer's certificates of compliance. A certificate of "Compliance with Specification" or suitable alternative shall be furnished for all materials to be supplied.

C. All Contractor required 'Quality Control' materials testing shall be based upon applicable ASTM and AWWA Test Methods referenced herein for the materials specified, including manufacture recommendations for testing procedures. All equipment, material, and labor necessary for Quality Control testing shall be supplied by and all costs borne by the Contractor.

1. Provide copies of all applicable testing procedures and standards (per ASTM, AWWA, and manufacture recommendations).
2. Provide certifications for calibration of all testing equipment.
3. A report of the test results shall be furnished.
4. All defects which become present from testing shall be rectified, and the piping system shall be retested, until passed.

D. All tests shall be performed in the presence of the Contracting Officer.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. In confined linear areas where protection of existing infrastructure, vegetation, and/or soils is specified only equipment that can be safely operated in the confined construction corridor will be permitted.

B. Work performed under this Section shall meet the requirements of the Uniform Plumbing Code, and applicable Wyoming Building Standards Code(s), current editions. In cases where the Drawings or National Codes conflict with local codes, the local codes shall apply.

C. The following codes and standards will apply to disinfecting water mains and components of the water system.

1. ANSI / AWWA Standard C651
2. AWWA Manual M20, "Water Chlorination/Chloramination Practices and Principles".

D. Deliver materials to site in unopened cartons or bundles as appropriate, clearly identified with manufacturer's name, standards label, grade or identifying number.

E. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect equipment and material from dirt, water, construction debris, and traffic.

1.8 TOLERANCES

A. Horizontal locations, grades and elevations for water systems facilities are to be established from referenced benchmarks, as shown on the Drawings, and as otherwise directed by the Contracting Officer.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials shall conform to sizes, capacities, qualities and quantities as shown on the Drawings and described in the specifications.

B. All water system components and materials must be NSF/ANSI 14 & 61 compliant, be wetted surface Lead Free, approved for potable water service, and acceptable to the Wyoming Department of Environmental Quality.

C. All pipe and fittings of a similar material type shall be from a single manufacturer, who is fully experienced, reputable and qualified to provide continuous quality control through plant inspection and certification of materials.

1. The pipe manufacturer must certify compliance with the specified materials and standards.
2. All pipe shall be clearly marked with type, class and/or thickness as applicable. Lettering shall be legible and permanent under normal conditions of handling and storage.

D. Materials shall be from new stock, delivered in good condition, and no used or damaged stock is allowed.

E. Where no material certification or method of test materials is specified, the latest certification or test specified by ASTM or AWWA shall be enforced.

2.2 PIPE AND FITTINGS

A. Polyethylene Pipe, Tubing and Fittings:

1. Polyethylene pipe, tubing and fittings shall be made from resin meeting the requirements of the Plastic Pipe Institute as PE4710, cell class per ASTM D3350, with 2% minimum carbon black for UV stabilizer.
2. Polyethylene pressure pipe/tubing and fittings (nominal size 1/2-inch through 3-inch) designated for construction of water lines shall comply with AWWA C901.
    a. Polyethylene pipe, tubing and accessories for 1/2-inch through 3-inch diameter (IPS/SDR) shall be pressure class 250psi, SDR 9 rated pipe/tubing, manufactured and tested in accordance with applicable ASTM and AWWA standards.

b. Dimensions and workmanship shall be as specified by ASTM D3035 (pipe), and ASTM D2737 (tubing).

3. Polyethylene fittings, transitions, connections and accessories shall have a pressure rating equal to or greater than the associated pipe, manufactured and tested in accordance with applicable ASTM and AWWA standards.
4. Polyethylene fittings and transitions shall conform to the following:
   a. Butt fusion and associated fittings shall conform to ASTM D3261
   b. Electrofusion and associated fittings shall conform to ASTM F1055
   c. Socket type fittings and accessories shall conform to ASTM D2683
5. Joints for service fittings and valve coupling to polyethylene pipe shall be bronze body meeting ASTM B584 for 3/4-inch pipe (IPS) or compression service fittings and adaptors for 2 inch and smaller pipe (IPS).
   a. All service brass shall comply with AWWA C800 and be approved for potable water services.
6. Butt heat fusion for joining polyethylene pipe shall conform to ASTM F2620.

B. Galvanized Steel Pipe and Fittings:

1. Galvanized steel pipe shall conform to the requirements of ASTM Specification A-120 and approved for use with potable water. The pipe shall be standard weight Schedule 40, hot dipped zinc coated, and shall have ends prepared with male iron pipe threads.
2. Galvanized steel pipe fittings shall be 150 lb., malleable iron, banded fittings with the material conforming to ASTM Specifications A-47 and the dimensions and threads conforming to ASA Specifications B-16.3 and B-2.1. The fittings shall be hot dipped galvanized in accordance with ASTM Specification A-153 and approved for use with potable water. Ends shall be prepared with female iron pipe threads.

C. Polyvinyl Chloride (PVC) Pipe and Fittings:

1. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.
2. PVC pipe for water mains shall meet the requirements of AWWA C900 made to ductile iron O.D.'s for "push-on" joints. Pipe joints shall be with an elastomeric gasket or joint. Pipe class shall be as shown on the Drawings.
3. PVC pipe with a nominal pipe size of 3 inches and smaller shall be solvent weld pressure pipe, Schedule 80 (IPS). Pipe shall be NSF approved, manufactured from virgin rigid PVC and meet the requirements of ASTM D1785.
4. PVC fittings for nominal pipe size of 3 inches and smaller shall be of compatible size and same material as the pipe it serves, minimum Schedule 80 (IPS). Fittings shall be NSF approved and meet the requirements of ASTM D2467. PVC threaded fittings shall be Schedule 80 and conform to ASTM D2464.
5. PVC solvent cements and primer for use with PVC pipe and fittings shall comply with the Uniform Plumbing Code Installation Standard IAPMO IS 8-92, 316.1.5 and a type recommended by pipe manufacturer. Conform to ASTM D2564.
6. Any connections to pipe 4-inches and larger installed below ground shall make changes in direction with Ductile Iron Flanged fittings of the same size and class as to the pipe it serves. All PVC and Ductile Iron fittings shall be joined together using a Mechanical Joint (MJ).

D. Pipe Thread Sealing Paste:

1. Pipe sealant compound shall be a non-hardening, non-seizing, and non-toxic sealing paste containing TFE-Fluorocarbon approved for use with potable water.

E. Casing Spacers:

1. Casing spacers shall be polyethylene, with configuration for centered restrained.
2. Casing spacers shall be compatible with carrier pipe, and sleeve/casing material.
3. Casing spacers may be required for single or multi-pipe clusters per Drawings.
4. Provide compatible end seals from same manufacture as casing spacers.
5. A minimum of two casing spacers per joint or every 5-feet of pipeline is required.

2.3 VALVES

A. Provide valves approved for water systems with ends as appropriate for the adjoining pipe, fitting or accessory.

B. Provide valves for service sizes as shown on the Drawings, conforming to applicable AWWA and ASTM standards.

C. Gate Valves

1. Gate valves shall be iron body, bronze mounted, double disc gate valves with non-rising stems with design, construction and pressure rating conforming to AWWA C515, with modifications specified herein.
2. Stem seals shall be double “O” ring seals designed so the seal above the stem collar can be replaced with the valve under pressure in full-open position.
3. Gate valves for underground installation shall have a two-inch square nut wrench nut for key operation. All valves shall open counterclockwise unless indicated otherwise.

D. Resilient Seated Gate Valves

1. Resilient seated gate valves shall be iron body, with non-rising stems with design, construction and pressure rating confirming to AWWA C515, standard for Reduced Wall, Resilient Seated Gate Valves with modifications specified herein.
2. Waterway shall be smooth and have no depressions or cavities in the seat area where foreign material can lodge and prevent closure or sealing.
3. Stem seals shall be “O” ring seals designed so that the seal above the stem collar can be replaced with the valve under pressure in full-open position.
4. Resilient seated gate valves for underground installation shall have 2-inch square wrench nut for key operation. All valves shall open counterclockwise unless indicated otherwise on the Drawings.
5. The resilient seated gate valves’ interior parts and surfaces shall be coated in accordance with AWWA C550.

E. Valve Boxes

1. Valve boxes shall be cast iron, 5-1/4-inch diameter adjustable valve boxes. Valve boxes shall be screw type and sufficient length for the bury depth specified. The cast iron cover of the valve box shall have an arrow indicating the direction of opening and the word “Water” stamped thereon. Cast iron covers shall be traffic rated for H20 loading.

2. Reinforced concrete collars shall be placed as shown on the Drawings.
3. Valve boxes shall be wrapped in polyethylene encasement.

F. Ball Curb Stop Valves (2-inch and smaller)

1. Conform to ANSI / AWWA C800.
2. Rated for 300-psi maximum working pressure.
3. Operating nut and handle.

G. Air Valves

1. Provide air release (ARV), air/vacuum (AVV), or combination air (CAV) valves for service size as shown on the Drawings, and where there are high points and changes in gradient of the water pipeline system, and high/mid points of long horizontal runs (1500-ft plus).
2. Air valves shall conform to AWWA C512, have a cast-iron body and cover, and stainless steel float. A simple or compound lever system. At least a standard 150-psi maximum operating pressure.
3. Air valve vents shall be installed in accordance with the Drawings and shall include an inflow preventor and bug screen installed on the outlet orifice. Valves shall be installed centered in vault or utility box as shown on Drawings.

H. Check Valve (Backflow Protection)

1. Provide dual check valves for service size as shown on the Drawings, for continuous pressure applications and backflow protection for point of use health hazard cross-connections.
2. Backflow pressure devices shall be in-line testable except for devices meeting American Society of Sanitary Engineers (ASSE) 1024 and installed in accordance with manufacturer's instructions and applicable plumbing codes.
3. Provide insulated enclosure or enclosure with heat tape for backflow prevention devices.
4. Brass/stainless steel materials meeting wetted surface “Lead Free” requirements for potable water systems, with at least a 125psi maximum working pressure.
5. Approved backflow prevention devices must meet the requirements of the Wyoming Department of Environmental Quality (WDEQ) Current Rules and Regulations, Chapter 12: Design and Construction Standards for Public Water Supplies.
6. Backflow prevention devices shall be certified by an approved third-party agency.
7. Backflow prevention devices at water service connections shall be certified by a certified backflow assembly tester at the time of installation.

I. Pressure Reducing Valves

1. Pressure reducing valves (PRV) shall be installed at the meter pit for any service with pressures exceeding 80 psi or as directed by the Contracting Officer.
2. The Contractor shall provide enough PRVs to install one on each new service. At the time of installation and in the presence of the Contracting Officer, the Contractor will complete pressure testing at each new service location to confirm whether a PRV is needed at that location. Any uninstalled PRVs will be given to the Contracting Officer as spares.

3. Direct acting water PRV shall be bronze body construction, with renewable stainless steel seat, and stainless steel integral strainer, with a 300 psi maximum working pressure.
    a. Provide a standard capacity PRV, with a standard adjustable pressure range of 25 to 75 psi.
        1) Static Pressure setting at 60 psi, or as directed by NPS.
    b. Pressure regulator shall have built-in thermal expansion by-pass feature.

2.4 FIRE HYDRANTS

A. Direct Bury Fire Hydrants

1. Conforming to ANSI / AWWA C502.
2. Mueller Super Centurion 250
3. Main valve opening size
4. UL listed fire main hydrant
5. 584 N cast on barrel between groundline flange and bonnet
6. UL / AWWA (4” shoe AWWA only)
7. Ten year limited warranty
8. 250 psi working pressure; 500 psi test pressure
9. 24” from bury line to nozzle centerline
10. Hydrant A423 with Option 901
11. Hydrants shall have one pumper connection and 2 hose connections

2.5 WATER METERS AND BOXES

A. Water meters shall be installed at the locations shown on the Drawings.

B. All meters shall meet the requirements of NSF Standard 61 and comply with ANSI/AWWA C-700 latest revision.

C. All meters shall be able to withstand complete water submersion of the unit and remain fully functional.

D. All meters shall be compatible with advanced metering infrastructure monitoring system for automated meter readings.

E. 1 in. Water Meters

1. Service: Potable Water
2. Measuring Element: Electromagnetic
3. Register: Programmable electronic with LCD display, hermetically sealed. Electronic communications register fully compatible with remote reader.
4. End Connections: Threaded per ANSI B1.20.1
5. Manufacturer: Sensus iPERL with radio read capabilities
6. The Contractor shall submit documentation verifying the meters will be compatible with the Park’s existing FlexNet radio read system. This submittal shall be approved by the Contracting Officer in writing prior to ordering meters or components.

F. Water meters shall be installed in thermal coil meter boxes. Water meter installation shall include dual check valves. Pressure reducing valves shall be installed on all services with

pressures exceeding 80 psi or as directed by the Contracting Officer. Boxes shall have cast iron locking lids with pentagon nuts.

2.6 WATER SERVICE LINE

A. All newly installed water service lines will be butt-fused HDPE certified to meet AWWA C901. Tubing shall be PE4710, Class 250 with a SDR of 9.0. Contractor shall minimize tubing connections and ensure continuous service lines without joints to the extent feasible.

2.7 CORPORATION STOPS

A. Corporation stops shall be brass with inlet and outlet as specified on the Drawings.

2.8 COMPRESSION CONNECTIONS

A. Ends of polyethylene tubing inserted in compression connections should be fitted with insert reinforcement.

2.9 SERVICE CLAMPS

A. Service clamps, where required, shall be flat double strap, bronze or other noncorrosive material, with neoprene gaskets and corporation stop threads. Service clamps for PVC shall provide full support around the circumference of the pipe and have a bearing area of sufficient width along the axis of the pipe so that the pipe will not be distorted when tightened.

2.10 PIPE INSULATION

A. Pipe insulation shall be high density, extruded polystyrene foam insulation board for buried service.

B. The 5-year aged R value per inch shall be 5 when tested at 75 degrees F mean temperature in accordance with ASTM C518.

C. Minimum compressive strength of 25 psi when tested in accordance with ASTM D1621.

D. Maximum water absorption of 0.1% by volume when tested in accordance with ASTM C272.

2.11 MARKING TAPE AND TRACING WIRE

A. Marking tape shall be minimum 3 inches wide, colored in APWA approved blue color, and imprinted with “Caution Buried Waterline Below” in black uniformly located along its entire length. Tape shall be minimum 5-mil tape with aluminum backing for locate using a non-ferrous locator. Where more than one utility is located in a common trench, marking tape shall be 6 inches wide with the imprint “Caution – Buried Utility Lines Below”.

B. Locating wire shall be minimum No. 10 gauge solid, coated, soft drawn copper wire (#10-AWG). Locating wire shall be strapped to any run of water pipeline to facilitate pipe location, stubbed inside valve/utility boxes, and marked with an irremovable aluminum tag with the corresponding utility. Connection of any bare wire ends shall be approved splice kit for underground use to secure electrical joint.

2.12 THRUST BLOCKS

A. Thrust blocks shall be installed as shown on the Drawings.

B. Concrete for thrust blocking shall be a dry mix, less than 1” slump and a minimum of 4000 psi break in 28 days.

C. Blocking shall be placed between solid ground and the fitting to be anchored. The area of bearing on the pipe and on the ground shall be as shown on the Drawings.

D. The blocking shall be placed so that the pipe and fitting joints will be accessible for repair.

E. Conform to Section 03 30 50 - Minor Concrete.

2.13 PIPE BEDDING AND BACKFILL

A. Furnish a pipe bedding material conforming to Section 704.01 of the FP-24 Standard Specifications. Pipe zone backfill (up to 12-inches over pipe) shall be consistent with pipe bedding material.

B. Pipe bedding shall meet Class I or Class II ASTM D2321.

C. Pipe trench backfill material may be native materials conforming to Section 704.01 of the FP-24 Standard Specifications, for plastic pipe.

D. Pipe backfill shall not contain debris, frozen material, unstable material or large clods. No rocks or stones greater than three (3) inches in diameter shall be within two (2) feet of the pipe. Pipe backfill shall be compacted as shown on the Drawings and to a density equal to or greater than the surrounding soil.

PART 3 EXECUTION

3.1 GENERAL

A. Conform to Section 611, Water Systems of the FP-24 Standard Specifications and WPWSS 2023. In case of conflict, the more stringent specification shall apply.

B. Applicable construction operations for excavation, bedding and backfill shall conform to Section 31 23 00 - Excavation and Fill.

C. Conform to state and federal guidance criteria for the separation of water and non-potable pipelines/facilities. Refer to Drawings and provide additional materials for proper construction as required.

D. Marking tap, tracing wire, and above ground utility posts/markers shall be installed as shown on the Drawings and details.

E. Care shall be taken in loading, transporting and unloading to prevent damage to materials. Store and protect materials according to manufacture recommendations.

F. All pipe, fittings, valves, enclosures, accessories and materials shall be examined before installation, and no piece shall be installed which is found to be defective. If any defective materials is discovered after it has been installed, it shall be removed and replaced in a satisfactory manner as directed by NPS.

G. Provide temporary blockage, plugs, caps and diversions in existing facilities, and dewatering of excavations as necessary to complete the work.

H. Install all pipe, valves and facilities at minimum depths specified on the Drawings.

I. Excavation width shall be as shown on the Drawings but should be no wider than what is required to safely place material.

J. Excavations shall meet all applicable safety provisions as described in Section 31 50 00 - Excavation Support and Protection.

K. Open excavations shall not be permitted during non-working hours. Cover pipe and facility openings and backfill all excavations, and/or cover with temporary trench plate protection at the end of each working day, for protection and public safety.

L. Additional information for installation, inspections, tests and safety considerations for construction of polyethylene piping systems can be found in the "Handbook of Polyethylene (PE) Pipe" published by The Plastics Pipe Institute, Inc. https://www.plasticpipe.org/PPI-Home/Shared_Content/Shop/PE-Handbook.aspx

3.2 PIPES AND FITTINGS (POLYETHYLENE AND PVC)

A. Polyethylene pipe and fittings shall be installed per the manufacturer's recommendations and standard practices, conforming to ASTM D2774.

B. PVC pipe and fittings shall be installed per the manufacturer's recommendations and standard practices, conforming to ASTM F1668 and D2774.

C. All pipe and fittings shall be cleaned and flushed before installation and protected from contaminates during installation.

D. Pipe shall be laid to the lines and grades shown on the Drawings.

E. Polyethylene and PVC pipe must be allowed to adjust to temperature of trench surrounding soil at the time of installation and prior to connections to fittings, valves, mechanical couplings and other accessories to protect against excessive thermal deflections and pull-out forces. Covering extended horizontal runs of pipe with embedment will facilitate cooling.

F. Cold field bending of polyethylene and PVC pipe shall conform to manufacturer requirements and must not exceed (long-term) minimum bend radius. Temporary blocks or restraints must be removed before final backfill.

G. Join solvent weld PVC pipe and fittings in two-step process with specified primer and solvent cement, following manufacturer recommendations and standard practices, conforming to ASTM D2855.

H. Join polyethylene pipe, prefabricated fittings, and butt end transitions/adaptors to mechanical joints by the method of butt fusion. Conform to manufacture recommendations and ASTM F2620 and D3261 for heat fusion joining procedures.

1. The supplier of the pipe and fittings shall provide a person certified by the pipe manufacturer and the fusion equipment manufacturer to train contractor fusion equipment operators and inspectors representing NPS.
2. The fusion equipment operator shall receive training using the recommended procedure. The Contractor shall be responsible to verify that the fusion equipment is in good operating condition and that the operator has been trained within the past twelve months. The fusion equipment shall be equipped with a Datalogger. Records of the welds (heater temperature, fusion pressure, and a graph of the fusion cycle) shall be maintained for five (5) years. Fusion beads shall not be removed.

I. Install polyethylene fabricated fittings to more than one pipe in sequence according to manufacture requirements. Additional trench widths/excavations may be required for proper heat fusion joining methods.

J. Mechanical and flange connections of pipe to valves, services, and other auxiliary equipment shall conform to manufacturer recommendations. Mechanical joints to polyethylene pipe must be resistant to pullout loads that develop in PE piping systems. Internal stiffeners may be required for small diameter pipe/tubing insert type fittings and compression couplings.

K. Anchor polyethylene pipe at connections or transitions to differing pipe materials, valves, and other auxiliary equipment to resistant pullout loads that develop in PE piping systems.

L. No pipe shall be installed in the trench until the trench and bedding have been inspected and approved. Valves and other control devices shall be installed in the line where shown on the Drawings.

M. Pipe passing through sleeves shall include casing spacers compatible with the carrier pipe and sleeve/casing, including multi-pipe configurations. End seals shall be installed on sleeves/casings.

N. Tracing wire shall be attached to pipe and other components, and marking tape shall be placed in all trenches as shown on the Drawings. Wire and tape shall be continuous in the trench. Wire shall be spliced and tape overlapped minimum of 12 inches if needs to be cut or joined.

O. Support pads, anchors and thrust blocks using minor concrete and reinforcing bars shall be installed as required at material changes, fittings, valves, services, and other auxiliary equipment to resistant loads typical of pressure pipe water systems. Concrete shall be hand placed to not interfere with bolts, connections, and normal operation of equipment.

3.3 VALVES

A. Valves shall be installed at locations specified and as shown on the Drawings. Adjustments for actual field conditions and pipeline profiles shall be as required and directed by the Contracting Officer. Final location of all valves shall be accepted by NPS prior to installation.

B. Provide all fittings, transitions and adaptors as required per manufactures requirements, and applicable ASTM and AWWA standards.

C. Valves shall be installed, and located in utility/valve boxes where specified, in such positions that they are readily accessible for normal operations without binding. All valves shall be installed with stems pointing up, including proper position for specified handles and accessibility of accessory key handles.

3.4 FIRE HYDRANTS

A. All hydrants shall stand plumb with the pumper nozzle facing the street. Hydrant shall be set with the ground line at the location indicated by the hydrant manufacturer. Hydrants shall be installed such that they have drainage away from them at the surface. Proper boot length shall be used to avoid hydrants installed in holes or depressions.

B. Drainage shall be provided at the base of the hydrant by placing clean gravel under and around the base of the hydrant. Sufficient gravel shall be placed as shown on the Drawings. Hydrants shall be braced against unexcavated earth at the end of the trench with concrete backing as shown on the Drawings.

3.5 THRUST BLOCKS, ANCHORING AND PIPE RESTRAINTS

A. Provide thrust blocks, anchorages, and mechanical pipe restraints at all fittings and auxiliary facilities, and changes in angle, alignments or elevation as specified, shown on the Drawings, and required by manufacturer’s recommendations.

3.6 BOXES AND ENCLOSURES

A. All valves and specified auxiliary equipment shall be installed in boxes or enclosures as shown on the Drawings. Sizes and dimensions shall be as specified or required to allow for accessibility and normal operations of the facility.

B. Provide risers and extensions for utility boxes as required for full depth access to facility and setting of box and cover to proposed grades.

C. Utility boxes and enclosures shall be properly set and centered on facility and buffered to avoid transmitting any shock or physical stress impacts to the pipeline, valve or other enclosed equipment.

D. The subgrade area on which the box sets shall be well compacted (no less than 95%) to fully support the box and protect the valve and assembly from traffic loading.

E. Backfill and compact the area around the utility box or enclosure using backfill material consistent with the trench backfill or structural fill and aggregate base where specified in pavements.

F. Misaligned boxes and enclosures shall be excavated, plumbed, reset and backfilled as directed by NPS at no additional cost.

G. Construct concrete collar to dimensions as shown on the Drawings, under Section 03 30 50 - Minor Concrete.

3.7 CORROSION PROTECTION

A. Isolate, dielectrically, all piping from all other metals including reinforcing bars in concrete slabs, other pipe lines, and miscellaneous metal.

B. Provide dielectric unions as needed for transitions between different metals in a given pipe.

3.8 FLUSHING / CLEANING

A. At the conclusion of the installation/construction work, thoroughly clean and flush all of the new pipe lines to remove all dirt, sand, particles, debris, or other material which may have entered during the construction period by flushing.

B. Flushing velocities shall be a minimum of 2.5 feet per second. All flushing shall be coordinated with the Contracting Officer. Debris and flushing waters shall be properly disposed conforming to specifications, permits and SWPPP.

3.9 HYDROSTATIC TESTING

A. GENERAL

1. Pressure testing of pipe and appurtenances shall be conducted in accordance with the appropriate AWWA Standard depending on the pipe material. PVC pipe and fittings shall be tested according to AWWA C605. Polyethylene pipe shall be tested according to AWWA M55 and ASTM F 2164, Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure. All pipe, fittings and joints shall be examined during the testing.
2. For safety reasons, hydrostatic testing only will be allowed.
3. Piping systems shall only be tested after the lines have been flushed and cleaned as specified within this specification and where applicable.
4. All concrete thrust blocks and anchors must be in place a minimum of 5 days prior to testing. All piping and system components must be restrained prior to testing. If backfill provides restraint, it must be properly placed and compacted. Follow all safety procedures to ensure protection of personnel during testing.
5. Testing may be conducted on the full system or in sections. Test section length is determined by the capacity of the testing equipment, and locations of systems valves and components. Lower capacity pressurizing or filling equipment may not be capable of completing the test within permissible time limits. If so, use higher capacity test equipment or select a shorter test section.
6. In all tests, all apparatus, which may be damaged by the test pressure, shall be isolated from the system.
7. Any defective material shall be replaced with sound material and test repeated until satisfactorily completed and approved.
8. All visible leaks at exposed joints and all leaks evident on the surface where joints are covered, shall be replaced, regardless of total leakage shown.
9. The test liquid should meet appropriate industry standards for safety and quality so that the environment, system, test equipment and disposal are not adversely affected. The recommended test liquid is water. The test liquid shall not to exceed 80 degrees (F).
10. Disposal of test liquid shall meet all permit and SWPPP requirements.

11. Provide copy of standard test procedures and certified test results to the Contracting Officer for compliance. For failing tests, provide proposed corrective actions to the Contracting Officer for review and approval.

B. PVC TESTING

1. The hydrostatic test pressure shall not be less than 1.25 times the maximum sustained working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the sustained working pressure at the lowest elevation of the test section. However, in no case shall the test pressure exceed the rated pressure for any joint, thrust restraint, valve, fitting or other connected appurtenance of the test section.
2. Properly assembled PVC pipe joints do not leak. The testing allowance shall be defined as the allowed quantity of makeup water supplied to the pipe section during the test to maintain a pressure within 5 psi of the required hydrostatic test pressure as defined in the contract documents. No test section shall be accepted if the quantity of makeup water is greater than that determined by the formula:

$$Q = \frac{LD\sqrt{P}}{148{,}000} \qquad \text{(Eq 1)}$$

Where:

Q = quantity of makeup water, in gal/h
L = length of pipe section being tested, in ft
D = nominal diameter of the pipe, in in.
P = average test pressure during the hydrostatic test, in lb/in.^{2} (gauge)

*Source: AWWA C605. Formula based on a testing allowance of 10.5 gpd/mi/in of nominal diameter at a pressure of 150 psi.

C. POLYETHYLENE TESTING

1. For leak testing purposes, the maximum allowable test pressure in polyethylene pipe is 150% of the pipe's design pressure rating (at the lowest elevating in the test section) for the application and the application service temperature. Do not subject lower pressure rated, non-polyethylene parts or devices to pressures above their pressure rating. Lower pressure rated parts may be removed or isolated from the test section to avoid damage or failure. Vent isolated parts or equipment to atmosphere.
2. All thermoplastic pipes have reduced strength at elevated temperature. Adjust testing pressures based on environmental and testing conditions. Before applying test pressure, allow time for the test fluid and the test section to equalize to a common temperature.
3. When testing at pressures above system design pressure up to 150% of the system design pressure, the maximum test duration is eight (8) hours including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize the test section. CAUTION – Testing at excessive pressure or for excessive time may damage the system.

3.10 DISINFECTION

A. After all other work has been completed and prior to placing the water system in service, including all mains, service lines and appurtenances installed under this contract completely disinfect the system in accordance with procedures as contained in the latest revision to ANSI / AWWA Standard C651 for disinfecting water mains, including manufacturer recommendations.

B. ANSI/AWWA C651 uses liquid chlorine, sodium hypochlorite, or calcium hypochlorite to chemically disinfect the main. Disinfecting solutions containing chlorine should not exceed 12% active chlorine, because greater concentration can chemically attack and degrade polyethylene. Operational disinfection practices should limit available chlorine levels to <=5ppm for temperatures up to 75°F.

C. The two acceptable methods of chlorination are tablet (calcium hypochlorite tablets) and continuous-feed (direct chlorine solution injection).

D. Water used in disinfection shall be supplied through a temporary connection that shall include an appropriate cross-connection control device, consistent with the degree of hazard, for backflow protection of the active distribution system.

E. During the retention period, all valves and other appurtenances shall be operated to ensure internal exposure with the chlorinated water. Chlorinated water shall be retained in the pipeline for a minimum of 24 hours.

F. Following the chlorination retention period, the system shall be thoroughly flushed until the chlorine residual of the section being flushed is equal to or less than the distribution system required operational levels.

G. Disposal of flushed chlorinated water is the responsibility of the Contractor and shall be carried out in strict observance of the water pollution control requirements, permits and specifications.

1. Conform to federal, state, and local regulations for the disposal of heavily chlorinated water.
2. Where applicable the Contractor shall apply a reducing agent to the chlorinated solution to neutralize residual chlorine or chloramines remaining in the flush waters to protect ecological conditions. Under no circumstances shall discharge to surface waters occur.

H. Bacteriological (Bac-T) Testing

1. Following flushing the water system must sit undisturbed for a period of 24-hours.
2. The Contractor shall have tests conducted for chlorine residual. The chlorine concentration level in the new water facility must meet the distribution system required operational levels, or if unknown meet the following requirements:
    a. Greater than or equal to 0.2 ppm free chlorine and less than or equal to 3 ppm free chlorine.
3. When the chlorine residual levels are compliant, the Contractor may proceed with the Bac-T testing.
4. The Contractor shall have a State certified laboratory perform the Bac-T tests.
    a. Samples shall be taken 24 hours or more after final flushing of the system.

b. At least one set of samples shall be collected from every 1200 ft (366 m) of the new water main, plus one set from each dead-end main section, and at least one set from each branch.
c. A suggested combination blow off and sampling tap is recommended.
d. Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate and tested for bacteriological quality as required by Standard Methods for the Examination of Water and Wastewater.

5. Report Bac-T test results to NPS. If test results indicate "Absent" for both E. coli and Coliform bacteria, then the water line has passed the testing process and can be placed in service and connected to the existing distribution system.

3.11 PROTECTION

A. The Contractor shall protect newly installed facilities for the duration of the work.

B. Repair and replace any damaged parts with new materials.

C. The water system shall be placed into service or winterized as directed by the Contracting Officer following completion, testing and acceptance of the work.

3.12 DEMONSTRATION AND TRAINING

A. The Contractor shall provide demonstration and training, as requested by the Contracting Officer, on the operation and maintenance of valve, vault, hydrant, backflow devices, meter or manhole components. All training shall be completed by a factory-authorized service representative.

END OF SECTION 33 14 00

SECTION 33 30 00 - SANITARY SEWERAGE

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing and installing gravity and force sewer system piping, sanitary sewer manholes, and all associated connections and appurtenances as shown on the Drawings, and as otherwise directed by NPS.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. All sewage system materials and construction work shall conform to local, state and federal health standards for sewage disposal systems.

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 03 30 50 - Minor Concrete
2. Section 31 23 00 - Excavation and Fill
3. Section 31 50 00 - Excavation Support and Protection
4. Section 32 16 00 - Concrete Curbs, Sidewalks, Aprons, and Pads

1.3 DEFINITIONS

A. Not used.

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. Submit supporting documentation, certificates of compliance, shop drawings, and supplier or manufacturer information at least fourteen days (14) prior to ordering materials or placement in the work for each proposed material and product, for review and acceptance of NPS for conformance to the material specifications.

1. For precast structures, submit design drawings, details, and supporting calculations for review and approval prior to casting. Design drawings, shop drawings and calculations

must be sealed and signed by an engineer who is registered as a civil engineer in the State of Wyoming.

2. Contractor must account for lead times on manufacture and delivery and allow for review of submittals by NPS. Design drawings, shop drawings and calculations shall include the following:
   a. Design parameters, loadings, earth cover, buoyancy, and design standards (i.e. ASTM, AASHTO, ACI) used for anticipated field conditions
   b. Dimensions, location of openings, and invert elevations
   c. Reinforcement, splice type and location, joint details, and gaskets
   d. Frames, covers, risers, fittings, seals, hardware and other accessories

C. Submittals include but are not limited to construction methods, manufacturer's descriptive literature, performance and test data, and manufacturer's data for sizes, pressure rating, rated capacity, listing/approval stamps, labels and other marking on equipment made to the specified standards for materials and settings of selected models for the following:

1. Pipe and fittings
2. Cleanouts, caps, covers, and utility boxes
3. Gaskets, couplings, sleeves, and assembly hardware
4. Dye for sanitary sewer tracing
5. Force sanitary main components
6. Grinder pump

D. Provide the following test reports where applicable.

1. Leakage Testing (*structures/vaults*): Provide copy of standard test procedures; and certified test results to NPS for compliance. For failing tests, provide proposed corrective actions to NPS for review/approval.
2. Low-air Pressure Testing (*sewer pipelines, exceeding 50-ft*): Provide copy of standard test procedures; and certified test results to NPS for compliance. For failing tests, provide proposed corrective actions to NPS for review/approval.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24), dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Wyoming Public Works Standard Specifications (WPWSS), 2023 Edition.

C. Applicable ASTM, AASHTO, American Concrete Institute (ACI), American National Standards Institute (ANSI), and Underwriters Laboratory (UL) standards.

D. Uniform Plumbing Code, 2024 Edition (International Association of Plumbing and Mechanical Officials, IAPMO/ANSI UPC1-2024).

E. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

F. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

G. A code not specified as a federal code is a Wyoming code.

H. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to Permits, Technical Conditions, Drawings, and Standard Specifications.

B. The Contractor shall furnish manufacturer's certificates of compliance. A certificate of "Compliance with Specification" or suitable alternative shall be furnished for all materials to be supplied.

C. All 'Quality Control' materials testing shall be based upon applicable ASTM and/or Plumbing Code test methods referenced herein for the materials specified, including manufacture recommendations for testing procedures. All equipment, material, and labor necessary for Quality Control testing shall be supplied by and all costs borne by the Contractor.

1. Provide copies of all applicable testing procedures and standards (per ASTM, Plumbing Code, and manufacture recommendations).
2. Provide certifications for calibration of all testing equipment.
3. A report of the test results shall be furnished.
4. All defects, which become present from testing shall be rectified, and the system shall be retested, until passed.
5. All tests shall be performed in the presence of the Contracting Officer.

D. For precast concrete structures, units may be rejected at the site upon visual inspection and where exhibiting any of the following:

1. Cracks passing through walls more than 1/16 inch wide
2. Nonrepairable honeycombed or spalled areas of more than 6 square inches
3. Noncompliance with reinforcement tolerances or cross sectional area shown
4. Wall, floor or lid less than minimum thickness
5. Internal dimensions less than plan dimensions by 1 percent or 1/2 inch, whichever is greater
6. Defects affecting performance or structural integrity

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. In confined linear areas where protection of existing infrastructure, vegetation, and/or soils is specified only equipment that can be safely operated in the confined construction corridor will be permitted.

B. Work performed under this Section shall meet the requirements of the Uniform Plumbing Code, 2024 Edition.

C. Deliver materials to site in unopened cartons or bundles as appropriate, clearly identified with manufacturer's name, standards label, grade or identifying number.

D. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect equipment and material from dirt, water, construction debris, and traffic.

1.8 TOLERANCES

A. Horizontal locations, grades and elevations for sanitary sewer system facilities are to be established from referenced benchmarks, as shown on the Drawings, and as otherwise directed by NPS.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials shall conform to sizes, capacities, qualities and quantities as shown on the Drawings or described in the specifications.

B. All pipe and fittings of a similar material type shall be from a single manufacturer, who is fully experienced, reputable and qualified to provide continuous quality control through plant inspection and certification of materials.

1. The pipe manufacturer must certify compliance with the specified materials and standards.

C. Materials shall be from new stock, delivered in good condition, and no used or damaged stock is allowed.

D. Where no material certification or method of test materials is specified, the latest certification or test specified by ASTM or applicable Code shall be enforced.

2.2 PIPE AND FITTINGS

A. All new force sewer lines should be SDR 26 PVC of the size shown on the Drawings.

B. Gravity sewer pipe/conduit shall be of the size shown on the Drawings. The pipe shall be PVC, have a minimum pipe wall thickness equivalent to SDR 26, and conform to the requirements of ASTM D3034. Joints with bell and spigot ends, and reinforced gasket joints. The rubber gasket shall be of composition rubber suitable for sewer service.

C. All fittings and accessories shall be from the same manufacturer of the pipe and have bell and/or spigot configurations compatible with that of the pipe.

D. Connections shall consist of PVC fittings, gaskets, couplings, adapters and other accessories for a watertight connection. Connections to structures shall consist of couplings precast into structure wall, or mechanical fittings for a watertight connection.

2.3 BEDDING, FOUNDATION AND BACKFILL

A. Sanitary sewer (solid) pipe 'bedding material' shall be as shown on the Drawings, and conforming to Section 704.01 of FP-24 Standard Specifications and Section 31 23 00 - Excavation and Fill.

B. Sanitary sewer structure foundation material shall be a coarse aggregate granular backfill as shown on the Drawings, and conforming to AASHTO M43, and Section 703, Aggregate of the FP-24 Standard Specifications.

C. Sanitary sewer structure and plastic pipe 'backfill material(s)' shall be as shown on the Drawings, and conforming to Section 704.01 of FP-24 Standard Specifications and Section 31 23 00 - Excavation and Fill.

2.4 CLEANOUTS

A. Cleanouts shall be installed at the locations shown on the Drawings or marked in the field by the Contracting Officer. Cleanouts shall be of the same size and material as the sewer line it serves.

2.5 UTILITY BOXES

A. Contractor shall verify utility box sizes required for sewer system facilities as shown on the Drawings, and actual sizes and dimensions of materials placed in the work.

B. Provide precast concrete boxes with steel or cast iron covers marked "SEWER" and traffic rated for H20 loading. Provide risers and extensions as required.

C. Concrete collars around utility boxes shall conform to Section 03 30 50 - Minor Concrete.

2.6 MARKING TAPE AND TRACING WIRE

A. Marking tape shall be minimum 3 inches wide, colored in APWA approved green color, and imprinted with "Caution Buried Sewer Line Below" in black uniformly located along its entire length. Tape shall be minimum 5-mil tape with aluminum backing for locate using a non-ferrous locator. Where more than one utility is located in a common trench, marking tape shall be 6 inches wide with the imprint "Caution – Buried Utility Lines Below".

B. Locating wire shall be minimum No. 14 gauge solid, coated, soft drawn copper wire (#14-AWG). Locating wire shall be strapped to any run of sewer pipeline (over 5-ft in length) to facilitate pipe location, stubbed inside valve/utility boxes, and marked with an irremovable aluminum tag with the corresponding utility. Connection of any bare wire ends shall be approved splice kit for underground use to secure electrical joint.

2.7 GRINDER PUMP

A. The grinder pump shall be installed as shown on the Drawings. The pump shall be provided with isolation and check valves. The sump shall be over 50 gallons.

B. The pump shall be a Zoeller 922 Simplex 48″ x 120″ Grinder Package with M803 pump or approved equal in terms of size, performance and functionality.

C. The operating point for the pump is 27.8 gpm @ 13.7 ft of total dynamic head.

D. The control panel for the pump shall include hand / off / auto switches, an elapsed time meter, and a pump cycle counter.

E. As shown on the Drawings, the wet well shall include a bolted solid fiberglass cover.

2.8 SEWER SYSTEM PRECAST MANHOLES

A. Manholes for sewer systems shall be precast concrete, conforming to the applicable requirements of ASTM C478 (manhole sections).

B. Structural design loads for precast concrete structures shall meet anticipated field conditions (as shown on Drawings), and conform to minimum design loading under ASTM C890 and ACI 318 and 350 codes, whichever is more stringent.

C. All underground sewer structures, and inlet/outlets and access openings shall be constructed to withstand corrosion and/or decay and shall be watertight. All joint seals, gaskets, connectors and fittings shall be watertight conforming to applicable ASTM and AASHTO standards for anticipated hydrostatic pressures and field conditions.

D. Manholes shall be of the general size and dimensions as shown on the Drawings, including:

1. Manholes shall be designed to withstand AASHTO HS20 (MS10) loading.
2. Manholes shall be constructed of precast concrete rings with frames and covers and steps in accordance with AASHTO M199 and as shown in the Drawings.
3. Adjusting rings may be used for adjusting the manhole top elevation to coincide with existing ground elevations, except the total height of adjusting rings used per manhole shall not exceed 12 inches. Adjusting rings shall be reinforced with the same percentage of steel as the riser and top.
4. Precast concrete rings shall conform to ASTM C478.
5. When required, noncorrosive steps of rubber encased steel, aluminum, or nylon shall be used. Steps shall withstand vertical loads of 400 pounds and pull out resistance of 1,000 pounds.

PART 3 EXECUTION

3.1 GENERAL

A. Conform to Section 612, Sanitary Sewer Systems or the FP-24 Standard Specifications and WPWSS 2023. In case of conflict, the most stringent specification shall apply.

B. Applicable construction operations for excavation, bedding and backfill shall conform to Section 31 23 00 - Excavation and Fill.

C. Conform to state and federal guidance criteria for the separation of potable water and sanitary sewer pipelines/facilities. Refer to Drawings and provide additional materials for proper construction as required.

D. Care shall be taken in loading, transporting and unloading to prevent damage to materials. Store and protect materials according to manufacture recommendations.

E. All structures, pipe, fittings, accessories and materials shall be examined before installation, and no piece or facility shall be installed which is found to be defective. If any defective materials is discovered after it has been installed, it shall be removed and replaced in a satisfactory manner as directed by NPS.

F. Provide temporary blockage, plugs, caps and diversions in existing facilities, and dewatering of excavations as necessary to complete the work.

G. Install all pipe, structures and facilities at minimum or maximum depths as specified on the Drawings.

H. Excavation width shall be as shown on the Drawings but should be no wider than what is required to safely install proposed improvements.

I. Excavations shall meet all applicable safety provisions as described in Section 31 50 00 - Excavation Support and Protection.

J. Open excavations shall not be permitted during non-working hours. Cover pipe and facility openings and backfill all excavations, and/or cover with temporary trench plate protection at the end of each working day, for protection and public safety.

K. Clean the interior of pipe and structures as work progresses. All finished sanitary sewer system piping, structures and facilities shall be flushed, clean and free of any debris and sediment before final acceptance.

3.2 SANITARY SEWER TRACING

A. Prior to commencing with construction, the Contractor shall dye test the existing 4-plex in the Northeast Entrance project area to determine the location and connectivity of the existing sanitary service(s). Available survey records show multiple cleanouts on the exterior of the building. The Contractor shall provide the Contracting Officer with the test results immediately. If it is determined that the existing sanitary service(s) for the 4-plex will be impacted by the proposed sanitary main, and the Contracting Officer approves the work, the existing sanitary service(s) shall be connected to the proposed sanitary main. Continuous operation of the 4-plex’s existing sanitary service(s) shall be maintained throughout construction activities.

B. Dye for sanitary sewer tracing shall be non-toxic, biodegradable and environmentally safe fluorescent dye certified for use in sanitary sewer systems. Dilution limits shall follow the dye manufacturer's recommendations.

C. All materials and labor associated with the sanitary sewer tracing test and connection of existing services to the proposed sanitary main, if completed, are considered incidental to the work and no additional payment shall be made.

3.3 SEWER SYSTEM PIPING

A. Install all pipe, fittings and cleanouts to the lines and grades as shown on the Drawings, in accordance with the pipe manufacturer’s specifications, ASTM D2321, and as otherwise directed by NPS.

B. In-situ trench foundation shall be undisturbed earth no less than 90% relative compaction; any materials placed to stabilize trench bottom foundation shall be no less than 95% relative compaction.

C. No pipe shall be laid until the trench, foundation, sub-grade preparation and bedding have been inspected and approved by the Contracting Officer.

D. All piping, fittings, and accessories shall be assembled per the manufacturer's recommendations. Lay pipe from the lower end with spigot ends pointing in the direction of flow.

E. Do not damage pipe sections, fittings, joints or gaskets during assembly. Use pipe lubricant, installation stub, etc. and follow manufacture recommendations to ensure all pipe sections are pushed "home." A come-along or other suitable method should be used; construction equipment such as an excavator bucket, etc. must not have direct contact with the plastic pipe end sections unless an installation stub and large timber or other suitable cushioning medium is utilized.

F. Only upon authorization of NPS may changes in direction, without the use of elbows or other fittings, be accomplished through joint deflection or longitudinal bending, but not both on the same length of pipe. Allowable joint deflection or longitudinal bending is dependent on pipe size and/or joint design, and shall not exceed the pipe manufacturer's published limits. Deflection testing will be required. The Contractor shall complete this work in accordance with ASTM D3034 and Section 2700 of the WYPWSS.

G. Install sewer cleanouts at locations as shown on the Drawings, and within 5-feet of a building footprint or facility connection pad on sewer export/discharge lines. Cleanouts require a utility box enclosure as specified, except where installed within footprint of the concrete apron of a utility host site connection pad.

H. Install tracing wire and marking tape as shown on the Drawings, per manufacture recommendations.

I. Do not drive or operate equipment directly over sewer system piping during backfilling, or until minimum cover is achieved per the manufacture installation requirements.

J. Contractor is responsible to protect sewer system piping from damage during the course of the project work.

K. Restore and stabilize barren soils and disturbed areas according to Section 32 90 00 - Restoration.

3.4 SEWER SYSTEM PRECAST STRUCTURES

A. Install all structures at the locations and to the lines and grades as shown on the Drawings, in accordance with the manufacturer's specifications, and as otherwise directed by the Contracting Officer.

B. Field repair precast concrete structures to correct damage from handling or manufacturing imperfections before installation, where authorized by the Contracting Officer.

C. Applicable construction operations for excavation, foundation, bedding and backfill shall conform to Section 31 23 00 - Excavation and Fill.

D. Precast concrete structures shall be constructed and/or assembled and placed in excavations on properly compacted foundations as shown on the Drawings and details. Structures shall be set to grade and oriented for connections, and to provide the required dimensions and clearances from other facilities.

E. In-situ excavation foundation shall be undisturbed earth no less than 90% relative compaction; any materials placed to stabilize excavation bottom foundation shall be no less than 95% relative compaction.

F. No structure shall be installed until the excavation, foundation, sub-grade preparation and any bedding have been inspected and approved by the Contracting Officer.

G. Pipe connections and access openings for precast structures shall be watertight and constructed to the tank manufacturer's recommendations. Center pipes in openings and seal with resilient connectors or mechanical seals. Fittings, couplings, adapters, gaskets, seals, band clamps, grout, concrete collars and other miscellaneous materials as required for completion of the work is included in payment for the structure bid item of work involved.

H. Match fit any keyed joints to ensure uniform alignment of walls and lids. Clean keyed joint surfaces and seal for a watertight structure per manufacturer requirements. Joint surfaces must be free of imperfections that may affect the joint integrity.

I. Construct manhole access openings to grade using risers, extensions or grade rings, and install frame and cover as shown on the Drawings, and conforming to manufacturer requirements. All extensions and access openings shall be watertight and sealed.

J. Prior to backfilling of precast structures, all lifting holes, cracks, and other remnant voids shall be filled with non-shrink grout and polyurethane sealant to provide for a watertight structure.

K. Do not drive or operate equipment directly over sewer system structures during backfilling, or until minimum cover is achieved per the manufacture installation requirements.

L. Contractor is responsible to protect sewer system structures from damage during the course of the project work.

M. Restore and stabilize barren soils and disturbed areas according to Section 32 90 00 - Restoration.

3.5 TESTING

A. Sewer system structures and tanks shall be inspected and tested for leakage prior to final backfill, and being finished and accepted. Hydraulic or vacuum testing is permitted. Leakage testing shall conform to manufacturer recommendations and Section 02700 of the WPWSS.

B. The Contractor shall perform a light test between manholes to check alignment and grade for displacement of pipe in accordance with Section 02700 of the WPWSS.

C. New sewer line will not be accepted until deflection and leakage tests have assured the Contracting Officer that pipe laying and joint are satisfactory. Deflection testing shall be performed in accordance with Section 02700 of the WPWSS and shall consist of pulling a mandrel through the pipe. Maximum deflection shall not exceed 5 percent of the pipe's internal diameter for final inspection.

D. Water Test

1. Where groundwater is a minimum of 2 feet above the sewer line, tests shall be made by sealing off the section of lines between manholes and measuring the infiltration by collecting or pumping the discharge into barrels or other approved methods. Tests shall be continued over a period of at least 4 hours for each section tested. Sufficient time shall be allowed to soak lines and manholes in advance of performing tests.
2. When groundwater is not above the pipe, testing shall be as follows:
    a. On flat slopes where the depth over the centerline of the pipe in the lower manhole of the section being tested will be not more than 10 feet, the upper manhole shall be filled to a depth of 2 feet over the top of the pipe and the lower manhole blocked. When the above conditions cannot be met, the Contracting Officer may order the Contractor to test the line in sections between manholes. The leakage shall be measured by checking the drop in water level in the manhole over a period of 4 hours.
    b. The maximum allowable infiltration or exfiltration, including manholes, shall not exceed 200 gallons per day per mile of sewer, per inch of pipe diameter. This does not preclude the fact that obvious and concentrated leaks, such as open joints, pinched gaskets, cracked barrels or bells, etc will not be allowed. The Contractor shall make repairs on concentrated leaks, and as necessary to reduce infiltration or exfiltration below the specified rate, and at their own expense.
    c. Manhole joints shall be checked by leakage by means of water testing as specified above.

E. Air Test (Alternate)

1. As an alternate to water testing, Contractor may utilize low pressure air as a means of testing the sewer mains. Sewer system pipelines (solid/tight lines) in excess of 50-feet shall be tested for leakage using low-pressure air testing (dry conditions), conforming to ASTM F1417, manufacturer recommendations, industry standards and Section 02700 of the WPWSS.

F. All testing shall be completed in the presence of the Contracting Officer. Provide all test results to NPS.

G. Existing manholes to which new connections are made shall be subject to the same testing requirements as new manholes.

H. Disposal of testing waters is the responsibility of the Contractor and shall be carried out in strict observance of the water pollution control requirements, permits and specifications.

3.6 DEMONSTRATION AND TRAINING

A. The Contractor shall provide demonstration and training on the operation and maintenance of the grinder pump to the NPS. The training shall be completed by a factory-authorized service representative.

B. The Contractor shall provide demonstration and training, as requested by the Contracting Officer, on the operation and maintenance of valve or manhole components. All training shall be completed by a factory-authorized service representative.

END OF SECTION 33 30 00

SECTION 33 40 00 - STORMWATER UTILITIES

PART 1 GENERAL

1.1 WORK SUMMARY

A. This section covers the requirements to perform work including but not limited to furnishing, fabrication, fitting, excavation, installation, and backfill efforts required to construct concrete culverts as shown on the Drawings, conforming to the Specifications, and as otherwise directed by the Contracting Officer.

B. Provide all labor, materials, tools, equipment, services, and incidentals as necessary to perform the work as described in this section and in accordance with the Contract Documents and Drawings and to the satisfaction of NPS.

C. Provide dewatering as necessary for completion of work and conformance to project Permits and SWPPP. Where possible perform applicable work and installations during the dry portion or low flow periods of the construction season (typically in the summer and fall).

1.2 RELATED WORK

A. Attention is directed to the General Requirements and related work specified in other sections includes, but is not limited to:

1. Section 03 30 50 - Minor Concrete
2. Section 31 23 00 - Excavation and Fill
3. Section 31 37 00 - Riprap
4. Section 31 50 00 - Excavation Support and Protection
5. Section 32 11 00 - Base Courses

1.3 DEFINITIONS

A. HDPE: high density polyethylene; synthetic thermoplastic resin.

B. PVC: polyvinyl chloride; synthetic thermoplastic resin.

C. RCP: reinforced concrete pipe

1.4 SUBMITTALS

A. Submittals shall be in conformance with Contracting Requirements, Specifications, and Division 1 - General Requirements.

B. A Certificate of Compliance(s) shall be furnished to NPS for review and acceptance, for each type of pipe material including fittings and special sections. Submit a certificate of compliance for each classification of joint systems and couplers.

C. If water-tight joints are specified, also provide documentation of source quality control testing for water-tight joints.

D. Provide product data and material certifications for all pipe and fitting materials and components.

1.5 REFERENCES

A. The Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-24) dated 2024; and published revisions thereto. https://flh.fhwa.dot.gov/resources/specs/

1. Payment descriptions in the FP-24 Standard Specifications shall not apply. Refer to Section 01 27 00 – Definition of Contract Line Items.
2. In case of conflict with the FP-24 Standard Specifications, the most stringent specification shall apply.

B. Applicable ASTM and AASHTO standards.

C. A reference within parentheses to a law or regulation is included in the Contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

D. Where the version of a referenced document is not specified, use the most recent version in effect on the date of the Notice to Bidders.

E. A code not specified as a federal code is a Wyoming code.

F. An agency or a department not specified as a federal or local agency or department is a Wyoming agency or department.

1.6 QUALITY ASSURANCE

A. Conform to the Contract Documents including but not limited to General Conditions, Special Conditions, Permits, Technical Conditions, Drawings, and Standard Specifications.

B. Comply with the quality control and assurance requirements, per the applicable FP-24 Standard Specifications for materials to be used in the work.

1.7 PROJECT CONDITIONS AND REQUIREMENTS

A. Deliver materials to site in unopened cartons or bundles as appropriate, clearly identified with manufacturer's name, standards label, grade or identifying number.

B. Pipe, fittings, gaskets, and other components shall be stored in a way that protects materials from the weather, heat sources, and corrosive liquids. Plastic pipe and fittings shall be protected

from direct sunlight by storing in containers and/or covering with tarpaulins or other suitable materials.

C. In confined linear areas where protection of existing infrastructure, vegetation, and/or soils is specified only equipment that can be safely operated in the confined construction corridor is permitted.

1.8 TOLERANCES

A. Not Used.

PART 2 PRODUCTS

2.1 CONCRETE PIPE MATERIAL

A. Conform to Section 706, Concrete Pipe of the FP-24 Standard Specifications.

B. Circular reinforced concrete pipe shall be Class V, under minimum cover for pipe diameter sizes 24 inches or less, conforming to AASHTO M 170.

C. Elliptical reinforced concrete pipe shall be Class V, under minimum cover for equivalent pipe sizes 24 inches or less, conforming to AASHTO M 207.

D. Joints for storm utility drainage piping shall meet the requirements for “standard, soil-tight” pipe joints, unless otherwise specified as “water-tight” joints.

E. Sealing materials for soil-tight pipe joints may be cement mortar or rubber gaskets.

2.2 BEDDING

A. Pipe bedding material shall conform to Section 704.01 of the FP-24 Standard Specifications and Section 31 23 00 – Excavation and Fill. Bedding material shall be used, except as shown on the Drawings or otherwise allowed by NPS.

B. In cases where native free-draining granular material is suitable for use as bedding and authorized by NPS, the trench may be excavated and bottom hand-shaped so that bottom segment of the pipe is firmly supported on undisturbed material.

C. Use the same bedding material for the entire length of the culvert.

2.3 INITIAL BACKFILL OR PIPE EMBEDMENT

A. Suitable material for the initial backfill or pipe embedment (up to minimum 12 inches above top of pipe) including the haunch area and pipe zone shall conform to requirements for pipe bedding or structural backfill material per Section 704, Soil of the FP-24 Standard Specifications.

B. In cases where native free-draining granular material (free of organics) is suitable for use as pipe embedment and accepted by NPS, the Contractor shall screen the native material to 1.5-inch minus prior to placement in the work.

PART 3 EXECUTION

3.1 GENERAL

A. All existing facilities to remain shall be located and protected from damage during operations. Additional requirements are specified in Section 02 01 00 - Maintenance of Existing Conditions.

B. Layout and place survey stakes for proposed storm water facilities for review and approval on-site by the Contracting Officer prior to excavation and installation.

C. Prior to starting operations, remove any brush and other obstructions that interfere with installation of storm water utilities, conforming to Section 31 11 00 - Clearing and Grubbing.

D. All areas disturbed by the Contractor's operations shall be restored and stabilized as specified in Section 32 90 00 - Restoration.

E. Dewatering may be required to properly complete the work. The excavation and general work area shall be sufficiently dry to allow for the proper construction and inspection of the excavation, subgrade, bedding and backfill materials, and installation of storm water facilities for a complete job in place.

F. Applicable construction operations for excavation and backfill shall conform to Section 31 23 00 - Excavation and Fill, and the applicable provisions of Section 209, Structure Excavation and Backfill of the FP-24 Standard Specifications.

G. Trench and/or excavation widths shall be as shown on the Drawings, but should be no wider than what is required to safely place and compact the backfill material on either side of the pipe or facility.

H. The bottom of the trench and/or excavation shall be graded and prepared to provide a firm and uniform bearing for the facility along its entire length. Unsuitable materials shall be addressed as specified in Section 31 23 00 - Excavation and Fill.

I. In-situ trench and/or excavation foundations shall be no less than 90% relative compaction; any materials placed or added to stabilize trench and/or excavation bottom foundation shall be no less than 95% relative compaction.

J. No storm water facility shall be placed in service until a suitable outfall and specified outlet protection is provided and/or constructed.

3.2 CONCRETE PIPE

A. Concrete piping shall be installed conforming to Section 602, Culverts and Drains of the FP-24 Standard Specifications.

B. Minimum bedding thickness shall be 4 inches (for 4" - 24" pipe) and 6 inches (for 30" -60" pipe) or as shown on the Drawings. For joints, a bell hole or coupling joint depression shall be created to accommodate pipe joint connections and install of the pipe with true grades and continuity of the specified invert elevation.

C. Any pipe fittings, couplers, adapters, connections, etc. as required for the proper construction of the project shall be as specified by the pipe manufacturer and shall be at least equal to that of the pipe joint performance requirements. Where applicable, the Contracting Officer shall review methods and materials proposed for connections to existing structures or pipes of differing material and/or sizes.

D. Where pipes are installed in manholes, drainage inlets, junction boxes or other structures, the connection shall be at least equal to that of the pipe joint performance requirements.

1. Where soil-tight pipe joints are specified, the ends of the pipes shall be placed flush or cut off flush with the inside face of the structure, and be grouted in place with hydraulic cement “non-shrink” grout, unless otherwise shown on the Drawings or directed by the Contracting Officer. Concrete collars (minor concrete, 8-inch thick min) shall be constructed at the exterior of the pipe penetration.
2. Where water-tight pipe joints are specified, the ends of the pipes shall be placed flush or cut off flush with the inside face of the structure. Gaskets or mechanical joints shall be used as provided or recommended by the pipe manufacture to provide the degree of water-tight joint specified.

E. Pipe shall not be placed or backfilled until the Contracting Officer has approved the trench excavation, foundation and bedding materials.

F. Provide the necessary equipment, tools and facilities for lowering and properly placing pipe sections in the trench, without damage to the pipe, or disturbance to the trench.

1. For concrete pipe with lift hole(s), after placing the pipe, fill the open lift holes with cement mortar or concrete plugs before backfilling.

G. Install concrete piping at the locations, along the alignments, and to the grades shown on the Drawings. Install piping beginning at low point. Place bell ends of piping, where appropriate, facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions or standards referenced.

H. The final installed alignment shall be such that no reverse grades exist and no point shall vary from a straight line drawn from inlet to outlet by more than 2 percent horizontally and vertically of the culvert length or 1 foot, whichever is less, unless otherwise shown on the Drawings. Position pipe with a longitudinal joint so the joint is opposite the invert.

I. Care shall be taken not to damage pipe sections, joints, or gaskets during assembly. Contractor shall make use of pipe lubricant, installation stub, etc. and follow manufacture recommendations to ensure all pipe sections are pushed “home.” A “come-along” or other similar method should be used; mechanical construction equipment such as an excavator bucket, etc. must not have direct contact with the pipe end sections unless an installation stub and large timber or other suitable cushioning medium is utilized.

J. Pipe shall be firmly joined by form-fitting coupling bands. End sections shall be attached to pipe by connecting bands or other means as recommended by the manufacturer.

K. Changes in direction, without the use of elbows or other fittings, may be accomplished through joint deflection or longitudinal bending, but not both on the same length of pipe. Allowable

joint deflection or longitudinal bending is dependent on pipe size and/or joint design, and shall not exceed the pipe manufacturer's published limits. No deflection in pipe shall be allowed without prior written acceptance by the Contracting Officer.

L. Initial backfill shall be placed and shoveled under the pipe to fill all voids and fully compacted up to the springline to complete the haunch area. Fill shall be placed and compacted uniformly on each side of the pipe to avoid disturbance to the pipe alignment and grade. Mechanical compactors shall not be used directly on the pipe.

M. Pipe zone backfill shall be structural backfill material and placed and compacted to a minimum of 12 inches above the top of pipe as shown on the Drawings. Mechanical compactors shall not be used directly on the pipe.

N. The final backfill section (starting 1-foot above pipe) shall be structure backfill, aggregate base, or "accepted" native soils, as shown on the Drawings, and in conformance with the Specifications.

O. Any trench backfill shall be placed in uniform lifts (not to exceed 8 inches) and shall be compacted as shown on the Drawings, except in no case shall be less than 90 percent relative compaction in structural areas.

P. Where conditions (i.e. space constraints, poor trench wall soil qualities, etc.) are cause for the Contractor's inability to achieve the backfill compaction requirements, flowable fill or controlled low strength material (CLSM) shall not be placed in the work without prior acceptance of the Contracting Officer.

Q. During the use and removal of trench wall supports or boxes, it is critical that the initial backfill, haunch, or pipe embedment material (up to minimum 12 inches above top of pipe) is not to be disturbed once placed and compacted in the trench. It is recommended that a sub-trench, sidewall benches or other methods be utilized to support the bottom bearing section of trench boxes in order to minimize disturbance of the pipe or said backfill material.

R. Pipe distorted more than 5 percent of nominal dimensions, ruptured, or broken shall be replaced.

S. The Contractor shall clean the interior of the pipeline as work progresses and the pipeline shall be clear and free of debris and sediment before acceptance.

3.3 PROTECTION

A. During and after installation and structure backfill, pipe and/or inlet structures shall be protected by an adequate backfill, cover of embankment or other load distribution facility, where applicable, to protect the in place pipe and/or inlet structures from equipment and construction loading.

B. After completion of the final surface improvements, live load traffic from the Contractor's operations shall not exceed the pipe or structure design loads.

END OF SECTION 33 40 00