

**Tigiwon Community House Roof Replacement and Accessible Ramp
Request for Quote
White River National Forest, CO**

Background and Statement of Work: The National Forest Foundation (NFF) is seeking a contractor to complete improvements at the Tigiwon Community House on the Eagle-Holy Cross Ranger District of the White River National Forest (WRNF). Planned improvements are listed below:

- Replacing the cedar shingle roof with a new CeDUR synthetic shake roof
- Installing a new lightning protection system
- Installing a new accessible ramp
- Installing a solar lighting system and panels

The Tigiwon Community House is located south of Minturn, CO. It was constructed in 1934 by the Civilian Conservation Corps and is included in the National Register of Historic Places. The existing shake roof is deteriorating, has been infiltrated by small mammals, and does not meet modern fire-safety designs. Access to the lodge is currently not compliant with the Architectural Barriers Act (ABA) and Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG). The Forest Service is also planning to utilize the structure as an overnight rental cabin, rather than a day use cabin, as it's currently being used. The goals of this work are to create an environment that is more accessible and welcoming to a diverse audience, improve infrastructure safety, and preserve a historically significant structure. See Appendix A for a Project Map and Appendix B for Photos.

The NFF in collaboration with WRNF staff is seeking a contractor to complete the work listed above and described in more detail below. Bids should be submitted to include all the work listed in this RFQ. We will not accept partial bids that only include certain sections of the desired scope of work.

Information Requested

If interested in this project, please provide a quote for the above statement of work by providing approach, work experience, and cost. Please also include your capacity for this project and efficiency in recreation infrastructure projects in the past, if any.

This is a request for quotes only and quotations furnished are not offers. This request does not commit the National Forest Foundation to pay any costs incurred in the preparation of submission of the quotation or to contract for supplies or services.

General Specifications

- (a) Description of Work – This Request for Quotes is for the following improvements at the Tigiwon Community House on the White River National Forest, including the following:

1. Mobilization to and from the project site.
2. Roof Replacement
 - i. Replacement of the Tigiwon Community House roof with a CeDUR synthetic shake roof in Walden color. The roof is approximately 2700 square feet with two dormers and 12:12 pitch.
 - ii. All materials and installation shall comply with 2021 International Building Code (IBC) requirements, CeDur manufacturer's instructions, and State Historic Preservation Office (SHPO) specifications.
 - iii. Remove existing roofing materials (main roof and dormer windows) down to the wood sheathing. Remove metal drip edge, valley and dormer window flashing. Replace underlayment and flashing according to CeDur shake manufacturing specifications and installation requirements (Appendix C: Roof Product Specifications) for new materials and equipment. Transport demolished materials off Government property and legally dispose of them, in accordance with Federal, State and County regulations.
 - iv. Project costs will also include repair of the masonry and flashing along the north and south sides of the existing stone chimney; all direct and indirect costs including Overhead, Profit, Bond, Insurance, General Conditions, Mobilization/Demobilization.
 - v. Furnish and install flashing/drip edge around the entire perimeter of the roof. Color is to be selected by WRNF and NFF staff from the manufacturer's standard color chart.
 - vi. Sample drip edge and valley material must be submitted to the Forest Service for approval/selection of color and type.
 - vii. Furnish and install sheet underlayment over the entire roof area according to manufacturer's instructions.
 - viii. Furnish and install architectural shingle roof in accordance with the manufacturer's installation instructions. Shingle exposure to meet manufacturer's recommendation for roof slope. Shingle color is Walden.
 - ix. Any items not specifically identified, but required for proper installation and function of roof, shall be considered incidental to this item.
 - x. Confer all product warranties to the Forest Service and provide two (2) copies of product literature and warranty documents.
 - xi. In addition to manufacturer's product warranties, the Contractor shall warrant installation for a period of two (2) years after acceptance.
 - xii. The Contractor shall comply with all specifications outlined in Appendix E: Design Specifications.
3. Lightning Protection System Replacement
 - i. Replace existing lightning protection system with new lightning protection system in accordance with 2021 IBC building and NFPA-780 codes. This will include 3 copper grounding rods. All the copper connecting wire to connect the grounding rods to the air conductors on the roof in accordance with NFPA-780 codes. The wire shall be no less than .375 inches in diameter ($\frac{3}{8}$ to $\frac{5}{8}$ copper wire). Install 13 air conductors ; 7 on the north facing side of the roof, 4 on the south facing portion of the roof and 2 on the chimney (replace in kind). Additionally, replace all necessary connecting clamps and hardware to install the system in kind and updated to meet 2021 IBC codes and NFPA-780 codes.

4. Erosion Control
 - i. Installation of silt fences, a concrete washout area, and other erosion control measures according to provided plans (see Appendix D: Accessible Ramp Designs) and specifications (Appendix E: Design Specifications).
5. Site Work
 - i. Demolition of current structures, gravel pathways, and site features according to provided plans (see Appendix D: Accessible Ramp Designs) and specifications (Appendix E: Design Specifications).
 - ii. Site grading according to provided plans (see Appendix D: Accessible Ramp Designs) and specifications (Appendix E: Design Specifications).
 - iii. Construction of new gravel pathways to connect to existing pathways according to provided plans (see Appendix D: Accessible Ramp Designs) and specifications (Appendix E: Design Specifications).
6. Accessible Ramp and Gravel Path
 - i. Construction of an Architectural Barriers Act (ABA) compliant ramp to allow access to the Tigiwon Community House east entrance, according to provided plans (see Appendix D: Accessible Ramp Designs) and specifications (Appendix E: Design Specifications).
 - ii. Any material listed in the specs with a vendor listed should be considered as a preferred vendor. The Contractor may choose another vendor and provide an alternative to be approved by WRNF and NFF staff prior to procurement.
7. Wrought Iron Handrails
 - i. Construction of wrought iron handrails according to provided plans (see Appendix D: Accessible Ramp Designs) and specifications (Appendix E: Design Specifications).
 - ii. Given the complexity of the wrought iron railing section of the ramp, Contractors are invited to submit alternatives (i.e. simple steel pickets) as optional items in their pricing schedule (see Pricing Schedule below). The triangle detail in the wrought iron railing picket is not a required design element in proposed railing alternatives. Providing a railing alternative is not required for bid submission.
8. Solar Lighting System
 - i. Installation of three 250W, 12V solar panels mounted on the north pit toilet roof
 - ii. 80 feet of trenching, wire, and conduit
 - iii. Provision and installation of the following:
 1. six 200aH, 6V deep cycle sealed lead acid batteries
 2. one, 60A solar charge controller
 3. ten light fixtures, to be chosen by the Forest Service representative
 4. two, three-way light switches
 5. One timer circuit for propane stove
 6. Associated wire, conduit, junction boxes, solar racking, etc.

9. General Project Coordination

- i. The Contractor shall attend one pre-construction meeting organized by the NFF and WRNF staff to review project scope, expectations, roles & responsibilities, schedule, required submittals, etc.
- ii. The Contractor shall attend weekly virtual project progress meetings to give updates to the WRNF and NFF project team on project progress, schedule updates, submittal review, etc.
- iii. The Contractor should expect Forest Service and/or NFF staff presence at the project site a couple days a week for oversight and to provide support with questions.

(b) Optional Items

1. East Entrance Awning Replacement

- i. Construction of a new awning over the East Entrance Door to accommodate the new ramp to the entrance according to provided plans (see Appendix D: Accessible Ramp Designs) and specifications (Appendix E: Design Specifications).
- ii. Any material listed in the specs with a vendor listed should be considered as a preferred vendor. The Contractor may choose another vendor and provide an alternative to be approved by WRNF and NFF staff prior to procurement.

2. Stage II Fire Restriction Measures

- i. If Stage II Fire Restrictions come into effect, contractors will be expected to abide by the protocols provided in Appendix G: Stage II Fire Restriction Protocols. All additional costs associated with complying with these protocols should be included in this optional bid item.

The Contractor shall identify which efforts and materials they can supply in terms of materials, labor, equipment, supplies, supervision, quality control, and incidentals required to complete the work described. The Contractor shall perform all work in a safe and conscientious manner.

(c) Project Location- The Tigiwon Community House is located south and west of Minturn, CO on the Eagle-Holy Cross Ranger District of the White River National Forest. The project is located approximately 6 miles up Tigiwon Road/NFS Road 707 off US Highway 24. See APPENDIX A for a project map.

Work Schedule- The work schedule will be determined in partnership with the selected contractor, NFF, and WRNF staff. Work is anticipated to occur in the summer of 2026. Tigiwon Road, which accesses the site, is open June 21 through November 21. If road conditions allow, work may occur prior to June 21. It is expected that the Contractor will begin project work within 60 days of receiving a Notice to Proceed. Early season snow may make access to the site difficult for periods of time beginning in early-mid October. The site will be closed to public use while work is completed.

Pricing Schedule

The Contractor shall price work according to the schedule below.

Description	Unit	Unit Cost	Quantity	Total Cost
Mobilization				
Roof Replacement				
Lightning Protection System Replacement				
Erosion Control				
Site Work				
Accessible Ramp and Gravel Path				
Wrought Iron Handrails				
East Entrance Awning Replacement				
Solar Lighting System				
General Project Coordination				
Total				

Optional Item

Description	Unit	Unit Cost	Quantity	Total Cost
Alternative Railing Option				
East Entrance Awning Replacement				
Stage II Fire Restriction Measures				

Other Project Requirements and Specifications

- (a) Utilities – The Contractor may camp on-site while work is completed. There are two vault toilets on site that may be used, but no running water, electric, gas, or other utilities. Materials may be staged in the Tigiwon Community House parking lot prior to and during construction, as needed. All excess materials shall be removed from the site upon completion.
- (b) Specifications – Project work shall be accomplished in accordance with the following:
- Structures shall comply with all applicable U.S. Forest Service design standards.
 - Accessible ramp and path must meet Forest Service Accessibility Guidelines, per the Architectural Barriers Act (APPENDIX F: Forest Service Accessibility Guidelines)

- All waste material must be disposed of in an appropriate manner off National Forest System lands
- The facility, parking lot, and surrounding site will be closed during construction and contractor is permitted to camp on site and utilize site for material storage during the project.
- No material storage is permitted across road from site.

Contractor Qualifications

- (a) Past Experience – Please provide a brief explanation of previous work experience with land management agencies.

Insurance Requirements

Upon selection of the winning bid, the Contractor agrees that it has and shall maintain the following insurance coverage indicated below. The effective date of all coverage shall precede the start of any work.

- a. State minimum workers' compensation insurance coverage for its employees, if any.
- b. Broad form general liability, property damage, and automotive liability insurance in the minimum amount of \$1,000,000 for bodily injury, death, or damage to property of any person and \$2,000,000 for bodily injury, death, or damage to property of more than one person. The Contractor shall name NFF an Additional Named Insured and provide NFF with a certificate of insurance evidencing such coverages, prior to the initiation of the Scope of Services.
- c. Contractor shall provide professional errors and omissions liability insurance if its Scope of Services includes professional services. Professional services for purposes of this section include, but are not limited to performing: architecture, engineering, landscape architecture, land surveying or planning, geological investigation, interior design/space planning, preparation and signing or stamping of drawings, maps, surveys or construction specifications, consulting, or design and development of computer software, programs or websites by the Contractor or by subcontractors on behalf of the Contractor. The minimum coverage limits required are \$1,000,000 for each claim and \$1,000,000 annual aggregate.

Payment/Performance Security

Contractor shall post cash, a letter of credit, bond, or other financial security that is easily convertible into cash in a form acceptable to the NFF, in its sole determination, to assure completion of the work required under any subsequent agreement and payment of all amounts lawfully due to all persons supplying or furnishing to the Contractor or Contractor's subcontractors with labor, laborers, materials, rental machinery, tools or equipment used or to perform the work. Contractor may incorporate required associated costs into mobilization costs or other approved expenses.

- a. Work that is classified as construction in accordance with the Miller Act or Little Miller Act or if required per conditions of the funding source, payment and performance bonding will be required in the full amount of any Agreement. For the purposes of this Request for Proposal, construction is defined as "any contract greater than \$100,000

- for the construction, alteration, or repair of any public building or public work where the federal government is the owner”, or
- b. If Contractor is not self-performing at least 85% of the total contract or if the cost of materials is in excess of the larger of \$100,000 or 50% of the contract total, payment and performance bonding will be required in the full amount of the agreement, or
 - c. If the value of the agreement is in excess of \$250,000, Contractor will be required to post financial security in a form acceptable to the NFF in the amount of 5% of the total agreement value up to \$250,000 in total financial security.

Quote Submission

Submit bids via email to ekasyon@nationalforests.org by EOD April 17th, 2026.

Contractor Selection Process

The NFF will use the Evaluation Factors below to review each submitted bid. Based on the outcomes of that selection process, the NFF will notify successful and unsuccessful bidders by April 24th, 2026 and will prepare a separate contract document.

- Price
- Previous Work History/Experience
- Project Approach and Method of Construction
- References

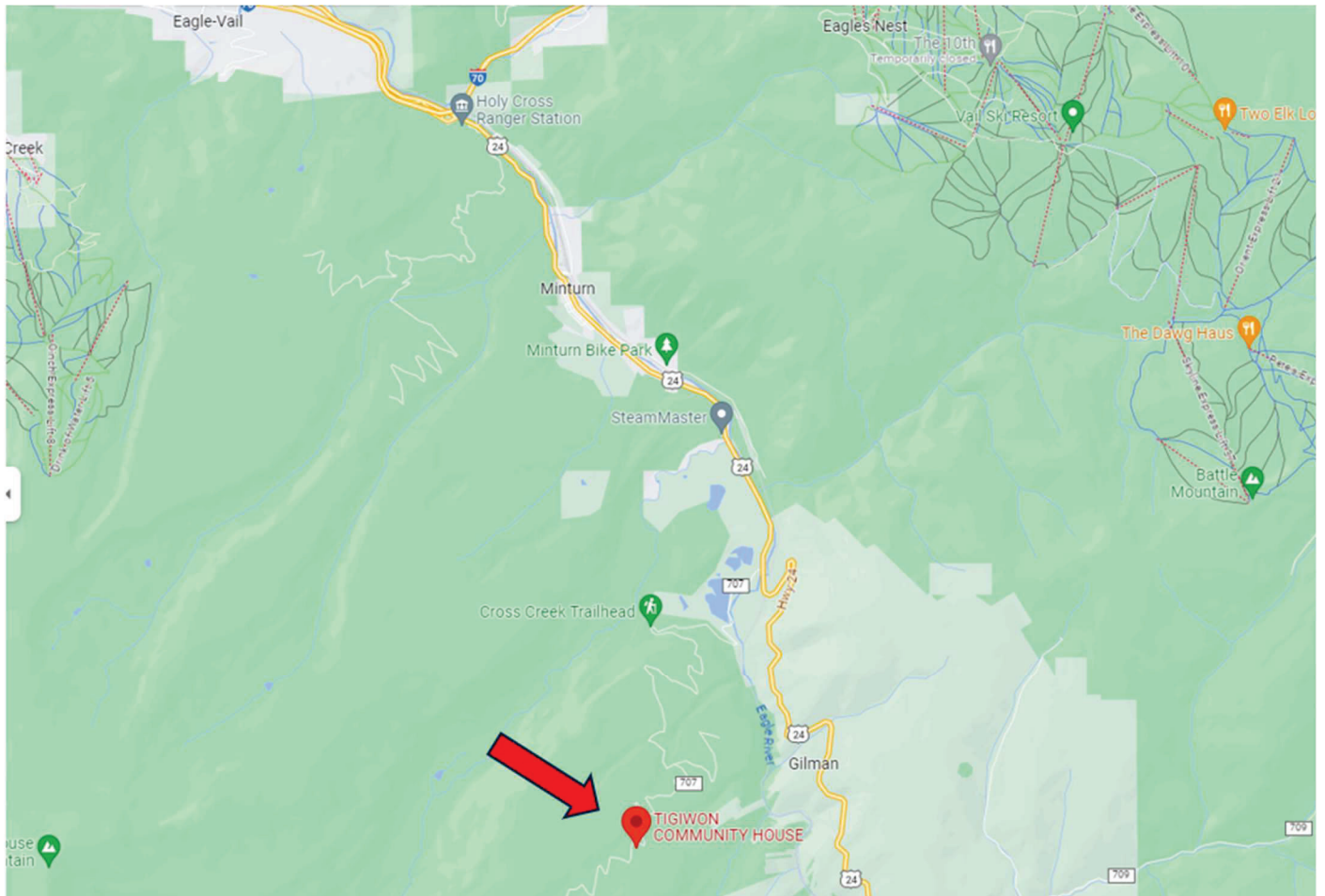
Price and previous work history are equally weighted.

Point of Contact

For questions about the details of producing the bid, please contact:

Emily Kasyon
National Forest Foundation – White River National Forest Program Coordinator
970.732.2612
ekasyon@nationalforests.org

APPENDIX A: Project Map



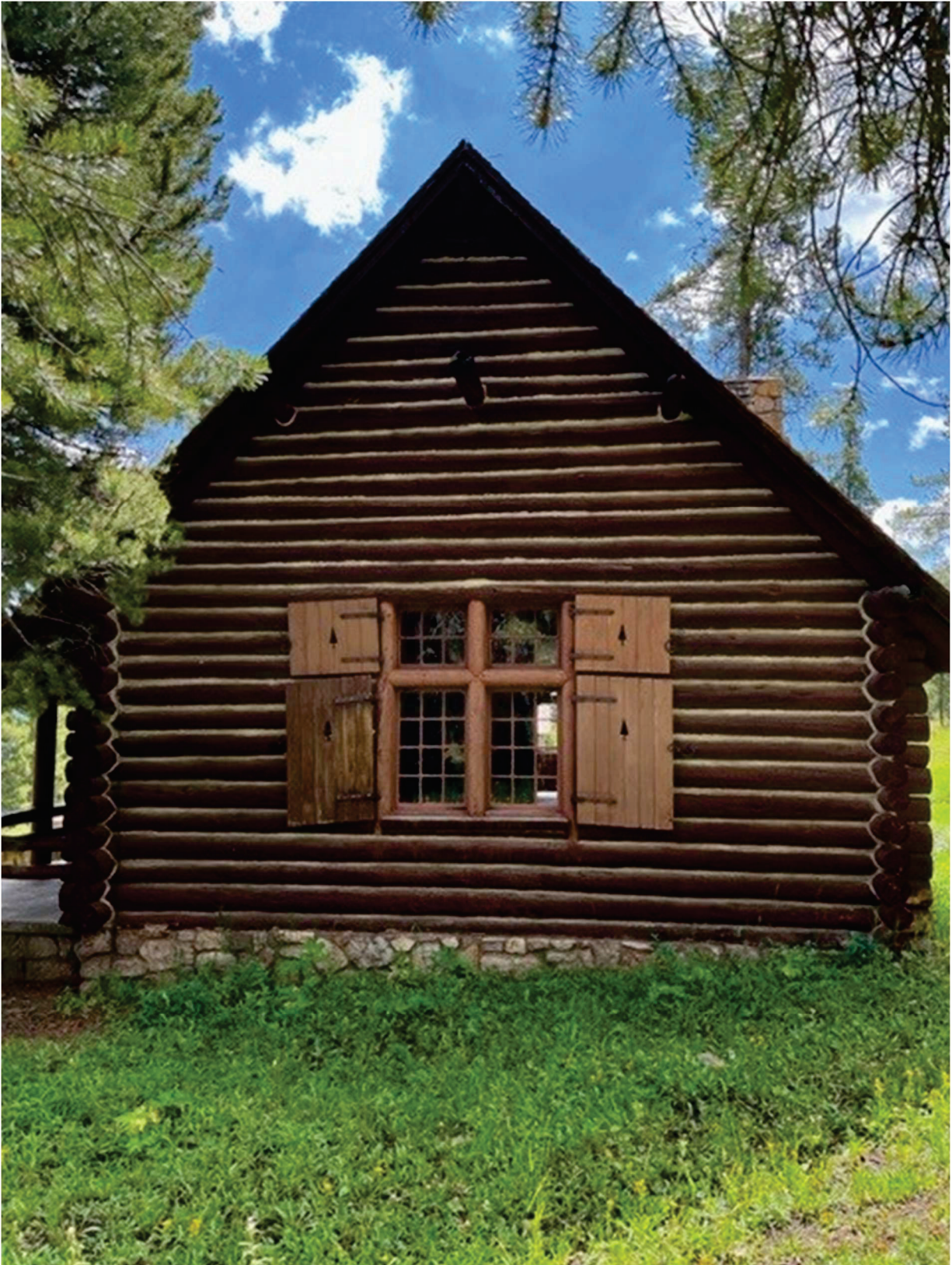
APPENDIX B: Photos



North Elevation



South Elevation



West Elevation



East Elevation



Back Door Detail



Back Door Detail



Back Door Awning Detail



West Chimney Flashing and Masonry

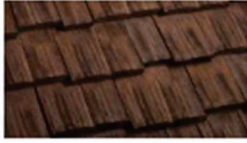


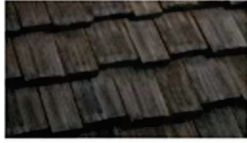
East Chimney Flashing and Masonry

APPENDIX C: Roof Product Specifications

3 Unique Widths
Available in 4 Timeless Colors

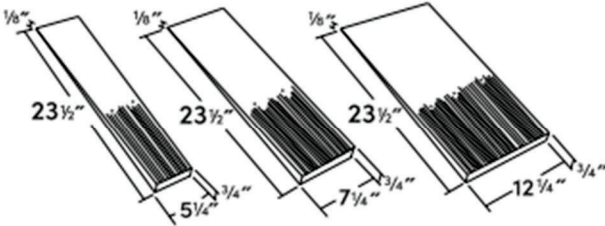

Walden


Live Oak

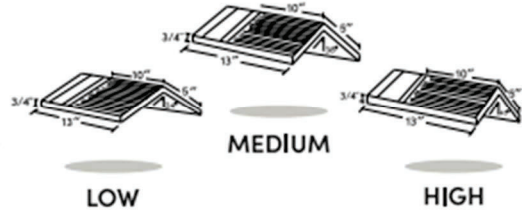

Shiloh


Golden Cedar

CeDUR Field Shake
3 Widths
50+ unique molds



CeDUR Hip & Ridge
3 Sizes - all 10 inch coverage
12 pieces per bundle - covers 10 feet per bundle




LIGHT WEIGHT
170 POUNDS PER SQUARE


STAND ALONE
CLASS A FIRE RATING


50 YEAR
Lifetime Limited Warranty


CLASS 4 IMPACT RATING
(HIGHEST RATING AVAILABLE)


115 MPH WIND
SPEED CERTIFICATION



Roofing Contractor: Gillespie Contracting Inc.
Location: Pennsylvania
Color: CeDUR Walden

[1] technical specifications CeDUR.com



The Most Realistic Synthetic Roofing Shake



EASILY INSTALLED.

- Can be Installed in Straight Courses or Staggered Courses
- Installed like Natural Cedar Shakes
- Installed Direct to Deck
- No Special Tools, Hardware, or Accessories are Required
- Requires No Sealing to Cut Edges Due to Closed Cell Structure



SOLID

- Advanced Thermoset Polymer
- Solid Product - No Cavity Back
- Molded from Natural Cedar Shakes
- Beautiful 3/4" inch Butt Thickness
- Extremely Lightweight - just 170 Pounds Per Square
- Deep Grain Patterns Provide Incredible Depth and Texture



VALUE

- 50 Year Lifetime Limited Warranty
- Homeowners Insurance Savings
- Improves Roof Insulation Value
- Preserves the Architectural Integrity of any Property
- Freeze/Thaw Resistant
- Low Lifecycle Cost
- Low Maintenance



TIMELESS

- The Most Authentic Wood Look
- No Splitting, Rotting or Risk of Fire
- Provides Stunning Curb Appeal
- Mold and Mildew Resistant
- Perfectly Replicates Heavy Hand Split Natural Cedar Shakes



DURABLE

- Class 4 Impact Rated - UL 2218
- Class A Fire Rated - ASTM E108
- No Special Fire Resistant Underlayment is Required to Achieve Fire Rating
- Certified to 115 mph Wind Speeds - Warranted to 90 mph



BEAUTIFUL

- Ages to True Natural Wood Colors
- Indistinguishable from Real Wood
- No Plastic Sheen or Shiny Appearance
- Natural Movement is Designed into our Product to Give Your Roof the Natural Cedar Shake Appearance



720-974-9200
www.cedur.com



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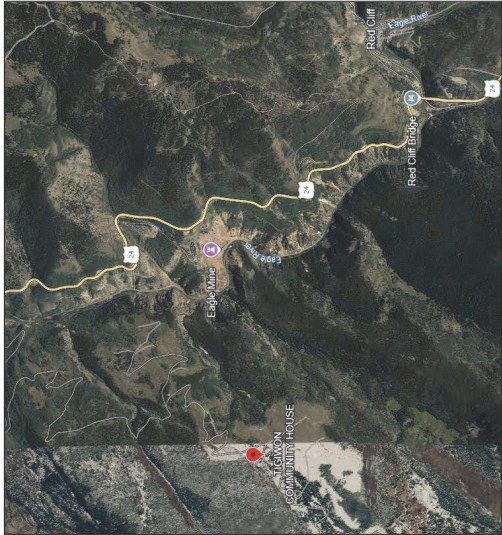
[1]. Technical specifications CeDUR.com

1. [Technical Information \(cedur.com\)](http://cedur.com)
[Fact-Sheet \(squarespace.com\)](http://squarespace.com)

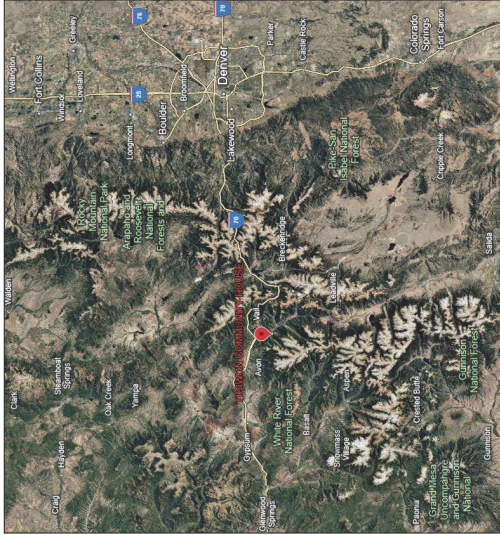
APPENDIX D: Accessible Ramp Designs

FOR BIDDING

LOCALITY MAP



VICINITY MAP



TIGIWON COMMUNITY HOUSE IMPROVEMENT DESIGN

WHITE RIVER NATIONAL FOREST, COLORADO

OWNER

NATIONAL FOREST FOUNDATION
Building 27, Suite 3, Fort Missoula Rd.,
Missoula, MT 59804

DESIGN TEAM

ARCHITECT:
CHAMBERLIN ARCHITECTS
12459 West Colfax Avenue,
Lakewood, CO 80215
(970) 242-6804

750 St. Joseph Street, Suite 81
Rapid City, SD 57701
(605) 355-6804

CIVIL & STRUCTURAL:
CHAMBERLIN ARCHITECTS
12459 West Colfax Avenue,
Lakewood, CO 80215
(970) 242-6804

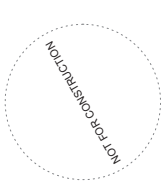
DRAWING LIST

GENERAL
G001 COVER PAGE

CIVIL
LEGEND AND ABBREVIATIONS
C001
NOTES
C002
EXISTING CONDITIONS AND DEMOLITION PLAN
C100
LAYOUT AND PRELIMINARY GRADING PLAN
C200
EROSION CONTROL PLAN
C300
EROSION CONTROL DETAILS
C301
EROSION CONTROL DETAILS
C302
SITE DETAILS
C400

STRUCTURAL
GENERAL NOTES AND DETAILS
S001
RAMP DETAILS
S002

ARCHITECTURAL
A100 ARCHITECTURAL PLAN, ELEVATIONS, & SECTIONS
A611 ARCHITECTURAL DETAILS





**TIGIWON
COMMUNITY HOUSE
IMPROVEMENT
DESIGN**

WHITE RIVER NATIONAL FOREST,
COLORADO

LEGEND AND ABBREVIATIONS

NO: 

ISSUED FOR: _____

DATE: _____

PROJECT STATUS: 75%

DATE: 02/13/2026
 PROJECT NO: 2505
 SHEET NO: C001
 M CHAMBERLIN ARCHITECTS

CIVIL SHEET INDEX	
SHEET # SHEET TITLE	
C001	LEGEND AND ABBREVIATIONS
C002	NOTES
C100	EXISTING CONDITIONS AND DEMOLITION PLAN
C200	LAYOUT AND PRELIMINARY GRADING PLAN
C300	EROSION CONTROL PLAN
C301	EROSION CONTROL DETAILS
C302	EROSION CONTROL DETAILS
C400	SITE DETAILS

ABBREVIATIONS:

[illegible]

NOTE: TOW SHALL BE TOP OF WATER ON UTILITY SHEETS ONLY
AND TOP OF WALL ON ALL OTHER SHEETS.



TIGWON
COMMUNITY HOUSE
IMPROVEMENT
DESIGN

WHITE RIVER NATIONAL FOREST,
COLORADO

NOTES

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PROJECT STATUS: 75%
DATE: 02/13/2026
SHEET NO: C002
PROJECT NO: 2305

EROSION CONTROL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS AND IMPLEMENTING AND MAINTAINING EROSION AND SEDIMENT CONTROL MEASURES AT ALL TIMES DURING CONSTRUCTION TO PREVENT DAMAGING FLOWS ON ADJACENT PROPERTY. EROSION CONTROL MEASURES SHALL BE DESIGNED AND CONSTRUCTED TO PREVENT EROSION, SEDIMENT, AND STORM WATER MANAGEMENT PLAN. CONDITIONS IN THE FIELD MAY WARRANT EROSION CONTROL MEASURES IN THE FIELD CONDITIONS WARRANT. THE PLAN MAY BE MODIFIED WITH APPROPRIATE APPROVALS AS FIELD CONDITIONS WARRANT.
2. NATURAL VEGETATION SHALL BE RETAINED AND PROTECTED WHEREVER POSSIBLE. EXPOSURE OF SOIL TO EROSION BY REMOVAL OR DISTURBANCE OF VEGETATION SHALL BE LIMITED TO THE AREA REQUIRED FOR IMMEDIATE CONSTRUCTION OPERATION AND FOR THE SHORTEST PRACTICAL PERIOD OF TIME.
3. TOPSOIL SHALL BE STOCKPILED TO THE EXTENT PRACTICABLE ON THE SITE FOR USE ON AREAS TO BE REVEGETATED. ANY AND ALL STOCKPILES SHALL BE LOCATED AND PROTECTED FROM EROSION ELEMENTS.
4. AT ALL TIMES, THE PROPERTY SHALL BE MAINTAINED AND/OR WATERED TO PREVENT WIND-CAUSED EROSION. EARTHWORK OPERATIONS SHALL BE DISCONTINUED WHEN FUGITIVE DUST SIGNIFICANTLY IMPACTS ADJACENT PROPERTY. EROSION CONTROL MEASURES SHALL BE MAINTAINED AND/OR WATERED TO PREVENT WIND-CAUSED EROSION. EARTHWORK OPERATIONS SHALL BE DISCONTINUED WHEN FUGITIVE DUST SIGNIFICANTLY IMPACTS ADJACENT PROPERTY. EROSION CONTROL MEASURES SHALL BE MAINTAINED AND/OR WATERED TO PREVENT WIND-CAUSED EROSION. EARTHWORK OPERATIONS SHALL BE DISCONTINUED WHEN FUGITIVE DUST SIGNIFICANTLY IMPACTS ADJACENT PROPERTY.
5. PERMANENT OR TEMPORARY SOIL STABILIZATION MEASURES SHALL BE APPLIED TO DISTURBED AREAS WITHIN 30 DAYS OF CONSTRUCTION. SOIL STABILIZATION MEASURES SHALL BE APPLIED TO DISTURBED AREAS WITHIN 30 DAYS OF CONSTRUCTION. SOIL STABILIZATION MEASURES SHALL BE APPLIED TO DISTURBED AREAS WITHIN 30 DAYS OF CONSTRUCTION. SOIL STABILIZATION MEASURES SHALL BE APPLIED TO DISTURBED AREAS WITHIN 30 DAYS OF CONSTRUCTION.
6. TEMPORARY FENCES SHALL BE INSTALLED ALONG ALL BOUNDARIES OF THE CONSTRUCTION LIMITS OR PROPERTY LINES IF REQUIRED BY THE CONTRACTING OFFICER TO PREVENT GRADING ON PROPERTY NOT OWNED BY THE GOVERNMENT. IN ADDITION, THE CONTRACTING OFFICER MAY REQUIRE ADDITIONAL TEMPORARY FENCES IF FIELD CONDITIONS WARRANT.
7. THE CONTRACTOR SHALL PREVENT SEDIMENT, DEBRIS AND ALL OTHER POLLUTANTS FROM LEAVING THE CONSTRUCTION SITE. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REMEDIATION OF ANY ADVERSE IMPACTS TO ADJACENT WATERWAYS, ROADWAYS, WETLANDS, ETC., RESULTING FROM WORK DONE AS PART OF THIS PROJECT.
8. THE CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POLLUTANTS THAT MAY HAVE BEEN INADEQUATELY DISCHARGED TO, OR ACCUMULATED IN, THE CONSTRUCTION AREA. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REMEDIATION OF ANY ADVERSE IMPACTS TO ADJACENT WATERWAYS, ROADWAYS, WETLANDS, ETC., RESULTING FROM WORK DONE AS PART OF THIS PROJECT.
9. THE GRADING CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL ENSURE THAT ALL LOADS OF CUT AND FILL MATERIAL IMPORTED TO OR EXPORTED FROM THIS SITE SHALL BE PROPERLY COVERED TO PREVENT LOSS OF THE MATERIAL DURING TRANSPORT ON PUBLIC ROADS.
10. APPROVED EROSION AND SEDIMENT CONTROL "BEST MANAGEMENT PRACTICES" (BMP) SHALL BE MAINTAINED AND RESPECTED THROUGHOUT THE DURATION OF THIS PROJECT. THE CONTRACTOR OR AGENT SHALL BE HELD RESPONSIBLE FOR THE DURATION OF THIS PROJECT. THE CONTRACTOR OR AGENT SHALL BE HELD RESPONSIBLE FOR THE DURATION OF THIS PROJECT. THE CONTRACTOR OR AGENT SHALL BE HELD RESPONSIBLE FOR THE DURATION OF THIS PROJECT.
11. WATER USED IN THE CLEANING OF CONCRETE TRUCK DELIVERY CHUTES SHALL BE DISCHARGED INTO A PREDESIGNATED BERNED CONTAINMENT AREA ON THE JOB SITE. THE REQUIRED CONTAINMENT AREA IS TO BE BERNED SO THAT WASH WATER IS TOTALLY CONTAINED. WASH WATER DISCHARGED INTO THE CONTAINMENT AREA SHALL BE ALLOWED TO EVAPORATE. WASH WATER DISCHARGED INTO THE CONTAINMENT AREA SHALL BE ALLOWED TO EVAPORATE. WASH WATER DISCHARGED INTO THE CONTAINMENT AREA SHALL BE ALLOWED TO EVAPORATE.
12. THE CONTRACTOR SHALL PROTECT ALL EXISTING DRAINAGE PATTERNS ADJACENT TO ANY LOCATION WHERE PAVEMENT CUTTING OPERATIONS INVOLVING WHEEL CUTTING, SAW CUTTING OR ABRASIVE WATER JET CUTTING ARE TO TAKE PLACE. THE CONTRACTOR SHALL PROTECT ALL EXISTING DRAINAGE PATTERNS ADJACENT TO ANY LOCATION WHERE PAVEMENT CUTTING OPERATIONS INVOLVING WHEEL CUTTING, SAW CUTTING OR ABRASIVE WATER JET CUTTING ARE TO TAKE PLACE.
13. PAVED SURFACES WHICH ARE ADJACENT TO CONSTRUCTION SITES SHALL BE SWEEPED IN A TIMELY MANNER WHEN SEDIMENT AND OTHER MATERIALS ARE TRACKED OR DISCHARGED ON TO THEM. EITHER SWEEPING BY HAND OR USE OF A SWEEPING MACHINE IS ACCEPTABLE. SWEEPING SHALL BE PERFORMED IN A MANNER THAT MINIMIZES DUST. MINIMIZE DUST. FLUSHING OFF PAVED SURFACES WITH WATER IS PROHIBITED.

ACCESSIBLE ROUTES:

1. ALL CONSTRUCTION AND VERIFICATION/TESTING SHALL BE IN ACCORDANCE WITH RULES AND REGULATIONS OF THE COLORADO DEPARTMENT OF TRANSPORTATION AND THE FEDERAL AID TO NATIONAL HIGHWAYS ACT, 23 U.S.C. 101, AND THE ARCHITECTURAL BARRIERS ACT ACCESSIBILITY STANDARD - AREAS AS PROVIDED FOR IN THE REGULATIONS OF THE UNITED STATES ACCESS BOARD.
2. NOTES AND REQUIREMENTS WITHIN THE CONSTRUCTION DOCUMENTS ARE A SUPPLEMENT TO, AND NOT A REPLACEMENT FOR THE REFERENCED REGULATIONS.
3. CONTRACTORS ARE TO BE AWARE WHEN REFERRING TO THE ABOVE STANDARDS, RULES, AND REGULATIONS THAT PUBLISHED VALUES FOR DIMENSION AND SLOPE ARE FOR FINISHED CONSTRUCTION, NO TOLERANCE IS PERMITTED BELOW MINIMUM AS SHOWN ON DRAWINGS OR ABOVE MAXIMUM VALUES AS INDICATED IN THE APPLICABLE LOCAL, STATE, AND FEDERAL STANDARDS.
4. THE CONTRACTORS EXPECT THE CONTRACTORS TO BE KNOWLEDGEABLE OF CONSTRUCTION PRACTICES, AND WITH REGULATIONS, AND CONSTRUCTION OF ACCESSIBILITY ROUTES. THE CONTRACTORS EXPECT THE CONTRACTORS TO BE KNOWLEDGEABLE OF CONSTRUCTION PRACTICES, AND WITH REGULATIONS, AND CONSTRUCTION OF ACCESSIBILITY ROUTES. THE CONTRACTORS EXPECT THE CONTRACTORS TO BE KNOWLEDGEABLE OF CONSTRUCTION PRACTICES, AND WITH REGULATIONS, AND CONSTRUCTION OF ACCESSIBILITY ROUTES.
5. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL COORDINATE WITH THE GOVERNMENT AND ENGINEER IF RULES AND REGULATIONS OF ACCESSIBILITY ROUTES CANNOT BE MET, OR A DISCREPANCY OF ACCESSIBILITY ROUTES CANNOT BE MET, OR A DISCREPANCY OF ACCESSIBILITY ROUTES CANNOT BE MET.

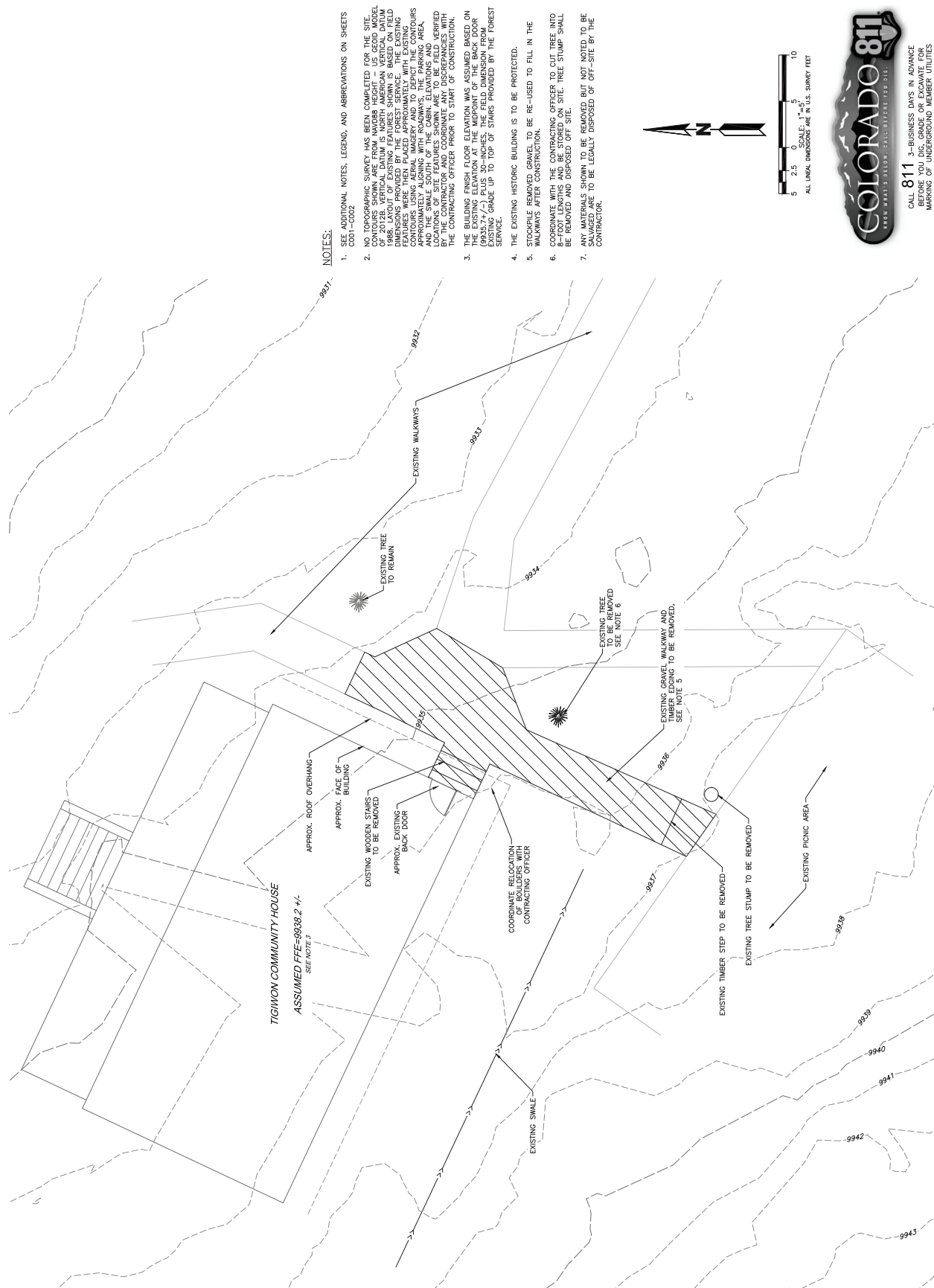
GRADING NOTES:

1. ALL SITE GRADING (EXCAVATION, EMBANKMENT, AND COMPACTION) SHALL CONFORM WITH THE PROJECT SPECIFICATIONS.
2. EXISTING ELEVATIONS SHOWN ON THIS DRAWING HAVE BEEN DERIVED FROM NAD83 HEIGHT - US GEOID MODEL OF 2012B. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM 1988. ELEVATIONS ARE NOT TO BE USED FOR CONSTRUCTION OF THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE GRADE CONDITIONS AT THE LIMITS OF CONSTRUCTION AND AT LOCATIONS THAT INTERFERE WITH EXISTING PROPOSED STRUCTURES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE GRADE CONDITIONS AT THE LIMITS OF CONSTRUCTION AND AT LOCATIONS THAT INTERFERE WITH EXISTING PROPOSED STRUCTURES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO THE START OF CONSTRUCTION.
3. PROPOSED CONTOURS AND SPOT ELEVATIONS AS SHOWN HEREIN ARE DEFINED AS FINISHED ELEVATION AFTER PAVING, LANDSCAPING, ETC.
4. TEMPORARY CUT/FILL SLOPES SHALL NOT EXCEED A STEEPNESS OF [1:1] (H:V). PERMANENT SLOPES SHALL NOT EXCEED [4:1] (H:V) (UNLESS NOTED OTHERWISE) IN AREAS TO BE SECEDED OR SODDED.

MARTIN/MARTIN, INC. GENERAL NOTES:

1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PROJECT STANDARDS AND SPECIFICATIONS.
2. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF PLANS APPROVED BY THE GOVERNMENT AND SUBMITTED TO THE APPROPRIATE DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS ON THE JOB SITE AT ALL TIMES.
3. CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER AND THE GOVERNMENT TWO WEEKS PRIOR TO THE START OF CONSTRUCTION. A PRE-CONSTRUCTION MEETING SHALL BE SCHEDULED WITH THE GOVERNMENT PRIOR TO START OF WORK.
4. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS AT AND ADJACENT TO THE JOB SITE INCLUDING, BUT NOT LIMITED TO, SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION.
5. THE CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE AGENCY OF THE CONTRACTOR'S SAFETY MEASURES IN, ON OR NEAR THE CONSTRUCTION SITE.
6. ALL TRENCHES SHALL BE ADEQUATELY SUPPORTED AND THE SAFETY OF WORKERS PROVIDED FOR AS REQUIRED BY THE MOST RECENT OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) "SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION." THESE REGULATIONS ARE DESCRIBED IN SUBPART P, PART 1926 OF THE FEDERAL REGISTER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION.
7. ALL TRENCH BACKFILL AND SUBGRADE PREPARATION SHALL BE TESTED TO ENSURE COMPLIANCE WITH PROJECT SPECIFICATIONS AND SHALL BE TESTED AT REQUIRED FREQUENCIES BY AN APPROVED PRIVATE SOILS TESTING FIRM. TEST RESULTS SHALL BE SUBMITTED TO THE GOVERNMENT AND APPROVED BY THE CONTRACTING OFFICER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION.
8. CONTRACTOR SHALL CONFORM TO ALL FEDERAL, STATE AND LOCAL HEALTH AND SAFETY RULES AND REGULATIONS.
9. BASED ON INFORMATION FROM THE FOREST SERVICE, THERE ARE NO KNOWN EXISTING UTILITIES ON SITE. IF UTILITIES ARE IDENTIFIED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL UTILITIES DURING CONSTRUCTION AND FOR COORDINATING WITH THE APPROPRIATE UTILITY COMPANY FOR THE PROTECTION OF UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL UTILITIES DURING CONSTRUCTION AND FOR COORDINATING WITH THE APPROPRIATE UTILITY COMPANY FOR THE PROTECTION OF UTILITIES.
10. EXISTING BOUNDARIES, FENCES, TREES, SODWALKS, CURBS AND GUTTERS, LANDSCAPING, STRUCTURES, AND IMPROVEMENTS DESTROYED, DAMAGED OR REMOVED DUE TO CONSTRUCTION OF THIS PROJECT SHALL BE REPLACED OR RESTORED IN LIKE KIND AT THE CONTRACTOR'S EXPENSE, UNLESS OTHERWISE INDICATED ON THESE PLANS.
11. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR OBTAINING NECESSARY ACCESS TO AND FROM THE SITE THROUGHOUT THE COURSE OF THE WORK. AS CONSTRUCTION CONDITIONS CHANGE AND THE WORK PROGRESSES, THE CONTRACTOR SHALL BE REQUIRED TO PERIODICALLY UPDATE THE GOVERNMENT SO THAT THEY ARE KEPT INFORMED ABOUT THEIR ACCESS.
12. CONTRACTOR SHALL OBTAIN A STORMWATER CONSTRUCTION PERMIT FROM THE COLORADO DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE PERMIT AND FOR THE PROTECTION OF THE PERMIT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE PERMIT AND FOR THE PROTECTION OF THE PERMIT.
13. CONTRACTOR SHALL OBTAIN A COLORADO STATE CONSTRUCTION DEMATERING DISCHARGE PERMIT FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT FOR ALL AREAS WHERE DEMATERING IS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE PERMIT AND FOR THE PROTECTION OF THE PERMIT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE PERMIT AND FOR THE PROTECTION OF THE PERMIT.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING STORM RUNOFF AND ANY GROUNDWATER EXISTING STREETS OR EROSION ON ADJUTING PROPERTIES IN ORDER TO CONSTRUCT THE IMPROVEMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING STORM RUNOFF AND ANY GROUNDWATER EXISTING STREETS OR EROSION ON ADJUTING PROPERTIES IN ORDER TO CONSTRUCT THE IMPROVEMENTS.
15. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING AND VERIFYING ELEVATIONS OF ALL EXISTING SITE AND BUILDING FEATURES AT THE POINT OF CONNECTION SHOWN ON THE PLANS, AND AT ANY UTILITY CROSSINGS PRIOR TO INSTALLING ANY OF THE NEW IMPROVEMENTS. IF A CONFLICT EXISTS AND/OR A DISCREPANCY EXISTS, THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO RESOLVE THE DISCREPANCY PRIOR TO THE START OF CONSTRUCTION.
16. COMPACTION OF ALL TRENCHES MUST BE ATTAINED AND COMPACTION TEST RESULTS SUBMITTED THE GOVERNMENT PRIOR TO FINAL ACCEPTANCE.
17. RECORD DRAWINGS SHOWING ALL CHANGES FROM THE APPROVED CONSTRUCTION DRAWINGS SHALL BE SUBMITTED TO THE GOVERNMENT PRIOR TO INITIATION OF THE REQUIRED WARRANTY PERIOD. THE RECORD DRAWINGS SHALL BE SUBMITTED TO THE GOVERNMENT PRIOR TO INITIATION OF THE REQUIRED WARRANTY PERIOD.
18. DURING CONSTRUCTION AND UPON COMPLETION OF CONSTRUCTION, THE SITE SHALL BE CLEANED AND RESTORED TO A CONDITION EQUAL TO, OR BETTER THAN, THAT WHICH EXISTED BEFORE CONSTRUCTION.
19. THE GOVERNMENT IS HEREBY NOTIFIED THAT IT IS TYPICAL AND LIKELY THAT SOME MOVEMENT OF THE EXISTING STRUCTURES WILL OCCUR DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION.
20. MARTIN/MARTIN SUGGESTS THAT ALL OWNERS, PRESENT AND FUTURE, BECOME AWARE OF THE RISK ASSOCIATED WITH IMPROPER MAINTENANCE OF SLOPES AND DRAINAGE AWAY FROM THE STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION.

2. GUIDE TO SKEWLING SOIL FOR HOMEOWNERS AND HOMEOWNERS: PUBLISHED BY THE COLORADO GEOLOGICAL SURVEY, SPECIAL PUBLICATION NO. 43.



CALL **811** 3-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE OR EXCAVATE FOR
MARKING OF UNDERGROUND MEMBER UTILITIES



CALL **811** 3-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE OR EXCAVATE FOR
MARKING OF UNDERGROUND MEMBER UTILITIES



**TIGWON
COMMUNITY HOUSE
IMPROVEMENT
DESIGN**

WHITE RIVER NATIONAL FOREST,
COLORADO

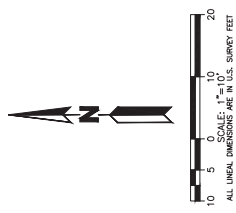
**EROSION CONTROL
PLAN**

NO. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
ISSUED FOR: DATE:
PROJECT STATUS: 75%

DATE: 02/13/2026
SHEET NO. C300
PROJECT NO. 2305

- LEGEND**
- SILT FENCE
 - VEHICLE TRACKING CONTROL
 - STABILIZED STAGING AREA
 - STOCKPILE MANAGEMENT W/ PROTECTION
 - CONCRETE WASHOUT AREA
 - ROCK SOCK
 - SF
 - VTC
 - SSA
 - SP
 - CWA
 - RS

NOTES:
1. SEE ADDITIONAL LEGEND, ABBREVIATIONS, AND NOTES ON SHEETS C001 - C002.



COLORADO 811
CALL 811 3-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE OR EXCAVATE FOR
MARKING OF UNDERGROUND MEMBER UTILITIES





PRE-MANUFACTURED CONCRETE WASHOUT AREA
NOTES:

1. SEE PLAN VIEW FOR LOCATION OF CWA INSTALLATION.
2. THE CWA SHALL BE INSTALLED PRIOR TO USING MATERIALS THAT REQUIRE WASHOUT ON THIS PROJECT.
3. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
4. THE WASHOUT AREA SHALL BE REPLACED OR CLEANED ONCE WASHOUT EFFLUENT REACHES HALF FULL TO MAINTAIN CAPACITY FOR LIQUID WASTE.
5. WASHOUT RESIDUE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT AN APPROVED WASTE FACILITY.
6. THE WASHOUT SHALL ONLY BE USED FOR NON-HAZARDOUS WASTES.
7. THE CWA SHALL BE COVERED WHEN NOT IN USE OR OUTSIDE OF WORK HOURS TO PREVENT WILDLIFE ACCESS INTO WASHOUT.

[illegible]

5. A NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.

6. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT

- [illegible]

[illegible]

A horizontal dimension line with arrows at both ends. The text "50' MIN." is written above the line.

-

1. **EXERCISE YOUR OWN REASONING.** No matter how it is effective, following someone else's lead is not a good idea. You must learn to think for yourself and make your own decisions. You must be able to analyze a situation, weigh the pros and cons, and arrive at a logical conclusion. This is a skill that is essential for success in any field.
2. **BE A TEAM PLAYER.** While it is important to be able to work on your own, it is equally important to be able to work with others. You must be able to communicate effectively, listen to others, and contribute to the team. This is a skill that is essential for success in any field.
3. **BE A PROBLEM SOLVER.** You will encounter many challenges in your life, and you must be able to solve them. This is a skill that is essential for success in any field.
4. **BE A LEADER.** You must be able to inspire and motivate others. This is a skill that is essential for success in any field.
5. **BE A TEAM LEADER.** You must be able to lead a team. This is a skill that is essential for success in any field.
6. **BE A TEAM MEMBER.** You must be able to be a part of a team. This is a skill that is essential for success in any field.
7. **BE A TEAM PLAYER.** You must be able to work with others. This is a skill that is essential for success in any field.
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Figure 1: Stockpile Protection Plan. The diagram shows a top-down view of a stockpile area. A large irregular shape represents the 'STOCKPILE'. To its right is a 'SELF PROTECT UNIT OF DETAIL FOR PROTECTIVE EQUIPMENT' (a triangle) and a 'SELF PROTECT UNIT OF DETAIL FOR VENTILATION EQUIPMENT' (a rectangle). A 'SECTION A' line is drawn across the protection structure. A 'SP' (Stockpile Protection) unit is shown in a circle. A small inset shows a detail of the protection structure.

***** 10/20/94



**TIGIWN
COMMUNITY HOUSE
IMPROVEMENT
DESIGN**

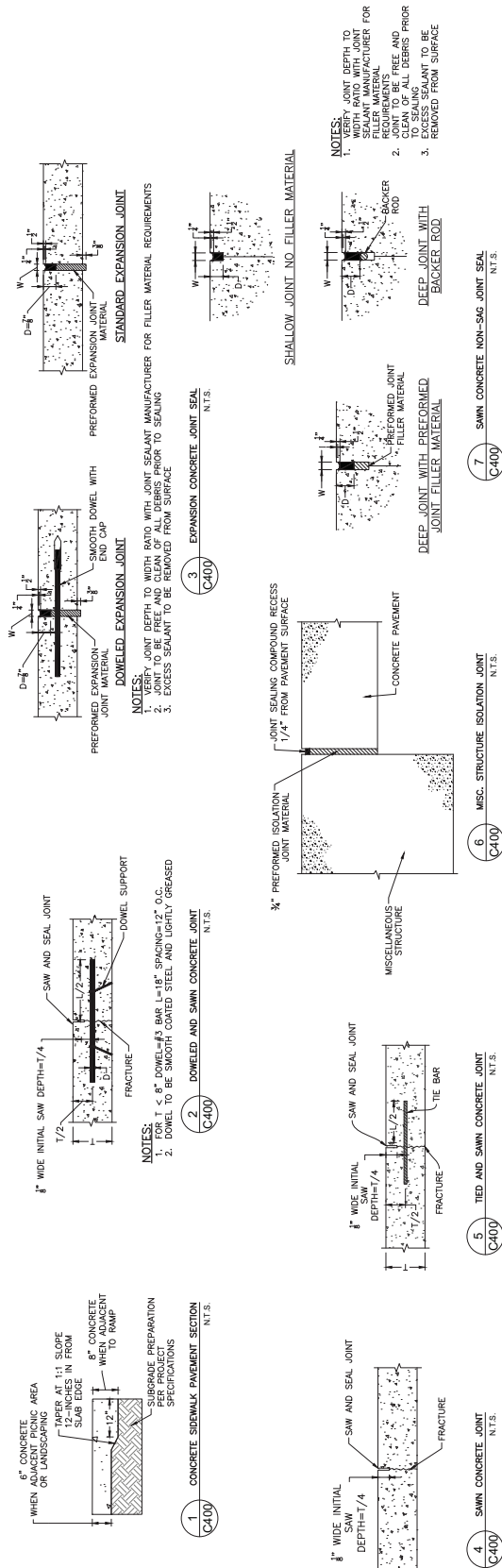
WHITE RIVER NATIONAL FOREST,
COLORADO

SITE DETAILS

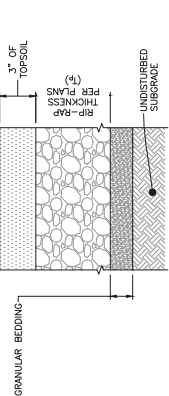
NO: ISSUED FOR: DATE:

PROJECT STATUS: 75%

DATE: 02/13/2026
SHEET NO: C400
PROJECT NO: 2305



CONCRETE JOINT NOTES:
1. JOINTS SHALL BE 1/2" WIDE AND 1/2" DEEP. JOINTS SHALL BE 1/2" WIDE AND 1/2" DEEP. JOINTS SHALL BE 1/2" WIDE AND 1/2" DEEP.
2. JOINTS SHALL BE 1/2" WIDE AND 1/2" DEEP. JOINTS SHALL BE 1/2" WIDE AND 1/2" DEEP. JOINTS SHALL BE 1/2" WIDE AND 1/2" DEEP.
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RIPRAP DESIGNATION	THICKNESS REQUIREMENTS FOR GRANULAR BEDDING			
	FINE-GRAINED SOILS 1		COARSE-GRAINED SOILS 2	
	TYPE I (LOWER LAYER)	TYPE II (UPPER LAYER)	TYPE I	TYPE II
L	4	4	4	6

NOTES:
1. SUBSTITUTION OF ONE 12-INCH LAYER OF TYPE II BEDDING, THE SUBSTITUTION OF ONE LAYER OF TYPE II BEDDING SHALL NOT BE PERMITTED AT DROP STRUCTURES. THE USE OF A COMBINATION OF FILTER FABRIC AND TYPE II BEDDING AT DROP STRUCTURES IS ALLOWED.
2. FIFTY PERCENT OR MORE BY WEIGHT RETAINED ON THE #40 SIEVE.

RIP RAP GRADATION		
	% SMALLER THAN GIVEN BY WEIGHT	TYPE L
INTERMEDIATE ROCK DIMENSION (IN)	70-100	15
	50-70	12
	35-50	9
	2-10	3
	D50 (IN)	9

U.S. STANDARD SIEVE SIZE	GRADATION FOR GRANULAR BEDDING	
	PERCENT PASSING BY WEIGHT	
	TYPE I (COOT SECT. 70.5/50 CLASS A	TYPE II (COOT SECT. 70.5/50 CLASS A
3 INCHES	—	90 — 100
1½ INCHES	—	—
¾ INCHES	—	20 — 90
½ INCHES	100	—
#4	95 — 100	0 — 20
#16	45 — 60	—
#50	10 — 30	—
#100	2 — 10	—
#200	0 — 2	0 — 3

NOTES:
1. EXTENTS OF RIPRAP AS SHOWN ON SHEET C200.
2. RIPRAP SHALL BE FREE FROM CRACKS, OVERBURDEN, SHALE, AND ORGANIC MATTER.
3. THE RIPRAP SHALL BE FREE FROM CRACKS, OVERBURDEN, SHALE, AND ORGANIC MATTER.
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8
RIPRAP DETAIL
N.T.S.



- NOTES:**
1. COVER HDG EMBED PL WITH BITUTHANE PRIOR TO SETTING POSTS ON KNIFE PLATE

1. **GENERAL:**
 - 1A) GENERAL: REFERENCES ON THE STRUCTURAL DRAWINGS TO ENGINEER MEAN THE STRUCTURAL ENGINEER OF RECORD. OTHER ENTITIES ARE SPECIFICALLY NOTED AS CONTRACTORS' ENGINEER, MECHANICAL ENGINEER, ETC.
 - 1B) THESE NOTES SUPPLEMENT THE SPECIFICATIONS, WHICH SHALL BE REFERENCED FOR ADDITIONAL REQUIREMENTS.
2. **USE OF DRAWINGS:**
 - 2A) DO NOT SCALE DRAWINGS.
 - 2B) DETAILS ON DRAWINGS TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS.
3. **DETAILS:** NOTED TYPICAL APPLY TO ALL SIMILAR CONDITIONS. WHERE NO SPECIFIC DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ELSEWHERE ON THE PROJECT.
4. **WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES AND SPECIFICATIONS:**
 - CONTACT THE ARCHITECT PRIOR TO PROCEEDING WITH CONSTRUCTION
 - THE MORE STRINGENT REQUIREMENTS SHALL GOVERN FOR BIDDING PRICING
5. **EXISTING STRUCTURES:**
 - 5A) EXISTING STRUCTURES HAVE BEEN PREPARED USING AVAILABLE DRAWINGS AND SITE OBSERVATION AS PERMITTED BY ACCESS RESTRICTIONS DURING DESIGN.
 - 5B) DURING CONSTRUCTION, THE CONTRACTOR MAY ENCOUNTER EXISTING CONDITIONS WHICH ARE NOT KNOWN OR ARE AT VARIANCE WITH PROJECT DOCUMENTATION. CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ALL CONDITIONS NOT PER THE CONTRACT DOCUMENTS. EXAMPLES INCLUDE:
 - SIZE, LOCATION, OR CONDITION OF EXISTING STRUCTURES SHOWN
 - DAMAGE OR DETERIORATION TO MATERIALS AND COMPONENTS
 - CONDITIONS OF INSTABILITY OR LACK OF SUPPORT
 - ITEMS NOTED AS EXISTING ON THE DRAWINGS BUT NOT FOUND IN THE FIELD
 - 5C) PREPARE DIMENSIONAL DRAWINGS OF ALL DISCOVERED ITEMS.

1. **CODES AND STANDARDS:**
 - 1A) GENERAL DESIGN
 - INTERNATIONAL BUILDING CODE 2024
 - 1B) LOADS
 - ASCESEI 7-22 "MINIMUM DESIGN LOAD FOR BUILDINGS AND OTHER STRUCTURES" WHERE INDICATED ON DRAWINGS
 - INDIVIDUAL UNFACTORED LOAD COMPONENTS (D, L, L_R, S, H, S_H, F, E, F_E, W, W_L) ARE AS DEFINED AND DETERMINED BY THE BUILDING CODES AND STANDARDS
 - UNFACTORED DEAD AND LIVE LOAD COMPONENTS SHALL BE COMBINED USING THE LOAD COMBINATIONS OF THE BUILDING CODE FOR SPECIALTY DESIGN BY OTHERS.
 - 1C) WOOD
 - ANSI/NDS-2024 "NATIONAL DESIGN SPECIFICATION (NDS) FOR WOOD CONSTRUCTION - WITH 2018 NDS SUPPLEMENT"
 - 2) SEISMIC LOADS
 - 2A) MAXIMUM ANTICIPATED CHANGE IN SEISMIC LOADING < 10% INCREASE FROM ORIGINAL SEISMIC LOADING TO COMPLY WITH INTERNATIONAL BUILDING CODE 2024
 - 3) **WIND LOADS**
 - RISK CATEGORY = I
 - BASIC ULTIMATE WIND SPEED, V_{ULT} = 120 mph
 - DESIGN WIND SPEED, V_{WD} = 100 mph
 - EXPOSURE CATEGORY = C
 - INTERNAL PRESSURE COEFFICIENT, GCPI = +0.18
 - TOPOGRAPHIC FACTOR, KZT = 1.00
 - GROUND ELEVATION FACTOR, K_E = 1.000
 - 4) **DESIGN WIND PRESSURE FOR COMPONENTS AND CLADDING AND ELEMENTS REFERRED BY THE CONTRACTOR**
 - 4A) LISTED COMPONENT AND CLADDING WIND PRESSURES ARE INCLUDED FOR REFERENCE ONLY. FINAL CALCULATIONS SHALL BE PROVIDED BY THE CONTRACTOR.
 - 4B) PRESSURES LISTED BELOW ARE ULTIMATE
 - 4C) SEE "WALL CORNER AND SPECIAL ROOF ZONES DIAGRAM"
 - 4D) COMPONENT AND CLADDING SURFACE PRESSURES (PSF)
 - VERTICALLY WIND-SCORPED AND PASTED INTO REVIT.

NOTES:

CONCLUSION

- NOTES:**
1. COVER HDG EMBED PL WITH BITUTHANE PRIOR TO SETTING POSTS ON KNIFE PLATE

1'-0"

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 - EXPOSURE CATEGORY = C
 - INTERNAL PRESSURE COEFFICIENT, GCPI = +0.18
 - TOPOGRAPHIC FACTOR, KZT = 1.00
 - GROUND ELEVATION FACTOR, K_E = 1.000
 - 4) **DESIGN WIND PRESSURE FOR COMPONENTS AND CLADDING AND ELEMENTS REFERRED BY THE CONTRACTOR**
 - 4A) LISTED COMPONENT AND CLADDING WIND PRESSURES ARE INCLUDED FOR REFERENCE ONLY. FINAL CALCULATIONS SHALL BE PROVIDED BY THE CONTRACTOR.
 - 4B) PRESSURES LISTED BELOW ARE ULTIMATE
 - 4C) SEE "WALL CORNER AND SPECIAL ROOF ZONES DIAGRAM"
 - 4D) COMPONENT AND CLADDING SURFACE PRESSURES (PSF)
 - VERTICALLY WIND-SCOPED AND PASTED INTO REVIT.

WOOD NOTES

- 1) **FRAMING/LUMBER:**
1A) DRY, MAXIMUM MOISTURE CONTENT AT THE TIME OF INSTALLATION, DOUGLAS FIR-LARCH, HEM-FIR WITH MINIMUM 16% MOISTURE. ALL DIMENSIONS BASED ON THE 2024 NATIONAL DESIGN SPECIFICATION (NDS) FOR WOOD CONSTRUCTION - WITH 2016 NDS SUPPLEMENT.
- 2) **PROVIDE HEM-FIR #2 UNLESS NOTED OTHERWISE ON DRAWINGS.**
- 3) **FASTENERS:**
3A) UNLESS NOTED OTHERWISE ON THE DRAWINGS, MINIMUM NAILS SHALL BE IN ACCORDANCE WITH IBC 2024 TABLE 204.10-3.
3B) WHERE COMMON NAILS ARE SPECIFIED, BOX NAILS OF EQUAL LENGTH MAY BE SUBSTITUTED PROVIDED ONE BOX NAIL IS ADDED FOR EVERY THREE COMMON NAILS SPECIFIED.
3C) ALL FASTENERS SHALL BE STAINLESS STEEL UNLESS NOTED OTHERWISE ON DRAWINGS.

MARTIN/MARTIN
CONSULTING ENGINEERS
2499 West Colfax Avenue
Lakewood, Colorado 80215
303.440.5100
www.mmartin.com

WHITE RIVER NATIONAL FOREST,
COLORADO

GENERAL NOTES AND DETAILS

NO. ISSUED FOR: DATE:

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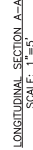
NO. ISSUED FOR: DATE:

Project Status: 60%

DATE: 1/28/2026 SHEET NO:

PROJECT NO:
25.0009-NFF

100S



1. CONTRACTOR SHALL FIELD VERIFY RAMP DIMENSIONS PRIOR TO FABRICATION.
2. CONTRACTOR SHALL FIELD VERIFY BUILDING FINISHED FLOOR ELEVATION AND ADJACENT GRADES, ADJUST RAMP LENGTH TO MEET ACTUAL FIELD CONDITIONS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONFIRM NUMBER OF STAIR RISERS TO MEET ACTUAL FIELD CONDITIONS PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO CONTRACTING OFFICER PRIOR TO CONSTRUCTION.
3. STAIRS SHALL BE POURED MONOLITIC WITH THE CONCRETE AT THE TOP AND BOTTOM OF STAIRS. IF THE CONTRACTOR DETERMINES THAT THERE IS A NEED TO ADD A COULD JOINT, PROVIDE TO THE CONTRACTING OFFICER PRIOR TO THE START OF CONSTRUCTION.
4. CONTRACTOR SHALL FIELD VERIFY EXISTING BUILDING FOUNDATION DEPTH. NEW 6" STEM WALL WRITING THE EXISTING FOUNDATION SHALL MATCH THE DEPTH OF EXISTING FOUNDATION.





**TIGWON
COMMUNITY HOUSE
IMPROVEMENT
DESIGN**

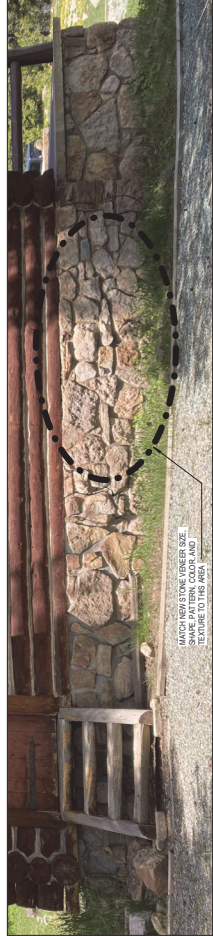
WHITE RIVER NATIONAL FOREST,
COLORADO

**ARCHITECTURAL
PLAN, ELEVATIONS,
& SECTIONS**

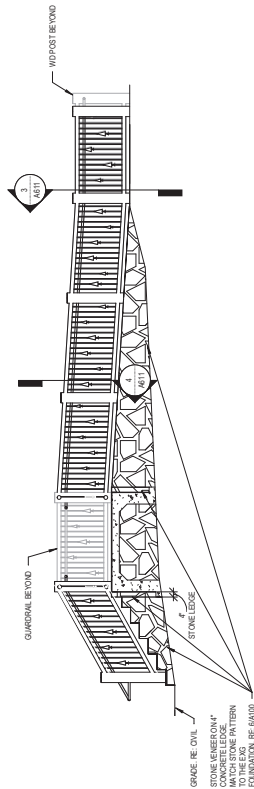
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PROJECT STATUS: 75%

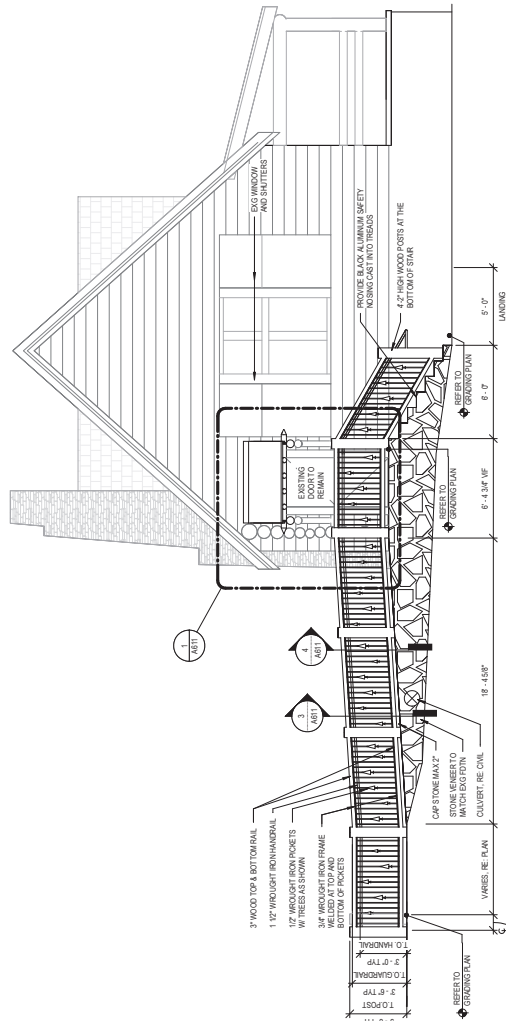
DATE: 2/13/2026
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PROJECT NO.: 2505



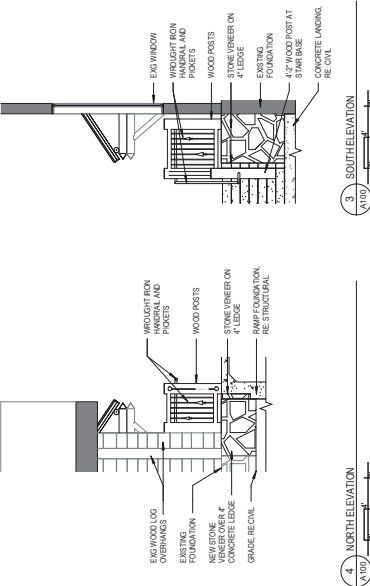
6 STONE PATTERN
NOT TO SCALE
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5 WEST ELEVATION | SECTION THROUGH STOOP, LOOKING EAST
A100

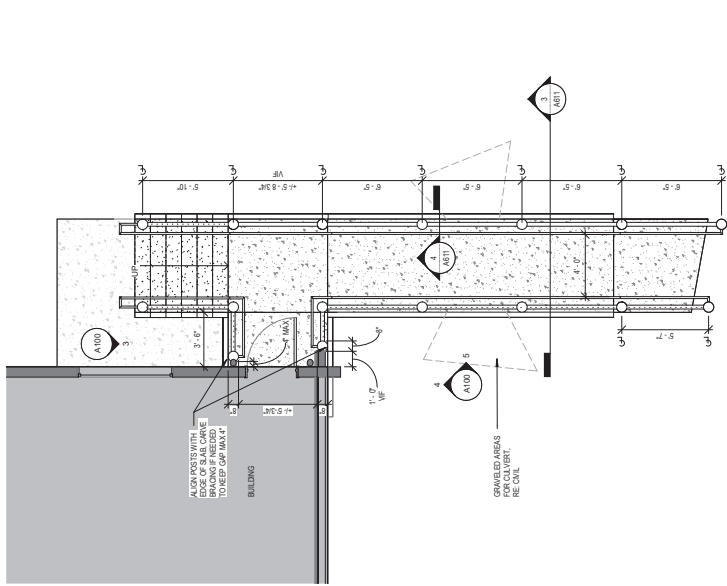


2 EAST ELEVATION
A100



3 SOUTH ELEVATION
A100

4 NORTH ELEVATION
A100



1 PLAN VIEW
A100

APPENDIX E: Design Specifications



United States
Department of
Agriculture

Forest Service

White River
National Forest

February 2026



Tigiwon Community House Improvements

Specifications

Division	Section Title
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SPECIFICATIONS GROUP

General Requirements Subgroup

DIVISION 01 - GENERAL REQUIREMENTS

01 1000	SUMMARY OF WORK
01 1400	WORK RESTRICTIONS
01 3100	PROJECT MANAGEMENT AND COORDINATION
01 3300	SUBMITTAL PROCEDURES
01 4000	QUALITY REQUIREMENTS
01 5000	TEMPORARY FACILITIES AND CONTROLS
01 5713	TEMPORARY EROSION AND SEDIMENTATION CONTROL
01 7300	EXECUTION REQUIREMENTS
01 7419	CONSTRUCTION WASTE MANAGEMENT
01 7700	CLOSEOUT PROCEDURES

Facility Construction Subgroup

DIVISION 02 - EXISTING CONDITIONS

02 4119	SELECTIVE DEMOLITION
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DIVISION 03 - CONCRETE

03 3000	CAST-IN-PLACE CONCRETE
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DIVISION 04 - MASONRY

04 2613	STONE VENEER
---------	--------------

DIVISION 05 - METALS

05 5000	METAL FABRICATIONS
05 7300	WROUGHT IRON RAILINGS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 1000	ROUGH CARPENTRY
---------	-----------------

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 3129	SYNTHETIC SHINGLES AND SHAKES
07 6200	SHEET METAL FLASHING AND TRIM
07 9200	JOINT SEALANTS

75% Construction Documents

DIVISION 08 - OPENINGS

NA

DIVISION 09 - FINISHES

09 9300 STAINING AND TRANSPARENT FINISHING

DIVISION 10 - SPECIALTIES

NA

DIVISION 11 - EQUIPMENT

NA

DIVISION 12 - FURNISHINGS

NA

DIVISION 14 - CONVEYING EQUIPMENT

NA

Facility Services Subgroup

DIVISION 21 – FIRE SUPPRESSION

NA

DIVISION 22 - PLUMBING

NA

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

NA

DIVISION 26 - ELECTRICAL

NA

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

NA

Site and Infrastructure Subgroup

DIVISION 31 - EARTHWORK

31 1000 SITE CLEARING

31 2000 EARTH MOVING

TIGIWON COMMUNITY HOUSE IMPROVEMENTS
WHITE RIVER NATIONAL FOREST

TOC - 2

75% Construction Documents

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 1373 CONCRETE PAVING JOINT SEALANTS

DIVISION 33 - UTILITIES

33 4100 STORM UTILITY DRAINAGE PIPING

END OF TABLE OF CONTENTS

SECTION 011000
SUMMARY OF WORK

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The intent of the contract is to provide for the complete construction of the project as described in the Contract Documents. The project requires the contractor to be responsible for supplying all labor, materials, equipment, miscellaneous items, freight, delivery, and all necessary valid licenses and permits required to complete work.
- B. The Tigiwon Community House is administered by the White River National Forest. Work for this project consists of a new handicapped accessible ramp with associated site improvements and modifications to an existing awning.

1.2 LOCATION

- A. This project is located in Eagle County, Colorado.

1.3 CONTRACTOR'S RESPONSIBILITIES

- A. Provide adequate signing and barricades and take necessary safety measures during all construction operations. Minimize disturbance of all undisturbed areas.

1.4 FIELD VERIFICATION

- A. Field verify all new and existing dimensions affecting the work of this contract before ordering products.

1.5 PERMITS

- A. Obtain permits for work required by County, State, or Federal laws or regulations.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011000

SECTION 011400
WORK RESTRICTIONS

PART 1-GENERAL

1.1 USE OF PREMISES

- A. Use of Site: Confine constructions operations to immediate area of work. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.2 GOVERNMENT'S OCCUPANCY REQUIREMENTS

- A. The Government will not occupy the Community House during entire construction period but may use the road for access to the Forest. Do not impede use or access.
- B. Limit construction operations to the area designated as within the Limits of Construction, except as indicated below.
- C. Exceptions to the Occupancy Requirements indicated above may be obtained with the prior written approval of the Contracting Officer. Submit requests for exceptions in writing to the Contracting Officer at least 48 hours in advance of the time when the exception is desired. Identify in the request:
 - 1. Reason for exception.
 - 2. Time and duration of exception.
 - 3. Details of the work to be performed.
 - 4. Expected impact on normal Government operations.
 - 5. Plan outlining how unexpected delays or impediments to completing the work in a timely way will be handled.

1.3 WORK RESTRICTIONS

- A. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. The Contracting Officer will designate areas on the site for material storage. Confine storage of materials to areas as approved by the CO.
- B. Since the work will take place on public lands, the public may be on-site during the Work. Provide adequate signing and barricades and take necessary safety measures to protect the public during all construction operations. Minimize disturbance of all undisturbed areas.

PART 2- PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 011400

SECTION 013100
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes certain administrative provisions for managing and coordinating construction operations, including but not limited to the following:
1. General project coordination.
 2. Coordination drawings.
 3. Conservation.
 4. Administrative and supervisory personnel.
 5. Conferences and meetings.
 6. Cleaning and protection.

1.2 GENERAL PROJECT COORDINATION

- A. Coordination of Trades: Coordinate construction operations included in the various sections of the Specifications to provide an efficient and orderly installation of each part of the Work. Coordinate construction operations included under different sections of the Specifications that depend on each other for proper installation, connection or operation.
1. Schedule construction operations in the sequence required to obtain the best results where the installation of one part of the Work depends on installation of other components before or after that part.
 2. Coordinate installation of different components to provide maximum accessibility for required maintenance, service, testing and repair.
 3. Accommodate items scheduled for later installation.
- B. Notification: Where necessary, prepare and distribute memoranda to each party involved, outlining special procedures required for coordination. When applicable, include notices, reports and meeting minutes as part of the memoranda.
- C. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other construction activities to avoid conflicts and promote orderly progress of the Work. Administrative procedures include but are not limited to the following:
1. Preparation of schedules.
 2. Installation and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.

5. Project closeout activities.

1.3 COORDINATION DRAWINGS

- A. Prepare coordination drawings where careful coordination is needed for installation of products and materials fabricated by separate entities, and prepare coordination drawings where limited space availability necessitates maximum utilization of the space for efficient installation of different components.
 1. Show the relationship of components shown on separate shop drawings.
 2. Indicate required installation sequences.
 3. Provide vertical and horizontal dimensions necessary to locate each component and avoid conflicts within the space.
 4. Comply with requirement specified in Division 1 Section "Submittal Procedures."

1.4 CONSERVATION

- A. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated in the Work
 2. Refer to other sections for disposal of salvaged materials that are designated as Government's property.

1.5 CONFERENCES AND MEETINGS

- A. Preconstruction Conference: The Contracting Officer shall schedule a preconstruction conference before starting construction at a time and place convenient to the Contractor. Conference shall review responsibilities and personnel assignments.
 1. Attendees: Participants at the conference shall be familiar with the project, shall be authorized to conclude matters relating to the Work, and shall minimally include representatives of the following parties:
 - a. Contracting Officer.
 - b. Contracting Officer's Representative
 - c. Contractor.
 - d. Major subcontractors.
 - e. Major suppliers.
 - f. Other concerned parties.
 2. Agenda: Subjects for discussion shall include items of significance that could effect progress, including but not limited to the following:
 - a. Tentative construction schedule.
 - b. Critical work sequencing.

- c. Designation of responsible personnel.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for processing Applications for Payment.
 - f. Distribution of Contract Documents.
 - g. Submittal of Shop Drawings, Product Data, and Samples.
 - h. Preparation of Record Documents.
 - i. Use of the premises.
 - j. Office, work, and storage areas.
 - k. Equipment deliveries and priorities.
 - l. Safety procedures.
 - m. First aid.
 - n. Security.
 - o. Housekeeping and progress cleaning.
 - p. Working hours.
3. Reporting: No later than five (5) calendar days after the conference, the Contractor shall distribute minutes of the conference to each party present and to other concerned parties, including the Contracting Officer.
- B. Progress Meetings: The Contracting Officer's Representative shall conduct progress meetings at the Project Site at regular intervals. Dates of meetings shall be coordinated with preparation of the payment request.
- 1. Attendees: In addition to the Contractor's and Contracting Officer's representatives, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
 - b. Review the present and future needs of each entity present, including but not limited to the following:
 - 1) Interface requirements.
 - 2) Time.
 - 3) Sequences of operations.
 - 4) Status of submittals.
 - 5) Deliveries.

- 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Hours of work.
 - 11) Hazards and risks.
 - 12) Housekeeping and progress cleaning.
 - 13) Quality and work standards.
 - 14) Change Orders.
 - 15) Documentation of information for payment requests.
 - 16) Updating of Record Documents.
3. Reporting: No later than five (5) calendar days after each meeting, the Contractor shall distribute minutes of the meeting to each party present and to other concerned parties, including the Contracting Officer. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 4. Schedule Updating: The Contractor shall revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. The revised schedule shall be issued concurrently with the report of each meeting.

1.6 SUBMITTALS

- A. Coordination Drawings: Comply with the shop drawing requirements specified in Division 1 Section "Submittal Procedures."
- B. Staff Names: Within 15 days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the site; identify their duties and responsibilities; and their addresses and telephone numbers.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

- A. Inspection of Conditions: Prior to installations, require the installer of each major component to inspect both the substrate and conditions under which work is to be performed.
 1. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

2. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.
- B. Construction in Progress: Keep construction in progress, and adjoining materials in place, clean during handling and installation. Apply protective coverings where required for protection from damage or deterioration.
- C. Completed Construction: Clean completed construction, and provide maintenance, as frequently as necessary to prevent damage or soiling or other deterioration through the remainder of the construction period. Adjust and lubricate operable components as necessary to assure operability without damage.
- D. Limiting Exposures: Supervise construction operations to prevent exposure of any part of construction, completed or in progress, to harmful, dangerous, damaging or otherwise deleterious conditions during the construction period. Such conditions include but are not limited to the following:
1. Excessive static or dynamic loading.
 2. Excessive internal or external pressures.
 3. Excessively high or low temperatures.
 4. Thermal shock.
 5. Excessively high or low humidity.
 6. Pollution and air contamination.
 7. Water or ice.
 8. Chemicals and solvents.
 9. Light.
 10. Puncture.
 11. Abrasion.
 12. Heavy traffic.
 13. Soiling, staining, and corrosion.
 14. Bacteria.
 15. Rodent and insect infestation.
 16. Combustion.
 17. Electrical current.
 18. High-speed operation.
 19. Improper lubrication.
 20. Unusual wear or other misuse.
 21. Contact between incompatible materials.
 22. Destructive testing.
 23. Misalignment.
 24. Excessive weathering.
 25. Unprotected storage.
 26. Improper shipping or handling.
 27. Theft or vandalism.

END OF SECTION 013100

SECTION 013300
SUBMITTAL PROCEDURES

PART 1- GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for the performance of the work. Submittals include action type and administrative/informational submittals.

1. Action Submittals.

- a. Product Data.
- b. Shop Drawings.
- c. Samples.
- d. Request for Information (RFI).
- e. Contractor quality control plan.
- f. Construction indoor air quality plan.
- g. Construction waste management plan.

2. Administrative/Informational Submittals.

- a. Contractor's construction schedule.
- b. Submittal schedule.
- c. Staff names and responsibilities.
- d. Contractor's quality control daily construction reports.
- e. Construction progress schedules.
- f. Permits, licenses, and certificates.
- g. Applications for payment.
- h. Performance and payment bond.
- i. Insurance certificates.
- j. List of subcontractors.
- k. Test reports.
- l. Field reports.
- m. Manufacturer's instructions.
- n. Schedule of values.

- B. See Division 1 Section "Closeout Procedures" for submitting Closeout Submittals, Warranties, Project Record Documents, Operation and Maintenance Manuals and "as built" drawings.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Contracting Officer's (CO's) responsive action.

- B. Administrative/Informational Submittals: Written information that does not require CO's approval. Submittals may be rejected for not complying with requirements.
- C. Electronic Submittals: Transmit submittals in electronic (PDF) format using an approved website service designed specifically for transmitting submittals such as Procore, Submittal Exchange, or Autodesk Construction Cloud.
 - 1. Electronic submittal process is not intended for color samples, color-charts, or physical material samples. For these items, submit actual items.
- D. Approved Equal: For products that are identified as "basis of design" or with only a single manufacturer listed or that include the phrase "or approved equal", alternative products that have the same salient characteristics as the specified product may be submitted for approval to the Contracting Officer. Salient characteristics may include technical or quality requirements, material, color, pattern, texture, fabrication details, etc.

1.3 SUBMITTAL PROCEDURES

- A. General: The following procedure requirements pertain to all submittals regardless of the method utilized for submission.
 - 1. Review each submittal and check for compliance with the Contract Documents. Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
 - 2. Contracting Officer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
 - 3. Submittals not required by the Contract Documents will not be reviewed and may be discarded.
 - 4. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on CO's receipt of submittal.
 - a. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. CO will advise Contractor when a submittal being processed must be delayed for coordination.
 - b. If intermediate submittal is necessary, process it in same manner as initial submittal.
 - c. Allow 10 working days for processing each re-submittal.
 - d. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- B. Submittal Stamp: Electronic or ink stamp each submittal utilized for identification and including the following:

1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 2 by 3 inches on label or beside title block to record Contractor's review and approval markings and action taken by CO.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Contractor.
 - d. Name of manufacturer.
 - e. Unique identifier, including revision number.
 - f. Number and title of appropriate Specification Section.
 - g. Drawing number and detail references, as appropriate.
 - h. Other necessary identification.
- C. Electronic Submittal Procedures: Where identified, utilize electronic submittal procedure. The full cost of Submittal Exchange project subscription is provided by the Government under separate contract.
1. Preparation of Submittals: Use any or all of the following options:
 - a. Subcontractors and Suppliers provide electronic (PDF) submittals to General/Prime Contractor via the Submittal Exchange website.
 - b. Subcontractors and Suppliers provide paper submittals to General/Prime Contractor who electronically scans and converts to PDF format.
 - c. Subcontractors and Suppliers provide paper submittals to Scanning Service which electronically scans and converts to PDF format.
 2. Before submitting submittals to the Contracting Officer, apply electronic approval stamp certifying the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product, dimensions, and coordination of information with other parts of the work.
 3. Transmit each submittal to the Contracting Officer using the submittal website.
 4. Government review comments will be made available on the submittal website for downloading. General/Prime Contractor will receive email notice of completed review.
 5. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the General/Prime Contractor. Use only final submittals with mark indicating action taken by Contracting Officer in connection with construction.
 6. Submit two sets of paper copies of reviewed submittals at project closeout for record purposes in accordance with Division 01, "Closeout Procedures."
 7. Internet Service and Equipment Requirements
 - a. Email address and Internet access at Contractor's main office.

- b. Software: Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

PART 2 – PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment. Submit product data through electronic submittal process.
 - 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 copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Compliance with recognized trade association standards.
 - g. Compliance with recognized testing agency standards.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams: Differentiate between manufacturer installed and field installed wiring. Show field-installed wiring, including power, signal, and control wiring.
 - f. Notation of dimensions established by field measurement.
- D. Samples: Submit three (3) sets of Samples. The CO will return one set marked with action taken. Samples include partial sections of manufactured or fabricated compo-

nents, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

1. Mount, display or package samples in the manner to facilitate review of qualities indicated. Include the following:
 - a. Specification Section number and reference.
 - b. Generic description of the Sample.
 - c. Sample source.
 - d. Product name or name of the manufacturer.
 - e. Compliance with recognized standards.
 - f. Availability and delivery time.
 2. Refer to Divisions 2 through 33 Sections for specific Sample requirements that illustrate workmanship, fabrication, techniques, details of assembly, connections, operation and similar construction characteristics.
 3. Submit a full set of choices where Samples are submitted for selection of color, pattern, texture or similar characteristics from a range of standard choices.
 4. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.
 - a. Unless noncompliance with the Contract Document provisions is observed, the submittal may serve as the final submittal.
 - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- E. Requests for Information (RFI's): Immediately on discovery of the need for additional information or interpretation of the Contract Documents, prepare and submit an RFI in the form specified.
1. RFI's submitted by entities other than the Contractor shall not be accepted.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 3. Content of the RFI: Utilize forms provided by the Contracting Officer. Include a detailed, legible description of item needing information or interpretation and the following:
 - a. Project name.
 - b. Project number.
 - c. Date.
 - d. Name of Contractor.
 - e. Name of Contracting Officer.
 - f. RFI number, numbered sequentially.
 - g. RFI subject.
 - h. Specification Section number and title and related paragraphs, as appropriate.

- i. Drawing number and detail references, as appropriate.
 - j. Field dimensions and conditions, as appropriate.
 - k. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - l. Contractor's signature.
 - m. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop
 - n. Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - 1) Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
4. CO's Action: CO will review each RFI, determine action required, and respond. Allow seven (7) working days for CO's response for each RFI. RFIs received by CO after 1:00 p.m. will be considered as received the following working day.
- a. The following RFIs will be returned without action:
 - 1) Requests for approval of submittals.
 - 2) Requests for approval of substitutions.
 - 3) Requests for coordination information already indicated in the Contract
 - 4) Documents.
 - 5) Requests for adjustments in the Contract Time or the Contract Sum.
 - 6) Requests for interpretation of CO's actions on submittals.
 - 7) Incomplete RFIs or inaccurately prepared RFIs.
 - b. CO's action may include a request for additional information, in which case CO's time for response will date from time of receipt of additional information.
 - c. CO's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Contracting Section "Contract Modification Procedures."
 - 1) If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify CO in writing within 10 days of receipt of the RFI response.
5. On receipt of CO's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify CO within seven days if Contractor disagrees with response.

6. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:

- a. Project name.
- b. Name and address of Contractor.
- c. Name and address of Contracting Officer.
- d. RFI number including RFIs that were dropped and not submitted.
- e. RFI description.
- f. Date the RFI was submitted.
- g. Date CO's response was received.
- h. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- i. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

F. Contractor Quality Control Submittals: Provide Quality Control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

1. Certifications: Where other Sections of the Specifications require certification that a product, material or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.

- a. Signature: Signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

2. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Requirements."

G. Contractor Quality Control Plan: Comply with requirements specified in Division 1 Section "Quality Requirements."

H. Construction Indoor Air Quality: Comply with requirements specified in Division 1 Section "Construction Indoor Air Quality Management."

I. Construction Waste Management Plan: Comply with requirements specified in Division 1 Section "Construction Waste Management."

J. Application for Payment: Comply with requirements specified in the Contract Clauses and Division 1 Section "Definition of Items & Measurement and Payment".

2.2 ADMINISTRATIVE/INFORMATIONAL SUBMITTALS

- A. General: Refer to other Division 1 Sections and other Contract Documents requirements for administrative/informational submittals.
- B. Contractor's Construction Schedule (CPM Schedule): Prepare and submit a construction schedule within 15 days of the date established for "Notice to Proceed."
- C. Submittal Schedule: After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.
 - 1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
 - 2. Prepare the schedule in chronological order. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number.
 - c. Submittal category (Shop Drawings, Product Data, or Samples).
 - d. Name of the subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for resubmittal.
 - g. Scheduled date for the CO's final release or approval.
 - 3. Distributions: Following response to the initial submittal, print and distribute copies to the CO, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
 - 4. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.
 - a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- D. Contractor's Quality Control Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at the site, and submit duplicate copies to the CO at weekly intervals:
 - 1. List of subcontractors at the site.
 - 2. Approximate count of personnel at the site.
 - 3. High and low temperatures, general weather conditions.
 - 4. Accidents and unusual events.
 - 5. Meetings and significant decisions.
 - 6. Stoppages, delays, shortages, and losses.
 - 7. Meter readings and similar recordings.

8. Emergency procedures.
 9. Orders and requests of governing authorities.
 10. Change Orders received, implemented.
 11. Services connected, disconnected.
 12. Equipment or system tests and startups.
 13. Partial Completions, occupancies.
 14. Substantial Completions authorized.
- E. Schedule of Values: Following award, provide a cost breakdown schedule listing main types of work with associated costs. Comply with requirements specified in the Contract Clauses.
- F. 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.
- G. 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.
- H. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

PART 3 – EXECUTION

3.1 GENERAL

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to CO.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
- C. CO will not review submittals that do not bear Contractor's approval stamp and will return them without action.

END OF SECTION 013300

SECTION 014000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control including preparing and executing a quality control program.

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 ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by CO.

1.3 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to CO for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum with reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to CO for a decision before proceeding.

1.4 SUBMITTALS

- A. As specified in Division 1 Section "Submittal Procedures".
- B. Testing Agencies Qualification Data: Submit proof of qualifications and experience in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Quality Control Plan: At the time of the preconstruction conference, submit for approval a written Contractor Quality Control (CQC) plan. Plan should be appropriate to complexity of project.
 - 1. The plan may include:

- a. A list of personnel responsible for quality control and assigned duties. Include each person's qualifications.
 - b. A copy of a letter of direction to the Contractor's Quality Control Supervisor outlining assigned duties.
 - c. Names, qualifications, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms.
 - d. Methods of performing, documenting, and enforcing quality control of all work.
 - e. Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.
2. If the plan requires any revisions or corrections, the Contractor shall resubmit the plan within 10 days.
 3. The Government reserves the right to require changes in the plan during the contract period as necessary to obtain the quality specified.
 4. No change in the approved plan may be made without written concurrence by the Contracting Officer (CO).
- D. Contractor's Quality Control Daily Reports: Submit showing all inspections and tests on the first workday following the date covered by the report.
- E. Test Reports:
1. Submit Daily Test Information Sheets with Quality Control Daily Reports.
 2. Submit failing test results and proposed remedial actions within four hours of noted deficiency.
 3. Submit three copies of complete test results not later than three calendar days after the test was performed.
 4. Test Reports shall be certified and include the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making tests and inspections.
 - f. Description of the Work and test and inspection method.
 - g. Identification of product and Specification Section.
 - h. Complete test or inspection data.
 - i. Test and inspection results and an interpretation of test results.
 - j. Ambient conditions at time of sample taking and testing and inspecting.
 - k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - l. Name and signature of laboratory inspector.
 - m. Recommendations on retesting and reinspecting.
- F. Off-Site Inspection Reports: Submit prior to shipment.
- G. Permits, Licenses, and Certificates: For CO's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices,

receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- E. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
- F. Testing Laboratory and Equipment: All measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards in accordance with NBS requirements. Upon request, measuring and testing devices shall be made available for use by the Government for verification tests.

1.6 QUALITY CONTROL

- A. Designate a Quality Control Supervisor with the following responsibilities:
 - 1. Quality Control Supervisor shall be on the project site whenever contract work is in progress. The Contractor's Quality Control Supervisor may also perform the duties of Project Superintendent,
 - 2. Complete Quality Control Daily Reports.
 - 3. Have all work inspected and tested often enough to ensure that the quality of materials, workmanship, construction, finish, and functional performance is in compliance with applicable specifications and drawings.
 - 4. Where testing services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 5. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.

6. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 7. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 8. Cooperate with testing agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Provide the following:
 - a. Access to the Work.
 - b. Incidental labor and facilities necessary to facilitate tests and inspections.
 - c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - d. Facilities for storage and field-curing of test samples.
 - e. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - f. Security and protection for samples and for testing and inspecting equipment at Project site.
- B. Testing Agency Responsibilities: Cooperate with CO and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify CO and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Submit a certified written report of each test, inspection, and similar quality-control service through Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 3. Retest and re-inspect corrected work.
 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 5. Do not perform any duties of Contractor.
 6. Perform independent testing and special inspections where indicated as the Contractor's responsibility as required by the Contract Documents, including:
 - a. Civil Drawings
 - b. Structural Drawings
 - c. Division 3 Section "Cast-In-Place Concrete".
 - d. Division 31 Section "Earth Moving"
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 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 Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
 - 2. Comply with the Contract Document requirements for Division 2 Section "Selective Demolition."
- 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.

3.2 OFF-SITE CONTROL

- A. Inspect items that are fabricated or assembled off-site for quality control at the place of fabrication.

3.3 ON-SITE CONTROL

- A. Notification:
 - 1. Notify the CO at least 48 hours in advance of the preparatory phase meeting.
 - 2. Notify the CO at least 24 hours in advance of the initial and follow-up phases.
- B. Preparatory Phase: Perform before beginning each feature of work.
 - 1. Review control submittal requirements with personnel directly responsible for the quality control work. As a minimum, the Contractor's Quality Control Supervisor and the foreman responsible for the feature of work shall be in attendance.
 - 2. Review all applicable specifications sections and drawings related to the feature of work.
 - 3. Ensure that copies of all referenced standards related to sampling, testing, and execution for the feature of work are available on site.
 - 4. Ensure that provisions have been made for field control testing.
 - 5. Examine the work area to ensure that all preliminary work has been completed.
 - 6. Verify all field dimensions and advise the CO of discrepancies with contract documents.
 - 7. Ensure that necessary equipment and materials are at the project site and that they comply with approved shop drawings and submittals.
 - 8. Prepare a report on all preparatory phase activities and discussions. Attach report to Contractor's Quality Control Daily Report.
- C. Initial Phase:

1. As soon as work begins, inspect and test a representative portion of a particular feature of work for quality of workmanship.
 2. Review control-testing procedures to ensure compliance with contract requirements.
 3. Prepare a report on all initial phase activities and discussions. Attach report to Contractor's Quality Control Daily Report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
- D. Follow-Up Phase: Inspect and test as work progresses to ensure compliance with contract requirements until completion of work.
- E. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be required on the same feature of work for the following reasons:
1. Quality of on-going work is unacceptable.
 2. Changes occur in the applicable quality control staff, on-site production supervision, or work crew.
 3. Work on a particular feature of work is resumed after a substantial period of inactivity.
- 3.4 MEETINGS
- A. Weekly check-in meetings are required for project progress updates.
- 3.5 ENFORCEMENT
- A. Stop work on any item or feature pending satisfactory correction of any deficiency noted by the quality control staff or the CO. The CO may designate locations of tests.

END OF SECTION 014000

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities.

1.2 WATER

- A. Contractor shall provide temporary water facilities for the duration of the project.

1.3 SANITARY FACILITIES

- A. Contractor shall provide temporary sanitary facilities for the duration of the project.

1.4 ELECTRICAL SERVICE

1.5 Contractor shall provide temporary power facilities for the duration of the project.

1.6 WASTE DISPOSAL FACILITIES

- A. Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.
- B. Use of Government waste facilities is not permitted.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 015000

SECTION 01 5713 - TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Additional information concerning temporary erosion and sedimentation control may be found on the civil drawings and the Colorado Department of Public Health and Environment's (CDPHE) Construction Stormwater Discharge Permit standards. In case of conflict between the drawings, CDPHE criteria and the information specified herein, the more stringent requirements shall govern.

1.2 SUMMARY

- A. Work Included. Furnish, install, maintain, and remove temporary erosion and sedimentation controls as shown on the drawings or specified herein, or as required to complete the work.
- B. Related Sections include the following:
 - 1. Division 31 Section "Site Clearing" site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
 - 2. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
 - 3. Division 31 Section "Trenching and Backfilling" for excavating and backfilling of utilities.
- C. Permits and Fees: Obtain and pay for all permits and fees required for the work of this section, including erosion and sediment control and water quality permits required by the authority having jurisdiction and the Colorado Department of Public Health and Environment, Water Quality Control Division.
- D. Erosion Control: The Erosion and Sedimentation Control Drawings included in the Contract Documents is the minimum requirement to be implemented. Provide additional control as necessary to meet applicable local, State, and Federal criteria, and as applicable Contracting Officer and engineer requirements.

1.3 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Unclassified Excavation: Removal of all material of whatever character required for the work encountered above subgrade elevations and to lines and dimensions indicated, including boulders.

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- C. Fill: Fill is all material placed to raise the grade of the site or to backfill excavation, upon which the Soils Engineer has made sufficient tests and observations to enable him to issue a written statement that, in his opinion, the fill has been placed and compacted in accordance with the requirements of these specifications.
- D. BMP: Best Management Practice. Erosion and sediment control devices, which may consist of silt fence, rock socks, filter fabric, riprap, etc.
- E. SWMP: Storm Water Management Plan. Identifies BMPs, which are erosion and sediment control measures for the project.
- F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- G. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- H. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services to buildings.

1.4 SUBMITTALS

- A. Submittal Procedures: All submittals are to be made to the Contracting Officer. If provided, refer to Division 1 section "Submittal Procedures."
- B. Product Data: Submit manufacturer's published descriptive literature and complete specifications for manufactured products specified herein and utilized on the project.
 - 1. Geotextiles.
 - 2. Erosion Control Fabric.
 - 3. Silt Fence.
 - 4. Rock Socks.
- C. Storm Water Management Plan:
 - 1. The project is anticipated to disturb less than 1-acre, not requiring a Storm Water Management Plan (SWMP) and report addressing erosion and sediment control measures. If site disturbance changes and is anticipated to disturb 1 or more acres, a SWMP will need to be prepared and included for the General Permit application.
 - 2. If disturbing 1 or more acres, the Contractor is responsible for obtaining all required permits including a General Permit application for Storm Water Discharges associated with construction activities at least ten (10) days prior to start of construction. Permits are to be filed with the Colorado Department of Public Health and Environment, Water Quality Control Division.
 - 3. If needed, the Contractor shall have the Storm Water Management Plan (SWMP) and report available on-site at all times.
 - 4. If needed, the Storm Water Management Plan should be reviewed and modified as part of the overall process of assessing and managing storm water quality issues at the site. Erosion and sediment control measures outlined in the report are intended as the minimum requirement for the construction of this project as anticipated at the time of design.

Additional measures are to be implemented and updated in the SWMP per CDPHE, as necessary and as required by CDPHE, the Contracting Officer, and engineer requirements, by the Contractor to control erosion and the release of sediment into the surrounding streets, storm sewer, or existing drainage facilities.

1.5 QUALITY ASSURANCE:

- A. Regulatory Requirements: Comply with applicable local, State and Federal ordinances, rules and regulations concerning sedimentation control and storm water runoff.
- B. In case of conflict between the above codes, regulations, references and standards and these specifications, the more stringent requirements shall govern.
- C. Preconstruction Conference: Conduct conference at Project site as directed by the Contracting Officer prior to start of construction. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.6 PROJECT/SITE CONDITIONS

- A. Existing Conditions: Verify all existing conditions affecting the work of this section prior to submitting bids or proposals. Additional compensation will not be allowed for revisions or modification of work resulting from failure to verify existing conditions.

1.7 WARRANTY

- A. Temporary Erosion and Sediment Control measures shall be maintained until permanent measures are in place. All damaged, disturbed or devices filled with sediment, which may occur within the specified project warranty period, shall be corrected at no cost to the Government. Any devices damaged by erosion or sediment shall be restored to their original condition by the Contractor, at no cost to the Government.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Erosion and Sedimentation Control Materials: Provide one or more of the following materials, as shown on the plans or as applicable for site conditions:
 - 1. Sand bags.
 - 2. Silt fences.
 - 3. Rock socks.
 - 4. Concrete washout area.
 - 5. Vehicle tracking control.
 - 6. Rock riprap.
 - 7. Temporary seeding.
 - 8. Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh.
 - 9. Biodegradable twisted jute or spun-coir mesh, 0.92 lb/sy minimum, with 50 to 65 percent open area.

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10. Drainage geotextile.
11. Impervious fill.
12. Other materials proposed for use on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. Determine the existing ground elevations, drainage patterns, and changes to such patterns during excavation in order to satisfactorily plan and provide materials for adequate erosion and sediment control devices.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and rights-of-way according to requirements of authorities having jurisdiction.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which the work of this section will be performed. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.

3.4 INSTALLATION

- A. Erosion and Sedimentation Control Devices. Erosion and sedimentation control measures to be taken during construction include, but are not necessarily limited to the following:
 1. Apply soil stabilization within 14 days to all disturbed areas that are to be dormant for a period longer than 30 calendar days after reaching grade. Stabilize soil with mulch anchored per criteria of authorities having jurisdiction. Temporarily revegetate areas that will remain in an interim condition for more than three (3) months.
 2. Roads and parking areas indicated to be paved may be covered with an appropriate aggregate base course in lieu of mulch. Temporary mulching or aggregate base course is not required if final pavement construction will take place within 30 days after grading to final contours.
 3. Soils that will be stockpiled for more than 30 days must be mulched and seeded within 14 days after stockpile construction.

4. Prevent sediment from leaving the project site by installing a silt fence or other BMPs as indicated on the plans. Protect existing storm inlets adjacent to the site by an approved gravel filter or rock socks.
5. Locate stone stabilization pads at all points of vehicular ingress and egress to the construction site.
6. Provide temporary erosion controls consisting of berms at the top of slopes and interceptor ditches at ends of berms and at those locations which will eliminate or minimize erosion during construction, along with temporary seeding, temporary diversion, chutes, and down pipes and lining of water courses.
7. Temporary sedimentation controls shall consist of rock socks, silt fence, barriers, and appurtenances at the top of spoil and borrow area slopes and where runoff water exits the site.
8. Maintain the available silt holding capacity of silt fence and rock socks until no longer needed. The sediment capacity of sediment retainage areas shall be at a minimum, the capacity shown on the plans in conformance with Urban Drainage Criteria Manual, Volume 3. Prior to removal, obtain concurrence of the Contracting Officer.
9. Remove accumulated sediment and debris from a BMP when the sediment level reaches one-half the height of the BMP, or at any time the sediment or debris adversely impacts the functioning of the BMP.
10. The erosion/sediment control plan shows the minimum required for the project. If it becomes apparent that additional controls are necessary, the Contracting Officer shall be notified and with approval of the Contracting Officer additional controls shall be installed.

B. Chemicals and Pollutants:

1. Store construction materials and chemicals that could contribute pollutants to the runoff within an enclosure, container, or dike located around the perimeter of the storage area, to prevent discharge of these materials into runoff from the construction site.
2. Locate areas used for collection and temporary storage of solid and liquid waste away from the storm drainage system. Provide covering or fencing as required to prevent windblown materials; construct perimeter dike to contain liquid runoff. These measures may not be necessary if materials are immediately placed in covered waste containers.
3. Perform equipment maintenance in designated areas using measures such as drip pans to control petroleum products spillage.
4. Immediately clean up and properly dispose of spills of construction related materials such as paints, solvents, or other chemicals.

C. Final Stabilization and Long-Term Management:

1. Final stabilization shall be achieved through permanent vegetation and landscaping after construction of all paved surfaces.
2. With approval of the Contracting Officer, temporary erosion and sediment control measures may be removed within 30 days after final site stabilization is achieved or after temporary measures are no longer needed.

D. Inspection and Maintenance: Inspect erosion and sediment control measures weekly during construction. In addition, inspect all facilities immediately after any significant runoff or snowmelt which results in runoff. Repair or otherwise mitigate any damage to the erosion and sediment control facilities at no additional cost to the Government.

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3.5 CLEANING

- A. Removal of Controls: Remove controls upon completion of that portion of the work for which controls were furnished. Leave the site and work area in a clean condition.

END OF SECTION 01 5713

SECTION 017300
EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. General installation of products.
 - 2. Progress cleaning.
 - 3. Protection of installed construction.
 - 4. Correction of the Work.
- B. See Division 1 Section "Closeout Procedures" for final cleaning.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: Before beginning work, investigate and verify the substrates other construction affecting the Work.
- B. Acceptance of Conditions: Examine areas, and conditions, with Installer. Record observations.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information

to CO. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 INSTALLATION

- A. General: Locate the Work and components of the 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.
- B. Comply with manufacturer's written instructions and recommendations for installing products.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by CO.
- F. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 working days during normal weather or 3 working days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.

- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use-cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.5 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 manufacturers written instructions for temperature and relative humidity.

3.6 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 their specified condition.

- C. Remove and replace damaged surfaces that are 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.

END OF SECTION 017300

SECTION 017419
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.
 - 4. Disposing of hazardous materials.

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. 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.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 SUBMITTALS

- A. Waste Management Plan: Submit three (3) copies of plan within 30 days of date established for the Notice to Proceed.

1.4 QUALITY ASSURANCE

- A. Waste Management Conference: Conduct conference at Project site.

1.5 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification and waste reduction work plan. 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 site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 3. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 4. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Contracting Officer (CO). Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - 1. Distribute waste management plan to everyone concerned within three (3) days of submittal return.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. 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.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:
1. Mountain Waste & Recycling, 1058 County Road 100, Carbondale, CO.
 2. Trinity Recycling, 585 Lindbergh Dr., Gypsum, CO.
- 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 the maximum extent practical.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are 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 the ground and protect from the weather.
 5. Remove recyclable waste off Government's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
- C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- D. Metals: Separate metals by type.
 - 1. Remove and dispose of bolts, nuts, washers, and other rough hardware.

3.4 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.
- C. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.5 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Government's property and legally dispose of them.
- D. Hazardous Waste: Dispose of properly by applicable standards and regulations.

END OF SECTION 017419

SECTION 017700
CLOSEOUT PROCEDURES

PART - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract close-out, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record documents.
 - 3. Operation and maintenance manuals.
 - 4. Warranties.
 - 5. Demonstration and training.
 - 6. Final cleaning.

1.2 SUBSTANTIAL COMPLETION

- A. Definition of Substantial Completion: The Date certified by the Contracting Officer when construction is sufficiently complete, in accordance with the Contract Documents, so the Government can occupy or utilize the Work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.
- B. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Contracting Officer (CO) of pending insurance changeover requirements.
 - 3. Submit specific workmanship bonds, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Government unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs and photographic negatives or electronic files, damage or settlement surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Government. Label with manufacturer's name and model number where applicable.
 - 7. Submit testing reports.
 - 8. Terminate and remove temporary facilities from Project site.
 - 9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- C. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, CO will either proceed with inspection or notify Contractor of unfulfilled requirements. CO will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by CO, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit certified copy of CO's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by CO. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, CO will either proceed with inspection or notify Contractor of unfulfilled requirements. CO will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1.5 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for CO's reference during normal working hours.

B. Record Documents: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
4. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

1.6 OPERATION AND MAINTENANCE MANUALS

- A. Assemble and submit Operation and Maintenance data as specified in Division 1 section "Operation and Maintenance Data."

1.7 WARRANTIES

- A. Submittal Time: Submit written warranties on request of CO for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

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

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 – EXECUTION

3.1 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Government personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Provide instructors experienced in operation and maintenance procedures.
 - 2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
 - 3. Schedule training with Government, through CO, with at least seven day's advance notice.
 - 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

3.2 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and anti-pollution 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. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - 1. 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.
 - 2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - 3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

4. Remove tools, construction equipment, machinery, and surplus material from Project site.
 5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 7. Sweep concrete broom-clean.
 8. Remove labels that are not permanent.
 9. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 10. Replace parts subject to unusual operating conditions.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Government property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 024119
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings or selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 MATERIALS GOVERNMENTSHIP

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 Government that may be uncovered during demolition remain the property of Government.

1. Carefully salvage in a manner to prevent damage and promptly return to Government.

1.3 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Schedule of selective demolition activities with starting and ending dates for each activity.
- B. Pre-demolition photographs or video.

1.5 CLOSEOUT SUBMITTALS

- A. Inventory of items that have been removed and salvaged.

1.6 FIELD CONDITIONS

- A. Government will continue to access the Forest immediately adjacent to selective demolition area. Conduct selective demolition so Government's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Government as far as practical.
- C. Notify Contracting Officer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Arrange selective demolition schedule so as not to interfere with Government's operations.

PART 2 - PRODUCTS

2.1 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 ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inventory and record the condition of items to be removed and salvaged.

3.2 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.

3.3 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 two 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 017419 "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 Government.
 - 4. Transport items to Government's storage area designated by Contracting Officer.
 - 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Contracting Officer, items may

be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.4 CLEANING

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
 - 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. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 017419 "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 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 2. Submit substantiating data for each concrete mix design contemplated for use to the Architect no less than four weeks prior to first concrete placement. Data for each mix shall include the following:
 - a. Mix identification number (unique for each mix submitted).
 - b. Statement of intended mix use.
 - c. Mixture proportions.
 - d. Water/cementitious materials ratio.
 - e. Wet and dry unit weight.
 - f. Total air content.
 - g. Design slump and allowable range after additions of all admixtures.

- h. Time limits on discharge: If time of discharge exceeds ACI 301 90 minute time limit, submit concrete properties criteria at permissible time of discharge and additional special inspection and testing requirements associated with time limits.
 - i. Compressive strength tests.
- 3. Shrinkage testing per ASTM C 157.
- 4. Concrete strength maturity curves: For concrete specified with a 56-day f'c concrete strength, develop and submit strength-maturity relationship curves in accordance with ASTM C 1074. Extend maturity testing to 56 days.
- C. Before submitting concrete design mixtures to the architect for review, contractor shall review concrete design mixture for applications, state on the submittal where the concrete mix will be used, establish procedures for ensuring quality of concrete materials and verify suitability of mix design for placement and finishing.
- D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
 - 1. Show all reinforcing, top and bottom profile of concrete element, supports below, including beams, columns and walls, grade beams, concrete walls, joists, etc. framing into element.
 - 2. Provide one continuous elevation at 1/4" (1:48) scale for all beams, joists or walls in a continuous line. Show pockets and openings in shear walls, structural slabs, beams, elevations of top of beams, walls, columns, sections through beams, pilasters, columns, and placing sequence of reinforcing for items with more than one reinforcing layer.
 - 3. Show locations of approved construction joints, locations of pour strips, splices of reinforcing, type of splice used and splice location. Identify all ASTM A706 and epoxy coated reinforcing locations.
- E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of Architect.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Curing compounds.
 - 6. Bonding agents.
 - 7. Repair materials.
 - 8. Supplementary Cementitious materials.
 - 9. Corrosion inhibitors.

- B. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates: Submit test reports indicating that aggregates are not potentially reactive based on the ASTM C295 or ASTM 1260 testing limits set forth in section 5.1 of "Guide Specification for Concrete Subject to Alkali-Silica Reactions" (2007 Portland Cement Association). Alternatively, submit ASTM C1567 test reports indicating that the combination of mix ingredients reduces the expansion due to Alkali aggregate reactivity such that the mix complies with section 5.2 of "Guide Specification for Concrete Subject to Alkali-Silica Reactions" (2007 Portland Cement Association). All tests for submitted reports shall have been performed within one year of the submittal date.
- C. Minutes of preinstallation conference.
- D. Placement Notification: Submit notification to Architect at least 24 hours in advance of placement.
- E. Certification of chloride screen effectiveness for penetrating sealers.
- F. Proposed location of saw cut joints not indicated on Drawings.
- G. Curing compound data demonstrating specified moisture loss performance.
- H. Evaporative retarder product and application data.
- I. Corrosion Inhibitor testing results.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Associate and a supervisor who is an ACI-certified Concrete Flatwork Finisher.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
 - 3. Personnel inspecting concrete reinforcing steel have current certification as an ACI Concrete Construction Inspector or have experience in concrete construction acceptable to the Architect.

- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
 - E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
 - F. Formwork: Contractor shall be responsible for design and engineering of formwork. Design of formwork and preparation of formwork drawings shall be performed under supervision of a qualified engineer registered in the state of the project.
 - G. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - H. Preinstallation Conference: Conduct conference at Project site **or by video conference call**.
 - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. ~~Independent testing agency responsible for concrete design mixtures.~~
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Special concrete finish subcontractor.
 - f. Owner's Testing/Inspection Agency.
 - g. Engineer by video call
 - h. Architect by video call
 - I. Record of Work: Maintain a record listing time and date of all structural concrete placement. Such record shall be kept until completion of Project and shall be available to Architect for examination at any time.
 - J. Pre-Placement Inspection: Formwork installation, reinforcing steel placement and installation of all items to be embedded or cast into concrete shall be verified by Contractor prior to placement.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement if present.
 - B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- 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. Chamfer Strips: Wood, metal, PVC, or rubber strips, ~~3/4 by 3/4 inch~~ (19 by 19 mm), minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than ~~1-inch (25 mm)~~ 1 1/2" inch (38 mm) to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than ~~1 inch (25 mm)~~ in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. All steel reinforcement shall be produced using an electric arc furnace.
- B. Reinforcing Bars: ASTM A 615/A 615M, ~~Grade 60~~ (Grade 420), deformed.
- C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed, where welding of reinforcement or field bending is noted on Drawings.

- D. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)** ASTM A 706/A 706M for bars that may be field bent, deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M for bars that are prefabricated, epoxy coated, with less than 2 percent damaged coating in each **12-inch (300-mm)** bar length.
- E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, plain-steel bars, ASTM A 775/A 775M epoxy coated.
- C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Ordinary Portland Cement: ASTM C 150, Type as indicated on drawings, gray Alternate cementitious materials when proposed to control alkali-silica reactions and tested as part of a representative concrete mix in accordance with ASTM C1567, may be used subject to approval.
 - 2. Blended Hydraulic Cement: ASTM C 595, **Type II, portland-limestone cement.**
 - 3. Supplementary Cementitious Materials (SCM): Of proportions and type to meet concrete performance criteria as indicated in the structural drawings. Available SCM's that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fly Ash: ASTM C 618, Class F or C
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - c. Silica Fume: ASTM C 1240, amorphous silica.

- B. Normal-Weight Aggregates: ASTM C 33, Class 3S 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. All coarse and fine aggregate shall be tested per ASTM C 295 or ASTM C 1293 in accordance with section 5.1 of "Guide Specification for Concrete Subject to Alkali-Silica Reactions" (2007 Portland Cement Association).
1. Maximum Coarse-Aggregate Size: As indicated on Drawings.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable or ASTM C 1602 tested non-potable which is compatible with admixtures. Provide sample and obtain approval from architect of color and finish of exposed concrete mixes where non-potable water is used.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
 7. Mid-Range Water Reducing Admixture: ASTM C 494/C 494M, Type A.
 8. Carbon Dioxide Mineralization: ASTM C494 Type S.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and not containing more chloride ions than are present in municipal drinking water and complying with ASTM C 494/C 494M, Type C for set accelerating use and ASTM C1582 for corrosion-inhibitor use.
1. **Products:** Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
 - b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
 - c. Euclid Chemical Company (The), an RPM company; ARRMATECT, EUCON BCN, or EUCON CIA.
 - d. Grace Construction Products, W. R. Grace & Co.; DCI.
 - e. Sika Corporation; Sika CNI.

f. ~~<Insert manufacturer's name; product name or designation>.~~

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete complying with and ASTM C1582 for corrosion-inhibitor use.

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

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

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.7 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/4 inch (6.4 mm)** and that can be filled in over a scarified surface to match adjacent floor elevations.
 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch (3.2 to 6 mm)** or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than **5000 psi (34.5 MPa)** at 28 days when tested according to ASTM C 109/C 109M.

2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 1. Use a qualified testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Supplementary Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement while meeting the embodied carbon limits listed on the drawings. Where indicated on the drawings, limit percentage, by weight, of cementitious materials other than Portland cement in concrete.

- C. Limit water-soluble, chloride-ion content in hardened concrete as listed on the drawings.
- D. 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 water-cementitious materials ratio below 0.50.
 - 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Performance and Design Requirements:
 - 1. Shrinkage: Shrinkage strain, determined in accordance with ASTM C 157 as amended and modified herein, shall not exceed the values below for each concrete class:
 - a. Amendments and modifications to ASTM C 157:
 - 1) Storage: After initial 24 hour comparator reading, specimens are placed back in lime saturated water until age of seven days. At seven days another comparator reading is taken. This reading is used as the base reading which is used to calculate percent shrinkage. The specimens are stored at 50% humidity and 73° F (23° C).
 - 2) Test Reports: Report gage length (average of three) after 4, 7, 14, 28, and 56 days. In addition to the information required by ASTM C 157, Section 11, shrinkage test reports shall include gage lengths (initial length measurements) used to determine reported shrinkage strains.
 - b. 28 Day Shrinkage Strain: Shrinkage strains shall not exceed the following:
 - 1) Concrete for slab-on-grade placed directly on vapor barrier: 0.046%.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Proportion structural normal-weight concrete mixture as noted on Drawings, unless aggregates are “potentially reactive” with alkalis based on the ASTM C 295 or ASTM C 1260 or ASTM C 1293 testing limits of Section 5.1 of “Guide Specification of Concrete Subject to Alkali-Silica Reactions” (2007 Portland Cement Association). When aggregates are “potentially reactive”, compliance with Section 5.2 of “Guide Specification for Concrete Subject to Alkali-Silica Reactions” (2007 Portland Cement Association) must be established through ASTM C 1567 testing for proposed alternate concrete mixture. Submit test reports in accordance with Part I of this Specification.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Concrete adjacent to elevator hoistway shall be installed to tolerances required by elevator manufacturer.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- E. 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.
- F. 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.
- G. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- H. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- I. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Form release agent shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."
 - a. Tolerance of Embedded Items: Comply with ACI 117.
 - 1) Embedded Plates and Weldments:
 - a) Location: +/- 1 inch (25 mm) vertical, +/- 1 inch (25 mm) horizontal.
 - b) Plumb and Alignment: 1/4 inch in 12 inches (1:48).
 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 3. Install dovetail anchor slots in concrete structures as indicated. Where masonry or veneer intersects concrete, provide one vertical dovetail slot for each 8 inches (200 mm) of masonry thickness. Where concrete serves as the backup, space slots at 16 inches (400 mm) on center.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than **50 deg F (10 deg C)** 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.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
 3. Leave formwork and shoring in place a minimum of 15 days after concrete placement unless reshoring is used.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete in accordance ASTM E1643.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Size, length, number and placement of supports shall be sufficient as to maintain reinforcing position within specified tolerances during construction traffic and concrete placement.
- E. On vertical formwork, use approved bar chairs or spacers as required to maintain concrete cover and bar position. Do not staple or use any other metallic fastener to secure bolsters, chairs, etc. to formwork for concrete surfaces exposed to exterior.
- F. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- G. 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.
- H. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 3. 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.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of **1/8 inch (3.2 mm)**. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch- (3.2-mm-)** wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
 3. Interior Slabs-on-Grade to Receive Carpet or Wood Floor Covering: Construct slabs as large a placement area as practical. Unless noted otherwise on Drawings, locate construction joints on column centerlines. Provide control joints at column centerlines and at intervals not more than **30 feet (9 m)** each way.
 4. All Other Interior Slabs-on-Grade: Unless noted otherwise on Drawings, locate construction joints on column centerlines. Locate control joints where shown on Drawings. If not shown, provide control joints at column centerlines and at intervals not more than **10 feet (3 m)** each way.
- D. 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.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than **1/2 inch (12 mm)** or more than **1 inch (25 mm)** below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least **6 inches (150 mm)** 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.

- D. 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.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. 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.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces **not exposed to public view**.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces **exposed to public view**

- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of **1/4 inch (6 mm)** in one direction.
- C. Top of surface for slabs
1. Slabs on ground shall be +/- **.75" (20 mm)**.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces **indicated**. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. 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.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.10 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), 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. Moisture-retaining-cover shall be inspected each day by Contractor. Any areas which do not show condensation on underside of cover or any slab areas which are not wet shall be immediately rewetted and cover replaced to prevent moisture loss.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer-
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a **No. 16 (1.18-mm)** 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 and that are unacceptable to Architect. Allow Architect and Structural Engineer to observe concrete surfaces upon removal of forms and prior to repair of surface defects. Defects in structural concrete shall be brought to the attention of the Architect and Structural Engineer.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than **1/2 inch (13 mm)** in any dimension to solid concrete. Limit cut depth to **3/4 inch (19 mm)**. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- 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. Submit proposed repair to Architect for review prior to commencement of work.
 1. Repair finished surfaces containing defects that are unacceptable to Architect. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of **0.031 inch (0.75 mm)** wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of **1/4 inch (6 mm)** to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes **1 inch (25 mm)** 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 (19-mm)** clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes **1 inch (25 mm)** 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 Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspection: As indicated on Drawings.

END OF SECTION 033000

SECTION 042613
STONE VENEER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Natural stone veneer.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type of stone, provide not less than five samples showing the range of colors and textures as well as the typical colors and textures.

1.3 QUALITY ASSURANCE

- A. Mockups: Build a sample mockup to verify selections made under Action Submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
 - 1. Build sample mockup for typical veneer wall mortared to plywood sheet approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness.
 - 2. At start of masonry work, provide opportunity for Contracting Officer's Representative to review and approve in-place stone veneer after first 50 sf has been laid, prior to completing the remainder of the work.

1.4 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

2.2 STONE

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching the variation of finish and color of exposed faces of existing stone:
 - 1. For ends of sills and caps and for similar applications that have more than one exposed surface, select stones to minimize cutting of exposed surfaces.
 - 2. Cut stone as necessary to provide special shapes for applications where indicated and to notch drip edges where indicated and at the underside of all capstones.
- B. Stone: Provide Rattler's Moss from Gallegos Stone Yard, 100 Yacht Club Drive, Edwards, CO 81632 (970-926-3737) or approved alternative that follows the submittal procedures. Stone found on site can also be used with approval of CO.
 - 1. Maximum Size of each stone (sum of face width + height): 55 inches. (Example: 30" width by 25" height).
 - 2. Minimum Size of each stone (sum of face width + height): 20 inches. (Example: 12" width by 8" height).
 - 3. Minimum dimension (either width or height): 4 inches.
 - 4. Joint Thickness: approximately 1/2 inch, no more than 1 inch.
 - 5. Color, Texture, Size, Pattern: Match variety of existing example.

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to match existing mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Mortar Cement: ASTM C 1329.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Essroc, Italcementi Group; Brixment Mortar Cement.
 - b. Lafarge North America Inc.; Lafarge Mortar Cement or Magnolia Superbond Mortar Cement.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
- F. Colored Cement Product: Packaged blend made from portland cement and hydrated lime or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Colored Portland Cement-Lime Mix:
 - 1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
 - 2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
 - 3) Lafarge North America Inc.; Eaglebond Portland & Lime.
 - 4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 3. Pigments shall not exceed 10 percent of portland cement by weight.
 4. Pigments shall not exceed 5 percent of mortar cement by weight.
- G. Aggregate for Mortar: ASTM C 144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- H. Aggregate for Grout: ASTM C 404.
- I. Water: Potable.

2.4 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
- C. Adjustable Masonry-Veneer Anchors:
 - 1. Basis of Design: Pos-I-Tie original anchors by Heckmann Building Products or approved equal. No. 75 Pos-I-Tie one-piece barrel screw consisting of a zinc barrel, steel/EPDM washer, flanged head and eye to receive Pos-I-Tie wire tie. Designed to seat barrel directly on structural portion of backup, with flanged head and washer sealing the fastener hole.
 - 2. Heckmann No. 78-S Split-Bend stone anchors, 2" wide only, length determined by contractor.
 - 3. General: Provide anchors that allow vertical adjustment but resist a 100-lbf (445-N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.5 mm).
 - 4. Fabricate stainless steel anchor sections and other metal parts from 0.105-inch- (2.66-mm-) thick steel sheet, galvanized after fabrication.
 - 5. Fabricate wire ties from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire unless otherwise indicated.
 - 6. Fabricate wire connector sections from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized, carbon-steel wire.

2.5 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:
 - 1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch (0.40 mm) thick.
 - 2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
 - 3. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed or as detailed on the Drawings.
 - 4. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal

back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch (0.76 mm).
 - 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) Advanced Building Products Inc.; Peel-N-Seal.
 - 2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - 3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
 - 4) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
 - 5) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
 - 6) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
 - 7) Hohmann & Barnard, Inc.; Textroflash.
 - 8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
 - 9) Polyguard Products, Inc.; Polyguard 300.
 - 10) Sandell Manufacturing Co., Inc.; Sando-Seal.
 - 11) Williams Products, Inc.; Everlastic MF-40.
 - b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
2. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.02 mm) thick.
 - 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) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
 - 2) Firestone Specialty Products; FlashGuard.
 - 3) Heckmann Building Products Inc.; No. 81 EPDM Thru-Wall Flashing.
 - 4) Hohmann & Barnard, Inc.; Epra-Max EPDM Thru-Wall Flashing.

5) Sandell Manufacturing Co., Inc.; EPDM Flashing.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is fully concealed, use flexible flashing.
4. Where specifically indicated, use the indicated flashing type.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
 - 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) Mortar Net USA, Ltd.; Mortar Net Weep Vents.
 - 2) Hohmann & Barnard; Mortar Trap Weep Vents.
 - 3) Masonry Technology Inc.; Stone Cavity Weeps (SCV 5012).

2.7 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer for type of masonry being cleaned.

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. Diedrich Technologies, Inc.
- b. EaCo Chem, Inc.
- c. ProSoCo, Inc.

2.8 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Use Type N unless another type is indicated.
- D. Pigmented Mortar: Use colored cement product.
 - 1. Application: Use pigmented mortar for exposed mortar joints.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use palletized stone without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange stone for exposed pattern to produce a blend of colors and textures to match the sample and the approved mockup. Mix units from several pallets as they are placed.
- C. Wetting of Stone: Wet stone before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

B. Joints:

1. For joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using smaller stones, particularly at corners and edges.
- B. Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed stone in pattern to match area of existing foundation indicated on Drawings. Include a mix of sizes, shapes, colors, and textures, within the range of both the existing foundation to be matched and the approved mockup. Keep stone sizes with the minimum and maximum sizes indicated.
- C. Fill space between concrete stemwall and masonry solidly with mortar unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Tool exposed joints raked 3/8" deep to match existing foundation to be matched.

3.5 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to concrete backup with masonry-veneer anchors to comply with the following requirements:
 1. Fasten screw-attached anchors to concrete stemwall backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 2. Embed tie sections in masonry joints.

3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than one anchor for each stone. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

3.6 FLASHING, WEEP HOLES, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations or laps in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 3. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing.
 1. Use specified weep/vent products to form weep holes.
 2. Space weep holes 48 inches (600 mm) o.c. unless otherwise indicated.

3.7 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor shall engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- C. Testing Prior to Construction: One set of tests.

- D. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

3.8 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean stone as work progresses by dry brushing to remove mortar fins and smears before tooling joints. Do not stop for the day until you have cleaned the stone. Stone that is not free of mortar due to lack of in-progress cleaning will be rejected.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 2. Protect adjacent metal and wood and nonmasonry surfaces from contact with cleaner.
 - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 4. Clean stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.9 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess clean masonry waste that cannot be recycled, and other masonry waste, and legally dispose of off Government's property.

END OF SECTION 042613

SECTION 055000
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Miscellaneous steel trim.
3. Loose bearing and leveling plates.

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 or built into unit masonry.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

1.2 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 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 A 36/A 36M.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

- F. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
 - 3. Provide stainless-steel fasteners for fastening nickel silver.
 - 4. Provide bronze fasteners for fastening bronze.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329. Provide blackened steel where exposed. Paint exposed fastener heads.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.3 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- 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. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. 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.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. 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.

2.6 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- C. Galvanize exterior miscellaneous steel trim. Provide blackened steel where exposed. Paint exposed fastener heads.

2.7 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.8 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.9 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

2.10 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- 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 universal shop primer indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Surface Preparation for Shop Priming of Nongalvanized Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. Surfaces to receive Interior Paint per section 099123:
 - a. SSPC-SP 2, "Hand Tool Cleaning" or
 - b. SSPC-SP 3, "Power Tool Cleaning."
 2. Surfaces to receive Exterior Paint per section 099123:
 - a. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 3. Surfaces to receive High Performance Coatings pre section 099600:
 - a. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Surface Preparation for Shop Priming of Galvanized Steel: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner recommended by paint manufacturer, or according to SSPC-SP 16 "Brush Blasting".
- F. 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

3.1 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.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry 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 nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 057300
WROUGHT IRON RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - a. Wrought iron handrails and guardrails.

1.2 DEFINITIONS

- A. Definitions in ASTM E 985 for railing-related terms apply to this section.

1.3 SYSTEM DESCRIPTION

- A. Structural Performance of Handrails and Railing Systems: Engineer, fabricate, and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by using metals that are compatible with one another. In some instances, the corrosion can be prevented by inserting a plastic insulator between the dissimilar materials.
- C. Thermal Movements: Allow for thermal movement resulting from up to 120 degree F maximum change (range) in ambient temperature in the design, fabrication, and installation of handrails and railings to prevent buckling, opening up of joints, and over-stressing of components, connections, and other detrimental effects. Base design calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1.4 SUBMITTALS

- A. Product data for each type of product specified.
- B. Shop drawings showing fabrication and installation of handrails and railings including plans, elevations, sections, details of components, and attachments to other units of Work. Show anchorage and accessory items.

1.5 PROJECT/SITE CONDITIONS

- A. Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field

measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.6 SEQUENCING AND SCHEDULING

- A. Mount handrails only on completed surfaces. Do not support handrails temporarily by any means not satisfying structural performance requirements.

PART 2—PRODUCTS

2.1 MATERIALS

- A. Provide metal forms and types that comply with requirements of referenced standards and that are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
- B. Steel and Iron: Provide steel and iron in the form indicated complying with the following requirements.
- C. Steel Plates, Shapes, and Bars: ASTM A 36.
- D. Malleable Iron Castings: ASTM A 47, grade 32510.

2.2 ACCESSORIES

- A. Fasteners: Provide fasteners as indicated, or if not indicated, select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loadings.
 - 1. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 - 2. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work except where exposed fasteners are unavoidable.
 - 3. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
 - 4. Cast-In-Place and Post-installed Anchors in Concrete: Cast-in-place anchors and expansion anchors fabricated from corrosion-resistant materials with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.

2.3 FABRICATION

- A. General: Fabricate handrails and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacings, and anchorage, but not less than that required to support structural loads.
- B. Preassemble railing systems in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- C. Form changes in direction of railing members by insertion of prefabricated elbow fittings, by radius bends of radius as designated, and by bending, as required.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- E. Welded Connections: Fabricate railing systems and handrails for connection of members by welding. For connections made during fabrication, 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. Obtain fusion without undercut or overlap. Remove welding flux immediately.
 - 2. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface match those adjacent.
- F. Non-welded Connections: Fabricate railing systems and handrails for connection of members by means of railing manufacturer's standard concealed mechanical fasteners and fittings unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- G. Brackets, Flanges, Fittings, and Anchors: Provide brackets and fittings as indicated or, if not indicated, provide manufacturer's standard wall brackets,

flanges, miscellaneous fittings, and anchors for connection of handrail and railing members to other construction.

- H. Provide inserts and the anchorage devices for connecting handrails and railing systems to wood posts. Fabricate anchorage devices capable of withstanding loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.
- I. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- K. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- L. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.
- M. For handrails and railing systems that are exposed to exterior or to moisture from condensation or other sources, provide weepholes or other means for evacuation of entrapped water in hollow sections of railing members, if any.
- N. Fabricate joints that will be exposed to weather in a manner to exclude water.
- O. Close exposed ends of handrail and railing members by use of manufacturer's standard prefabricated end fittings.
- P. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of the railing and wall is 1/4 inch or less.
- Q. Finishes:
 - 1. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
 - 2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are not acceptable if they are within 1/2 of the range of

approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples and they are assembled or installed to minimize contrast.

3. Buffed Finish, Lacquered: CDA M21 Mechanical Finish: buffed, smooth specular; Coating: clear organic, air dry, such as “Incralac” (Stan Chemical Company), or approved equal. Apply by air-spray in 2 coats per manufacturer’s directions, with interim drying, to a total thickness of 1.0 mil.

PART 3–EXECUTION

3.1 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete as masonry construction. Coordinate delivery of such items to project site.

3.2 ERECTION, INSTALLATION, APPLICATION

- A. General:

1. Fit exposed connections accurately together to form tight, hairline joints.
2. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of handrails and railings. Set handrails and railing accurately in location, alignment, and elevation, measured from established lines and levels and free from rack. Take care so as not to damage adjacent historic materials.
3. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
4. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

5. Field Welding: Comply with the following requirements:

- a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- b. Obtain fusion without undercut or overlap.
- c. Remove welding flux immediately.
- d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

6. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by structural loads.

B. Railing Connections:

1. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fitting designed for this purpose.
2. Non-Welded Connections: Use manufacturer's standard mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings.

C. Attachment of Railings to Posts: Attach railings to posts with indicated brackets and end fittings. Provide bracket with not less than 1- 1/2-inch clearance from inside face of handrail and finished wall surface.

3.3 PROTECTION

- A. Protect finishes of railing systems and handrails from damage during cleaning period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.

- B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION 057300

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Framing with timber.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of **2 inches nominal (38 mm actual)** or greater but less than **5 inches nominal (114 mm actual)** in least dimension.
- C. Timber: Lumber of **3 inches nominal (114 mm actual)** or greater in least dimension.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Wood screws

1.5 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 TIMBER FRAMING

- A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:
 - 1. Species Grade: **As noted on the drawings.**

2.2 TIMBER DECKING

- A. Provide 1"x4" timber decking complying with the following requirements, according to grading rules of grading agency indicated
 - 1. Species Grade: Hem-Fir #2 or better

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is provide fasteners of 300 series stainless steel and use stainless steel fasteners in stainless steel hardware. Where rough carpentry is exposed or in area of high relative humidity provide fasteners with hot-dip galvanized zinc coating complying with ASTM A153, Class D. All other fasteners shall be electro-galvanized meeting ASTM A641 "Regular Coating". Fasteners include all accessories such as washers and nuts.
- B. Wood Screws: ASME B18.6.1. **Wood Screws: Cut or rolled thread wood screws meeting the requirements of ANSI/ASME Standard B19.6.1. Provide corrosion resistant coating equivalent to hot dip galvanizing.**

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate blocking and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

- E. Do not splice structural members between supports.
- F. 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 **indicated** fastener patterns where applicable.

3.2 TIMBER FRAMING INSTALLATION

- A. Install timber with crown edge up and provide not less than 4 inches (102 mm) 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 (13-mm) air space 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.

END OF SECTION 061000

SECTION 073129

SYNTHETIC SHINGLES AND SHAKES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Synthetic roof shakes.
 - 2. Underlayment materials.
 - 3. Metal flashing and trim.

1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Synthetic roof shakes.
 - 2. Underlayment materials.
 - 3. Asphalt roofing cement.
- B. Shop Drawings: For shingles and metal flashing and trim.
- C. Samples: For each exposed product

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.6 WARRANTY

- A. Materials Warranty: Manufacturer agrees to repair or replace synthetic roof shakes that fail in materials within specified warranty period.
 - 1. Warranty Period: 50 years from date of Substantial Completion.
- B. Installer's 2-year total roof system warranty including underlayment, flashings, trim, and other roof components against water penetration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

2.2 SYNTHETIC ROOF SHAKES

- A. Synthetic roof shakes: Synthetic roof shakes of appearance, color, texture, and thickness of natural wood shakes, and free of surface imperfections.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide CeDUR Roof Tile manufactured by Colorado Roofing Products, www.cedur.com or a comparable product by Brava Roof Tile. In any case, use the same product as is used for the re-roofing of the historic cabin.
 - 2. Length: 23.75 inches.
 - 3. Width: variable (5, 7, and 12 inches) to create appearance of random sized shakes.
 - 4. Starter Shingle: Provide 15 inches long by 15 inches wide
 - 5. Pattern: Walden.
- B. Hip and Ridge Shakes: Manufacturer's standard units to match roof shakes.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum 50-mil- (1.3-mm-) thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied. Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment. Provide Grace Ice and Water Shield or approved equal.

2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

- B. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.
- C. Roofing Nails: ASTM F1667, hot-dip galvanized-steel box-type wire nails, sharp pointed, and of sufficient length to penetrate a minimum of 3/4 inch (19 mm) into sheathing or to penetrate through roof sheathing less than 3/4 inch (19 mm) thick.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- D. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- (25-mm-) minimum diameter.
 - 1. Provide with minimum 0.0134-inch- (0.34-mm-) thick metal cap, 0.010-inch- (0.25-mm-) thick power-driven metal cap, or 0.035-inch- (0.89-mm-) thick plastic cap; and with minimum 0.083-inch- (2.11-mm-) thick ring shank or 0.091-inch- (2.31-mm-) thick smooth shank of length to penetrate at least 3/4 inch (19 mm) into roof sheathing or to penetrate through roof sheathing less than 3/4 inch (19 mm) thick.

2.5 METAL FLASHING AND TRIM

- A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal: Copper, Aluminum or Galvanized Steel.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise indicated on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT MATERIALS

- A. Comply with synthetic shake and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.
- B. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck in locations indicated on Drawings.
 - 1. Comply with low-temperature installation restrictions of underlayment manufacturer.

2. Install lapped in direction that sheds water.
 3. Lap sides not less than 4 inches (102 mm). Lap ends not less than 6 inches (152 mm), staggered 24 inches (610 mm) between succeeding courses.
 4. Roll laps with roller.
 5. Prime concrete, masonry, and metal surfaces to receive self-adhering sheet.
 6. Cover underlayment within seven days.
- C. Metal-Flashed, Open-Valley Underlayment: Install one layer of 36-inch- (914-mm-) wide felt underlayment centered in valley, running full length of valley, and on top of underlayment on field of roof that is woven through valley. Install all layers of underlayment in and through valley tight with no bridging.
1. Lap ends at least 12 inches (305 mm) in direction that sheds water, and seal with asphalt roofing cement.
 2. Fasten to roof deck with underlayment nails located as far from valley center as possible and only to extent necessary to hold underlayment in place until installation of valley flashing.
 3. Solidly cement valley underlayment to roof-field underlayment that is woven through valley using asphalt roofing cement.

3.2 INSTALLATION OF METAL FLASHING AND TRIM

- A. Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
1. Install metal flashings in accordance with recommendations for wood roofing in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems."
- B. Pipe Flashings: Form flashing around pipe penetrations and wood roofing. Fasten and seal to wood roofing.

3.3 INSTALLATION OF SYNTHETIC ROOF SHAKES

- A. Install synthetic roof shakes in accordance with manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roofing Systems."
- B. Install wood-shake starter course along lowest roof edge.
1. Install in single layer.
 2. Extend 1 inch (25 mm) over fascia.
 3. Extend 1 inch (25 mm) over rake edge.
- C. Install first course of wood roof shakes directly over starter course and in continuous straight-line courses across roof deck. Install second and succeeding courses of wood roof shakes in continuous straight-line courses across roof deck.

1. Extend 1 inch (25 mm) over rake edge.
 2. Offset joints between shakes in succeeding courses a minimum of 1-1/2 inches (38 mm).
 3. Space shakes a minimum of 3/8 inch (10 mm) and a maximum of 5/8 inch (16 mm) apart.
 4. Maintain weather exposure of 10 inches (254 mm) for 22-inch (559 mm) long shakes.
- D. Ridge Units: Install units over wood roof shakes trimmed at apex of ridges and hips.
1. At unventilated ridges and hips, install concealed strip of self-adhering, polymer-modified bitumen sheet underlayment over apex shingles and below ridge units.
 2. Fasten ridge units to cover ridge vent without obstructing airflow.

END OF SECTION 073129

SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manufactured Products:
 - a. Manufactured through-wall flashing and counterflashing.
 - 2. Formed Products:
 - a. Formed low-slope roof sheet metal fabrications.
 - b. Formed wall sheet metal fabrications.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Fabricate and install copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - 1. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force
- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 4. Details of termination points and assemblies, including fixed points.
 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 7. Details of special conditions.
 8. Details of connections to adjoining work.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
 3. Accessories and Miscellaneous Materials: Full-size Sample.
- D. Qualification Data: For qualified fabricator.
- E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.6 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows 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 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
 - 2. Surface: Smooth, flat.
 - 3. Exposed Coil-Coated Finish:
 - a. 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.
 - 4. Color: As selected by Contracting Officer from manufacturer's full range.
 - 5. Concealed Finish: Pretreat with 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.

2.2 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- H. Do not use graphite pencils to mark metal surfaces.

2.4 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Base Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch (0.71 mm) thick.
- B. Counterflashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- C. Flashing Receivers: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

2.5 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch- high, end dams where flashing is discontinuous. Fabricate from the following materials:
 - 1. Stainless Steel: 0.0156 inch (0.396 mm) thick.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing Gravel Stop and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.
 - 1. Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
- B. Base Flashing: Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- C. Counterflashing: Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel sheet.
 2. Pre-tinning is not required for zinc-tin alloy-coated copper.

3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

H. Rivets: Rivet joints in zinc where necessary for strength.

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 24-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of anchor and washer at 36-inch centers.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.5 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.7 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nonstaining silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mastic.

1.2 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.4 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.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- 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.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; Dow Corning® 795 Silicone Building Sealant.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; Silpruf NB.
 - c. May National Associates, Inc.; a subsidiary of Sika Corporation; Bondaflex Sil 295 FPS NB.
 - d. Pecora Corporation; 864NST.
 - e. Sika Corporation; Joint Sealants; Sikasil WS-295.
 - f. Tremco Incorporated; Spectrem 2.

2.2 URETHANE JOINT SEALANTS

- A. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 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. LymTal International Inc.
 - b. Tremco Incorporated; Tremflex 834.

2.3 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Corporation-Construction Systems; MasterSeal 920 & 921(Pre-2014: Sonolastic Backer Rod).
 - b. Construction Foam Products; a division of Nomaco, Inc.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 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.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 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 laitance and form-release agents from concrete.
 - 2. 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.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

- B. Install sealant backings of kind 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.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. 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.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between different materials in horizontal traffic surfaces.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, M, P, 50, T, NT.
 - 3. Joint-Sealant Color: As selected by Contracting Officer from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in masonry veneer.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.

3. Joint-Sealant Color: As selected by Contracting Officer from manufacturer's full range of colors.

C. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:
 - a. Thresholds.
 - b. Sill plates.
 - c. Other joints as indicated on Drawings.
2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Contracting Officer from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 099300
STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:
 - 1. Exterior Substrates:
 - a. Wood posts, rails, beams, struts, boards, and other non-traffic surfaces.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted, from the Masters Painting Institute
- B. Samples: For each type of finish system and in each color and gloss of finish required.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Contracting Officer will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 10 sq. ft. (1 sq. m).
 - b. Other Items: Contracting Officer will designate items or areas required.
2. Final approval of stain color selections will be based on mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Contracting Officer at no added cost to Government.

PART 2 - PRODUCTS

2.1 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. Diamond Vogel Paints.
 3. PPG Paints.
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List." <https://www.mpi.net/apl/MpiNumber.asp?ID=13000>
- B. 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 manufacturers of topcoat for use in paint system and on substrate indicated.
- C. Stain Colors: Match existing historic cabin.

PART 3 - EXECUTION

3.1 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 Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Contracting Officer, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Wood Substrates:

- 1. Semitransparent Stain System, MPI #13:
 - a. Prime Coat: Stain, exterior, solvent based, semitransparent, matching topcoat.
 - b. Topcoat: Stain, exterior, solvent based, semitransparent, MPI #13.

END OF SECTION 099300

SECTION 31 1000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Protecting existing trees, shrubs, groundcovers, plants, grass, and other vegetation to remain or as designated by the Contracting Officer in pre-construction conference.
 - 2. Removing existing trees, shrubs, groundcovers, plants, grass, and other vegetation.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.
 - 5. Removing above- and below-grade site improvements.
 - 6. Removing existing fill.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Erosion and Sedimentation Control" for storm water erosion and sediment mitigation.
 - 2. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to be stockpiled or to remain on Government's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions. Information required may also be included in Division 1 Section "Project Record Documents."

1.6 QUALITY ASSURANCE

- A. Preconstruction Conference: Conduct conference at Project site as directed by the Contracting Officer prior to start of construction. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 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.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing indicated removal and alteration work on property adjoining Government's property will be obtained by Government before award of Contract. Authority and permits for performing indicated removal and alteration work on adjacent rights-of-way shall be obtained by Contractor.
 - 1. Do not proceed with work on adjoining property until directed in writing by the Contracting Officer.
- C. Protect improvements on adjacent and Government's property.
- D. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Government's premises where indicated.
- E. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- F. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
- G. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving," (PART 2 – PRODUCTS).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks, survey control points, monuments, property line pins and other reference points from disturbance during construction. If disturbed or destroyed, restore or replace at no cost to Government.
- B. Provide erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust from leaving project site.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated.
- D. Protect existing site improvements to remain from damage during construction.
 - 1. Restore or replace damaged improvements to their original condition, as acceptable to Government.

3.2 TREE PROTECTION

- A. Erect and maintain temporary fencing around drip line of individual trees or around perimeter drip line of groups of trees to remain before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, 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.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Cover exposed roots with wet burlap to prevent roots from drying and backfill with soil as soon as possible.

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- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Contracting Officer.
 - 1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

3.3 UTILITIES

- A. Contractor will locate utilities before site clearing. Notify the Contracting Officer if existing utilities are identified within the construction limits.
- B. Existing Utilities: 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 the Contracting Officer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without the Contracting Officer's written permission.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and completely remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 - 4. Use only hand methods for grubbing within drip line of remaining trees.
 - 5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earth moving is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered or as determined by Geotechnical Engineer in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

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- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches unless authorized by the Contracting Officer.
 - 2. Do not stockpile topsoil within drip line of remaining trees.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Stockpile surplus topsoil to allow for resspreading a thicker layer of topsoil.

3.6 SITE IMPROVEMENTS

- A. Remove existing above and below grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove gravel paving, timber edging, and wood stairs as indicated on plans.
- C. Remove existing fill as required by the Geotechnical Engineer.

3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Government's property.
 - 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 31 1000

SECTION 31 2000 – EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1, specification sections, apply to this section.
- B. Additional information concerning earth moving may be found on the construction drawings. In case of conflict between the drawings and the information specified herein, the more stringent requirements shall govern.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing and grading subgrades for walks, ramps, and lawns and grasses.
 - 2. Excavating and backfilling for structures, including over-excavation of existing unsatisfactory on-site soil materials and replacement with structural fill.
- B. Verification by Geotechnical Engineer: this section includes initial information related to earth moving, however, approval of all earth moving materials and operations are by the Contractor's Geotechnical Engineer and the Contracting Officer. Refer also to section 1.5D.
- C. Related Sections include the following:
 - 1. Division 01, Section "Temporary Erosion and Sedimentation Control" for erosion and sedimentation control measures.
 - 2. Division 31, Section "Site Clearing" site stripping, grubbing, stripping and stockpiling topsoil, and removal of above-grade and below-grade improvements.
 - 3. Division 31, Section "Trenching and Backfilling" for excavating and backfilling of utilities.
- D. References:
 - 1. Architectural Barriers Act Accessibility Standard- ABAAS as provided for in the regulations of the United States Access Board
- E. Permits and Fees: Obtain and pay for all permits and fees required for the work of this section, including erosion and sediment control and water quality permits (if disturbance is 1 or more acres) required by the Colorado Department of Public Health and Environment, Water Quality Control Division.

1.3 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
 - 1. Initial Backfill: Bedding placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill approved by the Geotechnical Engineer.
- D. Excavation: Removal of all material of various characteristics required for the work encountered above subgrade elevations and to lines and dimensions indicated, including boulders. See Section 3.4 "EXCAVATION, GENERAL" for definition of unclassified and classified excavation.
- E. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions, as directed or approved by the Contracting Officer and the testing and inspections agency to correct unsatisfactory conditions. Authorized additional excavation and replacement material will be paid for according to contract provisions for changes in the work.
- F. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
- G. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by the Contracting Officer. Unauthorized excavation, including disposition of over-excavated materials and other work resulting from slides, cave-ins, swelling, upheaval, or remedial work, as well as remedial work directed by the Contracting Officer, shall be without additional compensation.
- H. Fill: Fill is all material placed to raise the grade of the site or to backfill excavation, upon which the Geotechnical Engineer has made sufficient tests and observations to enable him/her to issue a written statement that, in his/her opinion, the fill has been placed and compacted in accordance with the requirements of these specifications.
- I. Structural Fill: Select granular material for use below structures and to 5 feet beyond the structure foundation lines. On-site material may be used if approved by the Geotechnical Engineer.
- J. Rock Excavation: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for Bulk Excavation or 3/4 cu. yd. for footing and trench excavation which in the Geotechnical Engineer's opinion cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.
 - 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- K. Structures: Ramps, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

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- M. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Material Test Reports: Provided by the Contractor from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D2487 of each on-site or borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D698 for each on-site or borrow soil material proposed for fill and backfill.
- B. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.5 QUALITY ASSURANCE

- A. Comply with applicable codes, ordinances, regulations, references, and standards in effect at bid date:
 - 1. Uniform Building Code (UBC) or International Building Code (IBC) per jurisdiction criteria.
 - 2. American Society for Testing and Materials (test methods as specified hereafter) (ASTM).
 - 3. State and local codes.
- B. In case of conflict between the above codes, regulations, references and standards, and these specifications, the more stringent requirements shall govern.
- C. Testing Agency: The Contractor will employ a qualified independent geotechnical testing agency. The Contractor shall furnish testing agency access to work, facilities and incidental labor required for testing. Notify the testing and inspection agency not less than 48 hours in advance of all work requiring testing.
- D. Geotechnical Engineer: All materials and operations under this section of the specifications shall be executed under the supervision of a Geotechnical Engineer, licensed in the State of Colorado, hired by the Contractor, who will place qualified personnel on the site during earth moving operations as necessary to observe, oversee, recommend, and approve all earth moving operations for the project.

The Geotechnical Engineer shall approve all foundation excavations and give written approval of the completed foundations to the Contracting Officer at the following times:

- 1. When excavations are first open.
- 2. Just prior to placing of concrete, shall test and control the fill compaction, approve the materials and method of placing and compacting and give written approval to the Contracting Officer that all bearing surfaces and fill requirements have been inspected.
- 3. The Contractor shall be responsible to notify the Geotechnical Engineer when tests are to be made.

- E. For approval of imported or on-site fill material, notify the Geotechnical Engineer at least four working days in advance of intention to import material, designate the proposed borrow area, and permit the Geotechnical Engineer to sample, as necessary, from the borrow area for the purpose of making acceptance tests to prove the quality of the material. The Geotechnical Engineer's report on the acceptability shall be final and binding.
- F. Reference Standards:

Compaction Standard: Standard Proctor Density ASTM D698.
- G. Preconstruction Conference: Conduct conference at Project site as directed by the Owner's Representative prior to start of construction. The Contractor is to comply with requirements, which may also be included in Division 1, Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

- A. No topographic survey has been completed for the site. Contours shown are from NAVD88 height - US geoid model of 2012B. Vertical datum is North American Vertical Datum 1988. Layout of existing features shown is based on field dimensions provided by the Government. The existing features were then placed approximately with existing contours using aerial imagery and to depict the contours approximately aligning with roadways, the parking area, and the swale south of the cabin. Elevations and locations of site features shown are to be field verified by the Contractor and coordinate any discrepancies with the Contracting Officer prior to start of construction.
- B. Existing Utilities: Locations, sizes and depths, or invert elevations of existing utilities, as shown on the drawings, are based on information provided by others and believed to be correct but may not be absolutely so. Such information is therefore presented only as approximations and should be verified prior to construction. Protect from damage any sewer, water, gas, electric, phone, or other pipe lines or conduits uncovered during the work until they have been examined by the Contracting Officer. If such lines are found to be abandoned and not in use, remove affected sections without extra cost. If such lines are found to be in use, carefully protect and carry on work around them. If the Contracting Officer deems it advisable to move such lines, the Government will pay cost of moving. Do not interrupt utilities serving facilities occupied by the Government or others unless permitted in writing by the Contracting Officer and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Contact utility-locator service for area where project is located before excavating.
 - 2. Notify the Contracting Officer not less than two days in advance of proposed utility interruptions.
 - 3. Do not proceed with utility interruptions without the Contracting Officer's written permission.
- C. Remove all existing fill deemed by the Geotechnical Engineer to be unsatisfactorily placed.
- D. Existing Contours and Elevations: Contours and spot elevations of existing ground elevations at the site, and approximate elevations of finish-grade cuts, fills, and excavations for the work are shown on the drawings. Contours and elevations for existing ground lines are based on information provided by others, and are believed to be correct, but may not be absolutely so. Existing contours and elevations should therefore be considered approximate and should be verified at the site prior to construction.

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- E. Verification of Existing Conditions: Visit the site prior to submission of bids. Verify existing conditions, elevations, and contours. In the event of discrepancies between existing conditions and those indicated on the contract documents or survey, contact the Contracting Officer for clarification.
- F. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, monuments, property line pins, and other reference points. If disturbed or destroyed, restore or replace by a professional land surveyor at no additional cost to the Government.
- G. Frost Protection: When freezing temperatures may be expected, do not excavate to the full depth indicated unless the footing or slabs are to be poured immediately after the excavation has been completed. If placing of concrete is delayed, protect the bottoms of excavations from frost until concrete is placed.

1.7 WARRANTY

- A. Settlement in backfill, fill, or in structures built over backfill or fill, which may occur within the specified project warranty period, shall be corrected at no cost to the Government. Any structures damaged by settlement shall be restored to their original condition by the Contractor, at no cost to the Government.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Shall meet approval of the Geotechnical Engineer and shall be free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Clean, on-site, natural soils, or imported materials, as approved by the Geotechnical Engineer.
- C. Unsatisfactory Soils: Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups, as identified by the Geotechnical Engineer.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Backfill and Fill: Approved by the Geotechnical Engineer.
- E. Structural Fill: Approved by the Geotechnical Engineer.
- F. Bedding Course: See Division 31, Section "Trenching and Backfilling."
- G. Sand: ASTM C33; fine aggregate, natural, or manufactured sand.

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 created by earth moving operations.
- B. Preparation of subgrade for earth moving operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31, Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 01, Section "Temporary Erosion and Sediment Control," during earth moving operations. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and rights-of-way.
- D. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials, as necessary.
- E. Cold Weather Work: Prevent frost from entering bearing stratus upon which construction will take place or in areas where fill will be placed in that season.

3.2 DEWATERING

- A. Prevent surface water and subsurface ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system to keep subgrades dry and convey groundwater away from excavations. Maintain until dewatering is no longer required.
 - 3. Obtain and comply with all provisions of the Colorado Department of Public Health and Environment, Water Quality Control Division, Construction Dewatering Permit.
- C. Protection of Persons and Property:
 - 1. Provide all necessary measures to protect workmen and passersby. Barricade open excavations occurring as part of the work, as required by municipal or other authorities having jurisdiction.
 - 2. Protect adjacent streets, roadways, and properties throughout the entire operation. Protect newly graded areas from destruction by weather or runoff. Protect structures, utilities, sidewalks, pavements, and other improvements from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: All excavation (other than rock excavation) is considered as unclassified and is defined as removal of all material encountered, regardless of soil type. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include soil materials, and obstructions. Unclassified excavation is considered normal excavation and no extra costs will be allowed.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove material of every nature or description encountered in obtaining required lines and grades. Excavate and/or place and compact fill to provide for building pad elevation(s) required by drawings.
 - 3. Excavate wide enough at foundations and retaining walls to permit erection and removal of forms, application of dampproofing or waterproofing.
 - 4. Pitch grading around excavations to prevent water from running into excavated areas.
 - 5. Pre-rip hardpan and soft bedrock with single-tooth ripper or other suitable equipment to facilitate excavation with conventional earth-moving equipment.
 - 6. Bearing soils disturbed by excavating equipment must be recompacted to 95 percent of maximum Standard Proctor Density (ASTM D698) prior to placing concrete.
 - 7. Exposed areas which will receive fill once properly cleaned, shall be scarified to a minimum depth of 8 inches, conditioned to near optimum moisture content, and compacted.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth excavation and rock excavation. Do not excavate rock until it has been classified and cross sectioned by the Contracting Officer.
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface, underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
- C. Stability:
 - 1. Slope sides of excavations in compliance with OSHA requirements and local codes or ordinances. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 - 2. Continuously monitor cut slopes for distress. Take all necessary precautions to safeguard workers, structures, and utilities.
 - 3. Provide all necessary shoring, sheeting, or bracing of sides of excavations required to prevent caving, erosion, and gulying. Provide underpinning of existing structures or other improvements adjacent to excavations which are subject to damage.
- D. Unanticipated Conditions: Notify the Contracting Officer immediately upon finding evidence of previous structures or filled materials which penetrate below designated excavation levels, groundwater or water-bearing strata, or other conditions which are not shown, or which cannot be

reasonably assumed from existing surveys and geotechnical reports. Secure the Contracting Officer instruction before proceeding with further work in such areas.

- E. Rock Excavation: Includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction. Rock excavation in unconfined areas is defined as removal and disposal of material which in the Geotechnical Engineer's opinion, cannot be excavated without continuous and systematic drilling and blasting, or continuous use of a suitable ripper or other special equipment.
 - 1. Unanticipated Rock Excavation: Rock excavation that is not indicated on existing surveys or which cannot be reasonably assumed from geotechnical studies of the site and which could not have been anticipated without extensive investigations. Unanticipated rock excavation shall be subject to change order procedures or previously agreed upon unit prices.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 feet. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb the bottom of excavation. Excavate by hand to final-grade before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
- B. Existing man-made fill shall be removed under structures, as required by the Geotechnical Engineer.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
- B. Scarify subgrade soils beneath exterior slabs, sidewalks, and pavements to a minimum depth of 12 inches, moisture condition and recompact, as specified.
- C. Existing man-made fill shall be removed under walks and pavements, as required by the Geotechnical Engineer.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Refer to Division 31, Section "Trenching and Backfilling," for excavating and backfilling of utilities.

3.8 SUBGRADE INSPECTION

- A. Notify the Geotechnical Engineer when excavations have reached required subgrade.
- B. If the Contracting Officer and Geotechnical Engineer determine that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

- C. Proof-roll subgrade below structures with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Remove and replace soft areas. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with equipment applicable for the construction area and approved by the Geotechnical Engineer.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Contracting Officer, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to contract provisions for changes in the work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Contracting Officer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2,500 psi, may be used when approved by Geotechnical Engineer. If approved by the Geotechnical Engineer, structural fill placed at 100 percent ASTM D698, 2 percent below to 1 percent above optimum moisture may be used.
 - 1. Fill unauthorized excavations under other construction or utility pipe, as directed by the Contracting Officer.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials in approved locations without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below-finish-grade, including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
 - 8. Acceptance of subgrade by the Geotechnical Engineer.

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- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Refer to Division 31, Section “Trenching and Backfilling,” for excavating and backfilling of utilities.

3.13 SOIL FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
 - 1. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
 - 2. In areas of fill, scarify natural soil following removal of unsatisfactory material, to a depth of 8 inches.
- B. Place and compact fill material in layers to required elevations per the Geotechnical Engineer and as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps, ramps, footings, and foundations, use structural fill or reconditioned on-site soils or imported fills of native soils as approved by the Geotechnical Engineer.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to optimum or to 3 percent over optimum moisture content for clay soils, or within 2 percent of optimum moisture content for granular soils, or as recommended by the Geotechnical Engineer.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content beyond the tolerances described above and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:
 - 1. Under exterior flatwork, slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under footings and to a minimum of 5-feet in all directions, excavate to approved natural soils, in fill condition, compact to 95 percent.
 - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below-subgrade and compact each layer of backfill or fill soil material at 90 percent.
 - 4. Compact foundation wall backfill to 95 percent.
 - 5. Compact scarified subgrade soils to 95 percent.

3.16 GRADING

- A. General: 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.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Grading tolerances identified herein apply to non-accessible routes, unless within this paragraph or specifically stated. Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 0.10 feet.
 - 2. Walks: Plus or minus 0.10 feet.
 - 3. Pavements: Plus or minus 0.10 feet.

- C. Accessible Routes: For accessible routes, finished construction of accessible areas to meet published values for dimension and slope. **No tolerance** is permitted below minimum or above maximum values and must meet accessible requirements such as ABAAS. All construction or alterations of accessibility routes (walks, ramps, entrances, etc.) shall comply with standards, rules and regulations set forth above, including but not limited to 5% maximum longitudinal grade on walks without handrails, 8.33% maximum longitudinal grade on walks with handrails, and landings 2% maximum composite slope. 2% maximum cross slope on walks, and 2% maximum composite slope in handicap parking/loading areas. **No tolerance** regarding maximum slope will be allowed.

Prior to construction, contractor shall coordinate as necessary with the Contracting Officer if rules and regulations of accessibility routes cannot be met or a discrepancy of requirements are indicated on drawings.

3.17 FIELD QUALITY CONTROL

- A. Testing Agency: The Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow the testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test the results for the previously completed work comply with requirements.

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- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Contracting Officer.
- D. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, and ASTM D 2937, as applicable. Perform field moisture tests in accordance with ASTM D6031. Tests will be performed at the following locations and frequencies at a minimum:
 - 1. Sidewalk Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 sq. ft. or less of paved area, but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by the Contracting Officer; reshape and recompact.
- C. Where settling occurs before the Project correction period elapses, remove finished surfacing and backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Government's property.

END OF SECTION 31 2000

SECTION 32 1373 – CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Additional information concerning concrete paving may be found on the drawings. In case of conflict between the drawings and the information specified herein, the more stringent requirements shall govern.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Expansion and contraction joints within cement concrete pavement.
 - 2. Joints between cement concrete and buildings and structures.
 - 3. Surface preparation including primers.
 - 4. Joint backup material.
- B. Related Sections include the following:
 - 1. Division 03 Section "Miscellaneous Cast-in-Place Concrete" for constructing joints in concrete pavement.

1.3 REFERENCES

- A. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, current edition.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

- E. Warranty: As required by Division 1 – Warranty Section: Contractor agrees to repair or replace joint sealers (including labor, materials, and any necessary associated costs) which fail to perform as watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of material for exposure indicated. Provide warranty signed by Installer and Contractor.

1.5 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Work under this section shall be subject to all applicable provisions of federal, state, and local rules and regulations.
- B. Applicator: Company specializing in application of sealants with five years minimum experience and be acceptable to manufacturer. Manufacturer's field representative shall visit site and make suggestions.
- C. Adhesion Tests: Prior to any sealant application, perform adhesion tests as directed by sealant manufacturer's technical representative.
- D. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Install sealant materials in strict accordance with all safety and weather conditions recommended by manufacturer, product literature, or Material Safety Data Sheets. Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed only when forecasted weather conditions are favorable for proper cure and development of high-early bond strength. Wherever joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in lower third of manufacturer's recommended installation temperature range.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by the Contracting Officer from manufacturer's full range.

2.2 JOINT SEALANTS

- A. Single-component formulation complying with ASTM D 6690 or D1190.
 - 1. Refer to CDOT Standard Specification, Section 705.01 and 705.09 for joint and crack sealant material requirements.
 - 2. Refer to CDOT Standard Specification, Section 412.18 for joint and crack sealant installation requirements.

2.3 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
- D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from manufacturer's recommendation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on 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.

3.3 JOINT DESIGN

- A. Sealant depth is measured at the center (thin) section of sealant bead.
- B. Install sealants to depths and widths as recommended by sealant manufacturer and as shown on the drawings. Also, conform to the following general limitations if not in conflict with sealant manufacturer's recommendations.
 1. For sidewalks, pavements and similar joints subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, but neither more than 5/8 inch deep nor less than 3/8 inch deep.
 2. For normal moving joints not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than 5/8 inch deep nor less than 1/4 inch deep.
 3. Depth of sealant must not exceed width of joint.
 4. Sealant joints shall not be less than 1/4 inch in width and 1/4 inch in depth.
 5. Sealant joints shall not exceed 2 inches in width in a single application.

3.4 SURFACE PREPARATION

- A. Preparation work shall result in clean surfaces in all areas where sealant is to be adhered. Such surfaces shall be free of any old sealant, contaminants, and impurities, which are deleterious to bonding or adhesion of primers or sealant.
- B. Clean ferrous metals of all rust, mill scale, and coatings by wire brush or grinding. Any equipment used to remove rust shall be free of oil contaminants.
- C. Wire brush masonry joint surfaces, then blow clean with oil free compressed air.
- D. Apply primer per manufacturer's recommendations. Allow primer to dry prior to applying sealant.
- E. Do not caulk joints until they are clean, dry, and free of dust, loose mortar, old sealant, foreign matter or other bond inhibiting materials, and in compliance with requirements of manufacturer of materials, details shown on drawings, and specific requirements of other sections of specifications.

3.5 JOINT BACKING

- A. Use joint backing to control depth of joint to specified thickness.
- B. Select joint backing size to allow for 25 percent compression of backing when inserted into joint.
- C. Where shown on drawings where depth of joint will not permit use of joint backing, or wherever recommended by sealant manufacturer, install bond-breaker tape to prevent three (3) sided adhesion.
- D. Do not leave voids or gaps between ends of joint backing units.

3.6 APPLICATION/INSTALLATION OF JOINT SEALANT

- A. Apply sealants neatly, in a good and workmanlike manner, which meets following minimum requirements or standards. Specific instructions of manufacturer must also be followed.
- B. Apply sealant using a gun with proper size nozzles. Use sufficient pressure to fill all voids and joints solid to backup material, with complete wetting of all joint bond surfaces.
- C. Applied sealant shall form a full, smooth, uniform bead, free of ridges, wrinkles, sags, air pockets and embedded impurities.
- D. After joint has been completely filled with sealant, neatly tool joint sealant to eliminate air pockets, or voids, and to provide a smooth, slightly concave, neat appearing finish, with sealant surface slightly below adjoining surfaces. Wetting of finished surface will not be allowed.
- E. Where horizontal joints are located between a horizontal surface and vertical surface, fill joint to form a slight cove, so joint will not trap moisture and dirt.
- F. Protect adjacent surfaces and systems from sealant material. Use masking tape where required to prevent contact of sealant with adjoining surfaces which 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.
- G. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- H. Tooling of Non-Sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified 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 sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- I. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

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- J. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.7 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.8 PROTECTION

- A. 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 and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

3.9 JOB SITE CLEAN-UP

- A. Sealant applicator must remove all excess materials from job site.
- B. Leave all surrounding areas where joint sealant has been applied free of excess sealant, debris, and foreign substances.

END OF SECTION 32 1373

SECTION 33 4100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Additional information concerning storm sewer systems may be found on the civil drawings. In case of conflict between the drawings and the information specified herein, the more stringent requirements shall govern.

1.2 REFERENCES

- A. State of Colorado, Department of Transportation (CDOT): State Department of Highways Standard Construction Specifications for Road and Bridge Construction, current edition.
- B. Reference Standards: Comply with the requirements of the reference standards noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents.

1.3 SUMMARY

- A. This Section includes gravity-flow storm utility drainage piping outside the building.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Erosion and Sedimentation Control" for erosion and sedimentation control measures.
 - 2. Division 03 Section "Miscellaneous Cast-in-Place Concrete" for concrete structures.
 - 3. Division 31 Section "Trenching and Backfilling" for excavating and backfilling of utilities.
 - 4. Division 31 Section "Earth Moving" for Site Grading.
- C. Existing Utilities
 - 1. It shall be the Contractor's responsibility to excavate and verify the location (depth, horizontal alignment, etc.) of all existing utilities that may affect construction of the proposed storm utility drainage piping line. All exploratory excavations shall occur far enough in advance to permit any necessary relocation to be made with minimum delay and to verify existing vertical and horizontal location to determine alignment for the proposed storm utility drainage piping line. All costs incurred by the Contractor in making exploratory excavations shall be considered to be included in the unit price bid for construction of each section of storm utility drainage piping line or the associated structures.

1.4 DEFINITIONS

- A. RCP: Reinforced Concrete Pipe.

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1.5 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be watertight with gasketed joint.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Pipe material and fittings.
- B. Design Mix Reports and Calculations: For each class of cast-in-place concrete.
- C. Field Quality-Control Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic inlets, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Deliver piping in manufacturer's original bundles, securely strapped, and with protective blocking as required. Label or tag each bundle with type, size and quantity of material.
- D. Exercise care to prevent damage to materials during loading, transportation and unloading. Do not drop pipe or fittings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CONCRETE PIPE AND FITTINGS

- A. RCP Sewer Pipe and Fittings: According to the following:
 - 1. ASTM C 76 and ASTM C 506 and ASTM C 507 for circular, arch, and vertical and horizontal elliptical pipe, respectively. Pipe shall be Class III, Wall B, unless otherwise noted.

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2. Joints: Water tight joints meeting ASTM C443 Standard Specification for joints in circular concrete sewer and culvert pipe, using rubber gaskets.

2.3 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 1. For Concrete Pipes: ASTM C 443 (ASTM C 443m), rubber.

2.4 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
 1. Cement: ASTM C 150, Type II.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi with 0.45 maximum water-cementitious materials ratio, 5-7% entrained air and maximum 4 inch slump. Refer to **Division 03 Miscellaneous Cast in Place Concrete** for additional information.
 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.5 PIPE OUTLETS

- A. Riprap Basins: Broken, irregular size and shape, graded stone according to Urban Drainage criteria.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Site excavation and filling are specified in Division 31 Section "Earth Moving."
- B. Excavation and backfilling for utilities are specified in Division 31 Section "Trenching and Backfilling."

3.2 PREPARATION

- A. Piping: Prior to installation, verify that insides of pipe and pipe joints are clean and free of dirt, mud, oil, shavings from cutting, or other deleterious materials.

3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate location and arrangement of underground storm utility drainage piping. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. General:
 - 1. Use only undamaged material.
 - 2. Lay pipe on firm bedding with full length of barrel fully supported. Maintain straight lines and uniform grades between invert elevations shown. Inside of pipe shall be smooth and clean.
 - 3. Begin all pipe installation at downstream end of pipe run, with lower segment of pipe in contact with specified bedding. Place bell or groove ends facing upstream.
 - 4. Plug ends temporarily during installation, until connections are made to adjoining pipe or to manholes or inlet structures.
 - 5. Trench excavation and placement and compaction of bedding and backfill are specified in Division 31 Section "Trenching and Backfilling."
- C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Plug all lifting holes in pipe with approved rubber plug or grout.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at slopes indicated on plan.
 - 2. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe installation Manual."

3.4 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318/318R.

3.5 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.6 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate report for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
 - 4. Submit separate report for each test.
 - 5. Gravity-Flow Storm Utility Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Test concrete piping according to ASTM C924 (ASTM C 924M).
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.7 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 33 4100

APPENDIX F: Forest Service Accessibility Guidelines

Links to [Architectural Barriers Act Accessibility Standards \(ABAAS\)](#)

[Forest Service Outdoor Recreation Accessibility Guidelines \(FSORAG\)](#)

APPENDIX G: Stage II Fire Restriction Protocols

White River National Forest

Stage II Fire Restriction Protocols

These restrictions are necessary for the overall protection of the forest should Stage II fire restrictions be put into effect. To ensure these requirements are met, contractors must notify and get clearance in the form of a letter with specific protocols concerning their project from their Forest Service project contact prior to starting any exempted activity listed in this letter.

Exempted activities will not be performed during a national weather service issued red flag warning for that location.

Welding, Gridding and Cutting Torches

Contractors are authorized to operate welding machinery, grinders or a cutting torch within the project area subject to the following conditions:

1. The ground must be barren of all flammable materials, or all combustible ground fuels must be wet down within a 10-foot radius of the cutting or welding area prior to operations.
2. A watchperson must be situated at each point where welding or cutting is occurring and shall remain on duty for at least one hour after welding or cutting is completed. The watchperson must be equipped with a radio/cell phone and shovel and have direct access to water to extinguish a fire.
3. A fire extinguisher of the size and type designed to extinguish a fire in the flammable material surrounding the area where welding or cutting is occurring must be readily available during welding and cutting operations.
4. A water truck, trailer, other container, or pump with sufficient water quantity to extinguish a fire must be present at the project site.
5. A dozer, excavator or similar machine, and operator must be present at the project site.

Blasting

Contractors are authorized to continue with already approved blasting operations within the project area subject to the following conditions:

1. The ground must be barren of all flammable materials, or all combustible ground fuels must be wet down within a 10-foot radius of the blasting area prior to operations.

2. A watchperson must be situated at a safe distance from each point where blasting is occurring and shall remain on duty for at least one hour after blasting is completed. The watchperson must be equipped with a radio/cell phone and shovel and have direct access to sufficient water to extinguish a fire.
3. A fire extinguisher of a size and type designed to extinguish a fire in the flammable materials surrounding the area being blasted must be readily available during blasting operations.
4. Each blasting site and the surrounding area must be re-inspected at the end of the day.

Vehicle Use

Contractors are authorized to use motor vehicles equipped with spark arresters off of National Forest System roads to accomplish planned construction activities, subject to the following conditions:

1. Vehicles must be parked in areas devoid of vegetation, or areas that have been wet down to reduce the risk of ignition.

In addition, internal combustion engines must be equipped with a spark arrester at all times on National Forest; wood burning/sheepherder stoves must also have a spark arrester.