



Project Manual

Navajo Housing Authority

ADVERTISEMENT FOR BIDS – IFB# 612

CROWNPOINT NM15-43
30 HOMEOWNERSHIP UNITS
Crownpoint, New Mexico



ISSUED FOR CONSTRUCTION



INDIGENOUS DESIGN STUDIO + ARCHITECTURE, LLC
8008 Pennsylvania Circle N.E.
Albuquerque, New Mexico 87110
tel. 505-226-2565 fax. 505-226-2566

BID DOCUMENTS



NAVAJO HOUSING AUTHORITY

**Navajo Housing Authority (NHA)
Procurement Department**

INVITATION FOR BID

Advertised - IFB #612 Construction Services for Demolition and Rebuilding of Homeownership Units in Crownpoint, NM

The Navajo Housing Authority (NHA) (hereinafter called the “Owner”) invites all Licensed General Contractors to bid on the Demolition and Rebuilding of Homeownership Units. Detailed information may be obtained from Academy Reprographics and requesting for the Advertised - IFB #612 Construction Services for Demolition and Rebuilding of Homeownership Units in Crownpoint, NM. The Owner will receive Sealed Bids until **2:00 PM, (MDST) on May 7, 2024**, via email at dyonnie@hooghan.org. Bids will be opened and publicly read aloud immediately after the specified closing time. Address any questions regarding this project in writing by **April 25, 2024 at 3:00 PM (MDST)** to: **Doris Yonnie, Procurement Specialist**, email dyonnie@hooghan.org. This invitation is **not restricted** to Navajo or Indian organizations and Navajo or Indian owned economic enterprises pursuant to 24 CFR 1000.48 (a) (2), 1000.50 and 1000.52 of NAHASDA.

Request for Bid Specifications may be obtained from **Academy Reprographics** by depositing \$100.00 (company check) payable to Navajo Housing Authority for each set of bid documents obtained. Upon returning sets in good condition within 10 days after the Bid Opening, deposit will be refunded. **Academy Reprographics is located at 8900 San Mateo Blvd, Suite N, Albuquerque, NM 87113 and phone number is (505) 821-6666 and fax number is (505) 857-0634, contact Savannah Arnold at savannah@acadrepro.com or Linda Chavez at linda@acadrepro.com.** General Contractors may request a maximum of two (2) complete sets of Bid Documents; subcontractors a maximum of one (1) complete set. The contractor will pay shipment of Bid Documents.



NAVAJO HOUSING AUTHORITY

Invitation for Bid Advertised – IFB #612 Construction Services for Demolition and Rebuilding of Homeownership Units in Crownpoint, NM

BID DUE DATE:

May 7, 2024 at 2:00PM
Mountain Daylight Saving Time (MDST)

CONTACT:

Doris Yonnie, Procurement Specialist
Navajo Housing Authority
Procurement Department
Email: dyonnie@hooghan.org

Delivery Addresses

The Navajo Housing Authority Procurement Department will not be accepting in-person or post office/courier submissions from Vendors on any solicitation at this time. The NHA will receive bid responses electronically to contact person above.

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SECTION I – General Information

1. NHA Background Information: The Navajo Housing Authority (NHA) is enterprise of the Navajo Nation, which covers approximately 27,000 square miles including the states of Arizona, New Mexico and Utah. NHA manages 15 housing management offices located in major communities within the boundaries of the Navajo Indian Reservation. The central office or headquarters is located in Window Rock, Arizona.

NHA is a recognized as the Indian tribal subdivision of the Navajo Nation Government and is governed by its own Board of Commissioners appointed by the President of the Navajo Nation and approved by the Navajo Nation Council oversight Committee. NHA is also a Tribally Designated Housing Entity having full responsibility for managing the Native American Housing Assistance Self Determination Act (NAHASDA) Indian Housing Block Grant for the Navajo Nation. The NHA allocates the NAHASDA grants to various organizations for the purpose of building affordable homes for Navajo families. The NHA currently operates and maintains over 7,000 dwelling units across the Navajo Nation. NHA is also in the business of developing and constructing residential homes (both rental and homeownership housing units) including qualified public buildings such as day care centers, group homes for the elderly, college student housing complexes and such other public facilities. Most recently, NHA implemented a Mortgage Program which provides mortgage financing opportunities for Navajo families wishing to construct their homes on the Navajo Reservation.
2. Invitation For Bid (IFB): The NHA invites all Licensed General Contractors to bid on construction services for Demolition and Rebuilding of Homeownership Units in Crownpoint, NM. This invitation is **unrestricted**: however, preference shall be given to Navajo or Indian Organizations and Navajo or Indian Owned Enterprises. Award will be in accordance with 24 CFR 1000.48, 1000.50 and 1000.52. The entities who respond to this IFB are herein referred to as the General Contractor.
3. Scope of Work in General: The Scope of Work shall contain the list of materials and/or services to be performed.
4. IFB Packet: This contains the instructions governing the bid preparation and required documents to be submitted are provided herein which must be met to be eligible for consideration.

Contractors may obtain copies of bid documents by depositing a \$100.00 check payable to Navajo Housing Authority for each set of Bid Documents or Digital Copy. The deposit is non-refundable. Copies may be obtained from Academy Reprographics, 8900 San Mateo Blvd, Suite N, Albuquerque, NM 87113, telephone number is (505) 821-6666 and fax number is (505) 857-0634, contact Savannah Arnold at savannah@acadrepro.com or Linda Chavez at linda@acadrepro.com .

5. Estimated Schedule of Activities:

Activities:

- a. Advertisement Period:
- b. Site Visit:

Due Dates:

- April 5, 2024 – May 7, 2024
April 23, 2024 @ 10:00am MDST

Location: NHA Project, NM15-43 Crownpoint, NM

- c. Pre-Bid Conference: April 23, 2024 @ 11:00AM MDST
Location: NHA Housing Management Office Conf. room – Crownpoint, NM
Immediately following Site Visit

- d. **Invitation For Bid Due:** **May 7, 2024 @ 2:00PM (MDST)**
Public Bid Opening:

Microsoft Teams

[Join the meeting now](#)

Meeting ID: 214 458 015 659

Passcode: 645DBT

- e. Tentative NHA Approval: June 13, 2024
f. Execution of Contract/NTP: June 20, 2024

*The NHA will issue an addendum if there is any deviation from the due date.

6. Inquiries: ANY AND ALL inquiries or questions shall be submitted in writing to Doris Yonnie, Procurement Specialist via email at dyonnie@hooghan.org by **April 25, 2024 @ 2:00PM (MDST)**. All responses will be made in writing to all General Contractors who have an interest in this IFB.
7. Addendum of Supplement to this IFB: In the event it becomes necessary to revise any part of the IFB, the Procurement Department shall issue a written addendum on the specifics of the change(s) and inform all concerned. All requested forms and attachments (Signature and Acknowledgment of Addendum) must be submitted with the Form of Bid and in the required format. The submission and signing of a bid shall indicate the intention of the bidder to adhere to the provisions described in this IFB.
8. Late Receipt of Bid: Late bids shall not be accepted. It is the responsibility of the bidder to ensure the bid arrives via email to the assigned Procurement Specialist prior to the due date and time specified **NO Exceptions**.
9. Rejection of Bids: The NHA reserves the right to reject any or all bids, whether within the estimated total contract price or not, and to waive informalities in the bids received whenever such rejection or waiver is in the best interest of the NHA.
10. Withdrawal of Bids: No bid shall be withdrawn for a period of sixty (60) days subsequent to the Opening of Bids without consent of NHA.
11. Proprietary Information: Any restrictions on the use of data contained within any bid must be clearly stated in the bid itself. Each and every page that contains proprietary information must be labeled or identified with "Proprietary".
12. Ownership of Bids: All materials submitted with the bid accepted shall become the property of the NHA and not returned to the General Contractor. The NHA has the right to use any or all information presented in the bid for the purpose of review and qualification. Disqualification or non-selection of the General Contractor or bid does not eliminate this right.

13. Incurring Cost: The NHA is not liable for any cost incurred by the General Contractor prior to issuance of the contract award for the General Contractor.
14. Acceptance of Bid Content: The contents of the bid of the successful General Contractor will become contractual obligations if acquisition action ensues. Failure of the successful General Contractor to accept these obligations may result in cancellation of the award and such General Contractor may be removed from future solicitation. The NHA reserves the right to pursue appropriate legal action in the set of the circumstances in Navajo Nation Tribal Courts.
15. Acceptance Time: The NHA will open and publicly read aloud all bids immediately after the specified closing time.
16. UEIN & System for Award Management (SAM) Registration: All NHA Contractors **must** be registered in the System for Award Management (SAM) at <https://www.sam.gov> . Request for a Unique Entity Identification Number (UEIN). The NHA will not award any contracts to Contractors who do not meet this requirement.
17. Award of Bid: Upon selection, the contract document will be prepared and delivered to the General Contractor and the bid deliverable submitted by the General Contractor will become part of the contract.
18. Award Procedures and Criteria:
 - a. All bids be publically opened via zoom on the specified due date.
 - b. Review: A review team will evaluate the bids received in accordance with the general criteria used herein. General Contractor should be prepared to provide any additional information the team feels necessary to the fair evaluation.
 - c. Endorsement: Failure of the General Contractor to provide any information requested in the IFB will result in disqualification of the bid. All bids must be endorsed with the signature of a responsible official having the authority to bind the offer to execution of the bid.
 - d. Compliance with NAHASDA Navajo or Indian Preference Requirements.
 - i. Navajo Preference: This IFB is NOT restricted to Navajo organizations and Navajo owned economic enterprises pursuant to 24 CFR 1000.48 (a) (2) of NAHASDA. In the award of contract, the NHA gives preference to Navajo organizations and Navajo-owned economic enterprises pursuant to 24 CFR 1000.48 (a) (2) of NAHASDA and Navajo Business Opportunity Act (NBOA) 5.N.N.C. 201 § et. Seq. Professional Vendor(s) must provide evidence of at least 51% Navajo ownership and indicate if vendor is a partnership, corporation, joint venture, sole proprietorship, or other legally bound arrangement with appropriate ownership documents.
 - ii. The Navajo Nation Contract and Purchase Certification and Certificate of Eligibility is reviewed, monitored and issued by the Navajo Nation Business Regulatory Department under the Navajo Nation Division of Economic Development. NHA shall require the current Navajo Nation

Contract and Purchase Certification and Certificate of Eligibility from Bidders seeking Navajo Preference at the time of proposal submission.

- a. Application of Navajo Preference. Businesses are certified according to the following priority classification:
 1. Priority #1 - 100% Navajo-owned and controlled business entity;
 2. Priority #2 –Certification shall be granted to:
 - a. Any fifty-one percent (51%) to ninety-nine percent (99%) Navajo; or
 - b. Fifty-one percent (51%) to one hundred percent (100%) other Indian owned and controlled business; or
 - c. One hundred percent (100%) Navajo Nation owned and controlled economic enterprise having its principal place of business on or off the Navajo Nation.
 - i. The qualified Navajo owned economic enterprise or organization Priority #1 are entitled to an award of 10 points of the available rating.
 - ii. The qualified Navajo owned economic enterprises or organizations Priority #2 are entitled to an award of 5 points of the available rating.
- b. Navajo Preference Company Ownership. If a Navajo Preference individual 51% or more, the Navajo Preference owner shall participate in more than 50% of the project and shall not offer or bid to any single sub-contractor(s) who is not Navajo Preference.

After applying Navajo Preference, if there is no Priority #1 or Priority #2 responsive and responsible bidder for a given solicitation. NHA will apply Indian Preference pursuant to Section 7(b) of the Indian Self-Determination and Education Assistance Act (ISDEAA) of 1975, preference in the award of contracts and subcontracts shall be given to Indian-owned economic enterprises and Indian organizations. The definitions of “Indian,” “economic enterprise,” and Indian Organization” shall be as defined in 24 C.F.R. 1000.48, 1000.50, and 1000.52 respectively. If there is a Priority #1 or Priority #2 responsive and responsible bidder for a given solicitation then Indian Preference shall not apply.

iii. Indian Preference:

This IFB is not restricted to Indian organizations and Indian owned economic enterprises pursuant to 24 CFR 1000.48 (a) (2), 1000.50 and 1000.52 of NAHASDA. In the award of contract, the NHA gives preference to Indian organizations and Indian-owned economic enterprises pursuant to 24 CFR 1000.48 (a) (2), 1000.50 and 1000.52 of NAHASDA. Vendor(s) must provide evidence of at least 51% Indian ownership from a recognized Indian Tribe. Indicate if vendor is a partnership, corporation, joint venture, sole proprietorship, or other legally bound arrangement with appropriate ownership documents.

- a. Application of Indian Preference. If IFB is not restricted to qualified Indian-owned economic enterprises or organizations, the NHA Procurement Department will review and certify which of the Bidders are qualified Indian-owned economic enterprises or organizations.
- b. Indian Preference Company Ownership, If Vendor or Contractor is 51% or more owned by an Indian Preference individual, the Indian Preference owner shall participate in more than 50% of the project and should not be bid out to any single sub-contractor(s) who are not Indian Preference.
- c. Award will be made to the qualified Indian enterprise or organization with the lowest responsive bid if that bid is within budgeting limits established for this project and is no more than "X" percent higher than the lowest responsive bid from any qualified Non-Indian Bidder.

	X = lesser of
When the lowest responsive bid is less than \$100,000	10% of that bid or 9,000
At least \$100,000 but less than \$200,000	9% of that bid or 16,000
At least \$200,000 but less than \$300,000	8% of that bid or \$21,000
At least \$300,000 but less than \$400,000	7% of that bid or \$24,000
At least \$400,000 but less than \$500,000	6% of that bid or \$25,000
At least \$500,000 but less than \$1,000,000	5% of that bid or \$40,000
At least \$1,000,000 but less than \$2,000,000	4% of that bid or \$60,000
At least \$2,000,000 but less than \$4,000,000	3% of that bid or \$80,000
At least \$4,000,000 but less than \$7,000,000	2% of that bid or \$105,000
\$7,000,000 or more	1 ½% of the lowest responsive bid, with no dollar limit

If no responsive bid by a qualified Indian enterprise or organization is within the stated range, award will be made to the Bidder with the lowest responsive, responsible bid.

The General Contractor shall submit a completed Form NHA Employment and Training Statement (Exhibit C) attesting to give preference and opportunity for training and employment to Navajos and Indians in implementing the contract pursuant to 24 CFR 1000.48 (a) (2), 1000.50 and 1000.52 of NAHASDA and NBOA, 5 N.N.C. § 201 et. seq. Failure to do so shall be grounds for NHA to deem the Contractor Non-Responsive.

- 19. Required Wage Rates: In accordance with the NAHASDA requirements, the contractor is to pay prevailing wage rates established by U.S. Department of Housing and Urban Development (Davis-Bacon Act). The current wage determination is set forth within the Contract Documents. This provision essentially provides that all labor mechanics employed by the contractor and subcontractors for this project shall be paid wages established by the U.S. Department of Housing and Urban Development.

20. Additional Information:

The NHA may request additional information from bidders after bid submission. Bidders will be required to submit by NHA's specified due date and time.

21. Organization Business Parameters

1. Team Continuity and Changes to Organizational Structure:

Following submittal of the IFB, Key Personnel or Major Participants identified in the IFB may not at any time be removed, replaced, or added without the written approval of the NHA. The NHA may revoke the responsive status of a Submitter if any Key Personnel or Major Participant identified in the IFB is removed, replaced, or added without NHA approval. To qualify for approval, the written request shall document that the proposed removal, replacement, or addition will be equal to or a more qualified Key Personnel or Major Participant provided in the IFB.

- 2. Sale of the Business Structure:** Following submittal of the IFB, if the business goes through a sale and new ownership is established, the submitter shall provide written documentation for NHA's approval of the new ownership status and provide supporting technical, administrative and financial capacity information for NHA's review and approval. The NHA may terminate contract for convenience if it is in the best interest of NHA.

- 22. Performance and Payment Bond:** A 100 percent performance and payment bond of the contract price will be required and shall be approved by the NHA prior to contract award. Verification of bonding capacity will be requested from the Contractor by the NHA for review.

- 23. Standard Contract:** A Standard Construction Agreement Between Owner and Contractor whose bid is determined to be responsive and responsible to the NHA, in consideration of qualifications, knowledge of Tribal standards, NAHASDA rules and regulations, and cost. The Navajo Housing Authority reserves the right to incorporate standard contract provisions into any contract negotiations as a result of a responsive and responsible bid in response to this IFB; such standard contract provisions include but is not limited to non-waiver of sovereign immunity by NHA. Navajo Nation laws govern the contract and Navajo Nation courts shall have sole and exclusive jurisdiction over any disputes that may arise.

- 24. Insurances(s):** The selected General Contractor agrees to procure and maintain professional liability insurance with an insurance company in good standing, name NHA as an additional insured, insuring payment of damages arising out of the performance of construction services for the NHA, in contractor's capacity if such damages are caused by error, omission or negligent act of the insured or any person for whom the insured is legally liable and responsible.

Additionally, the following minimum amounts of Liability Coverage shall be maintained by the Contractor during the life of the contract.

<u>Insurance</u>	<u>Limit or Amounts</u>
1. Workers Compensation	Statutory Limits
2. Employers Liability	One Accident \$100,000
3. Protective Liability	Bodily Injury \$1,000,000/2,000,000
4. Protective Liability	Physical Injury \$1,000,000/2,000,000
5. Public Liability	Bodily Injury \$1,000,000/2,000,000
6. Public Liability	Physical Injury \$1,000,000/2,000,000
7. Pollution (Environmental Liability)	\$1,000,000 Each Occurrence
8. Automobile Insurance	Bodily Injury \$1,000,000.00/2,000,000
9. Automobile Insurance	Physical Injury \$1,000,000.00/2,000,000
10. Errors and Omissions Liability	\$500,000/500,000

- 25. Arbitration:** At the discretion of the General Contractor, the Navajo Nation Sovereign Immunity Act provides the opportunity to parties doing business with the Navajo Housing Authority to engage in settlement of agreement of disputes through arbitration. 1 N.N.C. §554(J).

SECTION II – Instruction to Bidders and Bid Standards

The Navajo Housing Authority (NHA) is jointly developing this project with the Navajo Nation, including the financial contribution from Native American Housing & Self Determination Act (NAHASDA) program. The use of NAHASDA funds require that the contract be in compliance with the Federal Procurement standards. The following special instructions are the NHA and HUD program requirements that are part of the contract documents.

Read Instructions Carefully.
Failure to submit the following documents shall be grounds for the NHA to deem your bid as Non-Responsive.

E-mail bids will be accepted ONLY.

1. **General Standards:**

Please ensure you submit your response in the following manner:

- All Bids submitted must be one (1) electronic document.
- Submit an electronic document with subject title, clearly reads “**Do Not Open – Advertised - IFB #612 Construction Services for Demolition and Rebuilding of Homeownership Units in Crownpoint, NM**” and if Navajo Preference is applicable, clearly indicate “**Priority #1**” or “**Priority #2**” and if Indian Preference is applicable clearly mark “**Indian Preference**”.
- All Bidders shall acknowledge receipt of all addenda on form of bid (if applicable).
- Please submit bids with a cover sheet** and in the order of the bid requirements and tab all sections of the bid accordingly.
- All Bids shall include the following information as outlined in Additional Requirements.
- All Bids shall include the following information as outlined in EXHIBITS A through M.

2. **Form 5369** – Instruction to Bidders for contracts Public and Indian Housing Programs

3. **Additional Requirements**

Additional information is required as such and must accompany the bids at the time of submission in order to be deemed responsive. **All forms must be submitted, signed, dated and notarized, if applicable to the form.**

- EXHIBIT “A”** Financial Information

The bidder must demonstrate it has the financial capability to perform the required services. Submit 2022 and 2021 year-end financial statements acceptable to the NHA, which clearly depicts the stability of the company. These financial statements must either be “audited financial statements” or “signed and reviewed by a third party Certified Public Accounting (CPA)”. Financial Statements must include the **Balance Sheet, Profit & Loss Statement, and Income Statement.**

If the firm does not have “audited financial statements or signed and reviewed by a third party Certified Public Account (CPA)”, the firm shall submit the U.S. Corporation Income Tax Return Form 1120 for 2022 and 2021.

- If this is the first project as a Joint Venture (JV), please submit the requested financials for both entities.

You may be required to submit detailed financial documents and/or information by the NHA.

EXHIBIT “B-1” Navajo Preference

- All Bidders interested in claiming Navajo Preference must submit Exhibit B-1– The Navajo Nation Contract and Purchase Certification Certificate of Eligibility that documents if the bidder is Priority #1 or Priority #2, at the time of the bid submission.

Or;

EXHIBIT “B-2” Indian Preference. All Bidders interested in claiming Indian Preference must submit the following:

1. If not a qualified Indian Preference company with the NHA, but seeking Indian Preference, submit completed Appendix – 1, Form – Indian Enterprise Qualification Statement and include all required attachments as Exhibit B-2
2. If your company is already qualified as an NHA Indian Preference company, submit a copy of the NHA Indian Qualification Certified Letter as Exhibit B – 2.

If this is your first project as a JV and seeking Navajo or Indian Preference, please submit all information for both entities in the JV.

If “NOT APPLICABLE – PLEASE INDICATE NOT APPLICABLE for EXHIBIT B-1 and B-2 and submit as EXHIBIT B-1 and B-2.

EXHIBIT “C” Names of Core Crew Employees and Resumes

A core crew employee is an individual who is a bona fide employee of the contractor at the time the bid is submitted; or an individual who was not employed by the bidder at the time the bid was submitted, but who is regularly employed by the bidder in a supervisory or other key skilled position when work

is available. Bidders shall submit with their bids a list of all core crew employees and resumes.

EXHIBIT “D” List of Subcontractors

Bidders must submit a list of the subcontractors.

EXHIBIT “E” Employment and Training Statement

All Bidders are required to submit with bids a statement describing how they will provide Navajo or Indian Preference in the award of subcontracts. See Section 12(f) (1) of the Instructions to Bidders, Form 5369. The specific requirements of that statement and factors to be used by the Owner in determining the adequacy of the statement are as follows:

- (I) A statement describing the Bidder’s plan to provide Navajo or Indian Preference in subcontracting, including how eligibility for preference will be determined, the procedures that will be followed by the Bidder for qualifying subcontractors seeking to qualify for Navajo or Indian Preference, how Navajo or Indian Preference in the award of subcontracts will be made, and any other miscellaneous information.
- (II) A statement detailing the Bidder’s employment and training opportunities and its plan to provide preference to Navajo or Indian in implementing the contract; and
- (III) The number of percentage of Navajo or Indian anticipated to be employed and trained.

- **Must be signed and notarized** with the signature of a responsible official having the authority to bind the offer to execution of the bid.
- **Must include required separate documents** as specified on the form to
- If this is your first project as a JV, submit a separate form for each entity involved.

EXHIBIT “F” Non-Collusive Affidavit

- **Must be signed and notarized** with the signature of a responsible official having the authority to bind the offer to execution of the bid.
- If this is your first project as a JV, submit a separate form for each entity involved.

EXHIBIT “G” Certification Regarding Debarment, Suspension and Eligibility and Voluntary Exclusion Letter

- **Must be prepared on firm’s letterhead and signed** with the signature of a responsible official having the authority to bind the offer to execution of the bid.

- If this is your first project as a JV, submit a separate form for each entity involved.
- EXHIBIT “H”** Types of Agreements
- If any of the following apply to the applicant entity(s), the entity(s) must submit:
- Collaborative Agreements
 - JV Agreement
 - Teaming Agreement
 - Mentoring Agreement
 - Financial Support Agreement
 - Other Formalized Agreements

If “NOT APPLICABLE – PLEASE INDICATE NOT APPLICABLE for EXHIBIT H and submit as EXHIBIT H.

- EXHIBIT “I”** Contractor’s and Consultant’s Previous Participation Certification
- **Must be completed and signed** with the signature of a responsible official having the authority to bind the offer to execution of the bid.
 - If this is your first project as a JV, submit a separate form for each entity involved.

Form 5369 – Instructions to Bidders for contracts Public and Indian Housing Programs for Exhibit “J”

- EXHIBIT “I”** HUD form 5369a Representations, Certifications, and Other Statements of Bidders, Public and Indian Housing Programs, Previous Participation Certificate, Section 12: Be advised - Replacement of the second sentence; “If the Successful Bidder does not submit the certificate with his/her bid he/she must submit it within three (3) working days of the bid opening.” with **“The Bidder must submit the certificate (Replacement HUD Form 2530 Previous Participation - NHA P&CD 12/6/2010) with the bid.”** (As provided in the Contract Documents).
- EXHIBIT “K”** Form of Bid and Exhibit “K-1” Material and Labor Cost Breakdown
- **Must be completed and signed** with the signature of a responsible official having the authority to bind the offer to execution of the bid.
- EXHIBIT “L”** Bid Bond (L1) or Bid Security (L2)
- **Must be completed and signed** with the signature of a responsible official having the authority to bind the offer to execution of the bid.
- EXHIBIT “M”** If applicable, Certified Check or Cash Deposit in Lieu of Bid Bond Letter. A certified check in the amount equal to 10% of the bid, payable to the *Navajo Housing Authority* –or– an account established with a financial

institution naming *Navajo Housing Authority* as the sole account holder containing an amount equal to 10% of the bid, shall be submitted with bid.

EXHIBIT “A”- Financial Information

The bidder must demonstrate it has the financial capability to perform the required services. Submit 2022 and 2021 year-end financial statements acceptable to the NHA, which clearly depicts the stability of the company. These financial statements must either be “audited financial statements” or “signed and reviewed by a third party Certified Public Accountant (CAP)”. Financial Statements must include the **Balance Sheet, Profit & Loss Statement, and Income Statement.**

If the bidder does not have “audited financial statements or signed and reviewed by a third party Certified Public Accountant (CPA)”, the bidder shall submit the U.S. Corporation Income Tax Return Form 1120 for 2022 and 2021.

- If this is the first project as a Joint Venture (JV), please submit the requested financials for both entities.

You may be required to submit detailed financial documents and/or information requested by the NHA.

EXHIBIT “B-1” or “B-2” NAVAJO or INDIAN PREFERENCE

- **Exhibit B-1:** All bidders interested in claiming Navajo Preference must submit current and valid “The Navajo Nation Contract and Purchase Certification Certificate of Eligibility” that documents if the bidder is Priority #1 or Priority #2, at the time of the bid submission.
- If this is your first project as a JV and seeking Navajo Preference, please submit all information for both entities in the JV.

Or;

- **Exhibit B-2:** If not a qualified Indian Preference company with the NHA, but seeking Indian Preference please complete and submit all required attachments of Appendix-1, Form – Indian Enterprises Qualifications Statement to be considered for Indian Preference and submit as Exhibit B-2.
- If your firm is already a qualified NHA Indian Preference company, please submit a copy of the NHA Indian Qualification Certified letter in place of Exhibit B-2.
- If you are seeking Indian Preference for a JV, submit all information on behalf of the JV. *If this is your first project as a JV, please submit all information for each entity involved.*

If NOT APPLICABLE – PLEASE INDICATE NOT APPLICABLE and submit as EXHIBIT B-1 or B-2, or both, B-1 and B-2.

EXHIBIT “C”- Names of Core Crew Employees and Resumes

A core crew employee is an individual who is a bona fide employee of the contractor at the time the bid is submitted; or an individual who was not employed by the General Contractor at the time the bid was submitted, but who is regularly employed by the General Contractor in a supervisory or other key skilled position when work is available. General Contractor shall submit with their bids a list of all core crew employees and resumes.

EXHIBIT “D” - List of Subcontractors

Bidder must submit a list of the subcontractors. Each Sub-Contractor shall be licensed and have active registration on the System for Award Management (www.sam.gov) and have a valid Unique Entity Identification Number (UEI). If a subcontractor is not registered on sam.gov, at the time of bid submission, they shall immediately register and be an active registrant by the time of award of this contract.

- **ALL FIRST-TIER SUBCONTRACTORS MUST BE LISTED.**
- Any additional subcontractors identified in the bid documents shall also be listed.
- The NHA may deem a Bidder non-responsive, should Bidder NOT submit form.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.

TYPE OF WORK	SUBCONTRACTOR	SAM.GOV REGISTERED	UEI #	QUALIFIED NHA NAVAJO PREFERENCE COMPANY

Bidders that desire to be considered by NHA, are required to submit List of Subcontractors within 24 hours of bid opening, a list of **ALL** first-tier subcontractors, including the

subcontractor's name, bid amount and other information required by the NHA and as stated in NHA Contract Documents.

LICENSURE:

The subcontractor's name, the type of work, the subcontractor's bid amount, and the subcontractor's license number, if such license is required under state law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

'SPECIAL EXCEPTION':

A Bidder may list 'Special Exception' in place of a subcontractor when the Bidder intends to obtain a subcontractor to perform the work at a later date because the Bidder was unable to obtain a qualified or reasonable bid. The Bidder shall insert the term 'Special Exception' for that category of work, and shall provide documentation with the subcontractor list describing the Bidder's efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the Bidder was unable to obtain a qualified subcontractor bid. The NHA must find that the Bidder complied in good faith for any 'Special Exception' designation, in order for the bid to be considered. If awarded the contract, the NHA shall supervise the Bidder's efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor's bid. Any listing of 'Special Exception' on the sub-list form shall also include amount allocated for that work.

GROUND FOR DISQUALIFICATION:

The NHA may not consider any bid submitted by a Bidder if the Bidder fails to submit a subcontractor list meeting the requirements of State law. The NHA may withhold awarding the contract to a particular Bidder if one (1) or more of the proposed subcontractors are considered by the NHA to be unqualified to do the work or for such other reason in the best interest of the NHA. Notwithstanding any other provision in these instructions, if there is a good faith error on the sub-list form, at the sole discretion of the NHA, the NHA Contracting Officer may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the NHA. If such correction is submitted timely, then the sub-list requirements shall be considered met.

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

Subsequent to twenty-four (24) hours after the bid opening, the Bidder may change its listed subcontractors only after receiving written permission from the NHA based on complying with all of the following criteria.

1. The Bidder has established in writing that the change is in the best interest of the NHA and that the Bidder establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.

2. The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
3. Any requirement set forth by the NHA to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
4. Any increase in the cost of the subject subcontractor work is borne by the contractor.
5. Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
6. The NHA will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Bidder establishes that the subcontractor is not qualified for the work.

Example:

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR LICENSE #	SUBCONTRACTOR BID AMOUNT
ELECTRICAL	ABCD Electric Inc.	123456789000	\$325,000
LANDSCAPING	"Self"	123456789000	\$275,000
CONCRETE (ALTERNATE #1)	XYZ Concrete Inc	123456789000	\$315,000

SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.

EXHIBIT "E" – Employment and Training Statement

This form, when completely filled out, shall suffice to meet the minimum acceptable standard of the Navajo Housing Authority regarding the employment and training of Navajos or Indians and providing preference to Navajos or Indians implementing the contract and in the award of subcontracts. Answers will not be evaluated to determine their acceptability but rather, all completed forms will be accepted.

1. Does your firm presently provide employment and training opportunities to Navajos or Indians?

Yes _____ [You must answer (a)].

(a.) What will your company do to provide employment and training opportunities to Navajos or Indians in implementing the contract? (You must at least check one to meet standard of acceptability.)

(i) _____ In advertising for any vacant positions my company will provide for Navajo or Indian preference.

(ii) _____ Other. Explain on a separate sheet of paper

No _____ [You must answer (a)].

(a.) Please state on a separate sheet why your company currently offers no employment and training opportunities to Navajos or Indians.

2. Check applicable box (you must check at least one box):

_____ My company will provide preference to Navajos or Indians in the award of any subcontracts.

_____ My company will not subcontract any portion of the contract.

_____ Although, I anticipate to award subcontracts, it is infeasible to provide for Navajo or Indian preference in the award of subcontracts. Please provide certified statement stating why it is infeasible to provide Navajo or Indian preference in the award of subcontracts.

3. State the anticipated number or percentage of Navajos or Indians to be employed and trained under this contract.

_____ Check here if unsure or none, and state why on a separate sheet of paper.

I hereby certify that the above statements are correct and true.

Authorized Agent

Date

State of _____)ss

County of _____)ss

Subscribed and sworn to before me this _____ day of _____, 20__.

Signature of Notary

{SEAL}

My Commission expires _____, 20__.

EXHIBIT "F" – Non-Collusive Affidavit



State of _____)ss

County of _____)ss

_____, being first duly sworn, deposes and says:

That he/she is _____;
(A partner or officer of the company)

the party making the foregoing bid or bid, that such bid is genuine and not collusive or sham; that said bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement collusion or communication or conference, with any person, to fix the bid price of affiant or of any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that any other bidder, or to secure any advantage against the

(NHA)

or any person interested in the proposed contract; and that all statements in said bid or bid are true.

SIGNATURE OF:

Bidder, if the bidder is an individual;

Partner, if the bidder is a partnership;

Officer, if the bidder is a corporation;

(MUST BE NOTORIZED)

Subscribed and sworn to before me this _____ day of _____, 20__.

Signature of Notary

{SEAL}

My Commission expires _____, 20__.

EXHIBIT “G” – Certification Regarding Debarment, Suspension and Eligibility and Voluntary Exclusion

[Date]

Must be submitted on Entity's Letterhead

Navajo Housing Authority
Attn: Doris Yonnie
Procurement Department
P.O. Box 4980
Window Rock, AZ 86515

RE: Certification Regarding Debarment, Suspension and Eligibility
and Voluntary Exclusion

Dear Ms. Yonnie:

By submitting a bid in response to the Navajo Housing Authority (NHA) Invitation for Bid Number _____ for _____

_____, the undersigned certifies the following: I certify that, to the best of my knowledge, [_____ **Name of Company**] and all of its principals: (a) are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by a Federal Agency or agency; (b) have not within a Ten (10) year period preceding this bid been convicted of, or had civil judgment rendered against them for commission of fraud, or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, Tribal or local) transaction or contract under a public transaction, violation of antitrust statutes or commission of embezzlement, theft, forgery, falsification or destruction of records, making false statements, or receiving stolen property; (c) are not presently indicted for or other criminally or civilly charged by a government entity (Federal, State, Tribal or local) with the commission of any of the offenses enumerated in (b) of this certification; and (d) have not within a three year period preceding this bid had one or more public transaction (Federal, State, Tribal or local) terminated for cause.

1. This certification is a material representation of fact upon which the NHA has relied upon when this transaction was entered into. If it is later determined that the undersigned knowingly rendered an erroneous certification, in addition to other remedies available, the NHA may pursue available remedies including suspension, debarment, or termination of the contract.

Sincerely,

(Signature)

[Print Name, Title]

EXHIBIT “H” - Types of Agreements

If any of the following apply to the entity(s), the entity(s) must submit copies of:

- Collaborative Agreements
- JV Agreement
- Teaming Agreement
- Mentoring Agreement
- Financial Support Agreement
- Other Formalized Agreements

If “NOT APPLICABLE – PLEASE INDICATE NOT APPLICABLE for EXHIBIT H” and submit as EXHIBIT H.

**NAVAJO HOUSING AUTHORITY
PROCUREMENT AND CONTRACTS DEPARTMENT
CONTRACTOR'S AND CONSULTANT'S PREVIOUS PARTICIPATION CERTIFICATION**

EXHIBIT "I"

1. Firm Name/Business Address/Fax Number Telephone No./Federal Tax Identification No.	2. Year Present Firm Established	3. Date Prepared
1a. Submittal for: <input type="checkbox"/> Parent Company <input type="checkbox"/> Branch or Subsidiary Office		4. Specify type of Ownership, type of business and check below. if applicable: <input type="checkbox"/> A. Indian Owned Organization or Enterprise <input type="checkbox"/> B. Small Business (other Minority) <input type="checkbox"/> C. Woman Owned
5. Name of Parent Company, if any		5a. Name of Former Parent Co. or Firm/Business Name(s) if different from Parent Co. or Firm Name/Owners(s) and Years established.
6. Name of Owner(s)/Title/Telephone Number/Owner Responsibilities 1) 2) 3) 4)		

FOR CONSTRUCTION CONTRACTING ONLY (COMPLETE IF YOU ARE A GENERAL/SUB-CONTRACTOR)

7. Summary of Total Construction Contracts Awarded: Insert Index	Last 5 Years (most recent year first)					INDEX Range of Construction Contracts
	2023	2022	2021	2020	2019	
Direct Federal Contracts	_____	_____	_____	_____	_____	1. Less than \$100,000 2. \$100,000 to \$250,000 3. \$250,000 to \$500,000 4. \$500,000 to \$1,000,000 5. \$1 million to \$2 million 6. \$2 million to \$5 million 7. \$5 million to \$10 million 8. \$10 million or greater
Indian Housing Authorities	_____	_____	_____	_____	_____	
All other domestic work	_____	_____	_____	_____	_____	

**NAVAJO HOUSING AUTHORITY
PROCUREMENT AND CONTRACTS DEPARTMENT
CONTRACTOR'S AND CONSULTANT PREVIOUS PARTICIPATION CERTIFICATION**

8. Has the company or its former parent company/Owner debarred by the Federal, State or Local Government? If yes, provide what agency debarred the Company, duration, and reason for debarment.

9. Work by firm which best illustrate current qualifications relevant to this project (List no more than 5 projects).

a. Project Name and Location	b. Nature of Firm's Responsibility. Indicate if Firm was Prime Contractor or Subcontractor on Project.	c. Project Owner's Name & Address Contact Person and Phone No. And Email Address	d. Completion Date (actual or estimated)	e. Total Contract Amount	f. Was Project ever in default during your participation?
1)					/ / Yes (explain) / / No
2)					/ / Yes (explain) / / No
3)					/ / Yes (explain) / / No
4)					/ / Yes (explain) / / No
5)					/ / Yes (explain) / / No

Typed or Printed Name of Principal or Title:

Signature

Certification Date

Telephone No.

**U.S. Department of Housing and
Urban Development**
Office of Public and Indian Housing

**Instructions to Bidders for Contracts
Public and Indian Housing Programs**

Instructions to Bidders for Contracts

Public and Indian Housing Programs

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1. Bid Preparation and Submission

(a) Bidders are expected to examine the specifications, drawings, all instructions, and, if applicable, the construction site (see also the contract clause entitled **Site Investigation and Conditions Affecting the Work** of the *General Conditions of the Contract for Construction*). Failure to do so will be at the bidders' risk.

(b) All bids must be submitted on the forms provided by the Public Housing Agency/Indian Housing Authority (PHA/IHA). Bidders shall furnish all the information required by the solicitation. Bids must be signed and the bidder's name typed or printed on the bid sheet and each continuation sheet which requires the entry of information by the bidder. Erasures or other changes must be initialed by the person signing the bid. Bids signed by an agent shall be accompanied by evidence of that agent's authority. (Bidders should retain a copy of their bid for their records.)

(c) Bidders must submit as part of their bid a completed form HUD-5369-A, "Representations, Certifications, and Other Statements of Bidders."

(d) All bid documents shall be sealed in an envelope which shall be clearly marked with the words "Bid Documents," the Invitation for Bids (IFB) number, any project or other identifying number, the bidder's name, and the date and time for receipt of bids.

(e) If this solicitation requires bidding on all items, failure to do so will disqualify the bid. If bidding on all items is not required, bidders should insert the words "No Bid" in the space provided for any item on which no price is submitted.

(f) Unless expressly authorized elsewhere in this solicitation, alternate bids will not be considered.

(g) Unless expressly authorized elsewhere in this solicitation, bids submitted by telegraph or facsimile (fax) machines will not be considered.

(h) If the proposed contract is for a Mutual Help project (as described in 24 CFR Part 905, Subpart E) that involves Mutual Help contributions of work, material, or equipment, supplemental information regarding the bid advertisement is provided as an attachment to this solicitation.

2. Explanations and Interpretations to Prospective Bidders

(a) Any prospective bidder desiring an explanation or interpretation of the solicitation, specifications, drawings, etc., must request it at least 7 days before the scheduled time for bid opening. Requests may be oral or written. Oral requests must be confirmed in writing. The only oral clarifications that will be provided will be those clearly related to solicitation procedures, i.e., not substantive technical information. No other oral explanation or interpretation will be provided. Any information given a prospective bidder concerning this solicitation will be furnished promptly to all other prospective bidders as a written amendment to the solicitation, if that information is necessary in submitting bids, or if the lack of it would be prejudicial to other prospective bidders.

(b) Any information obtained by, or provided to, a bidder other than by formal amendment to the solicitation shall not constitute a change to the solicitation.

3. Amendments to Invitations for Bids

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b) Bidders shall acknowledge receipt of any amendment to this solicitation (1) by signing and returning the amendment, (2) by identifying the amendment number and date on the bid form, or (3) by letter, telegram, or facsimile, if those methods are authorized in the solicitation. The PHA/IHA must receive acknowledgement by the time and at the place specified for receipt of bids. Bids which fail to acknowledge the bidder's receipt of any amendment will result in the rejection of the bid if the amendment(s) contained information which substantively changed the PHA's/IHA's requirements.

(c) Amendments will be on file in the offices of the PHA/IHA and the Architect at least 7 days before bid opening.

4. Responsibility of Prospective Contractor

(a) The PHA/IHA will award contracts only to responsible prospective contractors who have the ability to perform successfully under the terms and conditions of the proposed contract. In determining the responsibility of a bidder, the PHA/IHA will consider such matters as the bidder's:

- (1) Integrity;
- (2) Compliance with public policy;
- (3) Record of past performance; and
- (4) Financial and technical resources (including construction and technical equipment).

(b) Before a bid is considered for award, the bidder may be requested by the PHA/IHA to submit a statement or other documentation regarding any of the items in paragraph (a) above. Failure by the bidder to provide such additional information shall render the bidder nonresponsible and ineligible for award.

5. Late Submissions, Modifications, and Withdrawal of Bids

(a) Any bid received at the place designated in the solicitation after the exact time specified for receipt will not be considered unless it is received before award is made and it:

(1) Was sent by registered or certified mail not later than the fifth calendar day before the date specified for receipt of offers (e.g., an offer submitted in response to a solicitation requiring receipt of offers by the 20th of the month must have been mailed by the 15th);

(2) Was sent by mail, or if authorized by the solicitation, was sent by telegram or via facsimile, and it is determined by the PHA/IHA that the late receipt was due solely to mishandling by the PHA/IHA after receipt at the PHA/IHA; or

(3) Was sent by U.S. Postal Service Express Mail Next Day Service - Post Office to Addressee, not later than 5:00 p.m. at the place of mailing two working days prior to the date specified for receipt of proposals. The term "working days" excludes weekends and observed holidays.

(b) Any modification or withdrawal of a bid is subject to the same conditions as in paragraph (a) of this provision.

(c) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent either by registered or certified mail is the U.S. or Canadian Postal Service postmark both on the envelope or wrapper and on the original receipt from the U.S. or Canadian Postal Service. Both postmarks must show a legible date or the bid, modification, or withdrawal shall be processed as if mailed late. "Postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed by employees of the U.S. or Canadian Postal Service on the date of mailing. Therefore, bidders should request the postal clerk to place a hand cancellation bull's-eye postmark on both the receipt and the envelope or wrapper.

(d) The only acceptable evidence to establish the time of receipt at the PHA/IHA is the time/date stamp of PHA/IHA on the proposal wrapper or other documentary evidence of receipt maintained by the PHA/IHA.

(e) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent by Express Mail Next Day Service-Post Office to Addressee is the date entered by the post office receiving clerk on the "Express Mail Next Day Service-Post Office to Addressee" label and the postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. "Postmark" has the same meaning as defined in paragraph (c) of this provision, excluding postmarks of the Canadian Postal Service. Therefore, bidders should request the postal clerk to place a legible hand cancellation bull's eye postmark on both the receipt and Failure by a bidder to acknowledge receipt of the envelope or wrapper.

(f) Notwithstanding paragraph (a) of this provision, a late modification of an otherwise successful bid that makes its terms more favorable to the PHA/IHA will be considered at any time it is received and may be accepted.

(g) Bids may be withdrawn by written notice, or if authorized by this solicitation, by telegram (including mailgram) or facsimile machine transmission received at any time before the exact time set for opening of bids; provided that written confirmation of telegraphic or facsimile withdrawals over the signature of the bidder is mailed and postmarked prior to the specified bid opening time. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for opening of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

6. Bid Opening

All bids received by the date and time of receipt specified in the solicitation will be publicly opened and read. The time and place of opening will be as specified in the solicitation. Bidders and other interested persons may be present.

7. Service of Protest

(a) Definitions. As used in this provision:

"Interested party" means an actual or prospective bidder whose direct economic interest would be affected by the award of the contract.

"Protest" means a written objection by an interested party to this solicitation or to a proposed or actual award of a contract pursuant to this solicitation.

(b) Protests shall be served on the Contracting Officer by obtaining written and dated acknowledgement from —

[Contracting Officer designate the official or location where a protest may be served on the Contracting Officer]

(c) All protests shall be resolved in accordance with the PHA's/IHA's protest policy and procedures, copies of which are maintained at the PHA/IHA.

8. Contract Award

(a) The PHA/IHA will evaluate bids in response to this solicitation without discussions and will award a contract to the responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the PHA/IHA considering only price and any price-related factors specified in the solicitation.

(b) If the apparent low bid received in response to this solicitation exceeds the PHA's/IHA's available funding for the proposed contract work, the PHA/IHA may either accept separately priced items (see 8(e) below) or use the following procedure to determine contract award. The PHA/IHA shall apply in turn to each bid (proceeding in order from the apparent low bid to the high bid) each of the separately priced bid deductible items, if any, in their priority order set forth in this solicitation. If upon the application of the first deductible item to all initial bids, a new low bid is within the PHA's/IHA's available funding, then award shall be made to that bidder. If no bid is within the available funding amount, then the PHA/IHA shall apply the second deductible item. The PHA/IHA shall continue this process until an evaluated low bid, if any, is within the PHA's/IHA's available funding. If upon the application of all deductibles, no bid is within the PHA's/IHA's available funding, or if the solicitation does not request separately priced deductibles, the PHA/IHA shall follow its written policy and procedures in making any award under this solicitation.

(c) In the case of tie low bids, award shall be made in accordance with the PHA's/IHA's written policy and procedures.

(d) The PHA/IHA may reject any and all bids, accept other than the lowest bid (e.g., the apparent low bid is unreasonably low), and waive informalities or minor irregularities in bids received, in accordance with the PHA's/IHA's written policy and procedures.

(e) Unless precluded elsewhere in the solicitation, the PHA/IHA may accept any item or combination of items bid.

(f) The PHA/IHA may reject any bid as nonresponsive if it is materially unbalanced as to the prices for the various items of work to be performed. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

(g) A written award shall be furnished to the successful bidder within the period for acceptance specified in the bid and shall result in a binding contract without further action by either party.

9. Bid Guarantee (applicable to construction and equipment contracts exceeding \$25,000)

All bids must be accompanied by a negotiable bid guarantee which shall not be less than five percent (5%) of the amount of the bid. The bid guarantee may be a certified check, bank draft, U.S. Government Bonds at par value, or a bid bond secured by a surety company acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. In the case where the work under the contract will be performed on an Indian reservation area, the bid guarantee may also be an irrevocable Letter of Credit (see provision 10, Assurance of Completion, below). Certified checks and bank drafts must be made payable to the order of the PHA/IHA. The bid guarantee shall insure the execution of the contract and the furnishing of a method of assurance of completion by the successful bidder as required by the solicitation. Failure to submit a bid guarantee with the bid shall result in the rejection of the bid. Bid guarantees submitted by unsuccessful bidders will be returned as soon as practicable after bid opening.

10. Assurance of Completion

(a) Unless otherwise provided in State law, the successful bidder shall furnish an assurance of completion prior to the execution of any contract under this solicitation. This assurance may be [Contracting Officer check applicable items] —

[] (1) a performance and payment bond in a penal sum of 100 percent of the contract price; or, as may be required or permitted by State law;

[] (2) separate performance and payment bonds, each for 50 percent or more of the contract price;

[] (3) a 20 percent cash escrow;

[] (4) a 25 percent irrevocable letter of credit; or,

[] (5) an irrevocable letter of credit for 10 percent of the total contract price with a monitoring and disbursements agreement with the IHA (applicable only to contracts awarded by an IHA under the Indian Housing Program).

(b) Bonds must be obtained from guarantee or surety companies acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. Individual sureties will not be considered. U.S. Treasury Circular Number 570, published annually in the Federal Register, lists companies approved to act as sureties on bonds securing Government contracts, the maximum underwriting limits on each contract bonded, and the States in which the company is licensed to do business. Use of companies listed in this circular is mandatory. Copies of the circular may be downloaded on the U.S. Department of Treasury website <http://www.fms.treas.gov/c570/index.html>, or ordered for a minimum fee by contacting the Government Printing Office at (202) 512-2168.

(c) Each bond shall clearly state the rate of premium and the total amount of premium charged. The current power of attorney for the person who signs for the surety company must be attached to the bond. The effective date of the power of attorney shall not precede the date of the bond. The effective date of the bond shall be on or after the execution date of the contract.

(d) Failure by the successful bidder to obtain the required assurance of completion within the time specified, or within such extended period as the PHA/IHA may grant based upon reasons determined adequate by the PHA/IHA, shall render the bidder ineligible for award. The PHA/IHA may then either award the contract to the next lowest responsible bidder or solicit new bids. The PHA/IHA may retain the ineligible bidder's bid guarantee.

11. Preconstruction Conference (applicable to construction contracts)

After award of a contract under this solicitation and prior to the start of work, the successful bidder will be required to attend a preconstruction conference with representatives of the PHA/IHA and its architect/engineer, and other interested parties convened by the PHA/IHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract (e.g., Equal Employment Opportunity, Labor Standards). The PHA/IHA will provide the successful bidder with the date, time, and place of the conference.

12. Indian Preference Requirements (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

(a) HUD has determined that the contract awarded under this solicitation is subject to the requirements of section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e(b)). Section 7(b) requires that any contract or subcontract entered into for the benefit of Indians shall require that, to the greatest extent feasible

(1) Preferences and opportunities for training and employment (other than core crew positions; see paragraph (h) below) in connection with the administration of such contracts or subcontracts be given to qualified "Indians." The Act defines "Indians" to mean persons who are members of an Indian tribe and defines "Indian tribe" to mean any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians; and,

(2) Preference in the award of contracts or subcontracts in connection with the administration of contracts be given to Indian organizations and to Indian-owned economic enterprises, as defined in section 3 of the Indian Financing Act of 1974 (25 U.S.C. 1452). That Act defines "economic enterprise" to mean any Indian-owned commercial, industrial, or business activity established or organized for the purpose of profit, except that the Indian ownership must constitute not less than 51 percent of the enterprise; "Indian organization" to mean the governing body of any Indian tribe or entity established or recognized by such governing body; "Indian" to mean any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act; and Indian "tribe" to mean any Indian tribe, band, group, pueblo, or community including Native villages and Native groups (including

corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

(b) (1) The successful Contractor under this solicitation shall comply with the requirements of this provision in awarding all subcontracts under the contract and in providing training and employment opportunities.

(2) A finding by the IHA that the contractor, either (i) awarded a subcontract without using the procedure required by the IHA, (ii) falsely represented that subcontracts would be awarded to Indian enterprises or organizations; or, (iii) failed to comply with the contractor's employment and training preference bid statement shall be grounds for termination of the contract or for the assessment of penalties or other remedies.

(c) If specified elsewhere in this solicitation, the IHA may restrict the solicitation to qualified Indian-owned enterprises and Indian organizations. If two or more (or a greater number as specified elsewhere in the solicitation) qualified Indian-owned enterprises or organizations submit responsive bids, award shall be made to the qualified enterprise or organization with the lowest responsive bid. If fewer than the minimum required number of qualified Indian-owned enterprises or organizations submit responsive bids, the IHA shall reject all bids and readvertise the solicitation in accordance with paragraph (d) below.

(d) If the IHA prefers not to restrict the solicitation as described in paragraph (c) above, or if after having restricted a solicitation an insufficient number of qualified Indian enterprises or organizations submit bids, the IHA may advertise for bids from non-Indian as well as Indian-owned enterprises and Indian organizations. Award shall be made to the qualified Indian enterprise or organization with the lowest responsive bid if that bid is -

(1) Within the maximum HUD-approved budget amount established for the specific project or activity for which bids are being solicited; and

(2) No more than the percentage specified in 24 CFR 905.175(c) higher than the total bid price of the lowest responsive bid from any qualified bidder. If no responsive bid by a qualified Indian-owned economic enterprise or organization is within the stated range of the total bid price of the lowest responsive bid from any qualified enterprise, award shall be made to the bidder with the lowest bid.

(e) Bidders seeking to qualify for preference in contracting or subcontracting shall submit proof of Indian ownership with their bids. Proof of Indian ownership shall include but not be limited to:

(1) Certification by a tribe or other evidence that the bidder is an Indian. The IHA shall accept the certification of a tribe that an individual is a member.

(2) Evidence such as stock ownership, structure, management, control, financing and salary or profit sharing arrangements of the enterprise.

(f) (1) All bidders must submit with their bids a statement describing how they will provide Indian preference in the award of subcontracts. The specific requirements of that statement and the factors to be used by the IHA in determining the statement's adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement shall be rejected as nonresponsive. The IHA may require that comparable statements be provided by subcontractors to the successful Contractor, and may require the Contractor to reject any bid or proposal by a subcontractor that fails to include the statement.

(2) Bidders and prospective subcontractors shall submit a certification (supported by credible evidence) to the IHA in any instance where the bidder or subcontractor believes it is infeasible to provide Indian preference in subcontracting. The acceptance or rejection by the IHA of the certification shall be final. Rejection shall disqualify the bid from further consideration.

(g) All bidders must submit with their bids a statement detailing their employment and training opportunities and their plans to provide preference to Indians in implementing the contract; and the number or percentage of Indians anticipated to be employed and trained. Comparable statements from all proposed subcontractors must be submitted. The criteria to be used by the IHA in determining the statement(s)'s adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement(s), or that includes a statement that does not meet minimum standards required by the IHA shall be rejected as nonresponsive.

(h) Core crew employees. A core crew employee is an individual who is a bona fide employee of the contractor at the time the bid is submitted; or an individual who was not employed by the bidder at the time the bid was submitted, but who is regularly employed by the bidder in a supervisory or other key skilled position when work is available. Bidders shall submit with their bids a list of all core crew employees.

(i) Preference in contracting, subcontracting, employment, and training shall apply not only on-site, on the reservation, or within the IHA's jurisdiction, but also to contracts with firms that operate outside these areas (e.g., employment in modular or manufactured housing construction facilities).

(j) Bidders should contact the IHA to determine if any additional local preference requirements are applicable to this solicitation.

(k) The IHA [] does [] does not [Contracting Officer check applicable box] maintain lists of Indian-owned economic enterprises and Indian organizations by specialty (e.g., plumbing, electrical, foundations), which are available to bidders to assist them in meeting their responsibility to provide preference in connection with the administration of contracts and subcontracts.

EXHIBIT “J” – HUD form 5369a

Representations, Certifications, and Other Statements of Bidders

Public and Indian Housing Programs

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1. Certificate of Independent Price Determination

(a) The bidder certifies that-

(1) The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to (i) those prices, (ii) the intention to submit a bid, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a competitive proposal solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

(b) Each signature on the bid is considered to be a certification by the signatory that the signatory-

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

_____ [insert full name of person(s) in the bidder's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the bidder's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the bidder deletes or modifies subparagraph (a)2 above, the bidder must furnish with its bid a signed statement setting forth in detail the circumstances of the disclosure.

[] [Contracting Officer check if following paragraph is applicable]

(d) Non-collusive affidavit. (applicable to contracts for construction and equipment exceeding \$50,000)

(1) Each bidder shall execute, in the form provided by the PHA/IHA, an affidavit to the effect that he/she has not colluded with any other person, firm or corporation in regard to any bid submitted in response to this solicitation. If the successful bidder did not submit the affidavit with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the affidavit by that date may render the bid nonresponsive. No contract award will be made without a properly executed affidavit.

(2) A fully executed "Non-collusive Affidavit" [] is, [] is not included with the bid.

2. Contingent Fee Representation and Agreement

(a) Definitions. As used in this provision:

"Bona fide employee" means a person, employed by a bidder and subject to the bidder's supervision and control as to time, place, and manner of performance, who neither exerts, nor proposes to exert improper influence to solicit or obtain contracts nor holds out as being able to obtain any contract(s) through improper influence.

"Improper influence" means any influence that induces or tends to induce a PHA/IHA employee or officer to give consideration or to act regarding a PHA/IHA contract on any basis other than the merits of the matter.

(b) The bidder represents and certifies as part of its bid that, except for full-time bona fide employees working solely for the bidder, the bidder:

(1) [] has, [] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [] has, [] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(c) If the answer to either (a)(1) or (a)(2) above is affirmative, the bidder shall make an immediate and full written disclosure to the PHA/IHA Contracting Officer.

(d) Any misrepresentation by the bidder shall give the PHA/IHA the right to (1) terminate the contract; (2) at its discretion, deduct from contract payments the amount of any commission, percentage, brokerage, or other contingent fee; or (3) take other remedy pursuant to the contract.

3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions (applicable to contracts exceeding \$100,000)

(a) The definitions and prohibitions contained in Section 1352 of title 31, United States Code, are hereby incorporated by reference in paragraph (b) of this certification.

(b) The bidder, by signing its bid, hereby certifies to the best of his or her knowledge and belief as of December 23, 1989 that:

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of a contract resulting from this solicitation;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the bidder shall complete and submit, with its bid, OMB standard form LLL, "Disclosure of Lobbying Activities;" and

(3) He or she will include the language of this certification in all subcontracts at any tier and require that all recipients of subcontract awards in excess of \$100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than \$10,000, and not more than \$100,000, for each such failure.

(d) Indian tribes (except those chartered by States) and Indian organizations as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) are exempt from the requirements of this provision.

4. Organizational Conflicts of Interest Certification

The bidder certifies that to the best of its knowledge and belief and except as otherwise disclosed, he or she does not have any organizational conflict of interest which is defined as a situation in which the nature of work to be performed under this proposed contract and the bidder's organizational, financial, contractual, or other interests may, without some restriction on future activities:

- (a) Result in an unfair competitive advantage to the bidder; or,
- (b) Impair the bidder's objectivity in performing the contract work. [] In the absence of any actual or apparent conflict, I hereby certify that to the best of my knowledge and belief, no actual or apparent conflict of interest exists with regard to my possible performance of this procurement.

5. Bidder's Certification of Eligibility

(a) By the submission of this bid, the bidder certifies that to the best of its knowledge and belief, neither it, nor any person or firm which has an interest in the bidder's firm, nor any of the bidder's subcontractors, is ineligible to:

(1) Be awarded contracts by any agency of the United States Government, HUD, or the State in which this contract is to be performed; or,

(2) Participate in HUD programs pursuant to 24 CFR Part 24.

(b) The certification in paragraph (a) above is a material representation of fact upon which reliance was placed when making award. If it is later determined that the bidder knowingly rendered an erroneous certification, the contract may be terminated for default, and the bidder may be debarred or suspended from participation in HUD programs and other Federal contract programs.

6. Minimum Bid Acceptance Period

(a) "Acceptance period," as used in this provision, means the number of calendar days available to the PHA/IHA for awarding a contract from the date specified in this solicitation for receipt of bids.

(b) This provision supersedes any language pertaining to the acceptance period that may appear elsewhere in this solicitation.

(c) The PHA/IHA requires a minimum acceptance period of [Contracting Officer insert time period] calendar days.

(d) In the space provided immediately below, bidders may specify a longer acceptance period than the PHA's/IHA's minimum requirement. The bidder allows the following acceptance period: calendar days.

(e) A bid allowing less than the PHA's/IHA's minimum acceptance period will be rejected.

(f) The bidder agrees to execute all that it has undertaken to do, in compliance with its bid, if that bid is accepted in writing within (1) the acceptance period stated in paragraph (c) above or (2) any longer acceptance period stated in paragraph (d) above.

7. Small, Minority, Women-Owned Business Concern Representation

The bidder represents and certifies as part of its bid/ offer that it -

(a) [] is, [] is not a small business concern. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR 121.

(b) [] is, [] is not a women-owned business enterprise. "Women-owned business enterprise," as used in this provision, means a business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business.

(c) [] is, [] is not a minority business enterprise. "Minority business enterprise," as used in this provision, means a business which is at least 51 percent owned or controlled by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of its voting stock is owned by one or more minority group members, and whose management and daily operations are controlled by one or more such individuals. For the purpose of this definition, minority group members are:

(Check the block applicable to you)

- | | |
|------------------------|------------------------------|
| [] Black Americans | [] Asian Pacific Americans |
| [] Hispanic Americans | [] Asian Indian Americans |
| [] Native Americans | [] Hasidic Jewish Americans |

8. Indian-Owned Economic Enterprise and Indian Organization Representation (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

The bidder represents and certifies that it:

(a) [] is, [] is not an Indian-owned economic enterprise. "Economic enterprise," as used in this provision, means any commercial, industrial, or business activity established or organized for the purpose of profit, which is at least 51 percent Indian owned. "Indian," as used in this provision, means any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act.

(b) [] is, [] is not an Indian organization. "Indian organization," as used in this provision, means the governing body of any Indian

tribe or entity established or recognized by such governing body. Indian "tribe" means any Indian tribe, band, group, pueblo, or community including Native villages and Native groups (including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

9. Certification of Eligibility Under the Davis-Bacon Act (applicable to construction contracts exceeding \$2,000)

- (a) By the submission of this bid, the bidder certifies that neither it nor any person or firm who has an interest in the bidder's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (b) No part of the contract resulting from this solicitation shall be subcontracted to any person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (c) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

10. Certification of Nonsegregated Facilities (applicable to contracts exceeding \$10,000)

- (a) The bidder's attention is called to the clause entitled **Equal Employment Opportunity** of the General Conditions of the Contract for Construction.
- (b) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.
- (c) By the submission of this bid, the bidder certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the Equal Employment Opportunity clause in the contract.
- (d) The bidder further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) prior to entering into subcontracts which exceed \$10,000 and are not exempt from the requirements of the Equal Employment Opportunity clause, it will:
 - (1) Obtain identical certifications from the proposed subcontractors;
 - (2) Retain the certifications in its files; and
 - (3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

Notice to Prospective Subcontractors of Requirement for Certifications of Nonsegregated Facilities

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Employment Opportunity clause of the prime contract. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Note: The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

11. Clean Air and Water Certification (applicable to contracts exceeding \$100,000)

- The bidder certifies that:
- (a) Any facility to be used in the performance of this contract [] is, [] is not listed on the Environmental Protection Agency List of Violating Facilities:
 - (b) The bidder will immediately notify the PHA/IHA Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the bidder proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and,
 - (c) The bidder will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

12. Previous Participation Certificate (applicable to construction and equipment contracts exceeding \$50,000)

- (a) The bidder shall complete and submit with his/her bid the Form HUD-2530, "Previous Participation Certificate." **The Bidder must submit the certificate (Replacement HUD Form 2530 Previous Participation - NHA P&CD 12/6/2010) with the bid.** Failure to submit the certificate by that date may render the bid nonresponsive. No contract award will be made without a properly executed certificate.
- (b) A fully executed "Previous Participation Certificate" [] is, [] is not included with the bid.

13. Bidder's Signature

The bidder hereby certifies that the information contained in these certifications and representations is accurate, complete, and current.

(Signature and Date)

(Typed or Printed Name)

(Title)

(Company Name)

(Company Address)

EXHIBIT "K" – Form of Bid

BID FOR: Advertised - IFB #612 General Construction for Demolition and Rebuilding of Homeownership Units in Crownpoint, NM

To the Navajo Housing Authority
P.O. Box 4980, Navajo Nation
Window Rock, AZ 86515

Contractors:

The undersigned has familiarized himself with the local conditions affecting the cost of the work, and with the Specifications (including Invitation for Bid, Instructions to Bidders, this bid, the Form of Bid Bond, the Form of Non-collusive Affidavit, the Form of Contract, the requirements for Performance and Payment Security, the General Conditions, the Special Conditions, the General Scope of Work, the Technical Specifications and the Drawings) and Addenda, if any thereto, as prepared by **Indigenous Design Studio + Architecture (IDS+A), LLC** and on file in the office of the Owner and have received and examined the following addenda:

Addendum No. _____	Date: _____
Addendum No. _____	Date: _____
Addendum No. _____	Date: _____
Addendum No. _____	Date: _____

BASE BID:

The undersigned hereby proposes to furnish all labor, materials, equipment and services to complete the contract work as specified under the Base Bid for the Construction Services Demolition and Rebuild of Public Rental Housing Units under the authority of Navajo Housing Authority, all in accordance with the above, for the lump sum of:

TOTAL BID (Base Bid):

_____ Dollars (\$ _____)

In submitting this bid, it is understood that the right is reserved by the NHA to reject any and all bids. If written notice of the acceptance of this bid is mailed, telegraphed or delivered to the undersigned within sixty (60) days after the opening thereof, or at any time thereafter before this bid is withdrawn, the undersigned agrees to execute and deliver a contract in the prescribed form and furnish the required performance and payment security within ten (10) days after the contract is presented to him for signature.

Bid Security in the sum of _____ Dollars (\$ _____)

In the form of _____ is submitted herewith in accordance with the Specifications.

Attached hereto is an affidavit in proof that the undersigned has not entered into any collusion with any person with respect to this bid of any other bid or the submitting of bids for the contract for which this bid is submitted.

The bidder represents that he () has, or () has not participated in a previous contract or subcontract subject to the equal opportunity clause prescribed by Executive Orders 10925, 11114, or 11246 of the Secretary of Labor; that he () has, or () has not filed all required compliance reports, and that representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards. (The above representation need not be submitted in connection with contracts or subcontracts which are exempt from the clause.)

By signing this bid, the bidder certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments and that he does not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this Contract. As used in this certification the term "segregated facilities" means any waiting rooms, work areas, rest rooms or wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that he will retain such certifications in his files; and that he will forward a notice to his proposed subcontractors as provided in the Instruction to Bidders.

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001

Name of Bidder: _____ Date: _____

Official Address: _____

By: _____

Print Name

Title: _____

Phone: _____

(Sign Original Only)

EXHIBIT "K-1" MATERIAL AND LABOR COST BREAKDOWN

IFB #612

CONSTRUCTION SERVICES FOR DEMOLITION AND REBUILDING OF HOMEOWNERSHIP UNITS IN CROWNPOINT, NM

Div. Sect #	Description	Cost (\$)
020000	OVERALL DEMOLITION	\$ -
021000	EXISTING SITE CONDITIONS-HAZARDOUS MATERIAL	
031000	CONCRETE FORMING AND ACCESSORIES	\$ -
032000	CONCRETE REINFORCEMENT	\$ -
033000	CAST INPLACE CONCRETE	\$ -
033800	POST TENSIONED STRUCTURAL CONCRETE	\$ -
042000	UNIT MASONRY	\$ -
061000	ROUGH CARPENTRY	\$ -
061600	SHEATHING	\$ -
061753	SHOP FABRICATED WOOD TRUSSES	\$ -
062023	INTERIOR FINISH CARPENTRY	\$ -
064023	INTERIOR ARCHITECTURAL WOODWORK	\$ -
066500	PLASTIC SIMULATED WOOD TRIM	\$ -
072100	THERMAL INSULATION	\$ -
072413	POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)	\$ -
072600	UNDER-SLAB VAPOR RETARDER FOR CONCRETE SLABS ON-GRADE	\$ -
073113	ASPHALT SHINGLES	\$ -
076200	SHEET METAL FLASHING AND TRIM	\$ -
077100	ROOF SPECIALITIES	\$ -
077220	RIDGE AND SOFFIT VENTS	\$ -
079200	JOINT SEALANTS	\$ -
081100	STORM DOORS	\$ -
081114	CUSTOM STEEL DOORS AND FRAMES	\$ -
081416	FLUSH WOOD DOORS	\$ -
085313	VINYL WINDOWS	\$ -
086250	TUBULAR DAYLIGHTING SYSTEM	\$ -
087100	DOOR HARDWARE	\$ -
092900	GYPSON BOARD	\$ -
096513	RESILIENT ACCESSORIES	\$ -
096519	RESILIENT TILE FLOORING	\$ -
099113	EXTERIOR PAINTING	\$ -
099123	INTERIOR PAINTING	\$ -
102600	WALL AND DOOR PROTECTION	\$ -
102800	TOILET AND BATH ACCESSORIES	\$ -
104416	FIRE EXTINGUISHERS	\$ -
113100	RESIDENTIAL APPLIANCES	\$ -
123530	RESIDENTIAL CASEWORK	\$ -
220719	PLUMBING PIPING INSULATION	\$ -
221005	PLUMBING PIPING	\$ -
221006	PLUMBING PIPING SPECIALITIES	\$ -
223000	PLUMBING EQUIPMENT	\$ -
224000	PLUMBING FIXTURES	\$ -
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	\$ -

230713	DUCT INSULATION	\$	-
233100	HVAC DUCTS AND CASING	\$	-
233300	AIR DUCT ACCESSORIES	\$	-
233700	AIR OUTLETS AND INLETS	\$	-
234000	HVAC AIR CLEANING DEVICES	\$	-
235400	ELECTRIC FURNACES	\$	-
260100	GENERAL PROVISIONS	\$	-
261100	RACEWAYS	\$	-
261200	WIRES AND CABLES	\$	-
261300	OUTLET BOXES	\$	-
261330	CABINETS	\$	-
261400	WIRING DEVICES	\$	-
261500	MOTORS	\$	-
261550	MOTOR STARTERS	\$	-
261600	PANELBOARDS	\$	-
261700	MOTOR AND CIRCUIT DISCONNECTS	\$	-
261810	FUSES	\$	-
261900	RELAYS AND CONTACTORS	\$	-
264100	ELECTRICAL SERVICE	\$	-
264500	GROUNDING	\$	-
265000	LIGHTING EQUIPMENT	\$	-
265010	LAMPS	\$	-
265020	BALLASTS AND ACCESSORIES	\$	-
265100	LIGHT EMITTING DIODE (LED) FIXTURES	\$	-
311000	SITE CLEARING	\$	-
312000	EARTH MOVING	\$	-
312311	EARTHWORK FOR BUILDING CONSTRUCTION	\$	-
313116	TERMITE CONTROL	\$	-
313700	RIP RAP	\$	-
321216	ASPHALT PAVING	\$	-
321313	CONCRETE PAVING	\$	-
321373	CONCRETE PAVING JOINT SEALANTS	\$	-
323113	CHAIN LINK FENCES AND GATES	\$	-
330000	SITE UTILITIES	\$	-
TOTAL	NHA NM15-043 CROWNPOINT 30 HOMEOWNERSHIP UNITS	\$	-

EXHIBIT "L1" – Bid Bond

KNOW ALL MEN BY THESE PRESENTS, That we the undersigned,

_____ as PRINCIPAL, and
(Name of Principal)

_____, as SURETY are held and
(Name of Surety)

firmly bound unto the NAVAJO HOUSING AUTHORITY, hereinafter called the "Owner", in the penal sum of \$ _____ Dollars, lawful money of the United States, for the payment of which sum will and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying bid dated _____, 2024 for Project _____.

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified therein after the opening of the same, or if no period be specified, within ninety (90) days after said opening, and shall within the period specified therefore, or, if no period be specified within ten (10) days after the prescribed forms are presented to for signature, enter into a written contract with the Owner in accordance with the bid as accepted, and give the required performance and payment security, for the faithful performance and proper fulfillment of such contract; or in the event of the withdrawal of said bid within the period specified, or the failure to enter into such contract and give such security within the time specified, if the Principal shall pay the Owner the difference between the amount specified in said bid and the amount for which the Owner may procure the required work or supplies or both, if the latter amount to be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument under their several seal this _____ day of _____, 2024, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of:

_____ (Seal)
(Individual Principal)

(Business Principal)

ATTEST:

(Corporate Principal)

(Business Address)

BY: _____ (Affix Corporate Seal)

ATTEST:

(Business Address)

(Corporate Surety)

BY: _____

(Affix Corporate Seal)

(Power of Attorney for person signing for Surety Company must be attached to Bond)

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the
_____ (title) of the Corporation named as
Principal in the within Bond; that _____, who
signed the said Bond on behalf of the Principal was then _____, of
said Corporation; that I know his signature, and his signature thereto is genuine; and that said
Bond was duly signed, sealed, and attested to for an in behalf of said corporation by authority of
its governing body.

(Affix Corporate Seal)

EXHIBIT "L2" – Irrevocable Letter of Credit

Mrs. Heather Duncan-Etsitty, CEO/Contracting Officer

Navajo Housing Authority
Post Office Box 4980
Window Rock, AZ 86515

Must be submitted on Bank's Letterhead

Dear Mrs. Duncan-Etsitty:

We hereby authorize you to draw on us to the aggregate amount of \$_____ (10% of the amount of the bid) in the event

_____ fails to execute a contract with the NAVAJO HOUSING AUTHORITY for the _____ or fails to provide adequate performance and payment security as required by the Contract Specifications.

Such drafts must be accompanied by:

1. Written certifications by you that the proceeds of any draft drawn on this letter of Credit will be used solely for the purposes and interests described in the above paragraph.
2. Written concurrence of the United States Department of Housing and Urban Development, Region IX, Office of Indian Programs to the draft.

We warrant to you that all drafts drawn in compliance with the terms of this Letter of Credit will be unconditionally and duly honored upon delivery of the documentation specified above and presented to this office.

This letter of Credit is irrevocable and shall be in full force and effect until notification in writing is received from you that a contract for the _____ Project has been awarded and executed. Thereupon, this Letter of Credit shall automatically be cancelled.

This letter of Credit shall not be modified or amended except upon the written agreement of this Bank and the NAVAJO HOUSING AUTHORITY and then only with the written concurrence of the United States Department of Housing and Urban Development, Region IX, Office of Indian Programs.

Sincerely,

President

EXHIBIT M, if applicable

Certified Check or Cash Deposit in Lieu of Bid Bond Letter. A certified check in the amount equal to 10% of the bid, payable to the Navajo Housing Authority –or– an account established with a financial institution naming Navajo Housing Authority as the sole account holder containing an amount equal to 10% of the bid, shall be submitted with each bid.

- ***If “NOT APPLICABLE – PLEASE INDICATE NOT APPLICABLE for EXHIBIT M” and submit as EXHIBIT M.***

End of Bid

Thank you for your interest in the NHA.

To be used by those firms and vendors desiring to be qualified for Indian Preference.

INDIAN ENTERPRISES QUALIFICATION STATEMENT

NOTE: Submit complete questionnaire to the Navajo Housing Authority Procurement Department within the time frame specified. Use additional sheets to complete answer if needed.

The Undersigned certifies under oath the truth and correctness of all answers to questions made hereinafter:

1. Applicant wishes to qualify as:

___ An "Economic Enterprise" as defined in Section 3(3) of the Indian Financing Act of 1974 (P.L. 93-262); that is "any Indian-Owned... commercial, industrial or business activity established or organized for the purchase of profit: Provided, that such Indian owner-ship shall constitute not less than 51 percent of the enterprise:

___ A "Tribal Organization" as defined in Section 4(c) of the Indian Self Determination and Education Assistance Act (P.L. 93-638); that is: "the recognized governing body of any Indian Tribe; any legally established organization of Indians which is controlled, sanctioned or chartered by such governing body or which is democratically elected by the adult members of the Indian community to be served by such organization and which includes the maximum participation of Indians in all phases of its activities: Provided that in any case where a contract is let or grant made to an organization to perform services benefiting more than one Indian Tribe, the approval of each such Indian Tribe shall be a prerequisite to the letting or making of such contract or grant... "

2. Name of Enterprises or Organization: _____

Contact Person / Title: _____

Mailing Address: _____

Physical Address: _____

E-mail: Address: _____

Telephone Number: _____

Fax Number: _____

3. Check One:

___ Corporation

___ Joint Venture

___ Partnership

___ Other

____ Sole Proprietorship

4. Federal Tax ID Number: _____

If no, provide Name and copy of Social Security card.

5. Are you registered in SAM (System for Award Management)?

Yes _____ No _____

If you wish to do business with the Navajo Housing Authority, you must be registered with SAM and have a Unique Entity Identification Number (UEI). The UEI is a 12-character alphanumeric ID assigned to an entity by SAM). Website is www.SAM.gov.

On April 4, 2022, the UEI across the federal government changed from the DUNS Number to the UEI (generated by <https://www.sam.gov>)

6. Unique Entity Identification Number (UEI Number): _____

7. Answer the following **If a Corporation:**

a. Date of Incorporation: _____

b. State of Incorporation: _____

c. Give the names and addresses of the officers of this Corporation and establish whether they are Indian (I) or Non-Indian (NI).

NAME AND SOCIAL SECURITY	I OR NI	TITLE	ADDRESS	% OF STOCK OWNERSHIP

d. Complete the following information on all stockholders who are not listed in C above, owning 0% or more of the stock. Establish whether they are Indian (I) or Non-Indian (NI).

<i>NAME AND SOCIAL SECURITY</i>	<i>I OR NI</i>	<i>ADDRESS</i>	<i>% OF STOCK OWNERSHIP</i>

If a Sole Proprietorship or Partnership:

Date of Organization: _____

Give the following information on the individual or partners and establish whether they are Indian (I) or Non-Indian (NI).

<i>NAME AND SOCIAL SECURITY</i>	<i>I OR NI</i>	<i>ADDRESS</i>	<i>% OF STOCK OWNERSHIP</i>

If a Joint Venture:

- a. Date of Joint Venture Agreement: _____
- b. Attach the information of each member of the joint venture prepared in the appropriate format given above.

8. Give the name, address, and telephone number of the principal contact person of your organization: _____

9. Has any officer or partner of your organization listed in #7 been an officer or partner of another organization that failed in the last ten (10) years to complete a contract? _____

If yes, state circumstances:

10. Has this enterprise failed in the last ten (10) years, to complete any work awarded to it or to complete the work on time? _____

If so, note when, where, and why: _____

11. Will any officer or partner listed in #7 be engaged in outside employment?

_____ YES _____ NO

If yes, complete:

<i>NAME / TITLE</i>	<i>HOURS PER WEEK OUTSIDE THE ENTERPRISE</i>

12. Is the enterprise or anyone listed in #7 above, currently subject to an administrative sanction issued by any department or agency of the Federal Government?

_____ YES _____ NO

If yes, complete:

<i>NAME OF PERSON/BUSINESS</i>	<i>DATE OF ACTION</i>	<i>TYPE OF ACTION</i>	<i>DEPARTMENT OR AGENCY</i>

13. Does this enterprise have any subsidiaries or affiliates or is it a subsidiary or affiliate of another concern?

_____ YES _____ NO

If yes, complete:

<i>NAME AND ADDRESS OF SUBSIDIARY, AFFILIATE OR OTHER CONCERN</i>	<i>DESCRIPTION OF RELATIONSHIP</i>

14. Does this enterprise or any person listed in #7 above have or intend to enter into any type of agreement with any other concern or person which relates to or affects the on-going administration, management or operations of this enterprise? These include but are not limited to management, and joint venture agreements and any arrangement or contract involving the provisions of such compensated services as administrative assistance, data processing, management consulting of all types, marketing, purchasing, production, and other type of compensated assistance.

_____ YES _____ NO

If yes, attach a copy of any written agreement or an explanation of any oral or intended agreement.

15. Has this enterprise ever been subject to a judgment of any court or administrative sanction (Federal, State, or Tribal)?

_____ YES _____ NO

Has any individual listed in #7 ever been subject to judgment of any court or administrative sanction (Federal, State, or Tribal)?

_____ YES _____ NO

If the answer is yes to any question, furnish details in a separate attachment.

16. Has any tax lien or other collection procedure been instituted against this enterprise or the individuals listed in #7 as a sole proprietor or partner in their capacities with this enterprises or other enterprise?

_____ YES _____ NO

If yes, furnish details in a separate exhibit.

17. Has this enterprise or any person listed in #7 ever been involved in a bankruptcy or insolvency proceeding? _ YES _ NO

If yes, furnish details in a separate exhibit.

18. What dollar amount of Working Capital is available to your enterprise prior to the start of construction? \$

Explain the source of these funds: _____

Include a copy of the company's most recent audited financial statement.

19. How will project development bookkeeping and payroll be maintained (Check one):

a. By contract with an outside professional accounting firm: _____

Name: _____ Telephone No.: _____

Address: _____

b. Records are to be kept by enterprise personnel: If "b" has been checked, state the Qualifications of your personnel to perform this function:

c. Other: _____

20. Trade References (including addresses and telephone numbers):

21. Bank and credit references (including addresses and telephone numbers):

22. a. Indicate the core crew employees in your work force, their job titles, and whether they are Indian or Non-Indian. Core crew is defined as an individual who is a current bona-fide individual who is regularly employed by the contractor in a supervisory or other key position when work is available.

- b. Over the past three (3) years, what has been the average number of employees:

23. Attach certification by a tribe or other evidence of enrollment in a federally recognized tribe for each officer, partner, or individual designated as an Indian in #7.
24. Attached a certified copy of the charter, article of incorporation, by-laws, partnership agreement, joint venture agreement and/or other pertinent organizational documentation.
25. Explain in narrative form the stock ownership, structure, management, control, financing, and salary or profit sharing arrangements of the enterprises, if not covered in answers to specific questions heretofore. Attached copies of all shareholder agreements, including voting trust, employment contracts, agreements between owners and enterprise. Include information on salaries, fees, profit sharing, material purchases, and equipment lease or purchase arrangements.
- Evidence relating to structure, management, control, and financing should be specifically included. Also, list the specific management responsibilities of each principal, sole proprietor, partner, or party to a joint venture (as appropriate) list in response to #7.
26. Attach evidence that the enterprise (or an individual in it) is appropriately licensed for the type of work that is to be performed. Include Federal I.D. Number.
27. Attach a brief resume of the education, technical training, business, employment, and design and/or construction experience for each officer, partner, or sole proprietor listed in #7. Include references.
28. List the type of service, supplies and work your firm offers:
(Attach line card, capabilities statement, and brochure. Attach additional sheet if appropriate)

29. Complete and submit a current w-9 form.

NOTE: I. Omission of any information may be caused for this statement not receiving timely and complete consideration.

ii. Knowing that the Navajo Housing Authority must approve a contract between this enterprise, the persons signing below certify that all information in this INDIAN ENTERPRISE QUALIFICATION STATEMENT, including exhibits and attachments, is true and correct.

iii. Print and type name below all signatures.

If applicant is Sole Proprietor or LLC, Sign Below:

Name Date

If applicant is in a Partnership or Joint Venture, all Partners must sign below:

Name Date

Name Date

If applicant is a corporation, affix corporate seal

Corporate Seal Date

By: _____
President's Signature

Attested by: _____
Corporate Secretary's Signature

WARNING: U.S. Criminal Code, Section 1010, Title 18, U.S.C. provides in part: "Whoever... makes, passes, utters, or publishes any statement, knowing the same to be false... shall be fined not more than \$5000 or imprisoned not more than two years, or both."

Issued August 1989

Notary Acknowledgment Form

State of _____ }

County of _____ }

This document was signed or attested before me on _____ [date] by

_____ [name(s) of person(s)].

(Seal)

Notary's signature: _____

My Commission expires on: _____

CONTRACT DOCUMENTS

General Conditions for Construction Contracts - Public Housing Programs

U.S. Department of Housing and Urban
Development
Office of Public and Indian Housing
OMB Approval No. 2577-0157 (exp. 11/30/2023)

**Applicability. This form is applicable to any
construction/development contract greater than \$250,000.**

Public reporting burden for this collection of information is estimated to average 1.0 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding the accuracy of this burden estimate and any suggestions for reducing this burden can be sent to the Reports Management Officer, Office of Policy Development and Research, REE, Department of Housing and Urban Development, 451 7th St SW, Room 4176, Washington, DC 20410-5000. When providing comments, please refer to OMB Approval No. 2577-0157. This form includes those clauses required by OMB's common rule on grantee procurement, implemented at HUD in 2 CFR 200, and those requirements set forth in Section 3 of the Housing and Urban Development Act of 1968 and its amendment by the Housing and Community Development Act of 1992, implemented by HUD at 24 CFR Part 75. The form is required for construction contracts awarded by Public Housing Agencies (PHAs). The form is used by Housing Authorities in solicitations to provide necessary contract clauses. If the form were not used, PHAs would be unable to enforce their contracts. Responses to the collection of information are required to obtain a benefit or to retain a benefit. The information requested does not lend itself to confidentiality. HUD may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB number.

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1. Definitions

- (a) "Architect" means the person or other entity engaged by the PHA to perform architectural, engineering, design, and other services related to the work as provided for in the contract. When a PHA uses an engineer to act in this capacity, the terms "architect" and "engineer" shall be synonymous. The Architect shall serve as a technical representative of the Contracting Officer. The Architect's authority is as set forth elsewhere in this contract.
- (b) "Contract" means the contract entered into between the PHA and the Contractor. It includes the forms of Bid, the Bid Bond, the Performance and Payment Bond or Bonds or other assurance of completion, the Certifications, Representations, and Other Statements of Bidders (form HUD-5370), these General Conditions of the Contract for Construction (form HUD-5370), the applicable wage rate determinations from the U.S. Department of Labor, any special conditions included elsewhere in the contract, the specifications, and drawings. It includes all formal changes to any of those documents by addendum, change order, or other modification.
- (c) "Contracting Officer" means the person delegated the authority by the PHA to enter into, administer, and/or terminate this contract and designated as such in writing to the Contractor. The term includes any successor Contracting Officer and any duly authorized representative of the Contracting Officer also designated in writing. The Contracting Officer shall be deemed the authorized agent of the PHA in all dealings with the Contractor.
- (d) "Contractor" means the person or other entity entering into the contract with the PHA to perform all of the work required under the contract.
- (e) "Drawings" means the drawings enumerated in the schedule of drawings contained in the Specifications and as described in the contract clause entitled Specifications and Drawings for Construction herein.
- (f) "HUD" means the United States of America acting through the Department of Housing and Urban Development including the Secretary, or any other person designated to act on its behalf. HUD has agreed, subject to the provisions of an Annual Contributions Terms and Conditions (ACC), to provide financial assistance to the PHA, which includes assistance in financing the work to be performed under this contract. As defined elsewhere in these General Conditions or the contract documents, the determination of HUD may be required to authorize changes in the work or for release of funds to the PHA for payment to the Contractor. Notwithstanding HUD's role, nothing in this contract shall be construed to create any contractual relationship between the Contractor and HUD.
- (g) "Project" means the entire project, whether construction or rehabilitation, the work for which is provided for in whole or in part under this contract.
- (h) "PHA" means the Public Housing Agency organized under applicable state laws which is a party to this contract.
- (j) "Specifications" means the written description of the technical requirements for construction and includes the criteria and tests for determining whether the requirements are met.
- (l) "Work" means materials, workmanship, and manufacture and fabrication of components.
- (a) The Contractor shall furnish all necessary labor, materials, tools, equipment, and transportation necessary for performance of the work. The Contractor shall also furnish all necessary water, heat, light, and power not made available to the Contractor by the PHA pursuant to the clause entitled Availability and Use of Utility Services herein.
- (b) The Contractor shall perform on the site, and with its own organization, work equivalent to at least [] (12 percent unless otherwise indicated) of the total amount of work to be performed under the order. This percentage may be reduced by a supplemental agreement to this order if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the PHA.
- (c) At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the work site a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.
- (d) The Contractor shall be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence, and shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The Contractor shall hold and save the PHA, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.
- (e) The Contractor shall lay out the work from base lines and bench marks indicated on the drawings and be responsible for all lines, levels, and measurements of all work executed under the contract. The Contractor shall verify the figures before laying out the work and will be held responsible for any error resulting from its failure to do so.
- (f) The Contractor shall confine all operations (including storage of materials) on PHA premises to areas authorized or approved by the Contracting Officer.
- (g) The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. After completing the work and before final inspection, the Contractor shall (1) remove from the premises all scaffolding, equipment, tools, and materials (including rejected materials) that are not the property of the PHA and all rubbish caused by its work; (2) leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer; (3) perform all specified tests; and, (4) deliver the installation in complete and operating condition.
- (h) The Contractor's responsibility will terminate when all work has been completed, the final inspection made, and the work accepted by the Contracting Officer. The Contractor will then be released from further obligation except as required by the warranties specified elsewhere in the contract.

3. Architect's Duties, Responsibilities, and Authority

- (a) The Architect for this contract, and any successor, shall be designated in writing by the Contracting Officer.

2. Contractor's Responsibility for Work

- (b) The Architect shall serve as the Contracting Officer's technical representative with respect to architectural, **Schedule** engineering, and design matters related to the work performed under the contract. The Architect may provide direction on contract performance. Such direction shall be within the scope of the contract and may not be of a nature which: (1) institutes additional work outside the scope of the contract; (2) constitutes a change as defined in the Changes clause herein; (3) causes an increase or decrease in the cost of the contract; (4) alters the Construction Progress Schedule; or (5) changes any of the other express terms or conditions of the contract.
- (c) The Architect's duties and responsibilities may include but shall not be limited to:
- (1) Making periodic visits to the work site, and on the basis of his/her on-site inspections, issuing written reports to the PHA which shall include all observed deficiencies. The Architect shall file a copy of the report with the Contractor's designated representative at the site;
 - (2) Making modifications in drawings and technical specifications and assisting the Contracting Officer in the preparation of change orders and other contract modifications for issuance by the Contracting Officer;
 - (3) Reviewing and making recommendations with respect to - (i) the Contractor's construction progress schedules; (ii) the Contractor's shop and detailed drawings; (iii) the machinery, mechanical and other equipment and materials or other articles proposed for use by the Contractor; and, (iv) the Contractor's price breakdown and progress payment estimates; and,
 - (4) Assisting in inspections, signing Certificates of Completion, and making recommendations with respect to acceptance of work completed under the contract.

4. Other Contracts

The PHA may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with PHA employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by PHA employees

Construction Requirements

5. Pre-construction Conference and Notice to Proceed

- of the work, and that it has investigated and satisfied itself
- (a) Within ten calendar days of contract execution, and prior to the commencement of work, the Contractor shall attend a preconstruction conference with representatives of the PHA, its Architect, and other interested parties convened by the PHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract. The PHA will provide the Contractor with the date, time, and place of the conference.
 - (b) The contractor shall begin work upon receipt of a written Notice to Proceed from the Contracting Officer or designee. The Contractor shall not begin work prior to receiving such notice.

6. Construction Progress

- (a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring labor, materials, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments or take other remedies under the contract until the Contractor submits the required schedule.
- (b) The Contractor shall enter the actual progress on the chart as required by the Contracting Officer, and immediately deliver three copies of the annotated schedule to the Contracting Officer. If the Contracting Officer determines, upon the basis of inspection conducted pursuant to the clause entitled Inspection and Acceptance of Construction, herein that the Contractor is not meeting the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the PHA. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.
- (c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the Contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the Default clause of this contract.

7. Site Investigation and Conditions Affecting the Work

- (a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location as to the general and local conditions which can affect the work or its cost, including but not limited to, (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is

reasonably ascertainable from an inspection of the site, including all exploratory work done by the PHA, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the PHA.

- (b) The PHA assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the PHA. Nor does the PHA assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

8. Differing Site Conditions

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) unknown physical conditions at the site(s), of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. Work shall not proceed at the affected site, except at the

Contractor's risk, until the Contracting Officer has provided written instructions to the Contractor. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, the Contractor shall file a claim in writing to the PHA within ten days after receipt of such instructions and, in any event, before proceeding with the work. An equitable adjustment in the contract price, the delivery schedule, or both shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

9. Specifications and Drawings for Construction

(a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be

promptly submitted to the Contracting Officer, who shall

promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(b) Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", of the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by", or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(c) Where "as shown" "as indicated", "as detailed", or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place" that is "furnished and installed".

(d) "Shop drawings" means drawings, submitted to the PHA by the Contractor, subcontractor, or any lower tier subcontractor, showing in detail (1) the proposed fabrication and assembly of structural elements and (2) the installation (i.e., form, fit, and attachment details) of materials of equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract. The PHA may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with other contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the PHA's reasons therefore. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.

(f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Architect approves any such variation and the Contracting Officer concurs, the Contracting Officer shall issue an appropriate modification to the contract, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued. (g) It shall be the responsibility of the Contractor to make timely requests of the PHA for such large scale and full size drawings, color schemes, and other additional information, not already in his possession, which shall be

required in the planning and production of the work. Such requests may be submitted as the need arises, but each such request shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay.

- (h) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the PHA and one set will be returned to the Contractor. As required by the Contracting Officer, the Contractor, upon completing the work under this contract, shall furnish a complete set of all shop drawings as finally approved. These drawings shall show all changes and revisions made up to the time the work is completed and accepted.
- (i) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all shop drawings prepared by subcontractors are submitted to the Contracting Officer.

10. As-Built Drawings

- (a) "As-built drawings," as used in this clause, means drawings submitted by the Contractor or subcontractor at any tier to show the construction of a particular structure or work as actually completed under the contract. "As-built drawings" shall be synonymous with "Record drawings."
- (b) As required by the Contracting Officer, the Contractor shall provide the Contracting Officer accurate information to be used in the preparation of permanent as-built drawings. For this purpose, the Contractor shall record on one set of contract drawings all changes from the installations originally indicated, and record final locations of underground lines by depth from finish grade and by accurate horizontal offset distances to permanent surface improvements such as buildings, curbs, or edges of walks.
- (c) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all as-built drawings prepared by subcontractors are submitted to the Contracting Officer.

11. Material and Workmanship

- (a) All equipment, material, and articles furnished under this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the contract to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of, and as approved by the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.
- (b) Approval of equipment and materials.
- (1) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the

machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

- (2) When required by the specifications or the Contracting Officer, the Contractor shall submit appropriately marked samples (and certificates related to them) for approval at the Contractor's expense, with all shipping charges prepaid. The Contractor shall label, or otherwise properly mark on the container, the material or product represented, its place of origin, the name of the producer, the Contractor's name, and the identification of the construction project for which the material or product is intended to be used.
- (3) Certificates shall be submitted in triplicate, describing each sample submitted for approval and certifying that the material, equipment or accessory complies with contract requirements. The certificates shall include the name and brand of the product, name of manufacturer, and the location where produced.
- (4) Approval of a sample shall not constitute a waiver of the PHA right to demand full compliance with contract requirements. Materials, equipment and accessories may be rejected for cause even though samples have been approved.
- (5) Wherever materials are required to comply with recognized standards or specifications, such specifications shall be accepted as establishing the technical qualities and testing methods, but shall not govern the number of tests required to be made nor modify other contract requirements. The Contracting Officer may require laboratory test reports on items submitted for approval or may approve materials on the basis of data submitted in certificates with samples. Check tests will be made on materials delivered for use only as frequently as the Contracting Officer determines necessary to insure compliance of materials with the specifications. The Contractor will assume all costs of retesting materials which fail to meet contract requirements and/or testing materials offered in substitution for those found deficient.
- (6) After approval, samples will be kept in the Project office until completion of work. They may be built into the work after a substantial quantity of the materials they represent has been built in and accepted.
- (c) Requirements concerning lead-based paint. The Contractor shall comply with the requirements concerning lead-based paint contained in the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. 4821-4846) as implemented by 24 CFR Part 35.

12. Permits and Codes

- (a) The Contractor shall give all notices and comply with all applicable laws, ordinances, codes, rules and regulations. Notwithstanding the requirement of the Contractor to comply with the drawings and specifications in the contract, all work installed shall comply with all applicable codes and regulations as amended by any

waivers. Before installing the work, the Contractor shall examine the drawings and the specifications for compliance with applicable codes and regulations bearing on the work and shall immediately report any discrepancy it may discover to the Contracting Officer.

Where the requirements of the drawings and specifications fail to comply with the applicable code or regulation, the Contracting Officer shall modify the contract by change order pursuant to the clause entitled Changes herein to conform to the code or regulation.

- (b) The Contractor shall secure and pay for all permits, fees, and licenses necessary for the proper execution and completion of the work. Where the PHA can arrange for the issuance of all or part of these permits, fees and licenses, without cost to the Contractor, the contract amount shall be reduced accordingly.

13. Health, Safety, and Accident Prevention

(a) In performing this contract, the Contractor shall:

- (1) Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health and/or safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation;
- (2) Protect the lives, health, and safety of other persons;
- (3) Prevent damage to property, materials, supplies, and equipment; and,
- (4) Avoid work interruptions.

(b) For these purposes, the Contractor shall:

- (1) Comply with regulations and standards issued by the Secretary of Labor at 29 CFR Part 1926. Failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91-54, 83 Stat. 96), 40 U.S.C. 3701 et seq.; and
 - (2) Include the terms of this clause in every subcontract so that such terms will be binding on each subcontractor.
- (c) The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 CFR Part 1904.
- (d) The Contracting Officer shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. This notice, when delivered to the Contractor or the Contractor's representative at the site of the work, shall be deemed sufficient notice of the noncompliance and corrective action required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to take corrective action promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under these circumstances.

(e) The Contractor shall be responsible for its subcontractors' compliance with the provisions of this clause. The Contractor shall take such action with respect to any subcontract as the PHA, the Secretary of Housing and Urban Development, or the Secretary of Labor shall direct as a means of enforcing such provisions.

14. Temporary Heating

The Contractor shall provide and pay for temporary heating, covering, and enclosures necessary to properly protect all work and materials against damage by dampness and cold, to dry out the work, and to facilitate the completion of the work. Any permanent heating equipment used shall be turned over to the PHA in the condition and at the time required by the specifications.

15. Availability and Use of Utility Services

- (a) The PHA shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the PHA or, where the utility is produced by the PHA, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.
- (b) The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the PHA, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

16. Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements

- (a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed under this contract, and which do not unreasonably interfere with the work required under this contract.
- (b) The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during performance of this contract, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- (c) The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. Prior to disturbing the ground at the construction site, the Contractor shall ensure that all underground utility lines are clearly marked.
- (d) The Contractor shall shore up, brace, underpin, secure, and protect as necessary all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be affected by the excavations or other operations connected with the construction of the project.
- (e) Any equipment temporarily removed as a result of work under this contract shall be protected, cleaned, and replaced in the same condition as at the time of award of this contract.

- (f) New work which connects to existing work shall correspond in all respects with that to which it connects and/or be similar to existing work unless otherwise required by the specifications.
- (g) No structural members shall be altered or in any way weakened without the written authorization of the Contracting Officer, unless such work is clearly specified in the plans or specifications.
- (h) If the removal of the existing work exposes discolored or unfinished surfaces, or work out of alignment, such surfaces shall be refinished, or the material replaced as necessary to make the continuous work uniform and harmonious. This, however, shall not be construed to require the refinishing or reconstruction of dissimilar finishes previously exposed, or finished surfaces in good condition, but in different planes or on different levels **Construction** when brought together by the removal of intervening work, unless such refinishing or reconstruction is specified in the plans or specifications.
- (i) The Contractor shall give all required notices to any adjoining or adjacent property owner or other party before the commencement of any work.
- (j) The Contractor shall indemnify and save harmless the PHA from any damages on account of settlement or the loss of lateral support of adjoining property, any damages from changes in topography affecting drainage, and from all loss or expense and all damages for which the PHA may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.
- (k) The Contractor shall repair any damage to vegetation, structures, equipment, utilities, or improvements, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

17. Temporary Buildings and Transportation of Materials

- (a) Temporary buildings (e.g., storage sheds, shops, offices, sanitary facilities) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the PHA. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- (b) The Contractor shall, as directed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any federal, state, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

18. Clean Air and Water

The contractor shall comply with the Clean Air Act, as amended, 42 USC 7401 et seq., the Federal Water Pollution Control Water Act, as amended, 33 U.S.C. 1251 et seq., and standards issued pursuant thereto in the facilities in which this contract is to be performed.

19. Energy Efficiency

The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub.L. 94-163) for the State in which the work under the contract is performed.

20. Inspection and Acceptance of

- (a) Definitions. As used in this clause -
- (1) "Acceptance" means the act of an authorized representative of the PHA by which the PHA approves and assumes ownership of the work performed under this contract. Acceptance may be partial or complete.
 - (2) "Inspection" means examining and testing the work performed under the contract (including, when appropriate, raw materials, equipment, components, and intermediate assemblies) to determine whether it conforms to contract requirements.
 - (3) "Testing" means that element of inspection that determines the properties or elements, including functional operation of materials, equipment, or their components, by the application of established scientific principles and procedures.
- (b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. All work is subject to PHA inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.
- (c) PHA inspections and tests are for the sole benefit of the PHA and do not: (1) relieve the Contractor of responsibility for providing adequate quality control measures; (2) relieve the Contractor of responsibility for loss or damage of the material before acceptance; (3) constitute or imply acceptance; or, (4) affect the continuing rights of the PHA after acceptance of the completed work under paragraph (j) below.
- (d) The presence or absence of the PHA inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specifications without the Contracting Officer's written authorization. All instructions and approvals with respect to the work shall be given to the Contractor by the Contracting Officer.
- (e) The Contractor shall promptly furnish, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The PHA may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The PHA shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

- (f) The PHA may conduct routine inspections of the construction site on a daily basis.
- (g) The Contractor shall, without charge, replace or correct work found by the PHA not to conform to contract requirements, unless the PHA decides that it is in its interest to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.
- (h) If the Contractor does not promptly replace or correct rejected work, the PHA may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor, or (2) terminate for default the Contractor's right to proceed.
- (i) If any work requiring inspection is covered up without approval of the PHA, it must, if requested by the Contracting Officer, be uncovered at the expense of the Contractor. If at any time before final acceptance of the entire work, the **Construction** PHA considers it necessary or advisable, to examine work already completed by removing or tearing it out, the Contractor, shall on request, promptly furnish all necessary facilities, labor, and material. If such work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray all the expenses of the examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, the Contracting Officer shall make an equitable adjustment to cover the cost of the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.
- (j) The Contractor shall notify the Contracting Officer, in writing, as to the date when in its opinion all or a designated portion of the work will be substantially completed and ready for inspection. If the Architect determines that the state of preparedness is as represented, the PHA will promptly arrange for the inspection. Unless otherwise specified in the contract, the PHA shall accept, as soon as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines and designates can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the PHA's right under any warranty or guarantee.

21. Use and Possession Prior to Completion

- (a) The PHA shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the PHA intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The PHA's possession or use shall not be deemed an acceptance of any work under the contract.
- (b) While the PHA has such possession or use, the Contractor shall be relieved of the responsibility for (1) the loss of or damage to the work resulting from the PHA's possession or use, notwithstanding the terms of the clause entitled Permits and Codes herein; (2) all maintenance costs on the areas occupied; and, (3) furnishing heat, light, power, and water used in the areas

occupied without proper remuneration therefore. If prior possession or use by the PHA delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

22. Warranty of Title

The Contractor warrants good title to all materials, supplies, and equipment incorporated in the work and agrees to deliver the premises together with all improvements thereon free from any claims, liens or charges, and agrees further that neither it nor any other person, firm or corporation shall have any right to a lien upon the premises or anything appurtenant thereto.

23. Warranty of

- (a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (j) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any subcontractor or supplier at any tier. This warranty shall continue for a period of _____ (one year unless otherwise indicated) from the date of final acceptance of the work. If the PHA takes possession of any part of the work before final acceptance, this warranty shall continue for a period of (one year unless otherwise indicated) from the date that the PHA takes possession.
- (b) The Contractor shall remedy, at the Contractor's expense, any failure to conform, or any defect. In addition, the Contractor shall remedy, at the Contractor's expense, any damage to PHA-owned or controlled real or personal property when the damage is the result of—
- (1) The Contractor's failure to conform to contract requirements; or
 - (2) Any defects of equipment, material, workmanship or design furnished by the Contractor.
- (c) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for (one year unless otherwise indicated) from the date of repair or replacement.
- (d) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect or damage.
- (e) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the PHA shall have the right to replace, repair or otherwise remedy the failure, defect, or damage at the Contractor's expense.
- (f) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall:
- (1) Obtain all warranties that would be given in normal commercial practice;
 - (2) Require all warranties to be executed in writing, for the benefit of the PHA; and,
 - (3) Enforce all warranties for the benefit of the PHA.
- (g) In the event the Contractor's warranty under paragraph (a) of this clause has expired, the PHA may bring suit at its own expense to enforce a subcontractor's, manufacturer's or supplier's warranty.

- (h) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defect of material or design furnished by the PHA nor for the repair of any damage that results from any defect in PHA furnished material or design.
- (i) Notwithstanding any provisions herein to the contrary, the establishment of the time periods in paragraphs (a) and (c) above relate only to the specific obligation of the Contractor to correct the work, and have no relationship to the time within which its obligation to comply with the contract may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to its obligation other than specifically to correct the work.
- (j) This warranty shall not limit the PHA's rights under the Inspection and Acceptance of Construction clause of this contract with respect to latent defects, gross mistakes or fraud.

24. Prohibition Against Liens

The Contractor is prohibited from placing a lien on the PHA's property. This prohibition shall apply to all subcontractors at any tier and all materials suppliers.

Administrative Requirements

25. Contract Period

this contract within 420 calendar days of the effective date of the contract, or within the time schedule established in the notice to proceed issued by the Contracting Officer.

26. Order of Provisions

accordance with the terms and conditions of the

In the event of a conflict between these General Conditions and the Specifications, the General Conditions shall prevail. In the event of a conflict between the contract and any applicable state or local law or regulation, the state or local law or regulation shall prevail; provided that such state or local law or regulation does not conflict with, or is less restrictive than applicable federal law, regulation, or Executive Order. In the event of such a conflict, applicable federal law, regulation, and Executive Order shall prevail.

27. Payments

- (a) The PHA shall pay the Contractor the price as provided in this contract.
- (b) The PHA shall make progress payments approximately every 30 days as the work proceeds, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer. The PHA may, subject to written determination and approval of the Contracting Officer, make more frequent payments to contractors which are qualified small businesses.
- (c) Before the first progress payment under this contract, the Contractor shall furnish, in such detail as requested by the Contracting Officer, a breakdown of the total contract price showing the amount included therein for each principal category of the work, which shall substantiate the payment amount requested in order to provide a

basis for determining progress payments. The breakdown shall be approved by the Contracting Officer and must be acceptable to HUD. If the contract covers more than one project, the Contractor shall furnish a separate breakdown for each. The values and quantities employed in making up this breakdown are for determining the amount of progress payments and shall not be construed as a basis for additions to or deductions from the contract price. The Contractor shall prorate its overhead and profit over the construction period of the contract.

- (d) The Contractor shall submit, on forms provided by the PHA, periodic estimates showing the value of the work performed during each period based upon the approved submitted not later than _____ days in advance of the date set for payment and are subject to correction and revision as required. The estimates must be approved by the Contracting Officer with the concurrence of the Architect prior to payment. If the contract covers more than one project, the Contractor shall furnish a separate progress payment estimate for each.
- (e) Along with each request for progress payments and the required estimates, the Contractor shall furnish the following certification, or payment shall not be made: I hereby certify, to the best of my knowledge and belief, that:
 - (1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;
 - (2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements; and,
 - (3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in subcontract.

Name:

Title:

Date:

- (f) Except as otherwise provided in State law, the PHA shall retain ten (10) percent of the amount of progress payments until completion and acceptance of all work under the contract; except, that if upon completion of 50 percent of the work, the Contracting Officer, after consulting with the Architect, determines that the Contractor's performance and progress are satisfactory, the PHA may make the remaining payments in full for the work subsequently completed. If the Contracting Officer subsequently determines that the Contractor's performance and progress are unsatisfactory, the PHA shall reinstate the ten (10) percent (or other percentage as provided in State law) retainage until such time as the Contracting Officer determines that performance and progress are satisfactory.
- (g) The Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration when computing progress payments.

Material delivered to the Contractor at locations other than the site may also be taken into consideration if the Contractor furnishes satisfactory evidence that (1) it has acquired title to such material; (2) the material is properly stored in a bonded warehouse, storage yard, or similar suitable place as may be approved by the Contracting Officer; (3) the material is insured to cover its full value; and (4) the material will be used to perform this contract. Before any progress payment which includes delivered material is made, the Contractor shall furnish such documentation as the Contracting Officer may require to assure the protection of the PHA's interest in such materials. The Contractor shall remain responsible for such stored material notwithstanding the transfer of title to the PHA.

- (h) All material and work covered by progress payments made shall, at the time of payment become the sole property of the PHA, but this shall not be construed as (1) relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or, (2) waiving the right of the PHA to require the fulfillment of all of the terms of the contract. In the event the work of the Contractor has been damaged by other contractors or persons other than employees of the PHA in the course of their employment, the Contractor shall restore such damaged work without cost to the PHA and to seek redress for its damage only from those who directly caused it.
- (i) The PHA shall make the final payment due the Contractor under this contract after (1) completion and final acceptance of all work; and (2) presentation of release of all claims against the PHA arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. Each such exception shall embrace no more than one claim, the basis and scope of which shall be clearly defined. The amounts for such excepted claims shall not be included in the request for final payment. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned.
- (j) Prior to making any payment, the Contracting Officer may require the Contractor to furnish receipts or other evidence of payment from all persons performing work and supplying material to the Contractor, if the Contracting Officer determines such evidence is necessary to substantiate claimed costs.
- (k) The PHA shall not: (1) determine or adjust any claims for payment or disputes arising there under between the Contractor and its subcontractors or material suppliers; or, (2) withhold any moneys for the protection of the subcontractors or material suppliers. The failure or refusal of the PHA to withhold moneys from the Contractor shall in no wise impair the obligations of any surety or sureties under any bonds furnished under this contract.

28. Contract Modifications

- (a) Only the Contracting Officer has authority to modify any term or condition of this contract. Any contract modification shall be authorized in writing.
- (b) The Contracting Officer may modify the contract unilaterally (1) pursuant to a specific authorization stated in a contract clause (e.g., Changes); or (2) for administrative matters which do not change the rights or

responsibilities of the parties (e.g., change in the PHA address). All other contract modifications shall be in the form of supplemental agreements signed by the Contractor and the Contracting Officer.

- (c) When a proposed modification requires the approval of HUD prior to its issuance (e.g., a change order that exceeds the PHA's approved threshold), such modification shall not be effective until the required approval is received by the PHA.

29. Changes

- (a) The Contracting Officer may, at any time, without notice to the sureties, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract including changes:
 - (1) In the specifications (including drawings and designs);
 - (2) In the method or manner of performance of the work;
 - (3) PHA-furnished facilities, equipment, materials, services, or site; or,
 - (4) Directing the acceleration in the performance of the work.
- (b) Any other written order or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating (1) the date, circumstances and source of the order and (2) that the Contractor regards the order as a change order.
- (c) Except as provided in this clause, no order, statement or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.
- (d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for an adjustment based on defective specifications, no proposal for any change under paragraph (b) above shall be allowed for any costs incurred more than 20 days (5 days for oral orders) before the Contractor gives written notice as required. In the case of defective specifications for which the PHA is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.
- (e) The Contractor must assert its right to an adjustment under this clause within 30 days after (1) receipt of a written change order under paragraph (a) of this clause, or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting a written statement describing the general nature and the amount of the proposal. If the facts justify it, the Contracting Officer may extend the period for submission. The proposal may be included in the notice required under paragraph (b) above. No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.
- (f) The Contractor's written proposal for equitable adjustment shall be submitted in the form of a lump sum proposal supported with an itemized breakdown of all increases and decreases in the contract in at least the following details:

- (1) Direct Costs. Materials (list individual items, the quantity and unit cost of each, and the aggregate cost); Transportation and delivery costs associated with materials; Labor breakdowns by hours or unit costs (identified with specific work to be performed); Construction equipment exclusively necessary for the change; Costs of preparation and/ or revision to shop drawings resulting from the change; Worker's Compensation and Public Liability Insurance; Employment taxes under FICA and FUTA; and, Bond Costs when size of change warrants revision.
- (2) Indirect Costs. Indirect costs may include overhead, general and administrative expenses, and fringe benefits not normally treated as direct costs.
- (3) Profit. The amount of profit shall be negotiated and may vary according to the nature, extent, and complexity of the work required by the change. The allowability of the direct and indirect costs shall be determined in accordance with the Contract Cost Principles and Procedures for Commercial Firms in Part 31 of the Federal Acquisition Regulation (48 CFR 1-31), as implemented by HUD Handbook 2210.18, in effect on the date of this contract. The Contractor shall not be allowed a profit on the profit received by any subcontractor. Equitable adjustments for deleted work shall include a credit for profit and may include a credit for indirect costs. On proposals covering both increases and decreases in the amount of the contract, the application of indirect costs and profit shall be on the net-change in direct costs for the Contractor or subcontractor performing the work.
- (g) The Contractor shall include in the proposal its request for time extension (if any), and shall include sufficient information and dates to demonstrate whether and to what extent the change will delay the completion of the contract in its entirety.
- (h) The Contracting Officer shall act on proposals within 30 days after their receipt, or notify the Contractor of the date when such action will be taken.
- (i) Failure to reach an agreement on any proposal shall be a dispute under the clause entitled Disputes herein. Nothing in this clause, however, shall excuse the Contractor from proceeding with the contract as changed.
- (j) Except in an emergency endangering life or property, no change shall be made by the Contractor without a prior order from the Contracting Officer.

30. Suspension of Work

- (a) The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the PHA.
- (b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified (or within a reasonable time if not specified) in this contract an adjustment shall be made for any increase in the cost of performance of the contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have

been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or for which any equitable adjustment is provided for or excluded under any other provision of this contract.

- (c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order); and, (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

31. Disputes

- (a) "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to the contract. A claim arising under the contract, unlike a claim relating to the contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim. The submission may be converted to a claim by complying with the requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.
- (b) Except for disputes arising under the clauses entitled Labor Standards - Davis Bacon and Related Acts, herein, all disputes arising under or relating to this contract, including any claims for damages for the alleged breach thereof which are not disposed of by agreement, shall be resolved under this clause.
- (c) All claims by the Contractor shall be made in writing and submitted to the Contracting Officer for a written decision. A claim by the PHA against the Contractor shall be subject to a written decision by the Contracting Officer.
- (d) The Contracting Officer shall, within 60 (unless otherwise indicated) days after receipt of the request, decide the claim or notify the Contractor of the date by which the decision will be made.
- (e) The Contracting Officer's decision shall be final unless the Contractor (1) appeals in writing to a higher level in the PHA in accordance with the PHA's policy and procedures, (2) refers the appeal to an independent mediator or arbitrator, or (3) files suit in a court of competent jurisdiction. Such appeal must be made within (30 unless otherwise indicated) days after receipt of the Contracting Officer's decision.
- (f) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under or relating to the contract, and comply with any decision of the Contracting Officer.

32. Default

- (a) If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with the diligence that will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within this time, the Contracting Officer may, by written notice to the Contractor, terminate the right to

proceed with the work (or separable part of the work) that has been delayed. In this event, the PHA may take over the work and complete it, by contract or otherwise, and may take possession of and use any materials, equipment, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the PHA resulting from the

Convenience Contractor's refusal or failure to complete the work within

the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the PHA in completing the work.

- (b) The Contractor's right to proceed shall not be terminated or the Contractor charged with damages under this clause if—
- (1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include (i) acts of God, or of the public enemy, (ii) acts of the PHA or other governmental entity in either its sovereign or contractual capacity, (iii) acts of another contractor in the performance of a contract with the PHA, (iv) fires, (v) floods, (vi) epidemics, (vii) quarantine restrictions, (viii) strikes, (ix) freight embargoes, (x) unusually severe weather, or (xi) delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and
- (2) The Contractor, within days (10 days unless otherwise indicated) from the beginning of such delay (unless extended by the Contracting Officer) notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of the delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, time for completing the work shall be extended by written modification to the contract. The findings of the Contracting Officer shall be reduced to a written decision which shall be subject to the provisions of the Disputes clause of this contract.
- (c) If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been for convenience of the PHA.

33. Liquidated Damages

- (a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, as specified in the clause entitled Default of this contract, the Contractor shall pay to the PHA as liquidated damages, the sum of \$ 500 p/day/unit [Contracting Officer insert amount] for each day of delay. If different completion dates are specified in the contract for separate parts or stages of the work, the amount of liquidated damages shall be assessed on those parts or stages which are delayed. To the extent that the Contractor's delay or nonperformance is excused under another clause in this contract, liquidated damages shall not be due the PHA. The Contractor remains liable for damages caused other than by delay.
- (b) If the PHA terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final

completion of the work together with any increased costs occasioned the PHA in completing the work.

- (c) If the PHA does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

34. Termination for

- (a) The Contracting Officer may terminate this contract in whole, or in part, whenever the Contracting Officer determines that such termination is in the best interest of the PHA. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which the performance of the work under the contract is terminated, and the date upon which such termination becomes effective.
- (b) If the performance of the work is terminated, either in whole or in part, the PHA shall be liable to the Contractor for reasonable and proper costs resulting from such termination upon the receipt by the PHA of a properly presented claim setting out in detail: (1) the total cost of the work performed to date of termination less the total amount of contract payments made to the Contractor; (2) the cost (including reasonable profit) of settling and paying claims under subcontracts and material orders for work performed and materials and supplies delivered to the site, payment for which has not been made by the PHA to the Contractor or by the Contractor to the subcontractor or supplier; (3) the cost of preserving and protecting the work already performed until the PHA or assignee takes possession thereof or assumes responsibility therefore; (4) the actual or estimated cost of legal and accounting services reasonably necessary to prepare and present the termination claim to the PHA; and (5) an amount constituting a reasonable profit on the value of the work performed by the Contractor.
- (c) The Contracting Officer will act on the Contractor's claim within days (60 days unless otherwise indicated) of receipt of the Contractor's claim.
- (d) Any disputes with regard to this clause are expressly made subject to the provisions of the Disputes clause of this contract.

35. Assignment of Contract

The Contractor shall not assign or transfer any interest in this contract; except that claims for monies due or to become due from the PHA under the contract may be assigned to a bank, trust company, or other financial institution. Such assignments of claims shall only be made with the written concurrence of the Contracting Officer. If the Contractor is a partnership, this contract shall inure to the benefit of the surviving or remaining member(s) of such partnership as approved by the Contracting Officer.

36. Insurance

- (a) Before commencing work, the Contractor and each subcontractor shall furnish the PHA with certificates of insurance showing the following insurance is in force and will insure all operations under the Contract:
- (1) Workers' Compensation, in accordance with state or Territorial Workers' Compensation laws.
- (2) Commercial General Liability with a combined single limit for bodily injury and property damage of not less than \$ _____ [Contracting Officer insert amount]

per occurrence to protect the Contractor and each subcontractor against claims for bodily injury or death and damage to the property of others. This shall cover the use of all equipment, hoists, and vehicles on the site(s) not covered by Automobile Liability under (3) below. If the Contractor has a "claims made" policy, then the following additional requirements apply: the policy must provide a "retroactive date" which must be on or before the execution date of the Contract; and the extended reporting period may not be less than five years following the completion date of the Contract.

(3) Automobile Liability on owned and non-owned motor vehicles used on the site(s) or in connection therewith for a combined single limit for bodily injury and property damage of not less than \$ _____ [Contracting Officer insert amount] per occurrence.

(b) Before commencing work, the Contractor shall furnish the PHA with a certificate of insurance evidencing that Builder's Risk (fire and extended coverage) Insurance on all work in place and/or materials stored at the building site(s), including foundations and building equipment, is in force. The Builder's Risk Insurance shall be for the benefit of the Contractor and the PHA as their interests may appear and each shall be named in the policy or policies as an insured. The Contractor in installing equipment supplied by the PHA shall carry insurance on such equipment from the time the Contractor takes possession thereof until the Contract work is accepted by the PHA. The Builder's Risk Insurance need not be carried on excavations, piers, footings, or foundations until such time as work on the superstructure is started. It need not be carried on landscape work. Policies shall furnish coverage at all times for the full cash value of all completed construction, as well as materials in place and/or stored at the site(s), whether or not partial payment has been made by the PHA. The Contractor may terminate this insurance on buildings as of the date taken over for occupancy by the PHA. The Contractor is not required to carry Builder's Risk Insurance for modernization work which does not involve structural alterations or additions and where the PHA's existing fire and extended coverage policy can be endorsed to include such work.

(c) All insurance shall be carried with companies which are financially responsible and admitted to do business in the State in which the project is located. If any such insurance is due to expire during the construction period, the Contractor (including subcontractors, as applicable) shall not permit the coverage to lapse and shall furnish evidence of coverage to the Contracting Officer. All certificates of insurance, as evidence of coverage, shall provide that no coverage may be canceled or non-renewed by the insurance company until at least 30 days prior written notice has been given to the Contracting Officer.

37. Subcontracts

(a) Definitions. As used in this contract -

(1) "Subcontract" means any contract, purchase order, or other purchase agreement, including modifications and change orders to the foregoing, entered into by a subcontractor to furnish supplies, materials, equipment, and services for the performance of the prime contract or a subcontract.

(2) "Subcontractor" means any supplier, vendor, or firm that furnishes supplies, materials, equipment, or services to or for the Contractor or another subcontractor.

(b) The Contractor shall not enter into any subcontract with any subcontractor who has been temporarily denied participation in a HUD program or who has been suspended or debarred from participating in contracting programs by any agency of the United States Government or of the state in which the work under this contract is to be performed.

(c) The Contractor shall be as fully responsible for the acts or omissions of its subcontractors, and of persons either directly or indirectly employed by them as for the acts or omissions of persons directly employed by the Contractor.

(d) The Contractor shall insert appropriate clauses in all subcontracts to bind subcontractors to the terms and conditions of this contract insofar as they are applicable to the work of subcontractors.

(e) Nothing contained in this contract shall create any contractual relationship between any subcontractor and the PHA or between the subcontractor and HUD.

38. Subcontracting with Small and Minority Firms, Women's Business Enterprise, and Labor Surplus Area Firms

The Contractor shall take the following steps to ensure that, whenever possible, subcontracts are awarded to small business firms, minority firms, women's business enterprises, and labor surplus area firms:

- (a) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
- (b) Ensuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;
- (c) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses and women's business enterprises;
- (d) Establishing delivery schedules, where the requirements of the contract permit, which encourage participation by small and minority businesses and women's business enterprises; and
- (e) Using the services and assistance of the U.S. Small Business Administration, the Minority Business Development Agency of the U.S. Department of Commerce, and State and local governmental small business agencies.

39. Equal Employment Opportunity

During the performance of this contract, the Contractor/Seller agrees as follows:

- (a) The Contractor/Seller shall not discriminate against any employee or applicant for employment because of race color, religion, sex, sexual orientation, gender identity, disability, or national origin.
- (b) The Contractor/Seller shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, disability, or national origin. Such action shall include, but not be limited to, (1) employment, (2) upgrading demotion, (4) transfer, (5) recruitment or recruitment advertising, (6) layoff or termination, (7) rates of pay or other forms of compensation, and (8) selection for training, including apprenticeship

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(c) The Contractor/Seller agrees to post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(d) The Contractor/Seller shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor/Seller, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(e) The Contractor/Seller shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(f) The Contractor/Seller shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(g) The Contractor/Seller shall furnish all information and reports required by Executive Order 11246, as amended, Section 503 of the Rehabilitation Act of 1973, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto. The Contractor/Seller shall permit

access to its books, records, and accounts by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(h) In the event of a that the Contractor/Seller is in noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor/seller may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(i) The contractor/seller will include the provisions of paragraphs (a) through (h) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each sub[contractor/seller] or vendor. The [contractor/seller] will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the [contractor/seller] becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the [contractor/seller] may request the United States to enter into such litigation to protect the interests of the United States.

(j) Compliance with the requirements of this clause shall be to the maximum extent consistent with, but not in derogation of, compliance with section 7(b) of the Indian Self-Determination and Education Assistance Act and the Indian Preference clause of this contract.

**40. Employment, Training, and Contracting
Opportunities for Low-Income Persons, Section 3 of the
Housing and Urban Development Act of 1968.**

(a) The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

(b) The parties to this contract agree to comply with HUD's regulations in 24 CFR Part 75, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the Part 75 regulations.

(c) The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 prioritization requirements and shall state the minimum percentages of labor hour requirements established in the Benchmark Notice (FR-6085-N-04).

(d) The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR Part 75, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR Part 75. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR Part 75.

(e) Noncompliance with HUD's regulations in 24 CFR Part 75 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

(f) Contracts, subcontracts, grants, or subgrants subject to Section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5307(b)) or subject to tribal preference requirements as authorized under 101(k) of the Native American Housing Assistance and Self-Determination Act (25 U.S.C. 4111(k)) must provide preferences in employment, training, and business opportunities to Indians and Indian organizations, and are therefore not subject to the requirements of 24 CFR Part 75.

41. Interest of Members of Congress

No member or delegate to the Congress of the United States of America shall be admitted to any share or part of this contract or to any benefit that may arise therefrom.

42. Interest of Members, Officers, or Employees and Former Members, Officers, or Employees

No member, officer, or employee of the PHA, no member of the governing body of the locality in which the project is situated, no member of the governing body of the locality in which the PHA was activated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the project, shall, during his or her tenure, or for one year thereafter, have any interest, direct or indirect, in this contract or the proceeds thereof.

43. Limitations on Payments made to Influence Certain Federal Financial Transactions

- (a) The Contractor agrees to comply with Section 1352 of Title 31, United States Code which prohibits the use of **Acts** Federal appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.
- (b) The Contractor further agrees to comply with the requirement of the Act to furnish a disclosure (OMB Standard Form LLL, Disclosure of Lobbying Activities) if any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

44. Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringement of any patent rights and shall save the PHA harmless from loss on account thereof; except that the PHA shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified and the Contractor has no reason to believe that the specified design, process, or product is an infringement. If, however, the Contractor has reason to believe that any design, process or product specified is an infringement of a patent, the Contractor shall promptly notify the Contracting Officer. Failure to give such notice shall make the Contractor responsible for resultant loss.

45. Examination and Retention of Contractor's Records

- (a) The PHA, HUD, or Comptroller General of the United States, or any of their duly authorized representatives shall, until 3 years after final payment under this contract, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this contract for the purpose of making audit, examination, excerpts, and transcriptions.
- (b) The Contractor agrees to include in first-tier subcontracts under this contract a clause substantially the same as paragraph (a) above. "Subcontract," as used in this clause, excludes purchase orders not exceeding \$10,000.
- (c) The periods of access and examination in paragraphs (a) and (b) above for records relating to (1) appeals under the Disputes clause of this contract, (2) litigation or settlement of claims arising from the performance of this contract, or (3) costs and expenses of this contract to which the PHA, HUD, or Comptroller General or any of their duly authorized representatives has taken exception shall continue until disposition of such appeals, litigation, claims, or exceptions.

46. Labor Standards - Davis-Bacon and Related

If the total amount of this contract exceeds \$2,000, the Federal labor standards set forth in the clause below shall apply to the development or construction work to be performed under the contract.

- (a) Minimum Wages.
- (1) All laborers and mechanics employed under this contract in the development or construction of the project(s) involved will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the regular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall

be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(2) (i) Any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met: (A) The work to be performed by the classification requested is not performed by a classification in the wage determination; and (B) The classification is utilized in the area by the construction industry; and (C) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(ii) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employee Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary.

(iii) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary.

(iv) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (a)(2)(ii) or (iii) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in classification.

(3) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(4) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the

amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(b) Withholding of funds. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working in the construction or development of the project, all or part of the wages required by the contract, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the Contractor, disburse such amounts withheld for and on account of the Contractor or subcontractor to the respective employees to whom they are due.

(c) Payrolls and basic records.

(1) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working in the construction or development of the project. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv), that the wages of any laborer or mechanic include the amount of costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(2) (i) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under subparagraph (c)(1) of this clause. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The Contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1214-0149.)

(ii) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(A) That the payroll for the payroll period contains the information required to be maintained under paragraph (c) (1) of this clause and that such information is correct and complete;

(B) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3; and

(C) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(iii) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirements for submission of the "Statement of Compliance" required by subparagraph (c)(2)(ii) of this clause.

(iv) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(3) The Contractor or subcontractor shall make the records required under subparagraph (c)(1) available for inspection, copying, or transcription by authorized representatives of HUD or its designee, the Contracting Officer, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to

make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(d) (1) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship and Training, Employer and Labor Services (OATELS), or with a State Apprenticeship Agency recognized by OATELS, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by OATELS or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in this paragraph, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event OATELS, or a State Apprenticeship Agency recognized by OATELS, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under

- the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (3) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.
- (e) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.
- (f) Contract termination; debarment. A breach of this contract clause may be grounds for termination of the contract and for debarment as a Contractor and a subcontractor as provided in 29 CFR 5.12.
- (g) Compliance with Davis-Bacon and related Act requirements. All rulings and interpretations of the Davis-Bacon and related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (h) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this clause shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the PHA, HUD, the U.S. Department of Labor, or the employees or their representatives.
- (i) Certification of eligibility.
- (1) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

- (2) No part of this contract shall be subcontracted to any person or firm ineligible for award of a United States Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (3) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.
- (j) Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.
- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics, including watchmen and guards, shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set forth in subparagraph (j)(1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic (including watchmen and guards) employed in violation of the provisions set forth in subparagraph (j)(1) of this clause, in the sum of \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by provisions set forth in subparagraph (j)(1) of this clause. DOL posts current fines at: <https://www.dol.gov/whd/govcontracts/cwhssa.htm#cmp>
- (3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in subparagraph (j)(2) of this clause.
- (k) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts all the provisions contained in this clause, and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all these provisions.

47. Non-Federal Prevailing Wage Rates

(a) Any prevailing wage rate (including basic hourly rate and any fringe benefits), determined under State or tribal law to be prevailing, with respect to any employee in any trade or position employed under the contract, is inapplicable to the contract and shall not be enforced against the Contractor or any subcontractor, with respect to employees engaged under the contract whenever such non-Federal prevailing wage rate exceeds:

- (1) The applicable wage rate determined by the Secretary of Labor pursuant to the Davis-Bacon Act (40 U.S.C. 3141 et seq.) to be prevailing in the locality with respect to such trade;
- (b) An applicable apprentice wage rate based thereon specified in an apprenticeship program registered with the U.S. Department of Labor (DOL) or a DOL-recognized State Apprenticeship Agency; or
- (c) An applicable trainee wage rate based thereon specified in a DOL-certified trainee program.

48. Procurement of Recovered Materials.

(a) In accordance with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, the Contractor shall procure items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition. The Contractor shall procure items designated in the EPA guidelines that contain the highest percentage of recovered materials practicable unless the Contractor determines that such items: (1) are not reasonably available in a reasonable period of time; (2) fail to meet reasonable performance standards, which shall be determined on the basis of the guidelines of the National Institute of Standards and Technology, if applicable to the item; or (3) are only available at an unreasonable price.

() Paragraph (a) of this clause shall apply to items purchased under this contract where: (1) the Contractor purchases in excess of \$10,000 of the item under this contract; or (2) during the preceding Federal fiscal year, the Contractor: (i) purchased any amount of the items for use under a contract that was funded with Federal appropriations and was with a Federal agency or a State agency or agency of a political subdivision of a State; and (ii) purchased a total of in excess of \$10,000 of the item both under and outside that contract.

INDIAN HOUSING

AMENDMENTS TO GENERAL CONDITIONS OF THE CONTRACT OF CONSTRUCTION

The following supplements modify, change, delete from or add to the “General Conditions of the Contract for Construction – Public Housing,” HUD Document 5370 (11/2023). Where any Article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

GENERAL

Throughout this document change all occurrences of “PHA” or “Public Housing Agency” to “IHA” or “Indian Housing Authority.”

CLAUSE 1. DEFINITIONS

Revised Paragraph 1.h. to read:

- b. The term “IHA” or “Indian Housing Authority” means the Indian Housing Authority organized under applicable tribal law.

CLAUSE 13. HEALTH, SAFETY, AND ACCIDENT PREVENTION

Add the following:

- f. The Contractor shall comply with governing standards of environmental protection in regards to use of volatile or lead-based materials in construction practices.
- g. The Contractor shall comply with governing standards of health, safety and environmental protection in regards to the potential discovery of, detection of, unearthing of, and/or disturbance of volatile, asbestos, or lead containing materials during the progress of construction.

CLAUSE 20. INSPECTION AND ACCEPTANCE OF CONSTRUCTION

In the first sentence of paragraph b., replace the work “Architect” with “Architect’s or Housing Authority’s Project Representative.”

Add the following paragraphs to Clause 20:

- (k) The following are the minimum required “Pre-cover-up” reviews for each dwelling unit or other designated portion of the work:
 - Before pouring concrete
 - Before backfilling utilities or foundations
 - Before installing interior building insulation
 - Before installing exterior wall finish (stucco, siding, etc.)
 - Before installing roofing over roof deck
 - Before installing drywall board
- (l) The Contractor shall notify the Architect or Housing Authority’s Project Representative a minimum of 24 hours prior to proceeding with any of the above “cover up” operations or with any tests required by the contract. The above list is not intended to be all inclusive; the

Project Representative may determine that additional “pre-cover-up” reviews are necessary and the contractor shall be so notified. The Project Representative shall maintain a record of reviews and approvals of the above phases of the work. In addition, the Contractor shall maintain an approval record card at each dwelling unit or other designated portion of the work with a space for the Project Representative’s signature and date for each “pre-cover-up” approval required. The Contractor shall not proceed to cover up the work until the appropriate review and approval signatures by the Project Representative are obtained. Notwithstanding any other provisions of this contract, failure by the Contractor to notify the Project Representative fore reviews and to obtain such approvals shall not constitute justification for increase in contract time or amount.

- (2) The Contractor or his superintendent shall make a complete and thorough pre-inspection of all portions of the work which he deems to be substantially complete and prepare a punch list of all incomplete or deficient items of work. A copy of the Contractor’s pre-inspection punch list shall be sent to the Housing Authority and to the Architect for record. The Contractor shall proceed immediately to correct all items on his pre-inspection punch list.
- (3) The Contractor shall back-check his pre-inspection punch list to assure that all possible incomplete and deficient items from his original list have been corrected. The Contractor shall then notify the Housing Authority or the Architect in writing that the designated portion of the work is ready for PRE-FINAL INSPECTION. The written notification shall contain a copy of the Contractor’s original pre-inspection punch list checked off with dates showing when each item was corrected. A separate list of any items not corrected with a reason why each item could not be corrected shall also be included.
- (4) The Architect’s or Housing Authority’s Project Representative will then conduct a pre-final inspection of the designated portion of the work and prepare a pre-final punch list of items which he considers to be incomplete or deficient. A copy of the Architect’s or Housing Authority’s Project Representative’s pre-final punch list shall be sent to the Housing Authority, to the Architect and to the Contractor. The Contractor shall proceed immediately to correct all items on the pre-final punch list.
- (5) The Contractor shall back-check the Architect’s or Housing Authority’s Project Representative’s pre-final punch list, to assure that all possible incomplete and deficient items from this list have been corrected. The Contractor shall then notify the Housing Authority or the Architect in writing that the designated portion of the work is ready for final inspection. The written notification shall contain a copy of the Architect’s or Housing Authority Project Representative’s pre-final inspection punch list checked off with dates showing when each item was corrected. A separate list of any items not corrected with a reason why each item could not be corrected shall also be included.
- (6) The Architect’s or Housing Authority’s Project Representative win then back-check the pre-final inspection punch list to confirm that all items on the list have been corrected and notify the Architect and the Housing Authority that the designated portion of the work is completed and ready for a FINAL INSPECTION. If any uncorrected items are of such nature as to prevent the designated portion of the work from being occupied, the Architect’s or the Housing Authority’s representative shall have the authority to declare that the designated portion of the work is not ready for final inspection.
- (7) The Housing Authority will schedule a final inspection by representatives from the Housing Authority and the Architect, who will prepare a final inspection punch list of items which they find to be incomplete or deficient the Contractor shall have ten (10) calendar days to correct the items on the final inspection punch list.

- (8) The Contractor shall back-check the final inspection punch list to assure that all possible incomplete and deficient items from this list have been corrected. The Contractor shall then notify the Housing Authority or the Architect in writing that all items on the final inspection punch list have been corrected. The written notification shall contain a copy of the final inspection punch list checked off with dates showing when each item was corrected. A separate list of any items not corrected with a reason why each item could not be corrected shall also be included.
- (9) The Architect's or Housing Authority's Project Representative will then back-check the final inspection punch list to confirm that all items on the list have been corrected and notify the Architect, and the Housing Authority that all of the items have been corrected.
- (10) The Housing Authority will then prepare a MEMORANDUM OF ACCEPTANCE FOR OCCUPANCY for the designated portion of the work, which will be dated on the date the Architect's or Housing Authority's Project Representative verified that all of the final inspection punch list items were corrected.

CLAUSE 27. PAYMENTS

Subpart (f):

Except as otherwise provided in State law, the Navajo Housing Authority (NHA) shall retain ten (10%) percent of the amount of progress payments until completion and acceptance of all work under the contract. Retention shall be released to the contractor upon submission of Contractor's Certificate & Release; Subcontractor and Material Suppliers Lien Release(s), NHA Certification of Punch Lists Completion Certification, As-built Drawings and NHA's certification of Labor Compliance.

This section is hereby deleted: [except, that if upon completion of 50 percent of the work, the Contracting Officer, after consulting with the Architect, determines that the Contractor's performance and progress are satisfactory, the NHA may make the remaining payments in full for the work subsequently completed. If the Contracting Officer subsequently determines that the Contractor's performance and progress are unsatisfactory, the NHA shall reinstate the ten (10) percent (or other percentages provided in State law) retainage until such time as the Contracting Officer determines that performance and progress are satisfactory.]

CLAUSE 32. DEFAULT

Subpart (b)(2): Add:

The Contractor must submit proper written documentation to justify delays as stipulated. No consideration will be given for delays beyond the ten (10) day period requirement, and not at the end of construction.

CLAUSE 36. INSURANCE

Subpart (b):

"The contractor is not required to carry Builder's Risk Insurance for work which does not include structural alterations or additions and where the PHA existing fire and extended coverage policy can be endorsed to include such work." **This paragraph shall be omitted from the contract documents and any references to this clause directly or implied. The contractor shall provide all applicable insurance for the project and shall include this cost in the bid.**

All required amount of Insurance limits shall ultimately be determined by the Contracting Officer.

SPECIAL CONDITIONS OF CONTRACT

Section 1 PROJECT IDENTIFICATION: NM15-043 Crownpoint, New Mexico 30 Home Ownership Units Demolition and Re-build.

- A. The project consists of the complete demolition of 30 family- 3BR, 4BR & 5BR single housing units and construction of 30 replacement units consisting of 3BR, 4BR & 5BR single units. New home construction in existing subdivision lots have been adjusted per flooding remediation recommendations, including new foundation systems, the floor plans and layout types are similar to the existing. New floor plans are based on a standardized “core” including the kitchen, living room, 1st, 2nd bathrooms, 1st, 2nd, 3rd, 4th and 5th bedrooms, laundry, and utility. These elements are the same (with some minor exceptions) for all unit types..

- B. Structural Summary:
 - 1. Load-bearing walls will be Wood Construction with EIFS- Stucco Finish System.
 - 2. Foundations will be post-tensioned concrete slabs.
 - 3. Interior non-bearing walls are standard 2x wood framing.
 - 4. Roof construction is shop-fabricated wood trusses.

- C. The overall intent is to construct “universal design” homes which can be easily converted to fully accessible units in the future based on changing needs of the housing authority, there are multiple designated individual units with Reasonable Accommodations. Some special features such as bathroom accessories and extended plumbing stub-outs are included in standard units for this purpose.

- D. Site work includes re-grading and new pad elevations, demolition of the existing driveways, with minor asphalt pavement, concrete curb and gutter, sidewalks, and fences both for individual lots and the development perimeter. Other site features include drainage improvements consisting of a rip-rap, concrete channels throughout the development per flooding remediation.

- E. Utility summary:
 - 1. Water/wastewater – Existing mains to remain in place. New service lines to each unit.
 - 2. Natural gas – NONE
 - 3. Electrical – Scope primarily consists of coordination with Continental Divide Electrical Coop. for new panels, disconnection & reconnection, to be completed by CDEC.

Section 2 TIME OF COMPLETION

The Contract work shall be commenced at the time stipulated in the notice to proceed to the contractor and shall be fully completed by **420** consecutive calendar days thereafter.

Section 3 LIQUIDATED DAMAGES

The parties hereby agree that the rate of liquidated damages under clause 33 of the general conditions shall be **\$500.00** per day for each uncompleted and/or unacceptable unit.

Section 4 COMMUNICATIONS

- 1. Any notice (including demands, instructions, approvals and claims) shall be in writing, and signed by an authorized representative of the party giving notice.

2. Any notice to the Contractor may be delivered at the office of the Contractor stated on the signature page of the contract, or at such other office as he may from time to time designate in writing to the Navajo Housing Authority, or may be sent by mail or by express courier/mail addressed to the Contractor's office.
3. All papers required to be delivered to the Navajo Housing Authority (NHA) or Architect shall, unless otherwise specified in writing to the Contractor, be delivered to NHA Construction Services Division at Ft. Defiance, Arizona, and any notice to the NHA or Architect may be delivered, or may be sent by mail to Navajo Housing Authority at P.O. Box 1579, Fort Defiance, Arizona 86504 or by express courier/mail to Navajo Housing Authority office building on Old coal Mine Road and Navajo Route 54, Fort Defiance, Arizona 86504 (928) 729-6607, or to such other representatives of the NHA or to such other address, as the NHA may from time to time designate in writing to the Contractor.
4. Any notice shall be deemed to have been given when delivered or, if mailed, when the notice shall have been received in due course of post, or, if delivered by express courier/mail, a copy of receipt of when the notice is actually received.

Section 5 **FTP SITE AND QUALITY CONTROL**

The contractor shall set up and maintain a web based FTP site (file transfer protocol) for exclusive use between the Contractor, A/E firm and Owner. Information for the Project shall be updated every Friday by 1:00pm to the FTP site. The FTP site must have enough storage capacity for all submittals, RFI, change orders, drawings, specifications and any other contract documents. All new information must be backed up every month and given to Owner on a monthly basis via compact disc. At conclusion of the project, the firm will provide a hard drive with all documents downloaded and save to external hard drive.

Contractor must establish and maintain a site specific Quality Control Program that outlines all the necessary provisions to ensure the project meets or exceeds the contract documents. This information is due with 10 days of the notice to proceed.

Section 6 **SIGNS**

Subject to prior approval of the NHA or Architect as to size, design, type and location, and subject to local regulations, the Contractor and his subcontractors shall erect temporary signs for purposes of project identification and for controlling vehicular traffic. The Contractor shall furnish, erect, and maintain such signs as required by safety regulations and as necessary to safeguard life and property.

Section 7 **JOB OFFICE**

The Contractor shall furnish and maintain, during construction of the project, adequate office facility at the project site for the use by Contractor, Project Architect, the NHA and NHA Project Representative, as follows: The office shall be painted, heated (in winter), cooled (in summer) and shall be provided with windows that lock and operate, doors that lock, toilet facilities, telephone, tables, benches, shelves and racks for drawings. The office shall contain not less than 220 square feet, exclusive of toilet facilities. Cost of installing utilities and telephone service shall be paid for by the Contractor. Contractor shall be responsible of ensuring that the office facility is established and operational at the time when the contractor has mobilized to the project site, otherwise contractor will be penalized fifty dollars (\$50.00) per day for each day that the office is not completely operational.

Temporary structures, fencing, sheds, trailers and material storage shall be arranged in a safe manner to avoid interfering with construction, public access or Owner's Operations. All locations of temporary structures, shed, trailers and material storage shall be approved in advance by NHA.

Section 8 NAVAJO AND INDIAN PREFERENCE

Pursuant to 24 C.F.R. § 1000.52, the Services to be performed under this Agreement are for a project subject to and in accordance with Section 101 (k) of NAHASDA, which provides a recipient shall apply the tribal employment and contract preference laws (including regulations and tribal ordinances) adopted by the Indian tribe that received a benefit from funds granted to the recipient under NAHASDA.

(a) The NHA shall apply the contracting preference laws of the Navajo Nation, which require that business entities with the Navajo Nation, including NHA, provide certified Navajo-owned businesses priority preference in the award of contracts, as well as preference to certified Indian-owned businesses. Navajo Business Opportunity Act, 5 N.N.C § 201 *et. seq.*

(b) In connection with the performance of this Agreement, the parties shall, to the greatest extent feasible, provide preference and opportunities for training and employment to Navajos and preferences in the award of contracts and subcontracts shall be given to Navajo organizations and Navajo-owned Economic Enterprises. Navajo Preference in Employment Act, 15. N.N.C. § 601 *et. seq.*

(c) The parties to this Agreement shall comply with provisions of this Section 16.6, and all HUD requirements. These Navajo and Indian preference requirements shall be incorporated into every subcontract entered by General Contractor in connection with the Services. In addition to the above, the Contractor shall demonstrate to the extent in which have met this requirement, such as radio and or local newspaper advertisements and local job fairs. A report of this information must be made available to the NHA upon request.

Section 10 ADDITIONAL ROCK CLAUSE REQUIREMENTS

Notwithstanding any provisions in these Special Conditions, General Conditions or any other matters specified in the Plans and Specifications the Contractor is hereby informed that Geotechnical Reports are not available for the site. The Owner makes no representation or warranty as to the existing soil and rock materials to be encountered, or the difficulty of excavation.

The contractor shall be responsible for familiarizing himself with each site, verify the data and satisfy himself as to the type, nature and quantities of all materials to be excavated. All trenching and excavating, regardless of materials encountered, equipment or methods required for excavation, will be unclassified and the cost thereof shall be considered as being included in the lump sum bid. No extra payment or change orders will be allowed for rock excavation.

Section 11 TAXES & FEES

The prime contractor shall be responsible to pay for all Navajo Nation Taxes and shall be included in Contractor's bid. The Navajo Housing Authority is exempt from paying any State Sales Taxes. State Sales Tax Exemption Certificates can be requested in writing from the NHA Finance Branch.

Contractor is also responsible for all others fees for this project, including utility fees, water hook-up, sewer fees, etc. The Contractor shall provide proof of payment to the Owner.

Contractor shall provide their own water supply per all applicable laws and regulations and obtain all necessary permits.

Section 12 DWELLING EQUIPMENT FURNISHED BY GENERAL CONTRACTOR

All dwelling equipment shall be furnished and installed as shown on the plans under this contract including the cost of the refrigerators, ranges and other residential equipment and appliances which will be

furnished by the Contractor and unloaded and installed by the Contractor at the General Contractor's expense with all appropriate adjustments for ready use.

Section 13 ARCHAEOLOGICAL CLEARANCE

Archaeological clearances have been obtained by the NHA, however archaeological sites may be located within the project boundaries after the construction work has started. Should an archaeological site be discovered during construction, it shall be the responsibility of the Contractor to stop construction work immediately and contact the Navajo Housing Authority for advice and instructions.

Specific details concerning archaeological requirements will be reviewed and discussed at the preconstruction conference. Any required adjustments and changes to the contract work will be accomplished by change order only.

Section 14 WARRANTY & WARRANTY RETAINAGE

Prior to the expiration of the warranty period, NHA will schedule site visit to project site to walk the Project(s), review all systems, and assure that there are no outstanding issues. The walk-thru will be made with NHA, Contractor, and select subcontractors as required. Each party shall be aware of this milestone and that they may be required to participate.

Notwithstanding any provisions in these Special Conditions, General Conditions or any other matters set out in the Plans and Specifications, the NHA shall withhold and retain two and one half percent (2.5%) of the construction contract price for a period coterminous with the Eighteen (18) Month period described in the General Conditions herein. Contractors may provide a 5% Warranty Bond in lieu of contract retention.

The sums withheld pursuant to this provision shall be within the exclusive domain and control of the NHA. After the expiration of the 18 months period described in the General Conditions, and no obligations of the Contractor arising for the provisions of the General Conditions continue to exist, the unexpended funds still withheld and retained shall be paid over by the NHA to the Contractor. No interest will be due the Contractor on the funds retained.

The failure of the Contractor to respond to the NHA's request or demands to comply with the provisions of the General Conditions and the Contractor having failed to adequately respond within a reasonable period of time, shall give the NHA the right to use the sums withheld to remedy any defects and damages described in the General Conditions, either by the NHA undertaking to make such remedies itself or to contract with others to do so.

The purpose of the warranty retention is to aid the NHA in the enforcement of provisions under the General Conditions of the Contract and is not to be construed as a limitation as the generality of its provisions nor the enforcement thereof.

Section 15 BORROW MATERIALS

The Contractor shall be responsible to arrange for the use of borrow sites and cost of the required borrow material for the specified construction work per the contract documents. All borrow material must be tested by a certified soil testing laboratory and approved by a registered engineer as fulfilling the requirements for structural fill as specified under the Technical Specifications.

Section 16 EXISTING UTILITIES AND STRUCTURES

It shall be the Contractor's responsibility to determine the locations of existing underground utilities including pipelines and drains, not shown on the drawings and to confirm the exact locations of those

existing utilities shown on the drawings. The existence and location of utilities are not guaranteed by the NHA and shall be investigated and verified in the field by the Contractor before commencing construction activities in any particular area. Public utility companies shall be notified in advance to assist in the identification and location of their buried utilities.

Contractor shall verify the existence, location, depth, invert elevation and operational status of all existing underground utilities that will be utilized for series to the project. Contractor must work with local utility authority.

The Contractor shall be responsible for any damages to existing utilities and structures encountered during construction operations. All utilities and structures encountered shall be maintained in good operating condition and shall be protected from damage by the Contractor.

Damage by the Contractor of utilities and structures encountered shall be immediately repaired at the Contractor's expense. The repairs shall be made with the same type of materials that were damaged, and the repair work shall be done in a method acceptable to the NHA.

Contractor shall contact local utility authority concerning UFER ground clarifications and acceptable methods of installation.

Section 17 NTUA PERMISSION TO TAP (PTT'S) NTUA UTILITIES:

The Contractor shall be responsible for the installation of water and sewer utility work as indicated on the plans and in the technical specification, and the utility work shall be in accordance with NTUA specifications.

The Contractor shall be responsible for payment of all NTUA establishment, connection and inspection fees. A list of fees can be found at NTUA.com. All Materials shall be submitted to the NHA USC and NTUA for approval prior to installation.

NHA will secure and pay for all Electrical Utility infrastructure, right of ways and NTUA estimates. The contractor shall coordinate the construction of the electrical infrastructure with NTUA and pay for the NTUA meter establishment fees.

All communication with Utility Provider will be coordinated through NHA Utility Section and the NHA Construction Management.

The Contractor shall coordinate approval of utility provider questions, requests, and comments in separate RFI log.

Submission of Permission-To-Tap documents to NTUA shall be complete with proposed installation routes and material submission. The NHA Utility Section shall perform the initial review of PTT packet, before it is submitted to NTUA The Contractor shall account for a 30-working day review time from the Utility Provider.

Section 18 "AS BUILT" DRAWINGS REQUIREMENTS

The Contractor shall be responsible for:

1. The completion, submission and maintenance of all on-site utility as-built drawings and information in strict compliance with the specified standards and requirements of the Navajo Tribal Utility Authority (NTUA), Continental Divide Electrical Coop. and the Indian Health Service (IHS).

2. The Coordination of review of all As-builts by the Navajo Housing Authority and the inspection of the on-site utility systems; and
3. The acceptance and transfer of all on-site utility systems to the NTUA at Fort Defiance, Arizona.

The above must be adhered to before any final inspections (MAO) are granted.

An NTUA approved set of "As-Built" site utility drawings with supporting documents (test data and results, approvals, etc.) must be submitted to the Navajo Housing Authority prior to the General Contractor's request for a final inspection of site utility work. As-builts shall conform to NTUA Specifications in TP5.0.

The contractor shall note any deviations from the contract drawings and specifications. The Contractor shall coordinate approval of utility provider questions, requests, and comments in separate RFI log. All as-built information shall be reviewed and accepted on monthly basis with designated A/E firm, so that all closeout documents are completed in timely fashion not to delay any submitted payments. As-built drawings shall include building, site and utility information that will be tied to local mapping system on Owners Geological Information System. The Contractor shall account for a 30-working day review time from the Utility Provider. As-built drawings are to be approved by Utility Provider before Utility Final Inspection is schedule and meters are released.

Section 19 **FINAL INSPECTION AND MEMORANDUM OF ACCEPTANCE FOR OCCUPANCY**

Prior to the Contractor's request to the Architect for the final inspection the Contractor shall conduct a pre-final inspection with the NHA project representative to ensure the readiness of the project. Only after the NHA's project representative verification on the readiness of the project and completion of Section 17 of these Special Conditions shall the Architect schedule a final inspection.

If after five (5) or more units have been inspected with ten (10) or more punch items per unit generated, final inspection will be cancelled and rescheduled until all punch items are reduced to ten (10) or less punch items per unit.

All punch items derived for the final inspection shall be corrected within ten (10) calendar days; otherwise the Contractor will be subjected to liquidated damages clause id contract time frame has expired. NHA project representative shall make all required verification or corrections with the Contractor.

Contractor shall provide training to client(s) on daily operation and required maintenance for project within 14 days after project close-out. Contractor shall provide multimedia recording of required trainings.

Section 20 **MONTHLY REPORTS**

Contractor shall provide monthly construction report with the following information; 1) Detailed updated construction schedule with summary report 2) Cost Loaded Schedule 3) Construction photos 4) Progress report based on schedule 5) Daily construction activities report, 6) Site Safety Report (Tool Box Talks). Monthly construction report is due with all pay applications and no applications will be processed without report. One hard copy of Monthly Report shall be provided along with a bookmarked PDF file. Monthly reports shall be uploaded to the FTP site.

In addition to all pay applications and baseline schedules, the contractor shall provide a Cost Loaded Schedule (CPM) that reflects time frames and quantities as identified in the Schedule of Values and Baseline Schedule. This information is due 10 days after NTP.

Contractor shall provide no less than 50 photos per month taken throughout the course of the month. Construction photos shall have the following information: Date of photo with date stamp on photo, location, project number, house number and description of work performed in photo. Photos shall be provided uploaded to FTP for owners use. All photos that are unclear, too dark or blurry will be rejected.

Section 21 PROGRESS PAYMENTS

1. Request for payment: The Contractor shall submit an original and four (4) copies of completed Standard HUD Payment for Application Form and supporting documents to the Architect as of the **25th** day of each month for work completed and materials stored. Materials stored off-site in a bonded warehouse, in which materials are clearly earmarked for the Project and inspected by the Architect are subject to payment by the NHA when request is supported by prepaid invoices.
2. Contractor's Request for Payment must include the following and supporting documents:
 - a. NHA Prescribed Forms – Application for Payment.
 - b. Construction Progress Chart and Schedule forms.
3. Certification of Progress: The Contractor shall be responsible for coordinating and verifications of all work in place with the NHA Project Inspector before request for payments is submitted to the Architect for approval.
4. Payment: Upon certification by the Architect and approval by the NHA, the NHA shall on or about the 30th day of the following month pay to the Contractor, on account of the contract, 90 percent of the value of labor and materials incorporated in the work and 90 percent of the value of materials suitably stored on the site, up to the 25th day of the preceding month. NHA will not pay for offsite storage of materials and equipment without prior approval. All offsite storage of materials must be licensed and bonded warehouse. In addition, stored material must be inspected and approved by A/E firm prior to submission of Pay Application.

Section 22 TIME EXTENSION DUE TO WEATHER CONDITIONS

Notwithstanding any provision in these Special Conditions, General Conditions or any other matters set out in the plan and specifications, the Contractor shall be responsible for providing records of actual site conditions, National Weather Service Reports, and any other documentation that would substantiate weather delay claims. Notice of weather delays shall be forwarded to NHA no later than ten (10) calendar days after occurrence. No claims will be entertained after 10 day period.

Section 23 CONTRACT WORK HOURS AND SAFETY

The Contractor and his subcontractors shall comply with Sections 203 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor Regulations (29 CFR Part 5).

The contractor shall conduct weekly safety meetings “tool box talks” on site with all crews and subcontractors. Contractor shall document and provide meeting minutes with submission of pay application. Contractor shall also provide site specific safety manual that includes, but not limited to the following information:

Company Safety and Health Policies

1. Accident Reporting Procedures
2. OSHA Record Keeping
3. Control of Hazardous Energy (lock out tag out)

4. Pre-Job Planning
5. Coned Space Entry
6. Excavation and Trenching Precautions
7. Demolition Precautions
8. Health and Environment
9. Hazard Communication Program
10. Personal Protective Equipment
11. Fire Protection, Prevention and Emergency Action
12. Signs and Signals
13. Material Handling

Section 24 OWNER ACCESS TO RECORDS

The Contractor and his subcontractors shall provide access to the Navajo Housing Authority, the Department of Housing and Urban Development, the Comptroller General of the United States, or any of their duly authorized representatives to any books, documents, papers, and records of the audits, examinations, excerpts, and transcriptions. The Contractor and his subcontractors shall retain all required records for three years after having received final payments and all other pending matters are closed.

Section 25 LOT CONFIGURATIONS

Contractor shall maintain current lot configurations and ensure that established survey monuments are not disturbed during construction. In the event monuments are disturbed contractor will be responsible for re-staking.

Section 26 ADA COMPLIANT REQUIREMENTS

Contractor shall comply with the design for the Architectural, Mechanical, Electrical, and Plumbing, including Specifications with the latest ADA requirements for the Assessable unit floor plan.

Section 27 CONSTRUCTIBILITY REVIEW

The contractor shall conduct a comprehensive constructability review of the all drawings and specifications and provide a report to the NHA within 10 working days after the notice to proceed. Once the report is reviewed by the NHA and A/E firm, a meeting will be scheduled to evaluate contractor's plan review comments.

Section 28 COLOR SCHEMES AND SELECTION

The contractor is to develop and present to the NHA for review and approval of 8 color/material schemes. The schemes are to include roof shingles and or metal roof, exterior paint, exterior trim, interior paint, interior trim, cabinets, counter tops, flooring, interior doors, exterior doors and any other item(s) that requires paint of finish selection.

Section 29 RE-INSPECTION COSTS

Contractor shall bear all costs for all re-inspections completed by the Owner's Independent Inspection Firm and must be paid directly to the firm. NHA will provide a copy of the re-inspection report and invoice to the contractor. Contractor is to provide proof of payment to the firm upon Owner's request.



**CONSTRUCTION AGREEMENT
BETWEEN
OWNER AND CONTRACTOR**

NAVAJO HOUSING AUTHORITY (“Owner”): **Navajo Housing Authority**
CompanyName/Address/Phone/Fax **PO Box 4980**
Window Rock Arizona 86515
Phone: 928-871-2697, Fax: 928-871-2698

OWNER’S REPRESENTATIVE:
Contact Person – Name/Address **Aneva J. Yazzie, Interim Chief Executive Officer**
Phone/Fax/Email **PO Box 4980**
Window Rock Arizona 86515
Phone: 928-871-2602, Fax: 928-871-2604
Email: ajyazzie@hooghan.org

GENERAL CONTRACTOR:
GENERAL CONTRACTOR’S REPRESENTATIVE
Contact Person – Name/Address Phone/Email

PROJECT:
Name/Location

DESIGN PROFESSIONAL:
Company Name/Address/Phone/Email

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**TERMS AND CONDITIONS OF CONSTRUCTION AGREEMENT BETWEEN
NAVAJO HOUSING AUTHORITY AND GENERAL CONTRACTOR**

This Construction Agreement (this "**Agreement**") is made and entered this ___st day of _____ by and between **NAVAJO HOUSING AUTHORITY**, hereinafter called "**Owner**" and _____, hereinafter called "**Contractor.**"

Owner and Contractor desire to enter into this Agreement for the construction component of the project described on **Exhibit "A"**, attached hereto (the "**Project Description**"), and to set forth the terms and conditions governing the relationship between Owner and Contractor under this Agreement.

COVENANTS:

**ARTICLE 1
DEFINITIONS; THE CONTRACT DOCUMENTS**

1.1 Capitalized terms used in this Agreement and not otherwise defined herein, shall have the meanings designated for such terms in the General Conditions of the Agreement for Construction (the "**General Conditions**"), attached hereto as **Exhibit "B"**.

1.2 The contract documents that consist of this Agreement are Conditions of the Contract (General, Supplementary and other Conditions), Plans, Specifications, addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement (collectively, the "**Contract Documents**"). Contractor shall perform the Work in strict and absolute accordance with the Contract Documents. The Contract Documents form the contract between Owner and Contractor and are as fully a part of this Agreement as if set forth herein. An enumeration of the Contract Documents, other than Modifications, appears in Article 4.

**ARTICLE 2
THE WORK (STATEMENT OF WORK); SUBCONTRACTORS; COORDINATION**

2.1 Contractor shall perform or cause to be performed all of the Work necessary to complete the construction component of the Project in strict and absolute accordance with the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others. Contractor shall perform all undertakings reasonably inferable from the Contract Documents or in consultation with the Owner's Contracting Officer as being necessary to produce the intended results for the proper and timely completion of the Work, excluding only the following which shall not be included within the Contract Sum.

2.2 **Prior to construction**, Contractor shall furnish to Owner a written list of the names of the Subcontractors and material suppliers (including those who are to furnish materials or equipment fabricated to a special design) for whom Contractor proposes to subcontract certain parts of the Work, together with, such other documentation requested by Owner. Owner may, upon its review of the qualifications, capabilities and financial capacity of the Subcontractors and such suppliers, object to certain of the Subcontractors or such suppliers within ten (10) days of Owner's receipt of such list. Contractor shall not allow any Subcontractor or supplier to whom Owner has made a timely objection to perform any Work. If Owner has made a timely objection to any such Subcontractors or such suppliers, Contractor shall submit to Owner the names of substitute Subcontractors or suppliers to whom Owner has no objection. Contractor shall make no substitution for any Subcontractor or supplier engaged in the Work if Owner objects to such substitution. Contractor shall not be required to contract with anyone with whom Contractor has a reasonable objection.

2.3 Contractor shall coordinate the Work with the work performed by Owner or any separate contractor engaged by Owner under the Project.

**ARTICLE 3
CONTRACT SUM (STIPULATED SUM)**

3.1 Owner shall pay Contractor in current funds for Contractor's performance of completed Work a stipulated sum in the amount of _____ **Dollars and Zero Cents (\$0.00)** the "**Contract Sum**"), subject to additions and deductions evidenced by Change Orders, as provided in the Contract Documents.

3.2 Schedule of Values (Cost Breakdown): Prior to the commencement of the Work, Contractor shall complete and submit for Owner's review and approval (the "**Schedule of Values**"), in the form attached hereto as **Exhibit "C"**. The Schedule of Values shall: (a) subdivide the Work into its respective parts; (b) be based upon the Project Schedule; (c) include dollar amounts for all items comprising the Work; (d) serve as the basis for evaluating each Application for Payment; and (e) be updated and revised from time-to-time at Owner's request. Owner may reject any Schedule of Values that appears susceptible to resulting in a "front loading" of payments or for any other good cause. Contractor represents to Owner that, to the best of Contractor's knowledge, the Schedule of Values, including the draw schedule related thereto, accurately estimates the amounts that will be payable to Contractor each month; provided, however, that Owner shall be obligated to make payments of approved and certified amounts only as provided in the Contract Documents.

ARTICLE 4
ENUMERATION OF CONTRACT DOCUMENTS

4.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated as follows:

4.1.1 This Agreement.

4.1.2 The General Conditions.

4.1.3 The Specifications contained in the Project Manual, dated _____, of which the table of contents listing is attached hereto as Exhibit "D". Contractor acknowledges it received from the Owner (the "**Project Manual**") for the project as part of the Bid Document Package.

<u>Section</u>	<u>Title</u>	<u>Pages</u>
	<u>See Exhibit "D"</u>	

4.1.4 The Plans dated "As listed in Exhibit E", of which the drawing listing is attached hereto as Exhibit "E". Contractor acknowledges it received from Owner (the "**Plans and Specifications**") for the Project as a part of the Bid Document Package.

<u>Number</u>	<u>Title</u>	<u>Date</u>
	<u>See Exhibit "E"</u>	

4.1.5 The Addenda dated as listed below. Contractor acknowledges it received from Owner (the "**Addenda**") for the Project as a part of the Bid Document Package.

<u>Number</u>	<u>Date</u>	<u>Pages</u>
1		

4.1.6 The Form of Bid submitted by Contractor dated _____ along with all required related documents and/or forms included in Contractor's sealed bid proposal envelope.

ARTICLE 5
PAYMENTS

5.1 Based upon an Application for Payment submitted timely by Contractor to Owner and Design Professional, and Certificates for Payment issued by Design Professional, Owner shall make monthly progress payments to Contractor on account of approved and certified amounts requested under an Application for Payment as provided below and in accordance with Article 11 of the General Conditions.

5.2 The pay period covered by each Application for Payment shall be one calendar month ending on the last day of the month or as follows.

5.3 On the first day of each month, Contractor shall submit to Owner and Design Professional, for their respective review,

certification and approval, (the "**Application for Payment**") in the form attached hereto as **Exhibit "F"**, or such other form as Owner may require, requesting payment for Work completed during the immediate preceding month. Each Application for Payment shall be completed in accordance with the Schedule of Values, and include all supporting documentation described in Article 11 of the General Conditions.

5.4 Owner shall make monthly progress payments to Contractor on account of the Contract Sum of amounts approved under an Application for Payment, as follows:

- (a) Not later than thirty (30) days following the timely submission of a complete and correct Application for Payment, Owner shall pay Contractor that portion of the Contract Sum properly allocable through the period covered by the Application for Payment, less the aggregate of (1) previous payment made by Owner; (2) the Retainage (as defined in Section 5.4(c) of this Agreement) from such previous payments; and (3) such other amounts properly withheld pursuant to the Contract Documents;
- (b) The Application for Payment may request payment for materials and equipment not yet incorporated into the Project, as provided in Article 11 of the General Conditions; and
- (c) Owner may retain from each progress payment an amount equal to **TEN (10%)** of amounts otherwise due and payable (the "**Retainage**"), plus any additional amounts Owner reasonably determines are necessary to cover any of the matters described in Article 11 of the General Conditions. The Retainage shall be maintained by Owner and shall remain on deposit until paid out to Contractor by Owner. Retainage shall be paid by the Owner to the Contractor in two payments; 7.5% within THIRTY 30 days of the completion of the project and the remaining 2.5% paid upon completion of the warranty period.

5.5 Final Payment not including the retainage, constituting the entire unpaid balance of the Contract Sum, shall be made by Owner to Contractor within **THIRTY (30)** days after Contractor has accomplished Final Completion.

5.6 Owner reserves the right to issue joint checks to Contractor and Contractor agrees to accept joint checks and, when requested by Owner, to execute joint check agreements in form acceptable to Owner. Owner shall notify Contractor prior to initiating joint check arrangements. Contractor consents to Owner communicating directly with Subcontractors to verify Contractor's payment history and account status.

ARTICLE 6

COMMENCEMENT; COMPLETION; PROGRESS SCHEDULE; LIQUIDATED DAMAGES

6.1 Contractor shall commence performance of its obligations under the Contract Documents upon the date specified in a written notice to proceed issued by Owner to Contractor. Subject to adjustments evidenced by Change Orders, Contractor shall cause the Work to be performed on an uninterrupted basis as progressively directed by the Contract Documents incorporated within this Agreement and the terms and conditions of this Agreement.

6.2 Subject to adjustments evidenced by Change Orders, Substantial Completion of the Work shall be achieved not later than (the "**Substantial Completion Date**"), which is equal to CALENDAR DAYS COMMENCING FROM THE "NOTICE TO PROCEED" DATE, subject only to completion of the Punch List Items included on the approved Punch List, as described in Article 11 of the General Conditions.

6.3 Subject to adjustments evidenced by Change Orders, (the "**Final Completion**") of the Work shall be achieved not later than **THIRTY (30) DAYS FOLLOWING SUBSTANTIAL COMPLETION DATE**.

6.4 In addition, and subject to adjustments evidenced by Change Orders, certain elements of the Work shall be completed by the milestone dates set forth in a detailed critical path schedule for performing the Work, which schedule, when approved by Owner, shall be attached hereto as **Exhibit "G"** (the "**Project Schedule**"). The Project Schedule shall specifically identify and incorporate the number of weather-delay days anticipated by Contractor and shall otherwise conform to the requirements set forth in Article 6 of the General Conditions.

6.5 Contractor understands that if Substantial Completion is not attained by the Substantial Completion Date, subject to adjustments evidenced by Change Orders, Owner will suffer substantial damages that will be extremely difficult and impracticable to accurately ascertain. Contractor agrees that if Contractor is delayed in attaining Substantial Completion by the Substantial Completion Date, subject to adjustments evidenced by Change Orders, Contractor shall pay Owner an amount equal

to **FIVE HUNDRED DOLLARS (\$500.00) PER UNIT/DAY** (the "**Liquidated Damages Amount**"), as liquidated damages, for each day of delay beyond the Substantial Completion Date. The Liquidated Damages Amount is a reasonable approximation of Owner's delay damages and may be assessed by Owner as and for liquidated damages, and not a penalty, in order to avoid costly litigation that would otherwise be required. Owner may deduct all liquidated damages it assesses against Contractor from any unpaid amounts then or thereafter due Contractor under this Agreement. Any liquidated damages not so deducted shall be payable by Contractor to Owner on demand. Any liquidated damages not paid within thirty (30) days of Owner's demand shall accrue interest at the prime rate of interest, as described in the *Money and Investing* section of the Wall Street Journal, plus four percent (4%) until paid in full. The liquidated damages provided herein shall not preclude Owner from exercising any other rights or remedies provided Owner in the Contract Documents or under Applicable Laws.

ARTICLE 7 **NAVAJO PREFERENCE**

This Contract is subject to termination or assessments of penalties for failure to comply with the contracting preference requirements under Navajo law, specifically including the Navajo Business Opportunity Act ("NBOA"), and in accordance with Article 17 of the General Conditions and in other provisions of this Agreement (*see* Instruction to Bidders, section 7.0) and required by 24 CFR § 1000.48-1000.54. If Contractor is eligible for and receives contracting preference under the NBOA, and other applicable laws, Contractor must maintain such Priority Certification during the course of this Agreement. The Contractor shall comply with the applicable ownership and control requirements under the NBOA, including decision-making authority requirements and shall provide evidence upon request of the Owner showing that the Contractor is utilizing the applicable decision making in day to day operations, management, administrative, selections, and financial accountability in its operations. The Owner may also verify that a Contractor receiving contracting preference under Navajo law is real and substantial in performance of all work under the Agreement. Under no circumstances shall a Contractor receiving contracting preference under Navajo law have in place any restrictions, charter requirement, or partnership agreements that prevent or limit the decision making or performance of a Navajo or Indian partner. The Owner has the right to require the Navajo or Indian partner be present or substantially participate in each subsequent decision made in furtherance of the work performed.

ARTICLE 8 **BONDS OR LETTER OF CREDIT; INSURANCE**

8.1 Before any Work is performed, Contractor shall furnish to, or for the benefit of Owner and any entity providing financing or funding for the Work (hereinafter, each such entity is a "**Funding Source**"), performance, labor, and material payment bonds covering all or any portion of the Work specified by Owner. All such bonds shall (a) contain dual obligee riders naming Owner, each Funding Source, and such other parties as Owner may designate as obligee, (b) be in the form of Exhibit "H" attached hereto, and (c) otherwise fully conform with the requirements of Article 13 of the General Conditions. The premium or other costs of any such bonds shall be included in the Contract Sum. Alternatively, Owner may agree to accept other financial accommodations from Contractor, in lieu of the bonds described in this Section 8.1, including a Letter of Credit. Contractor agrees to execute reasonable forms, instruments and agreements as necessary to effectuate any such accommodations.

8.2 Prior to performing any Work, Contractor shall provide to Owner's Representative Certificates of Insurance evidencing Contractor's and any Subcontractors' compliance with the insurance requirements provided in Article 13 of the General Conditions.

ARTICLE 9 **WAGE RATES**

Contractor must comply with the Navajo Preference and Employment Act (NPEA), including any licensing requirements; provided, however, (the "**Davis-Bacon Wage Rates**"), which are attached as Exhibit "I", are applicable to this Project in lieu of Navajo Nation wage rates for any trade classification for which the Davis-Bacon wage rate exceeds the rate of the Navajo Nation.

ARTICLE 10

GOVERNING LAW; FORUM AND VENUE; SOVEREIGN IMMUNITY

10.1 The Contract Documents shall be governed by, construed and enforced in accordance with the internal substantive Applicable Laws of the Navajo Nation. Owner and Contractor hereby irrevocably submit to the process, jurisdiction and venue of the Navajo Nation Tribal Court ("**Tribal Court**") or engage in the settlement of agreements of disputes through arbitration pursuant to 1 N.N.C. §554(j). Navajo Nation laws shall be applied to any legal disputes arising under the Contract Documents. In the absence of any Applicable Laws of the Navajo Nation, the Contract Documents shall be construed first in accordance with any federal Applicable Laws, and in the absence thereof, the Applicable Laws of the State in which the Project is located; provided that reference to and use of Applicable Laws of such State does not confer any jurisdiction to such State for purposes of any dispute arising out of or relating to the Contract Documents. Without limiting the generality of the foregoing, Owner and Contractor hereby waive and agree not to assert by way of motion, defense or otherwise in any such dispute any assertion that either party is not subject to the personal jurisdiction of the Tribal Court or Navajo Nation Arbitration Act, or that such dispute is brought in an inconvenient forum or that the venue therefore is improper.

10.2 Nothing in this agreement shall be interpreted as constituting a waiver, express or implied, of the sovereign immunity of the Navajo Nation. Furthermore, Owner hereby expressly reserves its exemption from levy or execution of judgments as set forth in 6 N.N.C § 623 and Navajo Nation laws.

ARTICLE 11 **MISCELLANEOUS**

11.1 **CHANGE ORDERS**

If, pursuant to the process set forth in Article 14 of the General Conditions, Owner determines a Change Order should be entered into, Owner and Contractor shall execute (a "**Change Order**") in the form attached hereto as Exhibit "J".

11.2 **PROJECT REPRESENTATIVES**

All decisions made by Owner's Representative and Contractor's Representative shall be binding on the respective represented party. Owner has the right, exercisable at any time, from time-to-time, to appoint a replacement Owner's Representative by providing notice thereof to Contractor. Contractor may terminate Contractor's Representative and appoint a replacement Contractor's Representative only after obtaining Owner's written approval.

11.3 **PERFORMANCE**

Contractor represents and warrants to Owner that: (a) Contractor will perform all of its obligations under the Contract Documents in accordance with the Standard of Care; and (b) all Work performed and materials and equipment supplied under this Agreement will be: (1) in strict and absolute accordance with the Contract Documents; (2) new and free from defects; (3) of good merchantable quality; and (4) fit for Owner's intended use. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective by Owner. If required by Owner, Contractor shall promptly furnish satisfactory Samples of materials demonstrating that the materials comply with this Section. Neither the express warranty of this Section nor any other express warranty shall void implied warranties of habitability, merchantability, or fitness for a particular purpose.

11.4 **CONTRACTOR REPRESENTATIONS AND WARRANTIES**

Contractor represents and warrants to Owner as follows:

- (a) Contractor's execution of this Agreement and its performance under the Contract Documents is within its duly authorized powers;
- (b) Contractor is financially solvent, able to pay its debts as they mature and progress of sufficient working capital to complete the Work and otherwise perform its obligations under the Contract Documents;
- (c) Contractor is able and has the requisite experience and competence to complete the Work and perform all of its obligations under the Contract Documents;

(d) Contractor has carefully reviewed the Contract Documents and the information furnished by Owner, has taken field measurements, as necessary, and has verified field conditions, comparing any such field measurements and conditions and other information known to Contractor with the Contract Documents, and has reported to Owner, prior to submitting Contractor's bid proposal, any error(s), conflict(s), inconsistency(ies), or omission(s) in the Contract Documents discovered during such review and verification.

(e) Contractor is authorized to do business in the jurisdiction in which the Project is located and shall at all times hold, and shall cause or ensure all persons or entities working under and through Contractor at all times hold, appropriate registrations and licenses required by Applicable Laws, including licenses from the licensing agency of the jurisdiction in which the Project is located;

(f) Contractor's employees have received or will receive all training and instruction necessary to perform the Work in conformance with the Contract Documents;

(g) the execution and delivery of the Contract Documents and performance of the Work will not result in any violation of, or default under, any term or provision of any other agreement, judgment or similar instrument to which Contractor is bound;

(h) there are no attachments, execution proceedings, assignments for the benefit of creditors, insolvency issues, bankruptcy reorganization or other similar proceedings pending or, to the best of Contractor's knowledge, threatened against Contractor, nor are any such proceedings contemplated by Contractor;

(i) there is no complaint, litigation, investigation or proceeding pending as of the date of Contractor's bid proposal or, to the knowledge of Contractor, contemplated or threatened against Contractor as of the date of this Agreement that would prevent Contractor from performing its obligations under the Contract Documents or any other instrument or document contemplated thereby or related thereto;

(j) Contractor is not a partner or joint venture with Owner in connection with the Work, and Contractor is entering into this Agreement and agreeing to comply with and perform the Work in accordance with the Contract Documents voluntarily and solely for Contractor's own profit and benefit;

(k) Contractor is not, nor will Contractor engage a Subcontractor of any tier to perform Work hereunder who is, an "Excluded Party" listed on the Excluded Parties List System maintained by the U.S. General Services Administration or otherwise prohibited from being involved in a covered transaction pursuant to 24 C.F.R. Part 24; and

(l) if, at any time during the course of the Work, Contractor, or any representative of Contractor, learns of any facts or circumstances that would render any of the foregoing representations and warranties untrue, then Contractor shall promptly notify Owner of all such facts or circumstances.

11.5 INTENDED BENEFICIARY; OWNER RIGHT TO ASSUME

Owner is an intended third-party beneficiary of any subcontracts or purchase orders between Contractor and Subcontractors or material suppliers, without liability for benefits received, and an obligee of all express and implied warranties given by any Subcontractor or material supplier under such subcontracts or purchase orders or imposed by Applicable Laws. Owner shall be entitled to enforce such subcontracts or purchase orders directly against such Subcontractors or material suppliers in the event Owner has been damaged by any breach thereof. Any such subcontracts or purchase orders are contingently assigned to and assumable by Owner, at Owner's option.

11.6 FURTHER ACTS

Each party shall execute and deliver all documents and perform all other acts reasonably necessary from time-to-time to carry out the matters contemplated herein.

11.7 ASSIGNMENT

Contractor shall not assign, convey or transfer any interest in any of this Agreement without the prior written consent of Owner, which consent may be arbitrarily withheld, conditioned or delayed. In the event Owner consents to an assignment,

Contractor's assignee shall assume in writing all obligations of Contractor hereunder, and Contractor shall continue to be liable for such obligations. Owner shall have the right, without limitation, to assign this Agreement, in whole or in part, to any party. This Section 11.7 notwithstanding, this Agreement shall inure to the benefit of and be binding upon Owner, Contractor and their respective successor(s) and assignee(s) in the event of any permitted assignment.

11.8 NOTICES AND COMMUNICATIONS

11.8.1 Any and all notices, approvals, consents or other communications required or permitted hereunder shall be given in writing and shall be delivered via: (a) facsimile (electronically confirmed by recipient); (b) personal delivery; (c) registered or certified mail, return receipt requested, postage prepaid; or (d) Federal Express, Airborne, United Parcel Service or other similar nationally recognized overnight courier; and, in each case, addressed to the applicable Project representative and, in all events, to Contractor and Owner at the addresses and/or facsimile numbers set forth on Page 1 of this Agreement. Any party may designate in writing and deliver in a like manner any changes in address at least ten (10) days before the change becomes effective.

11.8.2 Notices, approvals and other communications provided for herein shall be deemed received upon (a) electronic confirmation of receipt, if by facsimile; (b) the date of delivery to the addressee, if via personal delivery or overnight courier; or (c) three (3) days after the date of deposit in the U.S. Mail, if mailed. Notwithstanding the foregoing, any notice received after 5:00 p.m. (local time where the notice is received) shall be deemed received on the immediately following business day.

11.9 SURVIVAL

All indemnities, warranties, representations and other obligations of Contractor hereunder shall survive completion of the Work and/or termination of this Agreement.

11.10 EXHIBITS AND GENERAL CONDITIONS

The attached exhibits, including the General Conditions, are, by this reference, hereby incorporated herein and made a part hereof as though fully re-stated herein.

11.11 INDEPENDENT CONTRACTOR

Contractor's relationship to Owner is in all respects that of an independent contractor. Contractor shall be solely responsible for the supervision, performance, coordination and control of the Work to be performed by Contractor. Contractor shall not be deemed an employee, agent or member of Owner for any purpose. Neither party shall have the right or power to bind or obligate the other party for any liabilities or obligations without the prior written consent of the other party.

11.12 COMPUTATION OF PERIODS

All time periods referred to in this Agreement shall include all Saturdays, Sundays and holidays, unless the period of time specifies business days. If the date to perform any act, excluding the date on which payment is due, or give a notice with respect to this Agreement shall fall on a Saturday, Sunday or a holiday observed by the State in which the Project is located or the Navajo Nation, the act or notice may be timely performed on the next succeeding day that is not a Saturday, Sunday or a holiday observed by the State in which the Project is located or the Navajo Nation.

11.13 RELATIONSHIPS

The Contract Documents shall not be construed to create a contractual relationship of any kind between any person(s) or entity(ies) other than Owner and Contractor.

11.14 TERMS USED

Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

11.15 CAPTIONS

Any captions to or headings of the paragraphs or subparagraphs of this Agreement are solely for the convenience of the parties, are not a part of this Agreement, and shall not be used for the interpretation or determination of the validity of this Agreement or any provision hereof.

11.16 WAIVER

The waiver or failure to enforce any provision of this Agreement shall not operate as a waiver of any future breach of the provision or any other provision hereof.

11.17 COUNTERPARTS

This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. The signature pages from one or more counterparts may be removed from the counterparts and attached to a single instrument so that the signatures of all parties may be physically attached to a single document.

11.18 CONSTRUCTION

Each party has reviewed the Contract Documents to its satisfaction and agrees that any rule of construction to the effect that ambiguities are to be resolved against the drafting party shall not apply in the interpretation of this Agreement or exhibits hereto.

11.19 NO OTHER AGREEMENT

This Agreement constitutes the entire agreement between Owner and Contractor with respect to the Project and shall not be modified or amended except in a written document signed by Owner and Contractor. Any prior agreements or understandings between Owner and Contractor concerning the Project are superseded and replaced by this Agreement and are hereby rendered null and void.

11.20 SEVERABILITY

The provisions of this Agreement are severable and if any provision is determined to be void or unenforceable under any dispute resolution proceeding, such provision shall not affect the validity of any of the other provisions of this Agreement.

11.21 RISK OF LOSS

Risk of loss shall be with Contractor until materials or equipment have been incorporated in the Site.

IN WITNESS WHEREOF, Owner and Contractor have executed this Agreement as of the day and year set forth above.

OWNER:

NAVAJO HOUSING AUTHORITY

By: _____

Name: Heather L. Duncan-Etsitty

Its: Chief Executive Officer

Date: _____

CONTRACTOR:

By: _____

Name: _____

Its: President

Date: _____

Exhibit "A"

SAMPLE

End of document.



Exhibit "B"

**GENERAL CONDITIONS
of the
CONSTRUCTION AGREEMENT
BETWEEN
OWNER AND CONTRACTOR**

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ARTICLE 1
DEFINITIONS

As used in these General Conditions and the other Contract Documents, the words, terms and phrases set forth below shall have the following meanings.

"**Agreement**" means the Construction Agreement between Subrecipient and General Contractor to which these General Conditions are attached.

"**Applicable Law(s)**" means the requirements of all laws, ordinances, codes, rules, regulations, executive orders, judicial opinions, and decisions of all governmental authorities having jurisdiction over the Project, the Site, the Work, or any part thereof, including, but not limited to, the Navajo Nation, federal, state, county and local authorities. Applicable Laws include, but are not limited to, as applicable, those relating to HUD, taxes, employment (including the Navajo Nation Business Activity Tax, 24 N.N.C. § 401, et seq.), social security, unemployment, workers' compensation, wages (including the Navajo Preference in Employment Act, 15 N.N.C. § 601, et seq.), occupational health and safety, discrimination, disability, waters of the United States, land use, waste disposal, air, water, endangered species, groundwater, environmental contamination, toxic wastes, hazardous substances, oil, petrochemicals, pesticides, herbicides, building and construction codes and standards, and contracting licensing statutes and regulations. All references herein and in the Agreement to any Applicable Law, including, but not limited to, the Applicable Laws set forth in Article 17 of these General Conditions, are hereby amended to mean the most recent amendment or codification of the corresponding Applicable Law described herein. If, and to the extent, the citation of any Applicable Law set forth herein has been amended or superseded as of the date of the Agreement, Contractor hereby acknowledges and agrees any such citation is hereby deemed amended to mean the current citation for any such Applicable Law effective as of the date of the Agreement.

"**Application for Payment**" means the document described in Section 11.03 of the Agreement.

The term "**approved**" with respect to any item submitted by Contractor means that such item appears satisfactory; provided, however, that no such approval expresses or implies acceptance by Owner of the submittal as being in compliance with the Contract Documents nor is Contractor thereby relieved of its obligation therefore.

The phrase "**approved as noted**" means that with respect to any item submitted by Contractor, that item is approved by Owner, subject to satisfaction of any requirements noted in such approval.

"**Approving Authority(ies)**" has the meaning provided in Section 11.07.01 below.

"**Change Order(s)**" means a written instrument issued after execution of the Agreement that is signed by Owner and Contractor and authorizes (a) a change in the Work and/or (b) an adjustment in the Contract Sum and/or the Contract Time.

"**Claim(s)**" means any third party dispute, demand, liability, damage (whether direct or consequential), expense, penalty, fine, settlement, judgment, and any other loss.

"**Confidential Information**" means any and all information (and any and all documents or other media or materials containing information) that is: (a) not publicly available and that pertains to Owner or the Project, whether or not such information is expressly labeled or described as confidential; (b) expressly labeled or described as confidential; and/or (c) generated by Contractor pursuant to the Agreement, including without limitation, all reports, maps, surveys, drawings, computations, etchings, sketches, tracings, drafts and all other original documents.

"**Construction Administrator**" has the meaning provided in Section 4.04 below.

"**Contract Documents**" has the meaning provided in Article 1 of the Agreement.

"**Contract Sum**" has the meaning provided in Article 3 of the Agreement.

"**Contract Time(s)**" means the period of time allotted in the Contract Documents for Substantial Completion of the Work, the additional period of time allotted for Final Completion of the Work, and the time within which Contractor must complete any applicable milestone tasks as specified on the Project Schedule.

"**Contractor**" means the person or entity designated as such in the Agreement, or any successor of such person or entity approved by Owner in writing.

"**Contractor's Representative**" means the person or entity designated as such in the Agreement, or any successor of such person or entity approved by Owner in writing.

"**Day**" means calendar day unless otherwise specified.

"**Design Professional**" means n/a. is the person or entity responsible for the design component of the Project, or applicable portion thereof.

"**Final Completion**" has the meaning provided in Section 11.07.03 below.

"**Funding Source**" has the meaning provided in Article 8 of the Agreement.

"**General Conditions**" means these general conditions, which are attached as Exhibit "B" to the Agreement.

"**Hazardous Materials**" has the meaning provided in Section 6.07.08 below.

The words "**include**," "**includes**," "**including**" and any other derivation of "include" means "including, but not limited to" unless specifically set forth to the contrary.

"**Indemnified Parties**" means Owner; the Funding Source; their affiliated entities, parents, subsidiaries, partnerships, joint ventures, limited liability companies, members, trusts, and assigns, of every tier; their respective directors, officers, partners, agents, employees, volunteers, members, managers, trustees, and shareholders; and any successors or assigns of any of the foregoing.

"**Liquidated Damages Amount**" has the meaning provided in Section 6.5 of the Agreement.

"**Modifications**" means any of (a) a written amendment to the Agreement signed by Owner and Contractor, (b) a Change Order, or (c) a written order for a minor change in the Work issued by Owner pursuant to Section 14.02 below.

"**Non-conforming Work**" has the meaning provided in Section 11.07.02 below.

"**OSHA**" has the meaning given in Section 6.07.07 below.

"**Overtime**" means any premium labor time within a week in excess of a work week and is subject to the provisions of Section 6.08 below.

"**Owner**" means the person or entity designated as such in the Agreement, or any successor of such person or entity.

"**Owner's Representative**" means the person or entity designated as such in the Agreement or any successor appointed by Owner in writing.

"**Plans**," "**Specifications**" and "**Plans and Specifications**" means all plans and specifications for performance of any part of the Work, including (a) the plans and specifications described in Article 3 of the Agreement; (b) Shop Drawings to be prepared by Contractor or any Subcontractor in connection with the Work and approved in writing by Owner; (c) all addenda and Modifications to any of the foregoing; and (d) any Product Data or Samples.

"**Product Data**" means the illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by Contractor to illustrate a material, product or system for some portion of the Work.

"**Project**" means the project designated as such in the Agreement's recitals.

"**Project Manager**" has the meaning provided in Section 6.04.01 below.

"**Project Schedule**" means the schedule attached as Exhibit "G" to the Agreement and defined in Section 6.4 of the Agreement.

"**Punch List**" means the list containing the Punch List Items.

"**Punch List Items**" means, and shall be limited to, incomplete and incidental items of the Work that (a) do not materially interfere with the use and occupancy of the Project for its intended purpose, and (b) as a group are capable of being completed by Contractor within thirty (30) days of issuance of any Punch List.

"**Retainage**" has the meaning provided in Section 5.4(c) of the Agreement.

"**Samples**" means physical examples that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.

"**Schedule of Values**" has the meaning provided in Section 11.01 below.

"**Shop Drawings**" means the drawings, diagrams, schedules, and other data specially prepared for the Work by Contractor or any Subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

"**Site**" means the place where the Project is located.

"**Standard of Care**" means that degree of professional diligence and care ordinarily exercised by experienced and fully competent contractors having at least fifteen (15) years of experience constructing first-class projects that are similarly situated in scope and complexity to the construction component of the Project.

"**Stop Order**" has the meaning provided in Section 16.01 below.

"**Subcontractor(s)**" means any person or entity (other than an employee of Contractor or a Subcontractor) that contracts, directly or indirectly, with Contractor or a Subcontractor to furnish any of the Work.

"**Substantial Completion**" means the completion of all Work except Punch List Items.

"**Substantial Completion Date**" has the meaning provided in Section 6.2 of the Agreement.

"**Superintendent**" has the meaning provided in Section 6.04.02 below.

"**Week**" means a calendar week consisting of seven (7) days commencing at 12:01 A.M. each Monday and continuing up to and including midnight on the following Sunday.

"**Work**" means all labor, materials, tools, utilities, equipment, supervision, procurement, delivery, construction, installation, programming, training, start-up (including calibration, inspection and start-up operation), check-out, demonstration, testing, and other services necessary to properly construct the Project in accordance with the Contract Documents, including as set forth in, contemplated by or reasonably inferable from the Plans and Specifications, including as set forth in Article 2 of the Agreement.

"**Work week**" means 40 hours of labor time within a week.

ARTICLE 2

CORRELATION AND INTENT

2.01 The Contract Documents are intended to include all items necessary for the proper execution and completion of the Work; however, the enumeration of any portion of the Work shall not be construed to exclude other items contemplated by or reasonably inferable therefrom. The Contract Documents are complementary, and what is required by any one Contract Document shall be as binding as though required by all. In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and Applicable Laws, Contractor shall (a) provide the better quality or greater quantity of Work; (b) comply with the more stringent requirement; and/or (c) provide the most stringent

degree of obligation and liability to Owner. All of the foregoing shall be in accordance with Owner's interpretation.

2.02 The omission from the Plans and Specifications of items of construction, installation, or material that are reasonably inferable therefrom, or the failure to describe items required by sound construction practice, shall not relieve Contractor from furnishing such items in place, complete, and in a manner consistent with the Standard of Care; nor shall any such omission entitle Contractor to claim an adjustment to the Contract Sum or the Contract Time.

2.03 Figured dimensions and marked data shall take precedence over scaled measurements. In the event of any inconsistency between large scale Plans and small scale Plans, the large scale Plans shall govern. The foregoing shall not relieve Contractor of Contractor's responsibility to advise Design Professional and Owner of any inconsistency in any of the foregoing that a contractor exercising the Standard of Care should reasonably be expected to discover upon an appropriate review of the Plans and Specifications as necessary to properly perform the Work.

2.04 Specifications: Format and Interpretation

- (a) Where "**as shown**," "**as indicated**," "**as detailed**" or other such words are used in any of the Contract Documents, reference is made to the Plans and Specifications unless otherwise stated. Where "**as directed**," "**as required**," "**as permitted**," "**as prescribed**," "**reviewed**," "**as authorized**," "**as approved**," "**as accepted**," "**as selected**," or words of like import are used, direction, requirement, permission, prescription, review, authorization, approval, acceptance or selection by Owner is intended unless provided otherwise.
- (b) The term "**provide**" as used in any of the Contract Documents shall mean "**provide completed in place**," that is, furnished, installed, completed, tested and ready for operation or use.
- (c) The terms "**knowledge**," "**recognize**," and "**discover**," their respective derivatives, and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize), and discovers (or should discover) in exercising the Standard of Care required by the Contract Documents. Analogously, the expression "**reasonably inferable**" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a contractor exercising the Standard of Care.
- (d) Words in the singular shall include the plural whenever applicable, or if indicated by the surrounding context.
- (e) As the context so requires or indicates, gender specific terms shall be inclusive of masculine, feminine and neuter usage.

2.05 If the Specifications refer to specific products of one or more manufacturers, such references are for the purpose of designating the quality of materials and equipment to be furnished and are not intended to restrict competitive bidding unless specifically noted, "No Substitute"; provided, however, that Contractor shall not use or permit the use of a product manufactured other than one of those named without prior written approval of Owner.

2.06 If typical parts or sections of the Work are completely detailed on the Plans, and other parts or sections of the Work that are essentially of the same construction are shown in outline only, the complete details shall apply to the Work that is shown in outline.

ARTICLE 3
OWNERSHIP AND USE OF DOCUMENTS

3.01 As between the parties to the Agreement, Owner shall have title to all Plans and Specifications and other Contract Documents and unlimited rights with respect to any use thereof.

3.02 As to all persons other than Owner, the Plans and Specifications and other Contract Documents are instruments of service of the Owner. Contractor may retain one record set of such instruments of service. Neither Contractor nor any Subcontractor of any tier shall own or claim a copyright in such instruments of service, and, unless otherwise indicated,

Owner shall be deemed the author of them or the author's assignee, and will retain all common law, statutory and other reserved rights in addition to the copyright. All copies of such instruments of service, except Contractor's record set, shall be returned or suitably accounted for to Owner, upon request, upon Final Completion.

3.03 The Plans and Specifications and other Contract Documents furnished to Contractor are for use solely with respect to the Project and shall not be used by Contractor or any Subcontractor of any tier on other projects or for additions to this Project outside the scope of Work without the prior written consent of Owner. Contractor and all Subcontractors of any tier are granted a limited license to use and reproduce applicable portions of the Plans and Specifications and other Contract Documents appropriate to, and for use in, the execution of the Work. All copies made under such license shall bear the statutory copyright notice, if any, shown on the Plans and Specifications and other Contract Documents.

3.04 Contractor shall have obtained and familiarized itself with any design specifications or requirements of the Navajo Nation, federal, state and local agencies having any jurisdiction over the Work or Project before the Work commences to ensure compliance of such specifications or requirements (as applicable) with Applicable Law(s).

ARTICLE 4

DESIGN PROFESSIONAL; CONSTRUCTION ADMINISTRATOR

4.01 Owner reserves the right to delegate job administrative functions with respect to the Work to Design Professional. The Contract Documents shall not be construed to create a contractual relationship of any kind between Design Professional and Contractor.

4.02 Design Professional will provide services during the Project, including construction administration services, as provided for under that certain Design Professional Agreement dated _____, 2020 between Design Professional and Owner. A copy of such agreement shall be provided by Owner to Contractor and Contractor shall familiarize itself and comply with Design Professional's role described therein in the administration of the construction of the Project.

4.03 Design Professional may visit the Site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents.

4.04 Owner may also, from time-to-time, engage a construction administrator ("**Construction Administrator**") to assist Owner in (a) administering Contractor's performance of duties under the Agreement, (b) overseeing the Project, and (c) coordinating certain of Contractor's duties under the Agreement, as specified by Owner. Owner has the right to change Construction Administrator, in Owner's sole discretion, effective upon written notice delivered to Contractor. Any Construction Administrator engaged by Owner will have the duties and authority as specified by Owner from time-to-time. Such duties may include, but are not limited to, requiring that Contractor submit to Construction Administrator Applications for Payment along with corresponding documentation, all as specified in the Contract Documents and by Owner. Contractor agrees to cooperate with any Construction Administrator appointed by Owner in accordance with written directives issued by Owner, which may be delivered to Contractor from time-to-time.

4.05 Contractor shall provide Owner, Owner's Representative, the Funding Source, Design Professional, Construction Administrator and Owner's invitees with proper and safe access to the Work at all reasonable times during the preparation and progress of the Work.

4.06 Contractor shall not directly communicate with Design Professional without obtaining Owner's prior written approval.

ARTICLE 5

OWNER

5.01 INFORMATION AND SERVICES REQUIRED OF OWNER

5.01.01 To the extent required by Contractor to perform the Work and as agreed to by Owner, Owner shall furnish surveys describing the physical characteristics, legal limitations and utility locations for the Site, as well as a legal description thereof, each to the extent available. All other grades, lines, levels, benchmarks, courses and distances shall be established

and maintained by Contractor. All levels given on the Plans shall be carefully checked by Contractor with existing levels.

5.01.02 Owner shall obtain all easements required for the Work. Unless otherwise provided in the Agreement, all other permits and fees (including inspection fees) relating to the Work shall be obtained, and paid for, by Contractor as part of the Contract Sum, provided Owner and Design Professional fulfilled their respective obligations and have received approval from governmental authorities having jurisdiction over the Work or the Project.

5.01.03 Owner shall furnish to Contractor all information or services under Owner's control with reasonable promptness to avoid unreasonable delay in the orderly progress of the Work.

5.01.04 Owner will issue all instructions to Contractor through Design Professional or Owner's Representative; however, Owner reserves the right to direct and/or instruct Contractor and Design Professional simultaneously to effect changes in the Work.

5.01.05 Unless otherwise provided in the Contract Documents, Contractor will be furnished with, free of charge, one set of prints and one set of reproducible mylars of all drawings comprising the Plans and Specifications and one set of the Specifications. Additional copies of any part of such sets shall be made available to Contractor at Contractor's cost and expense.

5.01.06 Requests by Contractor for supplemental information shall be directed to Owner's Representative in writing.

5.02 OWNER'S RIGHT TO PERFORM CERTAIN WORK

5.02.01 If Contractor fails to carry out the Work in accordance with the Contract Documents, Owner may demand in writing that Contractor correct such failure with diligence and promptness. If Contractor does not correct such failure within seven (7) days of receiving Owner's demand, Owner may, without prejudice to any other remedy Owner may have, remedy such failure. In such event, an appropriate Change Order shall be issued deducting from the payments then or thereafter due Contractor the cost of remedying such failure, including costs related to any additional services of Design Professional made necessary by such failure. If payments then or thereafter due Contractor are not sufficient to cover such amounts, Contractor shall pay the difference to Owner on demand.

5.02.02 The rights described in this Section 5.02 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of Owner granted in the Contract Documents or under Applicable Laws or at law or in equity.

5.03 OWNER'S REPRESENTATIVE

Owner's Representative shall have full authority to receive and transmit communications on behalf of Owner. Owner's Representative shall have authority to bind Owner only as is defined in writing by Owner to Contractor.

ARTICLE 6 **CONTRACTOR**

6.01 STANDARD OF CARE

All Work, responsibilities and obligations performed under the Agreement by Contractor and each Subcontractor, of any tier, shall be performed in accordance with the Standard of Care. The Standard of Care shall be deemed to apply to, govern, and be the basis from which such performance shall be evaluated by Owner or any party presiding over any dispute resolution proceeding.

6.02 APPLICABLE LAWS

Contractor shall perform all Work in strict compliance with Applicable Laws.

6.03 REVIEW OF CONTRACT DOCUMENTS AND INVESTIGATION OF SITE

6.03.01 Contractor acknowledges that the Contract Documents are sufficient to enable Contractor to commence and complete the Work in accordance with Applicable Laws, and otherwise perform Contractor's obligations hereunder. Contractor shall provide Owner with prompt written notice if any of the Contract Documents, at any time, is insufficient in any way to enable Contractor to complete the Work in accordance with Applicable Laws or otherwise perform Contractor's obligations hereunder. Contractor shall report to Owner any error, inconsistency or omission Contractor may discover in the Contract Documents before Contractor performs any Work affected thereby.

6.03.02 Contractor shall not perform any portion of the Work without Contract Documents or, where required, approved (or approved as noted) Shop Drawings, Product Data or Samples.

6.03.03 Although the Plans and Specifications are understood to contain the dimensions required in the construction of the Work, Contractor shall make such changes as are necessary to make the parts of the Work fit in the best possible manner, but no alterations shall be made without Owner's prior written consent.

6.03.04 The exactness of grades, elevations, dimensions, or locations given on any Plans issued by the Design Professional, or the work installed by other contractors, is not guaranteed by the Design Professional or the Owner.

6.04 CONTRACTOR'S STAFF

6.04.01 Contractor shall appoint a project manager (the "**Project Manager**") for the Work who shall be authorized to act on behalf of Contractor and shall be an individual with whom Owner may consult at all reasonable times. The Project Manager shall have full supervision over the completion of the Work, shall be designated to act as the primary point of contact with Owner regarding all matters relating to the Work, and shall have full authority to bind Contractor. Any changes in the Project Manager shall require Owner's prior written approval.

6.04.02 Contractor shall make available on the Site at all times during the course of the Work a qualified superintendent (the "**Superintendent**") who shall not be replaced without prior written notice to Owner, except under extraordinary circumstances. All communications to the Superintendent shall be as binding as if given to Contractor.

6.05 SUPERVISION AND CONSTRUCTION PROCEDURES

6.05.01 Contractor shall (a) supervise and direct the Work; (b) be solely responsible for all construction means, methods, techniques, sequences, and procedures; and (c) coordinate all portions of the Work, including coordinating its Work with the work of others on the Project.

6.05.02 Contractor accepts sole responsibility with respect to Owner for the acts and omissions of Contractor, Subcontractors and their respective agents and employees.

6.05.03 On a weekly basis, Contractor shall submit in writing to Owner a brief description of the Work, including the location thereof, an accurate manpower count broken down by trade into supervisory personnel and workers, and a listing of all major equipment on the Site.

6.05.04 Contractor shall be responsible for the conduct of all of Contractor's employees and those of the Subcontractors. Contractor shall cause all workers to eat their lunches in areas designated by Owner. Contractor shall provide, and shall ensure that all workers utilize, approved portable sanitary facilities. Contractor will not permit either its employees or those of its Subcontractors to bring or consume alcoholic beverages or narcotics on the Site. Contractor shall not permit construction workers to smoke on the Site except in areas designated therefore by Owner, if any. Contractor shall, and ensure that any Subcontractors shall, comply with any other requirements of Owner governing the Work or the Project that may be specified by Owner from time to time.

6.05.05 Contractor shall be solely responsible for the safety of the Work and all persons and property potentially impacted by the Work whether or not such safety is under the control of Contractor.

6.06 CONTRACTOR'S CONSTRUCTION SCHEDULE

6.06.01 Within five (5) days of the execution date of the Agreement, Contractor shall prepare and submit for Owner's review and approval a detailed critical path schedule for performing the Work. Such schedule, upon approval

by Owner, shall be the Project Schedule from which Contractor's performance of the Work shall be measured. The Project Schedule shall be in a level of detail acceptable to Owner and shall indicate the dates for the commencement and completion of the various stages of the Work, including the dates when Owner information, approvals and Owner-furnished deliverables are required. The Project Schedule shall also include milestones for (a) a kickoff and concept review meeting, if required by Owner; (b) Site surveys and review meetings; (c) equipment and material delivery and installation; (d) downtimes for any aspect of Owner's operations; (e) training schedules; (f) start-up, check-out and performance testing; and (g) such other milestone tasks identified by Owner.

6.06.02 Owner's approval of the Project Schedule shall not relieve Contractor of its complete and exclusive control and responsibility over the construction means, methods, techniques, sequences, and procedures for executing the Work.

6.06.03 The Project Schedule shall be updated weekly by Contractor to reflect the conditions and progress of the Work, but such revisions shall not relieve Contractor of its obligations to complete the Work required under the Agreement within the Contract Time(s), as such date(s) may be adjusted in accordance with the Contract Documents. Contractor shall provide all Project Schedule updates to Owner to keep Owner advised of progress and significant changes. If Contractor fails to submit the required Project Schedule updates, Owner may withhold approval of all or part of Contractor's Applications for Payment until such time as Contractor furnishes acceptable updates.

6.06.04 If the Work falls behind the Project Schedule for any reason, Owner shall have the right to direct Contractor to take such steps as may be necessary to improve progress, including but not limited to increasing manpower, adding additional shifts of workers, and using additional days and overtime. Contractor shall be responsible for all costs associated with this recovery effort, without adjustment to the Contract Sum or Contract Time, unless the cause of the delay is excusable under Section 10.02.01 hereof, in which case Contractor may seek relief for such costs in accordance with Article 14 hereof.

6.06.05 If Owner performs other work on the Project with separate contractors under Owner's control, Contractor agrees to include the activities of such contractors in the Project Schedule. Contractor shall reasonably cooperate with Owner's separate contractors and coordinate its activities with those of such separate contractors so that the Project can be completed in an orderly and coordinated manner without unreasonable disruption.

6.07 LABOR AND MATERIALS

6.07.01 Except to the extent otherwise provided in the Contract Documents, Contractor shall provide and pay for, as part of the Contract Sum, all labor, materials, equipment, tools, temporary structures, construction equipment and machinery, water, heat, lighting, utilities, transportation, sanitary facilities, and other facilities and services necessary for the proper execution and timely completion of the Work, whether temporary or permanent.

6.07.02 Contractor shall (a) at all times enforce strict discipline and good order among Contractor's employees and shall not employ in the performance of the Work any unfit or unskilled person; (b) store Contractor's materials, equipment, tools, supplies and the operations of its workmen and Subcontractors within areas designated by Owner from time-to-time; (c) not unnecessarily burden the Work area; and (d) correct, at Contractor's expense, damage to property resulting from the Work.

6.07.03 Contractor shall (a) protect the Work from weather, theft and vandalism and (b) properly store and protect materials, equipment, tools and supplies delivered to the Site.

6.07.04 Manufacturers' printed instructions covering details of installation shall be followed if not in conflict with the Specifications. If there is a conflict between such instructions and the Specifications, Contractor shall notify the Owner at once and obtain the Owner's approval or instructions before proceeding.

6.07.05 Completed Work shall be left plumb, level, true to line or plane, anchored securely in place, and free from damage. All Work shall be constructed according to the Standard of Care.

6.07.06 With respect to all excess materials, Contractor shall first attempt to return all such materials for credit to Owner's account to the extent such returns are available, and then, recycle such materials (with any credits or payments received therefore being for Owner's account), before disposing of such materials in accordance with

Section 6.07.09.

6.07.07 Contractor shall comply with, and cooperate with Owner and other contractors and Subcontractors in connection with their compliance with, the regulations of the Occupational Safety and Health Act of 1970, as amended ("**OSHA**"), or any similar applicable state law.

6.07.08 Contractor shall not use, in connection with the Work, any hazardous waste, toxic substance or related materials ("**Hazardous Materials**") in such manner as would (a) violate any Applicable Laws; (b) cause any damage or a risk of any damage to the environment; or (c) leave any residue that could be hazardous to persons or property or cause liability to Owner. The term "Hazardous Materials" shall include substances defined as "hazardous substances" or "toxic substances" in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. Sec. 9061, *et seq.*; Hazardous Materials Transportation Act, 49 U.S.C. Sec. 1802; the Resource Conservation and Recovery Act, 42 U.S.C. Sec. 6901, *et seq.*; asbestos containing material; and PCBs. The foregoing shall not be deemed to prohibit Contractor from using in the Work any item specified by name in the Plans and Specifications. Contractor shall provide Owner with prompt written notice of the existence of any Hazardous Materials located on the Site upon Contractor's becoming aware of the existence of such Hazardous Materials and, in any event, prior to disturbing such Hazardous Materials.

6.07.09 Contractor shall cause all waste produced at the Site to be properly disposed of off the Site in accordance with all Applicable Laws. Contractor shall not permit any such waste to enter or be disposed in any drainage or sewer system connecting with or constituting a portion of the Project.

6.08 OVERTIME

6.08.01 The Contract Sum is based on the Project Schedule. Except as expressly provided for in the Contract Documents, Contractor shall not be entitled to any increase in the Contract Sum for overtime required to complete the Work in accordance with the Project Schedule.

6.08.02 If Owner requests that Contractor work overtime, Contractor shall comply with the following requirements:

- (a) Contractor shall prepare and submit in triplicate to Owner on a daily basis, a statement of employees by name, trade, classification, hourly rate, and premium or overtime charges worked to substantiate premium or overtime charges, in such detail to demonstrate to Owner the accuracy of the statement, and
- (b) Owner will pay for authorized overtime work only in amounts actually paid for by Contractor for actual overtime premium wages, actual contributions paid to federal and state unemployment tax and federal insurance contributions tax. No overhead or profit shall be included in actual overtime premium wages except in those instances in which Owner requests an acceleration of the Project Schedule in writing.

6.09 TAXES

Included within the Contract Sum are all sales, transaction privilege, consumer, use, personal property and other similar taxes applicable to the Work or any portion thereof, including taxes payable under the Navajo Nation Business Activity Tax (24 N.N.C. Sec. 401 *et seq.*)

6.10 PERMITS, FEES AND NOTICES

6.10.01 Except as specifically identified in the Contract Documents as being the responsibility of Owner, Contractor shall obtain and pay for, as part of the Contract Sum, all necessary permits, approvals, licenses, government charges and inspection fees required for the prosecution of the Work by any government or quasi-government entity having jurisdiction over the Project. Contractor shall provide reasonable assistance to Owner in obtaining those permits, approvals and licenses that are Owner's responsibility under the Contract Documents.

6.10.02 Prior to the execution of any Work, Contractor shall provide evidence of current licensure of Contractor and Subcontractors, as applicable, conforming to all codes and requirements of the contractor licensing statutes and regulations of the jurisdiction in which the Project is located.

6.10.03 Contractor shall give all notices and comply with all Applicable Laws bearing on the performance of the Work, and, with the requirements and standards established by technical societies, institutions or associations that have established requirements and standards relating to portions of the Work.

6.11 DOCUMENTS AND SAMPLES AT THE SITE

6.11.01 Contractor shall maintain at the Site for Owner one record copy of all current and up-to-date Plans, Specifications, addenda, Change Orders and other Modifications, in good order and marked to reflect all changes made during construction, and approved Shop Drawings, Product Data and Samples. Contractor shall submit to Owner two (2) complete sets (one to be reproducible in a format approved by Owner) and an electronic file in Auto CADD 2005 format or such other updated version approved by Owner, including descriptions, drawings, sketches, marked prints, and similar data indicating the Work in its "as-built" condition. Contractor shall keep "as-built" record drawings up to date concurrently as the Work progresses. Contractor shall submit such drawings to Owner with its final Application for Payment, which submittal shall be a condition precedent to Owner's obligation to make final payment.

6.11.02 No review or receipt of any of the information described in Section 6.11.01 by Owner shall be deemed a waiver or approval of any deviation of any of the same from the Contract Documents, including the Shop Drawings, or in any way relieve Contractor from Contractor's responsibility to perform the Work in accordance with the Contract Documents.

6.11.03 Contractor shall furnish to Owner four (4) complete sets of manuals containing the manufacturers' instructions for maintenance and operation of each item of equipment furnished under the Contract Documents and any additional data specifically requested under the various sections of the Specifications. The manuals shall be arranged in proper order, indexed and suitably bound.

6.12 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

6.12.01 The purpose of the Shop Drawings, Product Data, Samples and similar submittals is to demonstrate Contractor's conformance to the information provided and the design concept expressed in the Contract Documents.

6.12.02 Contractor shall procure, review, and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of Owner or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents. Contractor shall promptly prepare and deliver to Owner a complete and detailed schedule specifying all submittals that are required or anticipated to be delivered by Contractor hereunder, which schedule shall permit Owner and Owner's other consultants ten (10) business days to review any such submittals.

6.12.03 Owner's approval of Shop Drawings, Product Data or Samples, pursuant to the Contract Documents or otherwise, shall not relieve Contractor from responsibility for (a) errors or omissions therein or (b) any deviation from the requirements of the Contract Documents unless Contractor has specifically informed Owner of such deviation in writing and Owner agrees, in writing, to such deviation.

6.12.04 Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by Owner on previous submittals.

6.12.05 Contractor shall perform no portion of the Work requiring submission of a Shop Drawing, Product Data, Samples or similar submittals if the respective submittal has been rejected by Owner. Performance of such portion of the Work, to the extent the same shall not be in accordance with subsequently approved submittals, shall be at Contractor's sole risk, shall be deemed defective Work, and shall be corrected by Contractor pursuant to Section 15.02 below.

6.12.06 Contractor warrants that all Plans and Specifications prepared by or for Contractor for any part of the Work shall fully comply with all Applicable Laws; provided, however, that Contractor shall not be responsible for defects or deficiencies in any of the foregoing to the extent such are attributable to the Design Professional or any person or entity other than Contractor or a Subcontractor if such defects or deficiencies should not have been discovered by a contractor exercising the Standard of Care. If Contractor observes or becomes aware that any of the Plans and Specifications or any other part of the Contract Documents do not comply with Applicable Laws in any respect, Contractor

shall promptly notify Owner in writing, and any necessary changes shall be accomplished by appropriate Modification. If Contractor performs any Work knowing, or if Contractor reasonably should have known, it to be contrary to any Applicable Laws, Contractor shall make all changes necessary to comply therewith and shall assume full responsibility and bear all costs attributable to the correction of such Work.

6.12.07 All Shop Drawings, Product Data, Samples and similar submittals with respect to the Work shall become the property of Owner upon Final Completion.

6.13 USE OF SITE

6.13.01 Contractor shall confine the Work to the limits indicated by Applicable Laws, or as may be established by Owner from time to time.

6.13.02 Only materials and equipment that are used directly in the Work shall be brought to and stored on the Site by Contractor. Materials or equipment no longer required for the Work shall be promptly removed from the Site.

6.13.03 All construction related traffic, including truck traffic and deliveries with respect to the Work, shall enter and leave the Site only at Owner approved locations. Contractor shall stage the Work, from time to time, only at such portions of the Site as approved by Owner. Contractor shall, with no increase in the Contract Sum, move Contractor's staging area as and when requested by Owner.

6.14 CUTTING AND PATCHING OF WORK

6.14.01 Contractor shall be responsible for all cutting, fitting, patching, excavating or other alterations required to allow the Work to properly fit together. All cutting, fitting, patching, excavating or other alterations shall be done promptly and all other repairs shall be made as necessary to leave the entire Work in good condition.

6.14.02 Contractor shall not damage or endanger any portion of the Work or the work of Owner or any separate contractor by cutting, fitting, patching, excavating or otherwise altering the Work or such other work. Contractor shall not otherwise alter the work of Owner or any separate contractor except with the written consent of Owner.

6.14.03 If sleeves or hangers are not placed in time, or are improperly placed, Contractor shall be responsible for forming or drilling openings in the Work as required and for any patching or corrective work necessary, subject to the approval thereof by Owner and at no additional charge to Owner.

6.14.04 The cutting and chasing of existing construction for installation of mechanical and electrical Work and for the relocation of existing pipes, ducts, conduit and the like shall be performed by trades licensed to perform such Work.

6.14.05 Structural members shall not be cut or drilled and floors, walks, footings and partitions shall not be cut except with the prior written approval of Owner. Performance of such Work without such approval shall be at Contractor's sole risk and expense.

6.14.06 Penetration of the slab of any floor shall be core drilled in accordance with procedures to be approved by Owner before such Work is performed.

6.15 CLEANING UP

6.15.01 Contractor shall, at all times, keep the Site and, to the extent Contractor is granted access, areas adjacent to the Site and any surrounding areas in a neat and orderly condition and free from accumulation of waste materials or rubbish caused by Contractor's operations. Contractor shall clear all dirt, mud and debris from the streets surrounding the Site and, to the extent Contractor is granted access, areas adjacent to the Site and any surrounding areas so that such streets are broom clean at the end of each day. Contractor shall not, and shall not allow its Subcontractors to, burn any trash at the Site and any surrounding areas or elsewhere in the vicinity of the Site.

6.15.02 Contractor shall, and shall require its Subcontractors to, clean and maintain their respective

portions of the Work as required on a daily basis and as directed by Owner. As to unsalvageable materials disposed of off the Site, Contractor shall ensure such materials are disposed of at an approved landfill in full conformity with Applicable Laws.

6.15.03 If the Site or, to the extent Contractor is granted access, areas adjacent to the Site and any surrounding areas are not properly maintained, Owner may, upon twenty-four (24) hours notice to Contractor (or such shorter period as may be specified in any notice from a governmental authority with respect thereto), perform such maintenance and charge the cost therefore to Contractor.

6.15.04 In order to make the Work fit for occupancy and for its intended purposes upon Substantial Completion, Contractor shall remove all temporary facilities, waste materials and rubbish from and about the Site and, to the extent Contractor is granted access, the areas adjacent to the Site and any surrounding areas, as well as, all supplies, tools, construction equipment, machinery and surplus materials. In addition, at Substantial Completion, Contractor shall perform the following final cleaning:

- (a) Remove temporary protections;
- (b) Remove grease, mastic adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces;
- (c) Wash and shine glazing and mirrors;
- (d) Polish glossy surfaces to a clear shine;
- (e) Ventilating Systems: clean permanent filters and replace disposable filters if units were operated during construction; and clean ducts, blowers and coils if units were operated without filters during construction;
- (f) Broom clean exterior paved surfaces; rake clean the grounds on the Site;
- (g) Sweep up and thoroughly clean all carpeting; and
- (h) Snake all primary sanitary sewer lines that tie into the public sewer system and clean all storm drains.

6.15.05 Contractor shall use only cleaning materials that are in compliance with Applicable Laws and in a manner that will not damage any of the Work or the Site. Any glass or other Work damaged by Contractor or any Subcontractor shall be replaced and all surfaces that have been scratched or marred shall be refinished at no additional cost to Owner. All cleaning materials and methods shall comply with the recommendations of the manufacturer of the surface being cleaned.

6.16 ROYALTIES AND PATENTS

Contractor shall pay all royalties and license fees applicable to the Work and shall not unlawfully use or install any patented component of the Work. If any injunction or legal action seeking to stop the Work occurs, Owner may require Contractor to substitute such other articles of like kind as will make it possible to proceed with and complete the Work, and all costs and expenses occasioned thereby shall be borne by Contractor to the extent resulting from Contractor's failure to comply with the preceding sentence. The review by Owner of any non-specified method of construction, invention, appliance, process, article, device or material of any kind shall be for its adequacy related to the Work only, and shall not be an approval of Contractor's use thereof in violation of any patent or other rights of any third party.

6.17 INDEMNIFICATION

6.17.01 To the fullest extent permitted by Applicable Laws, Contractor agrees to defend, indemnify and hold harmless the Indemnified Parties for, from and against any and all Claims arising out of or related to performance of the Work, whether sustained or asserted before or after the date of Final Completion or termination of the Agreement, and all attorneys' fees, consultants' fees, and all other expenses, whether or not taxable, incurred by any of the Indemnified Parties in the investigation, defense, settlement and satisfaction thereof. This indemnity extends to and includes all Claims, just or unjust, whether based on a tort, strict liability, contract, lien, stop notice, Applicable Laws or other theory of relief or

liability, and whether the injury complained of arises from any death, personal injury, sickness, disease, property damage (including loss of use), trespass, economic loss, patent infringement, copyright infringement, hazardous substance release, oil discharge, waste disposal, taking of endangered species, or otherwise; provided, however, that if a Claim against any of the Indemnified Parties is based on a negligence theory of recovery, this Agreement to defend, indemnify, and hold harmless shall extend only to the extent the Claim is caused or alleged to be caused by the negligent acts, errors or omissions of Contractor or any person or entity for whom Contractor may be responsible. Contractor's indemnification obligation shall be without regard to any restriction on the compensation or benefits payable by or for Contractor or any subcontractor under any Applicable Laws governing workers' compensation.

6.17.02 Contractor expressly understands and agrees that any performance or labor and material bond or insurance protection required by any provision of the Contract Documents, or otherwise provided by Contractor, shall in no way limit the responsibility to defend, indemnify and hold harmless each of the Indemnified Parties as herein provided.

6.17.03 Contractor shall cause the provisions of this Section 6.17 to be included in each subcontract between Contractor and a Subcontractor and flow down to such other subcontracts entered into between a Subcontractor and its Subcontractors. At Owner's request, Contractor shall provide evidence satisfactory to Owner that it has fulfilled its obligation under this Section 6.17.

6.17.04 If any Claim indemnified hereunder but not accepted for coverage by Contractor's insurance policies has not been settled or discharged when the Work is completed, final payment of the Contract Sum shall not be due unless and until Contractor provides (a) a bond issued by a bonding company satisfactory to Owner, or (b) other security acceptable in an amount equal to 150% of the amount of any such Claim, including interest on such Claim as estimated by Owner. Such bond or other security shall be in form and substance satisfactory to Owner and shall be subject to such increase as Owner may from time to time require as interest accrues on such Claim.

6.17.05 All indemnities, warranties, representations and other obligations of Design Professional shall survive Final Completion and/or termination of the Agreement.

6.18 TEMPORARY OFFICE

At all times prior to Final Completion, Contractor shall provide and maintain a weather-tight, temporary office at the Site for Contractor's use at a location satisfactory to Owner. Such temporary office shall be fully functional and complete with utility hookups for power, heat, air-conditioning, and light and telephone service. The costs and expenses related to the provision and maintenance of such temporary office shall be included within the Contract Sum.

6.19 UTILITY COSTS; WORK AROUND UTILITIES

6.19.01 Except as otherwise provided for in the Agreement, Contractor shall provide and pay for all heating, cooling, lighting, utilities, and other facilities and services necessary for the proper execution and completion of the Work. Contractor shall furnish and maintain all temporary ventilating equipment as required prior to the installation of the permanent heating and cooling apparatus. As soon as the permanent heating and cooling apparatus has been fully installed, Contractor shall have the right to use the same in accordance with and subject to the provisions of Section 11.3 of the Agreement. Except as otherwise provided in the Agreement, all utility costs with respect to each portion of the Work shall be provided, and paid for, by Contractor, as part of the Contract Sum, until the date of Substantial Completion.

6.19.02 Contractor shall be responsible to cause all existing utilities to be located. Contractor shall hand excavate in proximity to located utilities. Contractor shall be responsible, without an increase in the Contract Sum, for all costs resulting from located utilities damaged during the Work.

6.20 CONFIDENTIAL RELATIONSHIP; NEWS RELEASES

In connection with the rendering of the Work, Confidential Information may be discovered by or disclosed to Contractor. Contractor agrees to treat all Confidential Information with the highest duty of trust imposed upon a fiduciary, not to disclose or allow access to any Confidential Information to any person (including employees of Contractor, except as necessary to perform the Work), to refrain from using Confidential Information for purposes other than the performance of the Work or as otherwise directed by Owner, to refrain from reproducing any Confidential Information except as necessary to perform the Work, and to return to Owner all documents and other materials containing Confidential Information

immediately upon Owner's request and in any event upon the termination of the Agreement or completion of the Work. Contractor acknowledges that Owner will not have an adequate remedy under any Applicable Laws for any breach of the foregoing provisions, and that, accordingly, Owner may obtain injunctive relief or a decree of specific performance directing Contractor to cure any such breach and to refrain from further actions that would constitute such a breach. Contractor acknowledges and agrees that its obligations hereunder and all other confidentiality provisions of the Contract Documents are as a fiduciary to Owner and that any release of Confidential Information by Contractor contrary to these confidentiality provisions shall be subject to all remedies and damages available to Owner at law or equity for breach of fiduciary duty.

6.21 NO STOPPAGE

Contractor shall not directly or indirectly stop performance of any Work in the event of a Claim or other dispute. Rather, Contractor will continue performance, under protest, pending resolution of such Claim or other dispute unless Owner specifically directs otherwise in writing. Contractor's failure to continue such performance shall be a material breach of the Agreement.

ARTICLE 7 SUBCONTRACTORS

7.01 SUBCONTRACTUAL RELATIONS

7.01.01 Each subcontract and purchase order entered between Contractor and a Subcontractor or material supplier shall:

- (a) be in writing;
- (b) specifically incorporate the Agreement by reference in its entirety;
- (c) be accompanied by such proof of insurance as Owner shall require;
- (d) provide that Owner is an intended third party beneficiary of the subcontract or purchase order (without liability for benefits received) and an obligee of all express and implied warranties given by any Subcontractor or material supplier under such subcontracts or purchase orders or as imposed by Applicable Laws, with the right to directly enforce those obligations as a principal, whether before or after Final Completion;
- (e) provide the Subcontractor or material supplier's consent to be joined in any dispute resolution procedure or proceeding involving Owner and Contractor;
- (f) provide that Owner shall be entitled to enforce such subcontract or purchase order directly against such Subcontractor or material supplier in the event Owner has been damaged by any breach thereof;
- (g) provide the Subcontractor or material supplier's consent that any such agreement or purchase order may be assigned to Owner at Owner's option if the Agreement is terminated for any reason and obligate the Subcontractor or material supplier to perform for the benefit of Owner the remainder of the Work covered by such agreement or purchase order as long as Owner continues to pay the amounts owing such Subcontractor or material supplier thereunder;
- (h) require, to the extent of the Work to be performed by the Subcontractor or materials to be supplied by the material supplier, each Subcontractor or material supplier be bound to the Contractor by the terms of the Contract Documents and to assume toward Contractor all the obligations and responsibilities that Contractor assumes toward Owner under the Agreement, including the responsibility for the safety of the Subcontractor's Work; and
- (i) require each Subcontractor or material supplier to enter into similar agreements with its Subcontractors.

7.01.02 Contractor shall coordinate the efforts of its Subcontractors and material suppliers so that no part of the Work is duplicated or omitted, and shall require its Subcontractors and material suppliers to proceed with the Work in accordance with the Project Schedule and in such order as Contractor may direct. Contractor agrees that it is as fully responsible to Owner for the acts and omissions of its Subcontractors, material suppliers and of persons either directly or indirectly employed by them as Contractor is for the acts and omissions of persons directly employed by Contractor.

7.01.03 The preceding Section 7.01.01 notwithstanding, nothing contained in the Contract Documents shall create any contractual obligation between any Subcontractor or material supplier and Owner.

7.01.04 Contractor shall require each Subcontractor and material supplier to carry insurance having limits, coverages and deductibles required by Owner, in Owner's sole and absolute discretion.

ARTICLE 8
WORK BY OWNER OR BY SEPARATE CONTRACTORS

(None)

8.01 OWNER'S RIGHT TO PERFORM WORK AND TO ENTER SEPARATE CONTRACTS

Owner reserves the right to perform certain of its own work and enter into contracts with separate contractors and subcontractors in connection with the Project. Contractor shall provide Owner and such other contractors and subcontractors reasonable opportunity to introduce and store their materials and execute their work, and shall properly connect and coordinate Contractor's Work with the work of Owner and such other contractors and subcontractors.

8.02 MUTUAL RESPONSIBILITY

8.02.01 If any part of the Work depends for proper execution or results upon the work of Owner or any separate contractor or subcontractor, Contractor shall, prior to proceeding with the Work, promptly notify Owner of any apparent discrepancies or defects in such other work that render it unsuitable for Contractor's Work. Failure of Contractor to provide such notice shall constitute an acceptance of such other work as suitable to receive Contractor's Work.

8.02.02 Should Contractor cause damage to the Work or property of Owner or any separate contractor or subcontractor, or to other work in the vicinity of the Project, including damage caused by defective work, Contractor shall promptly remedy such damage and attempt to resolve any dispute arising therefrom.

ARTICLE 9
TESTS AND COSTS

9.01 TESTS

9.01.01 If the Contract Documents or any Applicable Laws require any portion of the Work to be inspected, tested or approved, Contractor shall provide Owner timely notice (not less than 48 hours' prior notice) of its readiness therefore so Owner may observe such inspection, testing or approval. Contractor will arrange for the services of a testing laboratory(ies) or service organization designated by Owner for purposes of such inspections, tests or approvals.

9.01.02 If any inspection, testing or approval reveals a failure of the Work to comply with the requirements of the Contract Documents, Contractor shall bear the costs and expenses to correct such failure, including payment of any additional compensation to Design Professional made necessary by such failure.

9.01.03 Required certificates of inspection, testing or approval shall be secured by Contractor and promptly delivered to Owner.

9.01.04 Contractor shall coordinate the activities of all entities conducting inspections, tests or approvals by or for Owner and shall cooperate fully with such entities so as to facilitate such inspections, tests or approvals.

9.01.05 Separate testing required or performed by Owner that is consistent with normal practice in

constructing projects similar to the Project shall not entitle Contractor to any adjustment in the Contract Sum or the Contract Time.

9.02 COSTS

All cash discounts received by Contractor related to the Work shall accrue to Owner in total, and all quantity and trade discounts, rebates, refunds and all returns from sale of surplus material shall be applied as a reduction of the Contract Sum. Contractor shall notify Owner of, and qualify for available cash discounts, quantity and trade discounts, rebates, refunds and all returns from sale of surplus materials in any way related to the Work to the extent available in a manner consistent with the Contract Documents. At Owner's request, Contractor shall assist in the sale of surplus materials.

ARTICLE 10 TIME

10.01 PROGRESS AND COMPLETION

10.01.01 All time limits stated in the Contract Documents for the performance of Contractor's obligations are of the essence.

10.01.02 Contractor shall commence and carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion and Final Completion within the time periods provided therefore in Article 6 of the Agreement.

10.01.03 If Owner desires to accelerate performance of any part of the Work, Owner may request such acceleration, in which event Contractor shall advise Owner to what extent if any, in the judgment of Contractor, overtime Work will be required to accomplish such acceleration and the estimated extra actual out-of-pocket cost resulting from the use of such overtime. Upon receipt of such estimate from Contractor, if Owner still desires to accelerate performance of such part of the Work, Owner shall issue a Change Order for the Work Contractor shall perform on an accelerated basis.

10.02 DELAYS AND EXTENSIONS OF TIME

10.02.01 After all float time is used, the Contract Time may be extended by Change Order for such reasonable time as Owner may determine if Contractor is delayed in completing the Work because of: (a) any act or neglect of Owner or the Design Professional or by any employee of either, or by a separate contractor or subcontractor, but not including Subcontractors engaged by Contractor; (b) changes in the Work if the Work affected by the changes is on the critical path of the Project Schedule; (c) labor disputes, fire, unusual weather or floods; (d) any other cause beyond Contractor's reasonable control and without Contractor's negligence; (e) delay authorized by Owner; or (f) any cause that Owner determines may justify the delay.

10.02.02 A request for an extension of the Contract Time shall be made in writing to Owner, not more than seven (7) days after commencement of the occurrence giving rise to such request, otherwise such request will be waived. In the case of a continuing cause of delay, only one such request is necessary. Such request must be accompanied by complete documentation showing the current status of Work affected and the nature and exact duration of the requested extension. A request by the Contractor for an extension of the Contract Time under this Section 10.02.02 shall be a prerequisite to Contractor later claiming additional compensation as a result of Owner's acceleration or delays. Provided Owner has received a timely and proper request, within thirty (30) days after receiving such request, Owner shall determine, in Owner's reasonable discretion, whether a Change Order should be entered into on account of any of the causes described in Section 10.02.01.

10.02.03 Contractor recognizes that completing the Work on or before the original Contract Time(s) is of the utmost importance. Consequently, notwithstanding the right of Contractor to receive a time extension pursuant to Section 10.02.01, Contractor agrees that if it encounters a delay, it will, if directed by Owner under Section 6.06.04, develop and implement a schedule and plan to improve progress and overcome such delay.

10.02.04 In the event of any dispute whatsoever between Owner and Contractor, Contractor shall continue to proceed diligently with the Work as required by the Contract Documents, provided Owner continues to make undisputed payments on account of the Contract Sum as provided for in the Agreement.

ARTICLE 11

SCHEDULE OF VALUES, APPLICATION FOR PAYMENT, PAYMENTS AND COMPLETION SCHEDULE

11.01 SCHEDULE OF VALUES

Contractor shall complete and submit for Owner's review and approval the schedule of values ("**Schedule of Values**") for all of the Work in the form attached as Exhibit "C" to the Agreement. The Schedule of Values shall: (a) subdivide the Work into its respective parts; (b) be based upon the Project Schedule; (c) include dollar amounts for all items comprising the Work; (d) serve as the basis for evaluating Contractor's Applications for Payment; and (e) be updated and revised from time-to-time at Owner's request. Owner may reject any Schedule of Values that appears susceptible to resulting in a "front loading" of payments or for any other good cause. Contractor represents to Owner that, to the best of Contractor's knowledge, the Schedule of Values, including the draw schedule related thereto, accurately estimates the amounts that will be payable to Contractor each month; provided, however, that Owner shall be obligated to make payments in approved amounts only as provided in the Contract Documents.

11.02 APPLICATION FOR PAYMENTS SUBMITTED TO OWNER'S REPRESENTATIVE

All written communications from Contractor regarding payment shall be personally delivered to Owner's Representative who is designated as Owner's exclusive agent for purposes of such communications. No such communication shall be deemed received by Owner's Representative until it has been actually received by Owner's Representative.

11.03 APPLICATION FOR PAYMENT

11.03.01 The Application for Payment may request payment for equipment and materials not yet incorporated into the Project, provided that: (a) Owner has agreed in writing that the equipment and materials are suitably stored at another acceptable location; (b) the equipment and materials are protected by suitable insurance; (c) the equipment and materials are properly identified as being for Owner's Project; and (d) upon payment, title to such equipment and materials will pass to Owner free and clear of all claims, liens, encumbrances, and security interests. Payment for equipment and materials made in accordance with this Section 11.03.01 shall be subject to a retainage of ten percent (10%) or as otherwise provided in the Agreement.

11.03.02 The Application for Payment shall constitute Contractor's representation that the Work has been performed consistent with the Contract Documents, has progressed to the point indicated in the Application for Payment, and that title to all Work will pass to Owner free and clear of all claims, liens, encumbrances, and security interests upon the incorporation of the Work into the Project, or upon Contractor's receipt of payment, whichever occurs earlier. Values shall be assigned to individual items of Work in a manner that will avoid any "front loading" of payments.

11.03.03 Owner shall have the right to withhold the Retainage as provided in Section 5.4(c) of the Agreement. All requests for a reduction in Retainage shall be submitted in writing for Owner's approval and shall include consent of Contractor's surety, if any.

11.03.04 Other than the equipment and materials referenced in Section 11.03.01, no Application for Payment shall include any Work that is anticipated but not yet performed as of the date of the application. Owner may reject any Application for Payment that includes such anticipated but unperformed Work.

11.03.05 This Section 11.03 notwithstanding, payment of each Application for Payment requesting a progress payment shall be subject to all of the following conditions: (a) Contractor must submit with each Application for Payment a conditional waiver and release on progress payment in strict conformity with the statutory forms prescribed by the jurisdiction in which the Project is located from (1) Contractor, and (2) any Subcontractor, material supplier and other lower tier provider of Work ("**Lower Tier Claimant(s)**") for Work furnished or performed by Contractor and the applicable Lower Tier Claimants through the end of the month for which the Application for Payment is submitted; (b) Contractor must submit with each Application for Payment an unconditional waiver and release on progress payment in strict conformity with the statutory forms prescribed by the jurisdiction in which the Project is located from (1) Contractor, and (2) all Lower Tier Claimants in the full amount shown on all conditional waivers and releases submitted by Contractor and Lower Tier Claimants in connection with prior Applications for Payment for which Owner has made payment; (c) Contractor must submit with each progress payment Application for Payment written itemizations of the amount

requested for Contractor and each Lower Tier Claimant through the cut off date of the Application for Payment for which payment is requested, with supporting invoices, billings and other documentation, reasonably requested by Owner, to validate such amounts; (d) the Work for which payment is requested must have progressed to Owner's reasonable satisfaction; and (e) Owner is entitled to deduct any applicable withholding as provided hereunder or permitted in the jurisdiction in which the Project is located.

11.04 PROGRESS PAYMENTS

11.04.01 Upon Owner's receipt and approval of a properly submitted and accurate Application for Payment, Owner shall make payment to Contractor within the time specified in Section 5.4(a) of the Agreement, but in each case less the total of payments previously made, and less amounts properly withheld under the Contract Documents.

11.04.02 Contractor shall promptly pay each Subcontractor that amount paid to Contractor on account of such Subcontractor's Work. Contractor's agreements with all Subcontractors shall require all Subcontractors to similarly make payments to their Subcontractors.

11.04.03 Neither a progress payment nor any partial or entire use or occupancy of the Project by Owner shall constitute an acceptance of Work not in accordance with the Contract Documents.

11.05 PAYMENT WITHHELD

11.05.01 Owner may withhold payment in whole or in part of amounts requested under an Application for Payment, or nullify the whole or any part of a previously approved Application for Payment based upon subsequently discovered evidence or subsequent observations, to the extent such action is necessary in Owner's opinion to protect Owner from loss due to:

- (a) unsatisfactory job progress;
- (b) defective Work or materials not remedied;
- (c) disputed Work or materials;
- (d) failure to comply with other material provisions of the Contract Documents;
- (e) third party claims filed or reasonable evidence that a claim will be filed;
- (f) failure of the Contractor or a Subcontractor to make timely payments for labor, equipment and materials;
- (g) other damage to Owner;
- (h) reasonable evidence that Work cannot be completed for the unpaid balance of the Contract Sum;
- (i) liens filed in connection with the Work;
- (j) Change Order(s) reducing the Contract Sum;
- (k) set-off claims Owner may have against Contractor arising from work performed by Contractor under other agreements;
- (l) other items entitling Owner to a set-off against the amount requested in an Application for Payment; or
- (m) Retainage, if any, provided for in the Agreement.

11.05.02 Owner shall provide Contractor with a written statement detailing Owner's reasons for withholding payment. If Contractor disputes any determination by Owner regarding any Application for Payment, Contractor shall nevertheless expeditiously continue to prosecute the Work.

11.05.03 Payment of amounts previously withheld from an Application for Payment will be made upon submittal of a new Application for Payment by Contractor after the reasons for such withholding no longer exist.

11.06 SUBSTANTIAL COMPLETION AND PARTIAL OCCUPANCY

11.06.01 When Contractor considers that the Work, or a portion thereof that Owner agrees to accept separately, has reached the point of Substantial Completion, Contractor shall prepare and submit to Owner the Punch List. Owner shall have the right to add items to the Punch List based on Owner's inspection of the Work to determine that the Work, or portion thereof, if applicable, has reached the point of Substantial Completion. The Punch List, when approved by Owner along with Owner's determination of Substantial Completion, shall be the Punch List that must be completed by Contractor by the date for Final Completion. Failure to include any items on the Punch List does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents.

11.06.02 At any time before Substantial Completion, following written notice to Contractor, Owner shall have the right to occupy and use the Work. The preceding sentence notwithstanding, Owner may not exercise such right if occupancy or use will unduly interfere with or unduly delay completion of the Work.

11.06.03 Contractor shall, prior to and as a condition to Substantial Completion, provide Owner with sufficient training as needed to operate the various systems incorporated into the Work, including the environmental control systems and security systems, if any. Owner shall cooperate with Contractor to enable Contractor to provide such training at appropriate times and shall make itself available to receive such training at reasonable times requested by Contractor. Contractor shall have delivered to Owner all operation and maintenance instructions for equipment and apparatus prior to and as a condition of Substantial Completion.

11.06.04 Nothing contained in this Section 11.06 shall excuse Contractor from complying with the Project Schedule or the Contract Documents.

11.07 FINAL COMPLETION AND FINAL PAYMENT

11.07.01 Upon written notice from Contractor to Owner that the Work is complete, Owner will cause all required inspections to be performed by Design Professional and any other approving authority(ies) having jurisdiction over any portion of the Site or the Project (collectively, "**Approving Authority(ies)**").

11.07.02 If such inspections disclose any Work, in whole or in part, as being incomplete, defective or not in strict and absolute conformity with the Contract Documents ("**Non-conforming Work**"), Contractor will immediately correct such Non-conforming Work upon receipt of written notice thereof. Upon completion of such correction, the procedure in this Section 11.07 will be repeated until the Design Professional provides the required certification and any Approving Authority(ies) provide confirmation to Contractor of final inspection, approval and, if applicable, acceptance (including any required official action), separately or together.

11.07.03 Contractor shall not be deemed to have accomplished final completion of the Work ("**Final Completion**") unless and until the last of all of the following shall have occurred:

- (a) Design Professional has submitted to Owner an executed certification that certifies that all Work (other than the expiration of the warranty set forth in Section 15) has been completed in strict and absolute conformance with the Contract Documents, as amended by properly executed Change Orders, and including all corrections in the Work that are required (1) to remedy any defects therein or to obtain compliance with the Contract Documents; (2) to obtain a certificate of occupancy; or (3) to fulfill any of Owner's orders or directions under the Contract Documents, including any Punch List;
- (b) Design Professional has submitted to Owner an executed certification that certifies any other matters the Funding Source may require;
- (c) Owner receives written confirmation of final inspection, approval and, if applicable, acceptance from any Approving Authority(ies) (including confirmation that any required official action has taken place as necessary to effectuate final approval and acceptance of the Work by such Approving Authority(ies));

- (d) Contractor has completed all Punch List Items to the reasonable satisfaction of Owner;
- (e) Contractor has otherwise satisfied all other conditions of the Contract Documents related to the performance of the Work; and
- (f) Owner notifies Contractor of its final acceptance of the Work.

11.07.04 Upon achieving Final Completion, Contractor shall submit its final Application for Payment to Owner, together with, all of the following documents:

- (a) a conditional waiver and release on final payment in strict conformity with the statutory forms prescribed by the jurisdiction in which the project is located from (1) Contractor, and (2) all Lower Tier Claimants for all Work furnished or performed by Contractor and Lower Tier Claimants as described under such Application for Payment;
- (b) security that is sufficient to discharge the Project Site from any lien that shall have been filed and not settled or discharged when the Work is otherwise complete, including bonds issued by a bonding company satisfactory to Owner or such other security in an amount equal to 150% of the amount of any such claim, including interest on such claim as estimated by Owner, and which bond or other security shall be in form and substance satisfactory to Owner and subject to such increase as Owner may from time to time require as interest accrues on such claim;
- (c) consent of Contractor's surety, if any, to final payment;
- (d) all final drawings with notations and corrections showing the Work "as built" and Contractor's record drawings; and operating manuals, warranties, maintenance instructions for equipment and apparatus and all permits, licenses, approvals, certificates and authorizations required by any Applicable Laws and other deliverables required by the Contract Documents.

11.07.05 Upon Owner and any Funding Source approving Contractor's properly submitted and accurate final Application for Payment, Owner shall make final payment to Contractor, including any Retainage, within the time provided for in Section 5.5 of the Agreement.

11.07.06 If Owner so requires and notwithstanding the foregoing Section 11.07.05, Owner shall not be obligated to make final payment to Contractor until (a) Owner shall have completed an audit of Contractor's books and records related to the Project (provided, however, that if Owner shall not have completed an audit of Contractor's books and records within thirty (30) days of the date when all other conditions to the final payment have been made, then Owner shall be deemed to have waived its right under this Section 11.07.06 to require a completed audit as a condition to making the final payment, which waiver shall not affect Owner's ability to subsequently complete an audit of Contractor's books and records related to the Project); and (b) Contractor delivers a certificate to Owner certifying the Work has been completed in strict and absolute accordance with the Contract Documents, including any properly authorized changes thereto, and certifying any other matter the Funding Source may require.

11.07.07 Contractor must submit at the time Contractor receives final payment, an unconditional waiver and release on the final payment from Contractor in strict conformity with the statutory forms prescribed by the jurisdiction in which the project is located. Contractor must submit within fifteen (15) days of Contractor's receipt of final payment, an unconditional waiver and release on final payment in strict conformity with the statutory forms prescribed by the jurisdiction in which the project is located from each Lower Tier Claimant showing that all lien rights and other claims against the Project site with respect to the Work are released through the Final Completion Date and that there are no disputed claims

11.07.08 The acceptance of final payment by Contractor shall constitute a waiver of all claims by Contractor against Owner.

ARTICLE 12
PROTECTION OF PERSONS AND PROPERTY

12.01 SAFETY PRECAUTIONS AND PROGRAMS

Contractor recognizes the importance of performing the Work in a safe manner so as to prevent damage, injury or loss to: (a) all individuals at the Site, whether working at or visiting the Site; (b) the Work, including equipment and materials stored on or off the Site; and (c) all other property at the Site or adjacent thereto.

12.02 SAFETY OF PERSONS AND PROPERTY

12.02.01 Contractor and Subcontractors shall comply with all Applicable Laws relating to safety, as well as any Owner-specific safety requirements set forth in the Contract Documents. Contractor will immediately report in writing any safety-related injury, loss, damage or accident arising from the Work to Owner's Representative and, to the extent mandated by Applicable Laws, to all government or quasi-government authorities having jurisdiction over safety-related matters involving the Project or the Work.

12.02.02 Contractor's responsibility for safety under this Section 12.02 is not intended in any way to relieve any Subcontractors from their own contractual and legal obligations and responsibilities for: (a) complying with all Applicable Laws, including those related to health and safety matters; and (b) taking all necessary measures to implement and monitor all safety precautions and programs to guard against injury, losses, damages or accidents resulting from their performance of the Work.

12.02.03 Contractor shall give all notices and comply with all Applicable Laws (including all applicable regulations of OSHA) and all rules, regulations and orders of Owner bearing on the safety of persons and property or their protection from damage, injury or loss.

12.02.04 Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting of relevant signs warning against hazards in the Work or on or around the Project.

12.02.05 From time-to-time whenever all or any portion of the Project or adjacent area is open for business to the public prior to completion of the Work, Contractor shall furnish and install: (a) flashing barricades along all drives and pedestrian walkways that are adjacent to any construction areas; (b) danger signs and hard hat area signs to the extent required to safeguard the Site and people in or around the Site; and (c) wire mesh or snow fence type construction fence, or such other fence as Owner may reasonably require, to keep the public from entering the area of construction with respect to the Project. Contractor shall keep the foregoing signs and barricades in good condition and repair.

ARTICLE 13
INSURANCE AND BONDS

13.01 CONTRACTOR'S INSURANCE REQUIREMENTS

13.01.01 Contractor and the Subcontractors of every tier shall purchase and maintain for the time periods provided herein, at Contractor's and such Subcontractors' sole cost and expense, insurance in the coverage, limits, and terms set forth as follows:

- (a) Workmen's Compensation Insurance affording statutory coverage and containing not less than statutory limits for the state(s) in which the Work is being conducted, and Employer's Liability Insurance in the amount of not less than \$1,000,000 each accident for bodily injury, \$1,000,000 each employee for bodily injury by disease, and \$1,000,000 policy limit for bodily injury by disease per person;
- (b) Commercial General Liability ("CGL") Insurance with limits of liability of not less than \$1,000,000 per occurrence and \$5,000,000 annual aggregate. CGL insurance shall be written on an ISO occurrence form CG 00 01 1204 (or a substitute form providing equivalent coverage) and shall cover bodily injury and property damages arising from premises operations, independent contractor's, products-completed

operations, personal and advertising injury and liability assumed under an insured contract (including tort liability of another assumed in a contract);

- (c) Automobile Liability Insurance including coverage for owned, non-owned and hired autos in an amount not less than \$1,000,000 per occurrence, combined single limit liability covering bodily injury and property damage; and
- (d) Umbrella Insurance in the amount of \$5,000,000 per occurrence.

13.01.02 Failure to comply with Section 13.01.01 shall be a material breach of the Agreement.

13.01.03 If any part of the Work is performed pursuant to a subcontract agreement, insurance shall be provided by or on behalf of Subcontractor(s) to cover the part of the Work each has contracted to perform and shall be maintained until Final Completion. The type of insurance required is as described herein, and shall cover the amounts as specified.

13.01.04 Certificates of Insurance evidencing the required coverages shall be submitted prior to the commencement of the Work. The original and all required updates shall be sent to the Owner's Representative.

13.01.05 Contractor's insurance shall:

- (a) name the Indemnified Parties. Additional Insured under the CGL insurance using ISO additional insured endorsement CG 2037 0704 or a substitute providing equivalent coverage;
- (b) state that Owner will be provided at least thirty (30) days advance written notice of a cancellation or modification of the insurance;
- (c) apply as primary coverage without right of contribution from any other Owner insurance or self-insurance program;
- (d) be provided by an insurance company authorized to issue insurance in Arizona from a carrier having an A.M. Best Rating of at least A-.

13.01.06 The furnishing of the required Certificates of Insurance by Contractor shall in no way reduce Contractor's liabilities or obligations under the Agreement.

13.01.07 Contractor shall not violate, or permit to be violated, any conditions of any required insurance policies, and shall at all times satisfy the requirements of the insurance companies writing such policies.

13.01.08 If Contractor fails to furnish and maintain the insurance required herein or to furnish satisfactory evidence thereof, Owner shall have the right (but not the obligation) to procure and maintain the same for all parties on behalf of Contractor, at Contractor's cost and expense, and Contractor agrees to furnish all necessary information required to effect such insurance coverage.

13.02 OWNER'S INSURANCE

Owner shall pay for and maintain Owner's customary liability insurance. Owner may provide a "Builder Risk" policy. Insurance maintained by Owner is for the exclusive benefit of Owner and will not inure to the benefit of Contractor.

13.03 PERFORMANCE BONDS AND LABOR AND MATERIAL PAYMENT BONDS Pursuant to Article 8 of the Agreement, Contractor shall furnish Owner with performance and labor and material payment bonds, as applicable, covering the faithful performance and payment obligations under the Contract Documents of Contractor or any Subcontractor as required by Owner. All such bonds shall be in an amount, form and from a surety satisfactory to Owner and the Funding Source. All such bonds shall remain in full force and effect during the term of any warranty arising under the Contract Documents.

13.04 WAIVER OF SUBROGATION

Contractor waives all rights against the Indemnified Parties for recovery of damages to the extent such damages are covered by the Workmen's Compensation Insurance and Employers' Liability Insurance described herein. In connection therewith, Contractor shall obtain a Waiver of Subrogation endorsement equivalent to WC 00 03 13 for the benefit of the Indemnified Parties to effectuate such waiver. Owner and Contractor each waives, as against the other and all other named insureds, its right to recover from the other for loss or damage (notwithstanding that such loss or damage may result in whole or in part from negligence) to the extent covered by the remaining insurance coverages described herein.

ARTICLE 14 CHANGES IN THE WORK

14.01 CHANGE ORDERS

14.01.01 A "Change Order" is a written amendment to the Agreement signed by Owner and Contractor or their respective authorized Project representatives. The Contract Sum may be adjusted pursuant to a properly executed Change Order if Owner requests a change in the Work affecting the Contract Sum. The Contract Time may be adjusted as provided in Section 10.02.

14.01.02 Except in an emergency endangering life or property, in which case the Contractor shall proceed at its reasonable discretion to prevent threatened damage, injury or loss, Contractor shall provide Owner with written notice requesting a Change Order within seven (7) days after commencement of the occurrence giving rise to such request. Such notice shall (a) describe, with particularity, such occurrence and the probable effect the occurrence will have on the overall progress of the Work, and (b) include an estimate of any additional costs and expenses Contractor will incur as a result of the occurrence, as well as, such other written documentation as Owner may reasonably request to validate Contractor's Change Order request and to permit Owner to perform a cost or price analysis pursuant to 24 C.F.R. 85.36(f).

14.01.03 Provided Owner has received timely and proper notice, within thirty (30) days after receiving Contractor's Change Order request, Owner shall determine, in Owner's reasonable discretion, whether a Change Order should be executed.

14.01.04 The cost or credit to Owner resulting from a change in the Work shall be in accordance with Section 17.03.01 herein and the following:

- (a) If applicable unit prices are provided for in the Contract Documents or subsequently agreed upon, the proposal shall reflect all computations and extensions used by Contractor in arriving at the stated adjustment. Unit prices shall include all overhead, profit and all other costs applicable to the Work, and no additional mark-ups shall be added to the unit price proposals;
- (b) If applicable unit prices are not provided for in the Contract Documents or subsequently agreed upon, an itemized lump sum proposal shall be submitted. The lump sum proposal must itemize and substantiate all probable direct costs for labor, materials, tools and equipment anticipated as a result of the change and include Contractor's overhead and fee.

14.01.05 If an occurrence giving rise to a Change Order results in a modification of the original scope of the Agreement, the Change Order shall be subject to 24 C.F.R. 84.43 and 24 C.F.R. 85.36(d) in addition to the requirements of the Agreement.

14.01.06 If Owner and Contractor execute a Change Order, the Change Order may, as applicable, adjust the Contract Time by the amount of time the overall progress of the Work has been delayed, and/or equitably adjust the Contract Sum. Under no circumstance, however, shall the occurrence of the following circumstances or conditions justify a Change Order: (a) discovery of any error made by Contractor in determining the sufficiency of the time provided in the Agreement for accomplishing Substantial Completion or Final Completion; or (b) any delay caused by an alleged shortage of material, equipment or labor (for any reason). Upon execution of a Change Order, Contractor shall promptly proceed with the Work described thereunder. Owner shall receive a credit against the Contract Sum in the amount of any net

decrease in the Contract Sum resulting from all Change Orders entered into under the Agreement (i.e., the amount by which all deductive Change Orders, if any, exceed all additive Change Orders, if any).

14.01.07 No person other than Owner's Representative shall have any authority to authorize or approve a Change Order on behalf of Owner. Contractor shall not commence any Work that may be subject to a Change Order as described in this Section 14.01, unless and until a Change Order is entered into.

14.02 MINOR CHANGES IN THE WORK

Owner will have authority to order minor changes in the Work, provided such changes do not involve an adjustment in the Contract Sum or an extension of the Contract Time and are not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order executed by Owner, and shall be binding on Owner and Contractor. Contractor shall carry out such written orders promptly.

ARTICLE 15 UNCOVERING OF WORK AND CORRECTION OF WORK

15.01 UNCOVERING OF WORK

15.01.01 If a portion of the Work is covered contrary to Owner's request or to requirements specifically expressed in the Contract Documents, upon Owner's written request, Contractor shall uncover it for Owner's examination and replace it at Contractor's expense without adjustment to the Contract Sum or Contract Time.

15.01.02 If a portion of the Work that Owner has not specifically requested to examine prior to it being covered has been covered, Owner may request to see such Work and Contractor shall uncover it. If such Work is in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be at Owner's expense. If such Work is not in accordance with the Contract Documents, the cost of uncovering and replacement shall be at Contractor's expense.

15.02 CORRECTION OF WORK

15.02.01 Contractor agrees to correct any Non-conforming Work that is discovered within a period of **Eighteen (18) Months** from the date of Final Completion, or within such longer period to the extent required by the Contract Documents. Contractor shall bear all costs and expenses related to correcting such Non-conforming Work, including those related to remedying all work of Owner or separate contractors destroyed or damaged by such correction, additional testing and inspections, and compensation for the Design Professional's services and expenses made necessary thereby.

15.02.02 The **Eighteen (18) Month** period referenced in Section 15.02.01 above applies only to Contractor's obligation to correct Non-conforming Work and is not intended to constitute a period of limitations for any other rights or remedies Owner may have regarding Contractor's other obligations under the Contract Documents.

15.02.03 Contractor shall take meaningful steps to commence correction of Non-conforming Work, before or after Final Completion, including the correction, removal or replacement of the Non-conforming Work and any damage caused to other parts of the Work affected by the Non-conforming Work, within seven (7) days of receipt of Owner's written notice that the Work is not in conformance with the Contract Documents. If Contractor fails to commence the necessary steps within such seven (7) day period, Owner, in addition to any other remedies provided under the Contract Documents, may provide Contractor with written notice that Owner will commence correction of such Non-conforming Work with its own forces. If Owner does perform such corrective Work, Contractor shall be responsible for all reasonable costs incurred by Owner in performing such correction. If the Non-conforming Work creates an emergency requiring an immediate response, the seven (7) day periods identified herein shall be deemed inapplicable and any required emergency corrective Work shall be performed by Contractor within twenty-four (24) hours of Owner's notice; if such corrective Work is not performed within such time, Owner may perform such Work as provided in this Section 15.02.03.

ARTICLE 16
STOP ORDER; TERMINATION OF THE CONTRACT

16.01 OWNER'S RIGHT TO STOP WORK

The Owner may issue a stop order ("**Stop Order**") requiring Contractor to stop Work immediately on that portion of the Work defined in the Stop Order. In such event, Owner shall not be obligated to consider any claim from Contractor for additional compensation if Owner provides Contractor with written notice to resume performance of such Work within 120 days of the Stop Order. Stop Orders shall be hand delivered to the Contractor for acknowledgment and no Work shall be performed after the date of acknowledgment without Owner's written authorization to proceed. No verbal authorization will be recognized for the stoppage or restart of Work.

16.02 OWNER'S RIGHT TO TERMINATE FOR CONVENIENCE

16.02.01 Upon written notice to Contractor, Owner may, for its convenience and without cause, elect to terminate all or part of the Agreement. In the event of a termination under this Section 16.02.01, Contractor shall, unless the notice of termination directs otherwise, immediately discontinue the performance of the Work and the placing of orders for labor, equipment and materials, or other items in connection with the performance under the Contract Documents. If requested by Owner, Contractor shall make every reasonable effort to procure the cancellation or termination of all existing orders and subcontracts upon commercially reasonable terms and shall thereafter perform only such Work as may be necessary to preserve and protect any Work already in progress.

16.02.02 In the event of any termination under Section 16.02.01, Owner shall pay Contractor only for the Work executed to the date of such termination. In no event shall Contractor be entitled to any fee, overhead, expense or profit on Work not performed. Owner shall not reimburse Contractor on account of alleged continuing contractual commitment claims with respect to Subcontractors or cancellation penalties or damages related thereto.

16.03 OWNER'S RIGHT TO PERFORM AND TERMINATE FOR CAUSE

16.03.01 Owner shall have the rights set forth in Sections 16.03.02 and 16.03.03 below, in addition to any other rights and remedies provided in the Contract Documents or under Applicable Laws, if Contractor fails to: (a) provide a sufficient number of skilled workers; (b) supply the materials required by the Contract Documents; (c) comply with Applicable Laws; (d) timely pay Subcontractors without cause; (e) prosecute the Work with promptness and diligence to ensure that the Work is completed by the Contract Time(s), as such time(s) may be adjusted; or (f) perform material obligations under the Contract Documents.

16.03.02 Upon the occurrence of an event set forth in Section 16.03.01 above, Owner may provide written notice to Contractor that it intends to terminate the Agreement unless the problem cited is cured, or commenced to be cured, within seven (7) days of Contractor's receipt of such notice. If Contractor fails to cure, or reasonably commence to cure, such problem, then Owner may declare the Agreement terminated for default by providing written notice to Contractor of such declaration.

16.03.03 Upon declaring the Agreement terminated pursuant to Section 16.03.02 above, Owner may (a) enter upon the Site and take possession, for the purpose of completing the Work, of all equipment and materials, scaffolds, tools, appliances and other items thereon, that have been purchased or provided for the performance of the Work, all of which Contractor hereby transfers, assigns and sets over to Owner for such purpose; and (b) employ any person or persons to complete the Work and provide all of the required labor, services, equipment and materials, and other items. In the event of such termination, Contractor shall not be entitled to receive any further payments under the Contract Documents until the Work shall be finally completed in accordance with the Contract Documents. At such time, if the unpaid balance of the Contract Sum exceeds the cost and expense incurred by Owner in completing the Work, such excess shall be paid by Owner to Contractor. If Owner's cost and expense of completing the Work exceeds the unpaid balance of the Contract Sum, then Contractor shall be obligated to pay the difference to Owner. Such cost and expense shall include not only the cost of completing the Work, but also losses, damages, costs and expenses, including reasonable attorneys' fees and expenses, incurred by Owner in connection with the re-procurement and defense of claims arising from Contractor's default.

16.03.04 If Owner improperly terminates the Agreement for cause, the termination for cause will be converted to a termination for convenience in accordance with the provisions of Section 16.02 above.

16.04 CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE

Notwithstanding anything to the contrary in the Contract Documents, Contractor shall not have a right, and hereby waives any such right, to suspend the Work, terminate the Agreement because of Owner's default, or take any other action that would stop or slowdown its performance of the Work because of a dispute with Owner or a claim that Owner is in default and/or breach of contract, provided Owner continues to make undisputed payments on account of the Contract Sum as provided for in the Agreement. Contractor agrees that its sole remedy shall be to pursue recourse against Owner available under Article 10 of the Agreement.

16.05 BANKRUPTCY OF OWNER OR CONTRACTOR

16.05.01 If either Owner or Contractor institutes or has instituted against it a case under the United States Bankruptcy Code (such party being referred to as the "**Bankrupt Party**"), such event may impair or frustrate the Bankrupt Party's ability to perform its obligations under the Contract Documents. Accordingly, should such event occur:

- (a) The Bankrupt Party, its trustee or other successor, shall furnish, upon request of the non-Bankrupt Party, adequate assurance of the ability of the Bankrupt Party to perform all future material obligations under the Contract Documents, which assurances shall be provided within ten (10) days after receiving notice of the request; and
- (b) The Bankrupt Party shall file an appropriate action within the bankruptcy court to seek assumption or rejection of the Agreement within sixty (60) days of the institution of the bankruptcy filing and shall diligently prosecute such action.

16.05.02 If the Bankrupt Party fails to comply with its obligations in Section 16.05.01, the non-Bankrupt Party shall be entitled to request the bankruptcy court to reject the Agreement, declare the Agreement terminated and pursue any other recourse available to the non-Bankrupt Party under this Article 16.

16.05.03 The rights and remedies under Section 16.05.01 above shall not be deemed to limit the ability of the non-Bankrupt Party to seek any other rights and remedies provided by the Contract Documents or by law, including its ability to seek relief from any automatic stays under the United States Bankruptcy Code.

ARTICLE 17

FEDERAL REQUIREMENTS, NAVAJO AND INDIAN PREFERENCE AND NPEA

17.01 PROHIBITION AGAINST LIENS

Contractor hereby acknowledges that Applicable Laws prohibit Contractor and its Subcontractors from placing a lien on the Site. This prohibition shall be placed in all contracts Contractor enters into in connection with the Work performed under the Agreement.

17.02 EMPLOYMENT RIGHTS

Contractor shall meet with the Navajo Nation's Office of Navajo Labor Relations to discuss Contractor's obligations under NPEA prior to performing Work under the Agreement.

17.03 CONTRACT PROVISIONS REQUIRED BY 2 C.F.R. §200.317 - 326

By signing the Agreement, Contractor acknowledges that the Agreement is subject to the following specific Applicable Laws, to which Contractor is hereby bound.

17.03.01 CONTRACT ADJUSTMENTS; ADDITIONAL SERVICES

Notwithstanding any other term or condition of the Agreement, any settlement or equitable adjustment of amounts owing under the Agreement due to termination, suspension or delays by Owner and any Change Order modifying the Contract Sum shall be negotiated based on the cost principles stated at 48 C.F.R. Subpart 31.2 and conform to the contract pricing provisions of 2 C.F.R. §200.323. Contractor shall provide supporting cost information in sufficient detail to permit Owner to perform the required cost or price analysis.

17.03.02 REMEDIES

In accordance with 2 C.F.R. § 200.317 - 326, the Agreement contains administrative, contractual or legal remedies for instances in which Contractor violates or breaches the Agreement, and provides for such sanctions and penalties as may be appropriate.

17.03.03 EQUAL EMPLOYMENT OPPORTUNITY

Pursuant to 2 C.F.R. §200.326, Contractor and all Subcontractors of every tier shall comply with Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 C.F.R. Chapter 60).

17.03.04 COPELAND ANTI-KICKBACK ACT

Pursuant to 2 C.F.R. §200.326, Contractor and all Subcontractors of every tier shall comply with the Copeland "Anti-Kickback" Act (18 U.S.C. § 874), as supplemented in Department of Labor regulations (29 C.F.R. Part 3).

17.03.05 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 2 C.F.R. §200.326, and 24 C.F.R. 1000.16(c), Contractor and all Subcontractors of every tier shall comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 327-330), as supplemented by Department of Labor regulations (29 C.F.R. Part 5).

17.03.06 RECORDS RETENTION AND ACCESS

Contractor's accounting records regarding the Work performed hereunder shall be kept and maintained in accordance with generally accepted accounting principles consistently applied. Pursuant to 24 C.F.R. 85.36(i)(10) and (11), access shall be given by Contractor to Owner, HUD, the Comptroller General of the United States, or any of their duly authorized representatives, to any books, documents, papers, and records of Contractor that are directly pertinent to the contract between Owner and HUD for the purpose of making an audit, examination, excerpts, and transcriptions. All required records shall be retained for three (3) years after Owner, Contractor or other sub-grantees under the contract between Owner and HUD make final payment and all other pending matters are closed.

17.03.07 CLEAN AIR ACT AND CLEAN WATER ACT

Pursuant to 2 C.F.R. §200.326, Contractor shall comply with applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 U.S.C. § 1857(h)), Section 508 of the Clean Water Act (33 U.S.C. § 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 C.F.R. Part 15).

17.03.08 ENERGY EFFICIENCY

Contractor shall comply with the mandatory standards and policies relating to energy efficiency which are contained in the energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163) for the State in which the work under the contract is performed.

17.04 ADDITIONAL PROVISIONS REQUIRED BY 24 C.F.R. PART 1000

By signing the Agreement, Contractor acknowledges that the Agreement is subject to the following specific Applicable Laws, to which Contractor is hereby bound.

17.04.01 DEBARRED, SUSPENDED OR INELIGIBLE CONTRACTORS

Pursuant to 24 C.F.R. 1000.44, Contractor shall comply with 24 C.F.R. Part 24, Subpart C regarding the use of debarred, suspended or ineligible subcontractors.

17.04.02 NAVAJO PREFERENCE AND INDIAN PREFERENCE

Pursuant to 24 C.F.R. § 1000.52, the Services to be performed under this Agreement are for a project subject to and in accordance with Section 101 (k) of NAHASDA, which provides a recipient shall apply the tribal employment and contract preference laws (including regulations and tribal ordinances) adopted by the Indian tribe that received a benefit from funds granted to the recipient under NAHASDA.

(a) The NHA shall apply the contracting preference laws of the Navajo Nation, which require that business entities with the Navajo Nation, including NHA, provide certified Navajo-owned businesses priority preference in the award of contracts, as well as preference to certified Indian-owned businesses. Navajo Business Opportunity Act, 5 N.N.C § 201 *et. seq.*

(b) In connection with the performance of this Agreement, the parties shall, to the greatest extent feasible, provide preference and opportunities for training and employment to Navajos and preferences in the award of contracts and subcontracts shall be given to Navajo organizations and Navajo-owned Economic Enterprises. Navajo Preference in Employment Act, 15. N.N.C. § 601 *et. seq.*

(c) The parties to this Agreement shall comply with provisions of Section 16.6, and all HUD requirements.

(d) These Navajo and Indian preference requirements shall be incorporated into every subcontract entered by General Contractor in connection with the Services.

(e) Upon a finding by Owner, the Navajo Nation, or HUD that General Contractor or and any Sub-Consultant is not in compliance with Section 16.6, General Contractor shall, at the direction of Owner, take appropriate remedial action pursuant to this Agreement.

ARTICLE 18 UNDUE INFLUENCE

Contractor shall not, directly or indirectly, provide funds or other consideration to any person or entity (including, but not limited to, Owner, Owner's Representative, and Owner's employees and agents), to improperly procure special or unusual treatment with respect to the Contract Documents or for the purpose of otherwise improperly influencing the relationship between Owner and Contractor. Additionally, Contractor shall cause all of its officers, directors, employees, members, partners, agents and Subcontractors of any tier (as the case may be) to comply with the restrictions contained in the preceding sentence. Contractor represents and warrants to Owner that Contractor, its officers, directors, employees, members, partners, agents, and Subcontractors have not at any time in the past directly or indirectly provided funds or other consideration to any person or entity to improperly procure special or unusual treatment with respect to the Contract Documents or for the purpose of otherwise improperly influencing the relationship between Owner and Contractor.

ARTICLE 19 BYRD ANTI-LOBBYING AMENDMENT

19.1 INTEREST OF MEMBERS OF CONGRESS

No member of or delegate to the Congress of the United States of America shall be admitted to any share or part of this contract or to any benefit that may arise therefrom.

19.2 INTEREST OF MEMBERS, OFFICERS, OR EMPLOYEES, AND FORMER MEMBER, OFFICERS OR EMPLOYEES

No member, officer, or employee of the Navajo Housing Authority, no member of the governing body of the locality in which the projects is situated, no member of the governing body of the locality in which the Housing Authority was activated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the projects, shall, during his or her tenure, or for one year thereafter, have any interest, direct or indirect, in this

contract or the proceeds thereof.

19.3 LIMITATIONS ON PAYMENTS MADE TO INFLUENCE CERTAIN FEDERAL FINANCIAL TRANSACTIONS

19.3.01 The Contractor agrees to comply with Section 1352 of Title 31, United States Code which prohibits the use of Federal appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal Grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.

19.3.02 The Contactor further agrees to comply with the requirement of the Act to furnish a disclosure (OMB Standard Form LLL, Disclosure of Lobbying Activities) if any funds other than Federal appropriated funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, A Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

Exhibit "C"

SCHEDULE OF VALUES

SAMPLE

Exhibit "D"

PROJECT MANUAL

SAMPLE

Exhibit "E"
PLANS & DRAWINGS INDEX

SAMPLE

Exhibit "F"

APPLICATION FOR PAYMENT

SAMPLE

Exhibit "G"

PROJECT SCHEDULE

SAMPLE

Exhibit "H"

BONDS & INSURANCE

SAMPLE

Exhibit "I"

DAVIS BACON WAGE RATES

SAMPLE

Exhibit "J"

CHANGE ORDER

SAMPLE

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we, _____
_____ AS PRINCIPAL and _____
_____, AS SURETY, are held firmly bound unto

NAVAJO HOUSING AUTHORITY
P.O. BOX 4980
WINDOW ROCK, ARIZONA 86515

Hereinafter called the "Owner" in the penal sum of _____
(\$ _____) Dollars, for the payment of which sum we bind ourselves, our heirs, executors, administrators,
and successors, jointly and severally.

WHEREAS, the Principal has entered into a certain Contract with the Owner, dated _____, a copy
of which is hereto attached and made a part of hereof.

NOW THEREFORE, the condition of this obligation is such that if the Principal shall in all respects fully perform the
Contract and all duly authorized modifications thereof, during its original term and any extensions thereof that may be
granted and during any guaranty period for which the Contract provides, and if the Principal shall fully satisfy all claims
arising out of the prosecution of the work under the Contract and shall fully indemnify the Owner for all expenses which it
may incur by reason of such claims, including its attorney's fees and court costs, and if the Principal shall make full
payment to all person supplying labor, services, materials, or equipment in the prosecution of the work under the Contract,
in default of which such persons shall have a direct right of action hereupon; and if the Principal shall pay or cause to be
paid all sales and use taxes payable as a result of the performance of the Contract as well as payment of gasoline and special
motor fuels taxes in the performance of the Contract and all motor vehicle fees required for Contract, then this obligation
shall be void; otherwise, it shall remain in full force and effect. No modification of the Contract or extension of neither the
term thereof, nor any forbearance on the part of the Owner shall in any way release the Principal or the Surety from liability
hereunder. Notice to the Surety of any such modification, extension, or forbearance is hereby waived.

IN WITNESS WHEREOF, the aforesaid Principal and Surety have executed this instrument and affixed their seals hereto,
this _____ day of _____.

WITNESS:

Individual Principal

Business Address

By: (Affix by Seal)

ATTEST

Corporate Principal

Business Address

By: (Affix Corporate Seal)

ATTEST:

Corporate Surety

By: _____

Title: _____

Business Address

The rate of premium on this bond is \$ _____.

The total amount of premium charges is \$ _____.

(The above is to be filled in by Surety Company. Power-of-Attorney of person signing for the Surety Company must be attached).

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the corporation named as Principal in the a foregoing bond; and that _____ who signed the said bond on behalf of the Principal, was then _____ of said corporation; that I know his signature there to is genuine; and that said bond was fully signed, sealed and attested for and in behalf of said corporation by authority of its governed body.

By: _____
Affix Corporate Seal

ALTERNATIVE PERFORMANCE AND PAYMENT SECURITY

LETTER OF CREDIT

PROJECT NAME & NO: _____

COMPLETION ASSURANCE AGREEMENT

THIS AGREEMENT made this ___ day of _____, by and between the NAVAJO HOUSING AUTHORITY AND _____;
(CONTRACTOR)

WITNESSETH

WHEREAS, the General Contractor and NAVAJO HOUSING AUTHORITY have entered into a Construction Contract date _____, providing for Project: _____ described in such contract; and

WHEREAS, the General Contractor desires to meet his obligations to supply 100 percent Performance and Payment Bonds with a substitution of another form of security; and

WHEREAS, the NAVAJO HOUSING AUTHORITY has determined that a letter of credit arrangement would provide sufficient security in lieu of a performance and payment bond.

NOW THEREFORE, in consideration of the mutual promises and undertaking herein contained, and for the propose of inducing the NAVAJO HOUSING AUTHORITY to substitute a letter of credit arrangement for a performance and payment bond, the parties hereto agree that:

1. The General Contractor has provided the NAVAJO HOUSING AUTHORITY with an unconditional, irrevocable, straight Letter of Credit (FUND), issued by a banking institution in the amount of _____ and **00/100 (\$0.00)** to secure and indemnify the NAVAJO HOUSING AUTHORITY for any expenses, lost or damage suffered or sustained as a result of any default by the General Contractor in the performance of its obligations under the Construction Contract. It is expressly understood and agreed that the Fund shall at all times be under the control of the NAVAJO HOUSING AUTHORITY.
2. All disbursements from the Fund shall be authorized and made by the NAVAJO HOUSING AUTHORITY.
3. The Fund shall be maintained as a separate trust account and may be drawn in increments up to its aggregate amount of the aggregate may be drawn. Any incremented draw will not impair or diminish the right of the NAVAJO HOUSING AUTHORITY to make subsequent draws in any amount(s) up to the aggregate amount of the Fund. The proceeds of a draw may be disbursed as follows:
 - a. To the General Contractor during the course of construction to promote the completion of the project, as may be deemed necessary by the NAVAJO HOUSING AUTHORITY.
 - b. To the NAVAJO HOUSING AUTHORITY the entire Fund or balance remaining therein in the event of a default by the General Contractor under the Construction Contract to be used by the NAVAJO HOUSING AUTHORITY to indemnify for any loss, damage or

expense whatsoever which it may suffer by reason of the General Contractor's failure to perform the Construction Contract.

- c. To the General Contractor the balance of such Fund remaining after three months from the date of substantial completion, as defined in **ARTICLE 11, Section 11.06** of the Construction Contract, so long as the Project is free and clear of any liens, claims or encumbrances whatsoever, There shall be withheld from the payment of said balance an amount equal to 2 ½ percent of the total amount of the Construction Contract, which sum is to be retained in account for a period of eighteen (18) months from the date of substantial completion. Said sum shall be held as a Fund to guarantee against defects in construction due to faulty material or workmanship or damage to the premises resulting from such defects, which defects or damage become apparent within one year after the date of substantial completion. Said sum may be used for the correction of defects or damage in the event the General Contractor fails to make such corrections. The General Contractor's liability for such corrections is not limited by the amount of such sum.
4. It is agreed the General Contractor may provide a separate unconditional and irrevocable Letter of Credit to satisfy the requirement, set forth in paragraph 3(c) above, that 2 ½ percent of the total Construction Contract amount, for latent defects, be retained for eighteen (18) months beyond the date of substantial completion. If such separate unconditional and irrevocable Letter of Credit is provided, it must be delivered to and approved in writing by the NAVAJO HOUSING AUTHORITY and made subject to this completion Assurance Agreement before any balance remaining in the Fund is released to the General Contractor or the Fund Cancelled.
5. Any other provision of this Agreement, notwithstanding, it is understood and agreed that no funds may be disbursed to the General Contractor so long as there are any outstanding liens, claims or encumbrances against the Project, written notice of which have been received by the NAVAJO HOUSING AUTHORITY. If any such claims, liens, and encumbrances have not been removed or resolved, and written notice of such removal or resolution is not received by the NAVAJO HOUSING AUTHORITY, by the date of substantial completion, the NAVAJO HOUSING AUTHORITY may in its sole discretion exercise any of its right under **ARTICLE 11, Section 11.06** of the Construction Contract, General Conditions.
6. It is expressly understood by all parties hereto that in the event of a default by the General Contractor in any of its obligations under the Construction Contract, the entire Fund, any part thereof, or balance remaining therein may, at the option of the NAVAJO HOUSING AUTHORITY may be disbursed to it upon written request with an assignment of all rights granted to the NAVAJO HOUSING AUTHORITY.
7. This agreement shall not alter or limit the obligations and liabilities of General Contractor under the Construction Contract, but shall be deemed to be additional security for the performance by the General Contractor of its obligations thereunder.
8. It is understood and agreed that in the event the Fund is held by a depositary, that the depositary is not charged with any duty or responsibility to see to the performance of or compliance with any agreements between any of the parties hereto other than that of paying over the Fund as directed in writing by the NAVAJO HOUSING AUTHORITY nor to see to the application of the Fund after making disbursements as so directed. It is expressly understood and agreed that any claim, controversy, dispute or disagreement which may exist between the General Contractor and the NAVAJO HOUSING AUTHORITY shall have no effect whatsoever upon the obligation of the Depositary to pay the NAVAJO HOUSING

AUTHORITY promptly upon receipt of a notice issued pursuant to the terms of the Fund and this agreement.

9. Notwithstanding any other provisions of the Construction Contract, it is agreed the Fund will be administered pursuant to the terms of the Fund, this Agreement and any consistent provisions of the Construction Contract. Any inconsistent provisions in the Construction Contract shall be superseded and controlled by the Fund and this Agreement. It is expressly agreed that reference to this Agreement or collateral Construction Contract documents does not make the issuance of the Fund conditional.

(CONTRACTOR)

BY _____

NAVAJO HOUSING AUTHORITY

BY _____
(Contracting Officer)

WAGE RATES

"General Decision Number: AZ20240022 01/12/2024

Superseded General Decision Number: AZ20230022

State: Arizona

Construction Type: Building
BUILDING CONSTRUCTION, Includes Building Construction on
Treatment Plants and on Industrial Sites
(Chemical/Processing/Manufacturing Plants, Power Plants,
Refineries, Nuclear Plants, Etc.)

County: Apache County in Arizona.

BUILDING CONSTRUCTION PROJECTS (does not include single family
homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally
required to pay at least the applicable minimum wage rate
required under Executive Order 14026 or Executive Order 13658.
Please note that these Executive Orders apply to covered
contracts entered into by the federal government that are
subject to the Davis-Bacon Act itself, but do not apply to
contracts subject only to the Davis-Bacon Related Acts,
including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/05/2024
1	01/12/2024

ASBE0073-002 08/01/2023

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR.....	\$ 48.81	15.64

CARP1327-001 07/01/2019

	Rates	Fringes
CARPENTER (Drywall Hanging Only).....	\$ 26.24	8.86

ELEC0518-009 08/01/2023

APACHE (Area South of Highway 66)

	Rates	Fringes
ELECTRICIAN (Including Alarm Installation and Low Voltage Wiring).....	\$ 32.50	9.50+13.25%

* ELEC0611-009 01/01/2024

APACHE COUNTY (Area North of Highway 66)

	Rates	Fringes
ELECTRICIAN (Including Alarm Installation and Low Voltage Wiring) Zone 1.....	\$ 38.30	12.98

ZONE 1: 0 to 10 miles from Gallup, NM
 ZONE 2: 10 to 30 miles from Gallup - Add 9%
 ZONE 3: 30 to 40 miles from Gallup - Add 15%
 ZONE 4: Over 40 miles from Gallup - Add 26%

ENGI0428-003 06/01/2022

	Rates	Fringes
POWER EQUIPMENT OPERATOR (CRANE) (2) under 15 tons.....	\$ 33.41	12.57
(3) 15 tons to 100 tons, Tower Crane.....	\$ 34.49	12.57
(4) 100 tons and over.....	\$ 35.52	12.57

IRON0075-002 07/31/2023

	Rates	Fringes
IRONWORKER, REINFORCING AND STRUCTURAL.....	\$ 29.00	17.44

Zone 1: 0 to 50 miles from City Hall in Phoenix or Tucson
 Zone 2: 050 to 100 miles - Add \$4.00
 Zone 3: 100 to 150 miles - Add \$5.00

Zone 4: 150 miles & over - Add \$6.50

LABO1184-009 06/01/2023

	Rates	Fringes
LABORER		
General or Common Laborer...	\$ 24.18	7.59

LABO1184-010 06/01/2023

	Rates	Fringes
LABORER (MASON TENDER-BRICK).....	\$ 24.18	7.59

PAIN0086-006 06/30/2021

	Rates	Fringes
DRYWALL FINISHER/TAPER		
ZONE A.....	\$ 23.55	7.49
ZONE B.....	\$ 27.05	7.49

ZONE PAY:

 ZONE A: Free Zone: A distance of 0 to 100 miles from the old Phoenix courthouse.

 ZONE B: A distance of 101 miles and over from the old Phoenix courthouse: \$3.50 per hour over ZONE A

* SUAZ2012-011 05/30/2012

	Rates	Fringes
CARPENTER, Excludes Drywall Hanging.....	\$ 18.42	1.46
CEMENT MASON/CONCRETE FINISHER...	\$ 17.71	2.60
FLOOR LAYER: Hardwood and Resilient Flooring.....	\$ 17.98	6.50
GLAZIER.....	\$ 15.98 **	0.79
LABORER: Landscape & Irrigation.....	\$ 9.31 **	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 16.05 **	1.49
OPERATOR: Backhoe.....	\$ 14.00 **	1.80
PAINTER: Brush, Roller and Spray.....	\$ 16.13 **	0.00
PIPEFITTER.....	\$ 22.21	6.12
PLUMBER.....	\$ 19.04	3.07
ROOFER, Includes Installation of Metal Roofs.....	\$ 17.46	4.47
SHEET METAL WORKER.....	\$ 18.68	4.91

SPRINKLER FITTER (Fire Sprinklers).....	\$ 16.48 **	2.94
TILE SETTER.....	\$ 15.93 **	0.45

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.20) or 13658 (\$12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this

classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour

National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

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122113	HORIZONTAL LOUVER BLINDS
123530	RESIDENTIAL CASEWORK

DIVISION 13 – SPECIAL CONSTRUCTION

NOT IN CONTRACT

DIVISION 14 – CONVEYING EQUIPMENT

NOT IN CONTRACT

DIVISION 21 – FIRE SUPPRESSION

NOT IN CONTRACT

DIVISION 22 – PLUMBING

220500	COMMON WORK RESULTS FOR PLUMBING
220700	PLUMBING INSULATION
221116	DOMESTIC WATER PIPING
221119	DOMESTIC WATER PIPING SPECIALITIES
221319	SANITARY WASTE AND VENT PIPING
223300	ELECTRIC DOMESTIC WATER HEATERS
224000	PLUMBING FIXTURES

DIVISION 23 – HEATING VENTILATION AND AIR CONDITIONING

230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC
230700	HVAC INSULATION
233113	METAL DUCTS
233300	AIR DUCT ACCESSORIES
233713	DIFFUSERS, REGISTERS, AND GRILLES
235400	ELECTRIC FURNACES

DIVISION 26 – ELECTRICAL

260010	GENERAL PROVISIONS
260519	CONDUCTORS
260526	GROUNDING
260533	RACEWAYS, BOXES AND FITTINGS
262416	PANELBOARDS
262726	WIRING DEVICES AND PLATES
265113	LIGHTING EQUIPMENT

DIVISION 31 – EARTHWORK

310000	SITE CLEARING
312000	EARTH MOVING
313116	TERMITE CONTROL
313700	RIPRAP

DIVISION 32 – EXTERIOR IMPROVEMENTS

321216	ASPHALT PAVING
321313	CONCRETE PAVING
321373	CONCRETE PAVING JOINT SEALANTS
323113	CHAIN LINK FENCES AND GATES

DIVISION 33 – UTILITIES

33000 SITE UTILITIES

NAVAJO TRIBAL UTILITY AUTHORITY (NTUA)
TECHNICAL SPECIFICATIONS (SEPTEMBER 2008
or LATEST)

TP 1.0 EXCAVATION, TRENCHING, & BACKFILLING FOR WATER & SEWER
UTILITIES

TP 2.0 WATER AND SEWER LINE SEPARATION REQUIREMENTS

TP 3.0 WATER MAINS, WATER SERVICE LINES AND APPURTENANCES

TP 4.0 SEWER MAINS, SEWER LINES AND APPURTENANCES

TP 5.0 FINAL SITE UTILITY INSPECTION REQUIREMENTS

334213 CULVERT

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Work covered by the Contract Documents.
 2. Use of premises.
 3. Specification formats and conventions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: NM15-43 30 Units Crownpoint

1. Project Location: Crownpoint, New Mexico

- B. Owner: Navajo Housing Authority

1. Owner's Representative:

Edison Johnson, Development Coordinator
Navajo Housing Authority –Development & Construction Services Division
Planning and Development Department
P.O. Box 1579
Fort Defiance, AZ 86504
(928) 729-6610

- C. Architect:

Tamarah Begay, CEO/President
Indigenous Design Studio + Architecture LLC
P.O. Box 16657
Albuquerque, N.M. 87191
(505) 226-2565

- D. The Work consists of the following:

1. The Work includes site preparation, earthwork, sidewalks, site utilities and water line upgrade, wood framing, wood fabrications, carpentry, EIFS Stucco siding, interior architectural woodwork, thermal insulation, asphalt shingles, metal doors & frames, wood doors, vinyl windows, hardware, storage shelving, plaster, gypsum

board, ceramic tile, VCT flooring, interior and exterior painting, painting, toilet compartments, & accessories, fire extinguishers, kitchen cabinets, HVAC, plumbing and electrical.

- E. Project will be constructed under a single prime contract.

1.3 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

- 1. Limits: Confine constructions operations to project boundary.

- a. Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet beyond building perimeter; 10 feet beyond surface walkways, patios, surface parking, and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, storm-water detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.

- 2. Owner Occupancy: Allow for Owner occupancy of Project site.

- 3. Driveways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

- a. Schedule deliveries to minimize use of driveways and entrances.

- b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.4 WORK RESTRICTIONS

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

1.5 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "Master Format" numbering system.

- 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on *AIA Document G710, "Architect's Supplemental Instructions."*

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Work Change Directive: Architect may issue a Work Change Directive on AIA Document G714. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets Submittals Schedule and Contractor's Construction Schedule.
 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Submit draft of *AIA Document G703 Continuation Sheets*.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets AIA Document G702/CMA and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Submittals Schedule (preliminary if not final).
 5. List of Contractor's staff assignments.
 6. Copies of building permits.

7. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 8. Initial progress report.
 9. Report of preconstruction conference.
 10. Certificates of insurance and insurance policies.
- G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
1. Coordination Drawings.
 2. Project meetings.
 3. Requests for Interpretation (RFIs).

1.2 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit 5 opaque copies of each submittal. Architect will return four copies.
 4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

1.5 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after

execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

- a. Tentative construction schedule.
- b. Phasing.
- c. Critical work sequencing and long-lead items.
- d. Designation of key personnel and their duties.
- e. Procedures for processing field decisions and Change Orders.
- f. Procedures for RFIs.
- g. Procedures for testing and inspecting.
- h. Procedures for processing Applications for Payment.
- i. Distribution of the Contract Documents.
- j. Submittal procedures.
- k. Preparation of Record Documents.
- l. Use of the premises.
- m. Work restrictions.
- n. Owner's occupancy requirements.
- o. Responsibility for temporary facilities and controls.
- p. Construction waste management and recycling.
- q. Parking availability.
- r. Office, work, and storage areas.
- s. Equipment deliveries and priorities.
- t. First aid.
- u. Security.
- v. Progress cleaning.
- w. Working hours.

3. Minutes: Architect will record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at monthly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction

behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- 1) Review schedule for next period.
- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
3. Minutes: Architect will record and distribute to Contractor the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.6 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect and Construction Manager.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
- C. Hard-Copy RFIs: CSI Form 13.2A.
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect'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 Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B. Include the following:
1. Project name.
 2. Name and address of Contractor.

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3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Daily construction reports.
 - 3. Field condition reports.
- B. See Division 01 Section "Payment Procedures" for submitting the Schedule of Values.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

1.3 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from parties involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. Equipment at Project site.
 - 3. Material deliveries.
 - 4. High and low temperatures and general weather conditions.

5. Accidents.
 6. Stoppages, delays, shortages, and losses.
 7. Meter readings and similar recordings.
 8. Orders and requests of authorities having jurisdiction.
 9. Services connected and disconnected.
 10. Equipment or system tests and startups.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation on CSI Form 13.2A. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to 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 performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. See Division 01 Section "Closeout Procedures" for submitting warranties.
- C. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- D. See Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- E. See Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of

the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Use AIA Document G810.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

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.
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. Printed performance curves.
 - g. Operational range diagrams.
 - h. Compliance with specified referenced standards.
 - i. Testing by recognized testing agency.
 4. Number of Copies: Submit 5 copies of Product Data, unless otherwise indicated. Architect will return 4 copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.

- f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 - k. Relationship to adjoining construction clearly indicated.
 - l. Seal and signature of professional engineer if specified.
 - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit two opaque (bond) copies of each submittal. Architect will return one copy.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
 - 1. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.
- F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A.
 - 1. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

- G. **Manufacturer Certificates:** Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. **Product Certificates:** Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. **Material Certificates:** Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. **Material Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. **Product Test Reports:** Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. **Research/Evaluation Reports:** Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- M. **Preconstruction Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- N. **Compatibility Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- O. **Field Test Reports:** Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- P. **Maintenance Data:** Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- Q. **Design Data:** Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- R. **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.

- S. **Manufacturer's Field Reports:** Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Statement on condition of substrates and their acceptability for installation of product.
 - 2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- T. **Insurance Certificates and Bonds:** Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

2.3 DELEGATED DESIGN

- A. **Performance and Design Criteria:** Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. **Delegated-Design Submittal:** In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- 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.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. NO EXCEPTIONS TAKEN: Approval/Acceptable with no corrections.
 - 2. MAKE CORRECTIONS NOTED: Approved with notations or clarification required. All comments are clear and further review is required. The contractor shall address all review comments when proceeding with the work.
 - 3. AMEND & RESUBMIT: Disapproved – resubmit requiring minor corrections or clarifications. Architect will identify the reasons for resubmission.
 - 4. REJECTED – SEE REMARKS: Disapproved – resubmit: Rejected as not in accordance with the contract or as requiring major corrections or clarifications. The Architect will identify the reasons for disapproval. The Contractor shall revise and resubmit with changes clearly identified. On advice of counsel, select appropriate terms for action stamp and insert term and explanation of each action taken in subparagraph below. See Evaluations.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

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.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. See Divisions 02 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- D. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

- G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- H. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of three previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

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 Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: For Owner'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. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems 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.
- D. 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.
- E. 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.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of

manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.6 QUALITY CONTROL

- A. **Contractors Responsibilities:** Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
1. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. **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 as specified in Division 01 Section "Submittal Procedures."
- C. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.

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 Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. See Division 01 Section "Execution" for progress cleaning requirements.

1.2 DEFINITIONS

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

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

1.4 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pavement: Comply with Division 32 Section "Asphalt Paving."
- B. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.
- C. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry, Miscellaneous Rough Carpentry."
- D. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead, unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 1. At each telephone, post a list of important telephone numbers including:
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Owner's office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations.
 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- E. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
 1. Provide temporary, directional signs for construction personnel and visitors.
 2. Maintain and touchup signs so they are legible at all times.

- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.
- F. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 1. Prohibit smoking in construction areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. See Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
- C. See Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - g. Cost information, including a proposal of change, if any, in the Contract Sum.
 - h. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 4. Store cementitious products and materials on elevated platforms.
 5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 7. Protect stored products from damage and liquids from freezing.

1.5 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. **Manufacturer's Warranty:** Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. **General Product Requirements:** Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. **Standard Products:** If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
- B. **Product Selection Procedures:**
 - 1. **Products:** Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 - 2. **Manufacturers:** Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 - 3. **Product Options:** Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
 - 4. **Visual Selection Specification:** Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. **Standard Range:** Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern,

density, or texture from manufacturer's product line that does not include premium items.

- b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 45 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

- B. Related Sections include the following:

1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1 Section "Submittal Procedures" for submitting surveys.
3. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

- A. Qualification Data: For land surveyor to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Certified Surveys: Submit three copies signed by land surveyor.
- D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's written permission.
- C. 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.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. 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 Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.

4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

- E. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification; signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 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.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of **9 feet** in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. 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 Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- 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. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. 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.
- I. 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.
- J. 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.
- K. 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.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 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.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. See Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- D. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- E. See Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- F. See Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

- A. 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 Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner 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, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect 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 Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection 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 a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect 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. Re-inspection: Request re-inspection 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. Organize list of spaces in sequential order, starting with exterior areas first.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect 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 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 FINAL CLEANING

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

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to 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.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. 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.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - r. Leave Project clean and ready for occupancy.

- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's 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 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation manuals for systems, subsystems, and equipment.
 - 2. Maintenance manuals for the care and maintenance of systems and equipment.
- B. See Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 SUBMITTALS

- A. Manual: Submit two copies of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.
- B. Descriptions: Include the following:
1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.

- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of

parts and components, and recommended spare parts for each component part or piece of equipment:

- D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions that detail essential maintenance procedures:
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
- E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Product Data.
- B. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- C. See Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up Record Prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal: Submit two set(s) of plots from corrected Record CAD Drawings and one set(s) of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.
 - b. Final Submittal: Submit two set(s) of marked-up Record Prints, and the following:
 - 1) Record CAD Drawing Files and Plots: two set(s).
 - 2) Copies printed from Record CAD Drawing Plots: three sets. Print each Drawing, whether or not changes and additional information were recorded.
- B. Record Product Data: Submit one copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: 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 would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:
1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
 2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
 - a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
 - b. CAD Software Program: The Contract Drawings are available in AutoCad 2018.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.

1.2 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.3 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- B. Coordinate content of training modules with content of approved operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- 1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.

2. Documentation: Review operations and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

END OF SECTION 017900

SECTION 021000 EXISTING SITE CONDITIONS - GEOTECHNICAL & HAZ-MAT REPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section consists of information on existing site conditions.

1.2 SUBSURFACE SOILS DATA

- A. Subsurface soils investigations have been made and the results are made available for the Contractor. This soils investigation data is not a warranty of site conditions, the Contractor is expected to examine the site and determine for him/her the character of materials to be encountered.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: As specified in Division 31 "Earthwork Section."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 021000



915 Malta Avenue ♦ Farmington, NM 87401 ♦ Tel (505) 327-7928 ♦ Fax (505) 326-5721

December 24, 2018

Nathan Wero, NCARB, CDT
Indeginous Design Studio + Architecture, LLC
3737 Princeton Drive, NE, Suite 130
Albuquerque, New Mexico 87107

RE: Geotechnical Engineering Report Addendum No. 1
Assessment of 30 Unit Housing Subdivision
Crownpoint, New Mexico
GEOMAT Project No. 182-2953

As requested, GEOMAT Inc. (GEOMAT) is providing recommendations for a driveway rigid pavement section to be used at the NHA15-43 30 unit housing subdivision located in Crownpoint, New Mexico. This is Addendum No. 1 to our original Geotechnical Engineering Report (GEOMAT Project No. 182-2953) dated March 29, 2018.

Based on the soil conditions encountered at the site, we recommend a minimum driveway concrete thickness of 4.5 inches. The concrete should attain a minimum compressive strength of 4000 psi at 28 days. The slump of the concrete at time of placement should be between 2 and 4 inches and its air content between 4.5 to 7.5 percent.

An aggregate base course layer under the concrete is not required. However, prior to placement of the concrete, the exposed ground surface should be scarified to a minimum depth of 8 inches and watered as necessary to bring the material to within optimum moisture content to 2 percent above and compacted to a minimum of 95 percent of ASTM D698 maximum dry density. Any fill required to achieve finished subgrade elevation should also be placed under the same moisture-density control.

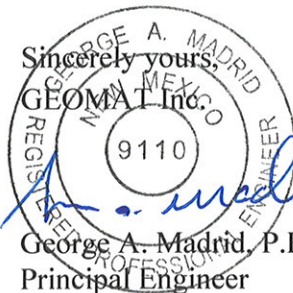
All other recommendations in our original report remain unchanged.

We have appreciated being of service to you in the geotechnical engineering phase of this project. If you have any questions concerning this report, please contact us.

Sincerely yours,

GEOMAT Inc.

George A. Madrid, P.E.
Principal Engineer



12.24.18



**GEOTECHNICAL ENGINEERING REPORT
30 UNIT SUBDIVISION
NHA NM15-43
CROWNPOINT, NEW MEXICO**

Submitted To:

Nathan Wero, NCARB, CDT
Indeginous Design Studio + Architecture, LLC
3737 Princeton Drive, NE, Suite 130
Albuquerque, New Mexico 87107

Submitted By:

GEOMAT Inc.
915 Malta Avenue
Farmington, New Mexico 87401

March 29, 2018
GEOMAT Project 182-2953



915 Malta Avenue ♦ Farmington, NM 87401 ♦ Tel (505) 327-7928 ♦ Fax (505) 326-5721

March 29, 2018

Nathan Wero, NCARB, CDT
Indeginous Design Studio + Architecture, LLC
3737 Princeton Drive, NE, Suite 130
Albuquerque, New Mexico 87107

RE: Geotechnical Engineering Report
30 Unit Subdivision – NHA NM15-43
Crownpoint, New Mexico
GEOMAT Project No. 182-2953

GEOMAT Inc. (GEOMAT) has completed the geotechnical engineering exploration for the assessment of a 30 unit housing subdivision located in Crownpoint, New Mexico project number NM15-43. This study was performed in general accordance with our Proposal No. 172-12-03, dated December 14, 2017.

The results of our engineering study, including the geotechnical recommendations, site plan, boring records, and laboratory test results are attached. Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, if the housing units are to be replaced, they could be supported on structurally-reinforced (mat or post-tensioned) slab foundations on engineered fill. Other design and construction details, based upon geotechnical conditions, are presented in the report.

We have appreciated being of service to you in the geotechnical engineering phase of this project. If you have any questions concerning this report, please contact us.

Sincerely yours,
GEOMAT Inc.

Seth D. Yokel
By: [Signature]
Seth D. Yokel
Staff Geologist



Matthew J. Cramer, P.E.
Vice President

Copies to: Addressee (1)

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Site Plan
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APPENDIX B

Laboratory Test Results
Laboratory Test Procedures

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Important Information About This Geotechnical Engineering Report (Taken From GBA)

**GEOTECHNICAL ENGINEERING REPORT
30 UNIT SUBDIVISION
NHA NM15-43
CROWNPOINT, NEW MEXICO
GEOMAT PROJECT NO. 182-2953**

INTRODUCTION

This report contains the results of our geotechnical engineering exploration for the assessment of a 30-unit subdivision (NHA project number NM15-43) located in Crownpoint, New Mexico, as shown on the Site Plan in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations about:

- subsurface soil conditions
- groundwater conditions
- lateral soil pressures
- earthwork
- assessment of the existing structures
- foundation design and construction for new structures
- slab design and construction
- pavement design
- drainage

The opinions and recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, and experience with similar soil conditions, structures, and our understanding of the proposed project as stated below.

PROPOSED CONSTRUCTION

We understand the project will consist of the assessment (by others) of the 30 existing single housing units and, recommendations for design of new units, as applicable. Also included is evaluation of the existing pavements for the subdivision by others. We understand that based on the assessments of others regarding the structural conditions of the housing units, either a rebuild or repair/modernization of the existing units will be recommended by the design team. Since these assessments were not completed at the time of our field exploration, our exploratory boring locations were distributed across the subdivision in order to obtain generalized subsurface information for the entire site.

If a complete rebuild is required based upon the assessments by others, we understand the existing buildings will be demolished and new units of similar size will be constructed in the same locations. We anticipate the new units will be wood framed and supported on structurally-reinforced (post-tension) slabs. No basements or other below-grade structures are planned, and no significant earthwork cuts or fills are expected to be necessary to achieve the planned finished grades. We also understand that the existing subdivision streets will be assessed and possibly recommended for a complete removal and replacement.

SITE EXPLORATION

Our scope of services performed for this project included a site reconnaissance by a staff geologist, a subsurface exploration program, laboratory testing and engineering analyses.

Field Exploration:

Subsurface conditions at the site were explored on March 16, 2018 by drilling ten exploratory borings at the approximate locations shown on the Site Plan in Appendix A. Borings B-1, B-3, B-5, B-6, B-8, and B-10 were drilled to depths of approximately 10 feet below existing ground surface in the proximity of the existing units. Borings B-2, B-4, B-7, and B-9 were drilled to a depth of approximately 5 feet in the subdivision roadway.

The borings were advanced using a CME-55 truck-mounted drill rig with continuous-flight, 7.25-inch O.D. hollow-stem auger. The borings were continuously monitored by a geologist from our office who examined and classified the subsurface materials encountered, obtained representative samples, observed groundwater conditions, and maintained a continuous log of each boring.

Soil samples were obtained from the borings using a combination of standard 2-inch O.D. split spoon and 3-inch O.D. modified California ring barrel samplers. The samplers were driven using a 140-pound hammer falling 30 inches. The standard penetration resistance was determined by recording the number of hammer blows required to advance the sampler in six-inch increments. Representative bulk samples of subsurface materials were also obtained.

Groundwater evaluations were made in each boring at the time of site exploration. Soils were classified in accordance with the Unified Soil Classification System described in Appendix A. Boring logs were prepared and are presented in Appendix A.

Laboratory Testing:

Samples retrieved during the field exploration were transported to our laboratory for further evaluation. At that time, the field descriptions were confirmed or modified as necessary, and laboratory tests were performed to evaluate the engineering properties of the subsurface materials.

SITE CONDITIONS

The site of the subdivision under assessment is approximately three quarters of a mile west of State Highway 371 and consists of four streets: Antelope Street, Opal Street, Turquoise Street, and Harmony Street with Turquoise and Antelope Streets oriented generally in a north-south direction and Harmony and Opal Streets oriented in generally an east-west direction. The subdivision is comprised of 30 individual housing units, of which several appeared to be abandoned. The ground surface across the site appeared to gently slope downward from south to north across the subdivision. The existing site was vegetated by a sparse to moderate growth of weeds and several trees at the time of our exploration. The roadways in the subdivision contained some cracking but no apparent potholes. The following photograph depicts the site at the time of our exploration.



**Picture from Intersection of Antelope Street and Harmony Street
View to the North**

SUBSURFACE CONDITIONS

Soil Conditions:

As presented on the Boring Logs in Appendix A, we encountered stiff to very stiff sandy lean clay soils in all of the borings from the ground surface to depths ranging from approximately 1.5 to 4 feet. In all of the borings, the clayey soils were underlain by loose to dense sandy soils. In borings B-1, B-2, B-4, B-6, B-7, and B-9 the sandy soils below the surficial clay soils extended to the total depths explored. In borings B-3, B-5, B-8, and B-10, stiff to very stiff lean clay soils were present below the sandy soils and extended to the total depths explored.

Groundwater Conditions:

Groundwater was not encountered in the borings to the depths explored. Groundwater elevations can fluctuate over time depending upon precipitation, irrigation, runoff and infiltration of surface water. We do not have any information regarding the historical fluctuation of the groundwater level in this vicinity.

Laboratory Test Results:

Laboratory analyses of samples tested indicate the sandy lean clay soils have fines contents (silt- and/or clay-sized particles passing the U.S. No. 200 sieve) ranging from approximately 65 to 68 percent. Results of the hydrometer test indicate the sample tested had a clay content (particles smaller than 0.002 mm) of approximately 25 percent.

Laboratory analyses of samples tested indicate the lean clay with sand soils have fines contents of 79 percent. In-place dry densities of the lean clay with sand soils ranged from approximately 91 to 94 pounds per cubic foot (pcf), with natural moisture contents of approximately 7 percent.

In-place dry densities of the clayey sand soils ranged from approximately 88 to 106 pounds per cubic foot (pcf), with natural moisture contents ranging from approximately 6 to 8 percent.

Laboratory consolidation/expansion testing was performed on undisturbed ring samples of the subgrade soils beneath the proposed building area. Results of these tests indicate that the clayey sand soils undergo slight compression when subjected to anticipated foundation stresses at the existing moisture contents. When subjected to increased moisture conditions at these stresses, they undergo slight additional compression. Results of these tests indicate that the lean clay with sand soils undergo slight compression when subjected to anticipated foundation stresses at the existing moisture contents. When subjected to increased moisture conditions at these stresses, they undergo slight to moderate expansion.

Results of all laboratory tests are presented in Appendix B.

OPINIONS AND RECOMMENDATIONS

Geotechnical Considerations:

The site is considered suitable for the proposed buildings based on the geotechnical conditions encountered and tested for this report. To reduce the potential for settlement and provide more uniform and higher allowable bearing pressures, the footings should bear on engineered fills.

We were not provided with any information documenting the conditions of the soils at the time the buildings were constructed, or the amount of earthwork that might have been done. We were also not provided information about the direction, and magnitude of movement and structural distress of any buildings. Therefore, it is not possible to determine whether the moisture contents have increased or decreased, or whether any volume changes have occurred, since that time. However, moderate changes in the moisture contents of soils, even on the order of two to three percent, could induce movements (expansive or compressive). Distress to buildings supported on shallow foundations could occur as a result of either expansion or collapse/settlement.

It should also be noted that the soils tested were sampled at locations adjacent to the buildings, and are not necessarily representative of the soils under the buildings. We were not provided with any information about any previous geotechnical studies that might have been done at the site, including any records of earthwork observation and/or testing. It is possible that these soil conditions were previously identified and that remediative measures were undertaken, i.e., proper earthwork procedures, to improve the compression and/or expansion characteristics of the soils under the structures. Evidence of remediative earthwork measures being taken during construction may be better determined in the structural and civil assessments of the site.

If there are any significant deviations from the assumed floor elevations, structure locations and/or loads noted at the beginning of this report for any new structures, the opinions and recommendations of this report should be reviewed and confirmed/modified as necessary to reflect the final planned design conditions.

Foundations:

Based on our understanding of the type of structures to be built and the results of our field subsurface exploration and laboratory testing, if the buildings are to be replaced, the buildings should be supported on a structural, reinforced (mat or post-tensioned) slab foundation.

Structural (mat or post-tensioned) slab foundations are intended to be sufficiently rigid to function as a single structural unit to reduce building distress if the underlying soils were to become wet and differentially move. The results of our laboratory testing indicate that movements on the order of 1 to 2 inches could result as result of increased moisture conditions. Therefore, the structures and the utilities entering the structures should be designed to accommodate this magnitude of movement. It is of paramount importance to provide good positive drainage away from the buildings to ensure that surface water is transmitted away from the structures. Also, utility trenches entering and exiting the buildings should be properly backfilled to reduce the potential for moisture infiltration through the backfill. Consideration should also be given to routing the water lines overhead in the buildings to reduce the potential for leaks below the slab.

The structural slab foundations should be designed by the Project Structural Engineer to tolerate movement of the underlying foundation soils. The structural reinforced slab foundations should rest on a minimum of one (1.0) foot of engineered fill, including the thickness of the base course. Also, we recommend that the perimeter edges of the slabs be “turned down” to a thickness of at least 30 inches below adjacent grade for frost protection.

Guidelines for the design and construction of post-tensioned slabs, thickened edges and/or interior beams have been developed by the Post-Tensioning Institute (PTI) and American Concrete Institute. Due to the expansive nature of the clayey soils, the PTI expansive model should be used for design.

The soil conditions specific to the subject site may require alternative or supplemental design considerations that are not specifically addressed by PTI. GEOMAT is providing the following parameters that can be implemented for commonly used design methods.

A maximum allowable bearing value of 1,000 psf may be used for structural reinforced slab foundation system (reinforced mat or post-tensioned slab) bearing on a properly prepared engineered fill at 6 inches below finished pad elevations. A maximum allowable bearing value of 2,000 psf may be used for perimeter turn-down foundations bearing a minimum of 30 inches below finished pad elevation. A modulus of elasticity value of 3,000 pounds per square inch would be appropriate of the general site soil conditions. A coefficient of subgrade reaction (K_{V1}) of 300 kips per cubic foot (kcf) is appropriate for the soil type at the site. This coefficient can be corrected to account for the width (b) of the slab using the following equation:

$$K = K_{V1} ((b+1)/(2b))^2$$

According to criteria presented in the PTI Manuel 3rd Edition, and based on our laboratory test results, the clayey soils at the site would classify as an expansive site.

VOLFLO 1.5 software was used as an aid to evaluate the characteristics of the expansive clayey soils on the site. Based on the VOLFLO analysis, the edge moisture variation distance (e_m) is 9.0 feet for the center lift condition and 4.8 feet for the edge lift condition. The Y_m values are -0.18 inches for the center lift condition and 1.51 inches for the edge lift condition. A slab subgrade friction coefficient of 0.70 is appropriate for a structural reinforced foundation resting on the engineered fill. This value may be increased to 1.0 for a foundation resting on an aggregate base course or granular base course, such as might be used to provide a capillary moisture break.

The estimated differential soil movement outlined above is based on normal climate conditions. Additional movements are possible if the foundation soils are infiltrated by moisture due to concentrated surface storm water, inadequate site drainage, water line or utility pipe leaks, landscape irrigation line leaks, excessive irrigation, etc.

For foundations adjacent to descending slopes, a minimum horizontal setback of five (5) feet should be maintained between the foundation base and slope face. In addition, the setback should be such that an imaginary line extending downward at 45 degrees from the nearest foundation edge does not intersect the slope.

Footings and foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement.

Foundation excavations should be observed by GEOMAT. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

Site Classification:

Based on the subsurface conditions encountered in the borings, we estimate that Site Class D is appropriate for the site according to Table 20.3-1 of the ASCE 7-10 Standard in accordance with the 2015 International Building Code. This parameter was estimated based on extrapolation of data beyond the deepest depth explored, using methods allowed by the code. Actual shear wave velocity testing/analysis and/or exploration to a depth of 100 feet were not performed as part of our scope of services for this project.

Lateral Earth Pressures:

For soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are presented in the following table:

- **Active:**
 - Granular soil backfill 35 psf/ft
 - Undisturbed subsoil30 psf/ft

- **Passive:**
 - Shallow foundation walls250 psf/ft
 - Shallow column footings.....350 psf/ft

- **Coefficient of base friction:**0.40
The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

Where the design includes restrained elements, the following equivalent fluid pressures are recommended:

- **At rest:**
 - Granular soil backfill50 psf/ft
 - Undisturbed subsoil60 psf/ft

Fill against grade beams and retaining walls should be compacted to densities specified in **Earthwork**. Medium to high plasticity clay soils should not be used as backfill against retaining walls. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Over compaction may cause excessive lateral earth pressures that could result in wall movement.

Floor Slab Design and Construction:

The floor slabs should be placed on a minimum of one (1.0) foot of compacted soil (including the base course). On-site or imported soils with low expansive potentials should be used in fills that will support the floor slabs. Some differential movement of a slab-on-grade floor system is possible if the subgrade soils become elevated in moisture content. Such movements are considered within general tolerance for normal slab-on-grade construction. To reduce potential slab movements, the subgrade soils should be prepared as outlined in the **Earthwork** section of this report.

For structural design of concrete slabs-on-grade, a modulus of subgrade reaction of 250 pounds per cubic inch (pci) may be used for floors supported on compacted engineered fill.

Additional floor slab design and construction recommendations are as follows:

- Control joints should be provided in slabs to control the location and extent of cracking. Joint spacing should be designed by the structural engineer.
- Interior trench backfill placed beneath slabs should be compacted in accordance with recommended specifications outlined below.
- In areas subjected to normal loading, a minimum 4-inch layer of clean-graded gravel, aggregate base course should be placed beneath interior slabs. For heavy loading, re-evaluation of slab and/or base course thickness may be required.
- Other design and construction considerations, as outlined in the ACI Design Manual, Section 302.1R are recommended.
- If moisture sensitive floor coverings are used on interior slabs, consideration should be given to the use of membranes to help reduce the potential for vapor rise through the slab.

Subgrade preparation and moisture control recommendations provided in this report help to reduce soil related problems that may result in distress of concrete floor slabs on grade. However, concrete drying shrinkage, temperature induced volume change and curling can create cracking and distress in the concrete slab on grade. To reduce distress from these causes, properly proportioned concrete mixes with adequate curing and proper joint spacing must be provided. These options should be discussed with the project Architect/Engineer.

Pavement Design and Construction:

Design of pavements for the project has been based on the procedures outlined in the Guideline for Design of Pavement Structures by the American Association of State Highway and Transportation Officials (AASHTO).

The average daily traffic (ADT) volume projections for this project were developed as follows:

- Determine the numbers of housing units that will access the roads. In some cases, this includes adjacent units that are not in the specific project but must use the road as access.
- Use an average of 2 vehicles per unit.
- Use an average of 2 passes in each lane for each vehicle per day.
- Estimate 5% of vehicles are trucks.

Based upon the above criteria, the estimated average daily traffic (ADT) for the streets in the subdivision is 120, with trucks comprising approximately five percent of the total traffic.

We are presenting options for flexible (asphalt) pavement sections. Recommendations for rigid (concrete) pavement sections will be provided if requested.

Based on the subsurface conditions encountered in borings at this location, the recommended pavement section is three (3.0) inches of hot-mix asphalt on a minimum of six (6.0) inches of aggregate base course if a complete removal and replacement is recommended by the assessments.

The existing asphalt concrete and aggregate base course could be reclaimed/processed for reuse as aggregate base material.

The design subgrade R-Value for this portion of the project is 16. Although not expected, should import material be necessary to adjust the street grades, the import material should have a minimum R-Value of 16.

Pavement Construction Recommendations:

Immediately prior to paving, the prepared subgrade should be proof-rolled under the observation of a representative of GEOMAT. The proof-rolling should be conducted utilizing a fully loaded, single axle water truck with a minimum 2,000 gallon capacity or other vehicle that will provide an equivalent weight on the subgrade. The proof-rolling should consist of driving the truck across all the areas to be paved with asphalt at a slow speed (less than 5 mph) and observing any deflections or distress caused to the subgrade. Areas that show distress should be repaired by removing and replacing the soft material with suitable fill.

Aggregate base course should conform to Section 304 of NMDOT specifications for Base Course.

Aggregate base course should be placed in lifts not exceeding six inches and should be compacted to a minimum of 95% Standard Proctor density (ASTM D-698), within a moisture content range of 4 percent below, to 2 percent above optimum. In any areas where base course thickness exceeds 6 inches, the material should be placed and compacted in two or more lifts of equal thickness.

If the hot-mix asphalt is placed in more than one mat, the surface of each underlying mat should be treated with a tack coat immediately prior to placement of the subsequent mat of hot-mix asphalt.

Asphalt concrete should be obtained from an engineer-approved mix design prepared in accordance with NMDOT specifications. The hot-mix paving should be placed and compacted in accordance with NMDOT specifications.

Portland cement concrete for pavements should be obtained from an engineer-approved mix design prepared in accordance with NMDOT specifications. The concrete should be placed in accordance with NMDOT specifications.

The performance of the recommended pavement sections can be enhanced by minimizing excess moisture that can reach the subgrade soils. The following recommendations should be considered at minimum:

- Site grading at a minimum 2% grade away from the pavements;
- Compaction of any utility trenches to the same criteria as the pavement subgrade.

The recommended pavement sections are considered minimal sections based on the anticipated traffic volumes and the subgrade conditions encountered during our exploration. They are expected to perform adequately when used in conjunction with preventive maintenance and good drainage. Preventive maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment.

General Pavement Considerations:

The performance of the recommended pavement sections can be enhanced by minimizing excess moisture that can reach the subgrade soils. The following recommendations should be considered at minimum:

- Site grading at a minimum 2% grade away from the pavements;
- Compaction of any utility trenches to the same criteria as the pavement subgrade.

The recommended pavement sections are considered minimal sections based on the anticipated traffic volumes and the subgrade conditions encountered during our exploration. They are expected to perform adequately when used in conjunction with preventive maintenance and good drainage. Preventive maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment.

Slopes:

Assuming fill specifications, compaction requirements, and recommended setbacks provided in this report are followed, cut and fill slopes as steep as to 2.5:1 (horizontal:vertical) should be stable. Depending upon specific project conditions, adequate factors of safety against slope failure may be available for steeper configurations. However, such a determination would require additional analysis.

Earthwork:

General Considerations:

The opinions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section. Although underground facilities such as foundations, septic tanks, cesspools, basements and irrigation systems were not encountered during site reconnaissance, such features could exist and might be encountered during construction.

Site Clearing:

1. Strip and remove all existing pavement, fill, debris and other deleterious materials from the proposed building area. Any existing structures should be completely removed from below any building, including foundation elements and any associated development such as underground utilities, septic tanks, etc. All exposed surfaces below footings and slabs should be free of mounds and depressions which could prevent uniform compaction.
2. If unexpected fills or underground facilities are encountered during site clearing, we should be contacted for further recommendations. All excavations should be observed by GEOMAT prior to backfill placement.
3. Stripped materials consisting of vegetation and organic materials should be removed from the site, or used to re-vegetate exposed slopes after completion of grading operations. If it is necessary to dispose of organic materials on-site, they should be placed in non-structural areas, and in fill sections not exceeding 5 feet in height.

4. Sloping areas steeper than 5:1 (horizontal:vertical) should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be level and wide enough to accommodate compaction and earth moving equipment.
5. All exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of eight inches, conditioned to near optimum moisture content, and compacted to at least 95% of standard proctor (ASTM D698).

Excavation:

1. We present the following general comments regarding our opinion of the excavation conditions for the designers' information with the understanding that they are opinions based on our boring data. More accurate information regarding the excavation conditions should be evaluated by contractors or other interested parties from test excavations using the equipment that will be used during construction. Based on our subsurface evaluation it appears that excavations in soils at the site will be possible using standard excavation equipment.
2. On-site soils may pump or become unstable or unworkable at high water contents, especially for excavations near the water table. Dewatering may be necessary to achieve a stable excavation. Workability may be improved by scarifying and drying. Over-excavation of wet zones and replacement with granular materials may be necessary. Lightweight excavation equipment may be required to reduce subgrade pumping.

Slab Subgrade Preparation:

1. After site clearing is complete, the existing soil below the building area should be prepared as recommended in the **Floor Slab Design and Construction** and **Site Clearing** sections of this report. Soils should be removed to provide at least a one (1.0) foot thickness of compacted soil and base course below the floor slab.
2. A minimum 4-inch layer of aggregate base course should be placed beneath floor slabs on grade.

Foundation Preparation:

Footings should bear on engineered fill as recommended in the **Foundations** section of this report. All loose and/or disturbed soils should either be compacted or removed from the bottoms of footing excavations prior to placement of reinforcing steel and/or concrete.

Fill Materials:

1. Native or imported soils with low expansive potentials could be used as fill material for the following:
 - general site grading
 - foundation areas
 - interior floor slab areas
 - foundation backfill
 - pavement areas
2. Select granular materials should be used as backfill behind walls that retain earth.
3. On site or imported soils to be used in structural fills should conform to the following:

<u>Gradation</u>	<u>Percent finer by weight (ASTM C136)</u>
3"	100
No. 4 Sieve	50-100
No. 200 Sieve	50 Max

Maximum expansive potential (%)*1.5

* Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about 3 percent below optimum water content. The sample is confined under a 144-psf surcharge and submerged.

4. Aggregate base should conform to Type I Base Course as specified in Section 303 of the 2014 New Mexico Department of Transportation (NMDOT) “*Standard Specifications for Road and Bridge Construction.*”

Placement and Compaction:

1. Place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift.
2. Un-compacted fill lifts should not exceed 10 inches loose thickness.

3. Materials should be compacted to the following:

<u>Material</u>	<u>Minimum Percent (ASTM D698)</u>
Subgrade soils beneath fill areas	95
On site or imported soil fills:	
Beneath footings, slabs on grade and pavements.....	95
Aggregate base beneath slabs and pavements.....	95
Miscellaneous backfill.....	90

4. On-site and imported soils should be compacted at moisture contents near optimum.

Compliance:

Recommendations for slabs-on-grade and foundation elements supported on compacted fills depend upon compliance with **Earthwork** recommendations. To assess compliance, observation and testing should be performed by GEOMAT.

Drainage:

Surface Drainage:

1. Positive drainage should be provided during construction and maintained throughout the life of the proposed project. Infiltration of water into utility or foundation excavations must be prevented during construction. Planters and other surface features that could retain water in areas adjacent to the buildings or pavements should be sealed or eliminated.
2. In areas where sidewalks or paving do not immediately adjoin the structures, we recommend that protective slopes be provided with a minimum grade of approximately 5 percent for at least 10 feet from perimeter walls. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.
3. Downspouts, roof drains or scuppers should discharge into splash blocks or extensions when the ground surface beneath such features is not protected by exterior slabs or paving.
4. Sprinkler systems should not be within 5 feet of foundation walls. Irrigated landscaping adjacent to the foundation system should be minimized or eliminated.

Subsurface Drainage:

Free-draining, granular soils containing less than five percent fines (by weight) passing a No. 200 sieve should be placed adjacent to walls which retain earth. A drainage system consisting of either weep holes or perforated drain lines (placed near the base of the wall) should be used to intercept and discharge water which would tend to saturate the backfill. Where used, drain lines should be embedded in a uniformly graded filter material and provided with adequate clean-outs for periodic maintenance. An impervious soil should be used in the upper layer of backfill to reduce the potential for water infiltration.

GENERAL COMMENTS

It is recommended that GEOMAT be retained to provide a general review of final design plans and specifications in order to confirm that grading and foundation recommendations in this report have been interpreted and implemented. In the event that any changes of the proposed project are planned, the opinions and recommendations contained in this report should be reviewed and the report modified or supplemented as necessary.

GEOMAT should also be retained to provide services during excavation, grading, foundation, and construction phases of the work. Observation of footing excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present and is considered a necessary part of continuing geotechnical engineering services for the project. Construction testing, including field and laboratory evaluation of fill, backfill, pavement materials, concrete and steel should be performed to determine whether applicable project requirements have been met.

The analyses and recommendations in this report are based in part upon data obtained from the field exploration. The nature and extent of variations beyond the location of test borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.


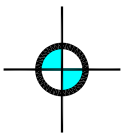
Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities at the same time. No warranty, express or implied, is intended or made. We prepared the report as an aid in design of the proposed project. This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction equipment and techniques to be used on this project.

This report is for the exclusive purpose of providing geotechnical engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken. This report has also not addressed any geologic hazards that may exist on or near the site.

This report may be used only by the Client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on and off site), or other factors may change over time and additional work may be required with the passage of time. Any party, other than the Client, who wishes to use this report, shall notify GEOMAT in writing of such intended use. Based on the intended use of the report, GEOMAT may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements, by the Client or anyone else, will release GEOMAT from any liability resulting from the use of this report by an unauthorized party.

Appendix A



 Approximate Not to Scale	SITE PLAN Boring Locations (approximate) GEOMAT Project No. 182-2953 Date of Exploration: March 16, 2018		PROJECT Assessment of 30 Housing Unit Subdivision NHA Project NM15-43 Crownpoint, New Mexico	
	 GEOMAT INC.			



915 Malta Avenue
 Farmington, NM 87401
 Tel (505) 327-7928
 Fax (505) 326-5721

Borehole B-1

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Ring and Split spoon samples</u>	Logged By: <u>SY</u>
Hammer Weight: <u>140 lbs</u>	Remarks: <u>None</u>
Hammer Fall: <u>30 inches</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
94.0			6.6	3-7-7	SS 6		CL		1	Sandy lean CLAY, dark brown, stiff, slightly damp
				6-8-9	R 18				2	Clayey SAND, tan to brown, fine- to medium grained, medium dense, slightly damp to dry
				7-7-10	SS 18				3	
									4	
									5	
									6	Thin laminations of organics
									7	
									8	
									9	
									10	Contains clay lenses
									11	
					12	Total Depth 11½ feet				
					13					
					14					
					15					

GEOMAT 182-2953.GPJ GEOMAT.GDT 3/29/18

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample



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Borehole B-2

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Bulk sample from auger cuttings</u>	Logged By: <u>SY</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
					A		ACP		0 - 3	Asphalt Concrete 3" inches thick
							ABC		3 - 7	Aggregate Base Course 7" thick
							CL		7 - 3	Sandy lean CLAY, dark brown, slightly damp to damp
							SC		3 - 5	Clayey SAND, tan to brown, fine- to medium grained, slightly damp to dry
									5 - 6	Total Depth 5 feet
									6	
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

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Borehole B-3

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Ring and Split spoon samples</u>	Logged By: <u>SY</u>
Hammer Weight: <u>140 lbs</u>	Remarks: <u>None</u>
Hammer Fall: <u>30 inches</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description				
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)											
94.4			6.8	6-10-17	SS 6		CL		1	Sandy lean CLAY with trace gravels, dark brown, very stiff, slightly damp to damp				
				2	3	Clayey SAND, tan to brown, fine- to medium grained, medium dense to dense, slightly damp to dry, contains clay lenses and thin laminations of organics								
				4	5		Lean CLAY with sand, tan/gray, dry, very stiff, slightly weathered (caliche)							
				6	7									
				8	9									
				10	11	6-6-7	SS 6		CL					
				12	Total Depth 11½ feet									
				13										
				14										
				15										

GEOMAT 182-2953.GPJ GEOMAT.GDT 3/29/18

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample



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Borehole B-4

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Bulk sample from auger cuttings</u>	Logged By: <u>SY</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
65	23				A		ACP		1	Asphalt Concrete 3" inches thick
							ABC		1	Aggregate Base Course 6" thick
					A		CL		2	Sandy lean CLAY, dark brown, slightly damp to damp
					A		SC		3	Clayey SAND, tan to brown, fine- to medium grained, slightly damp to dry
									4	
									5	
									6	Total Depth 5 feet
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

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Borehole B-5

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Ring and Split spoon samples</u>	Logged By: <u>SY</u>
Hammer Weight: <u>140 lbs</u>	Remarks: <u>None</u>
Hammer Fall: <u>30 inches</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description		
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)									
88.0			7.5	5-7-9	R 18		CL		1	Sandy lean CLAY, dark brown, slightly damp to damp		
				2								
				3							Clayey SAND, tan to brown, fine- to medium grained, medium dense, slightly damp to dry	
				4							Contains thin laminations of organics and lenses of clay	
				5	6-11-17	SS 6		SC				
				6								
				7								
				8							Lean CLAY with sand, tan/gray, dry, very stiff, slightly weathered (caliche)	
				9						CL		
				10	9-11-13	SS 18						
				11								
12	Total Depth 11½ feet											
13												
14												
15												

GEOMAT 182-2953.GPJ GEOMAT.GDT 3/29/18

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample



915 Malta Avenue
 Farmington, NM 87401
 Tel (505) 327-7928
 Fax (505) 326-5721

Borehole B-6

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Bulk, Ring and Split spoon samples</u>	Logged By: <u>SY</u>
Hammer Weight: <u>140 lbs</u>	Remarks: <u>None</u>
Hammer Fall: <u>30 inches</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description				
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)											
105.9	17	21	8.4	6-11-11	D		CL		1	Sandy lean CLAY, dark brown, stiff, slightly damp to damp				
					R 18				2					
					SS 18				3	Clayey SAND, tan, fine- to medium grained, loose, slightly damp to dry Contains thin laminations of organics, slightly weathered (caliche)				
									4					
									5					
								5-6-6					6	Contains clay lenses
													7	
													8	
													9	
								4-5-8	R 18				10	
													11	
								12	Total Depth 11½ feet					
								13						
								14						
								15						

GEOMAT 182-2953.GPJ GEOMAT.GDT 3/29/18

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample



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Borehole B-7

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Bulk sample from auger cuttings</u>	Logged By: <u>SY</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
					D		ACP		0	Asphalt Concrete 3" thick
					D		ABC		1	Aggregate Base Course 17" thick
					D		CL		2	Sandy lean CLAY, dark brown, slightly damp to damp
					D		SC		4	Clayey SAND, tan to brown, fine- to medium grained, slightly damp to dry
									5	Total Depth 5 feet
									6	
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample



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Borehole B-8

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Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Ring and Split spoon samples</u>	Logged By: <u>SY</u>
Hammer Weight: <u>140 lbs</u>	Remarks: <u>None</u>
Hammer Fall: <u>30 inches</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
				5-7-12	R 18		CL		1 2	Sandy lean CLAY, dark brown, stiff to very stiff, slightly damp to damp
				10-12-13	SS 6		SC		3 4 5	Clayey SAND, tan to brown, fine- to medium grained, medium dense, slightly damp to dry Contains thin laminations of organics
				4-20-31	R 18				6 7 8 9 10 11	Lean CLAY with sand, tan/gray, slightly damp to dry, very stiff, slightly weathered (caliche)
									12	Total Depth 11½ feet
									13	
									14	
									15	

GEOMAT 182-2953.GPJ GEOMAT.GDT 3/29/18

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Borehole B-9

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Bulk sample from auger cuttings</u>	Logged By: <u>SY</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
					A		ACP		0	Asphalt Concrete 3" inches thick
					A		ABC		1	Aggregate Base Course 6" inches thick
					A		CL		2	Sandy lean CLAY, dark brown, slightly damp to damp
					A		SC		3	Clayey SAND, tan to brown, fine- to medium grained, slightly damp to dry
					A		SC		4	
									5	Total Depth 5 feet
									6	
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample



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Borehole B-10

Project Name: <u>30 Unit Subdivision - NHA NM15-43</u>	Date Drilled: <u>3/16/2018</u>
Project Number: <u>182-2953</u>	Latitude: <u>None Determined</u>
Client: <u>IDS+A</u>	Longitude: <u>None Determined</u>
Site Location: <u>Crownpoint, New Mexico</u>	Elevation: <u>None Determined</u>
Rig Type: <u>CME-55</u>	Boring Location: <u>See Site Plan</u>
Drilling Method: <u>7.25" O.D. Hollow Stem Auger</u>	Groundwater Depth: <u>Not Encountered</u>
Sampling Method: <u>Ring and Split spoon samples</u>	Logged By: <u>SY</u>
Hammer Weight: <u>140 lbs</u>	Remarks: <u>None</u>
Hammer Fall: <u>30 inches</u>	

Laboratory Results				Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
91.5	79	27	6.9	5-8-8	SS 6		CL		1	Sandy lean CLAY, dark brown, stiff, slightly damp to damp
									2	
				6-12-12	R 18		SC		3	Clayey SAND, tan to brown, fine- to medium grained, medium dense, slightly damp to dry Contains thin laminations of organics
									4	
				6-12-12	R 18		CL		5	Lean CLAY with sand, tan/gray, stiff, slightly damp to dry, slightly weather (caliche)
									6	
				6-12-12	R 18		CL		7	
									8	
				6-12-12	R 18		CL		9	
									10	
				5-6-6	SS 18		CL		11	
12										
								12	Total Depth 11½ feet	
									13	
									14	
									15	

GEOMAT 182-2953.GPJ GEOMAT.GDT 3/29/18

A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample D = Disturbed Bulk Sample

UNIFIED SOIL CLASSIFICATION SYSTEM						CONSISTENCY OR RELATIVE DENSITY CRITERIA				
Major Divisions				Group Symbols	Typical Names					
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines		Penetration Resistance, N (blows/ft.)	Standard Penetration Test Density of Granular Soils			
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines			Relative Density			
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures			0-4	Very Loose		
			GC	Clayey gravels, gravel-sand-clay mixtures			5-10	Loose		
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines		11-30	Medium Dense			
			SP	Poorly graded sands and gravelly sands, little or no fines		31-50	Dense			
		Sands with Fines	SM	Silty sands, sand-silt mixtures		>50	Very Dense			
			SC	Clayey sands, sand-clay mixtures		Standard Penetration Test Density of Fine-Grained Soils				
Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid Limit 50 or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands		Penetration Resistance, N (blows/ft.)	Consistency	Unconfined Compressive Strength (Tons/ft2)			
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays					<2	Very Soft	<0.25
		OL	Organic silts and organic silty clays of low plasticity					2-4	Soft	0.25-0.50
	Silts and Clays Liquid Limit greater than 50	MH	Inorganic silts, micaceous or diatomaceous free sands or silts, elastic silts					4-8	Firm	0.50-1.00
		CH	Inorganic clays of high plasticity, fat clays					8-15	Stiff	1.00-2.00
		OH	Organic clays of medium to high plasticity					15-30	Very Stiff	2.00-4.00
		PT	Peat, mucic & other highly organic soils					>30	Hard	>4.0
Highly Organic Soils										
U.S. Standard Sieve Sizes										
	>12"	12"	3"	3/4"	#4	#10	#40	#200		
Boulders	Cobbles		Gravel		Sand			Silt or Clay		
		coarse	fine	coarse	medium	fine				

MOISTURE CONDITIONS

Dry	Absence of moist, dusty, dry to the touch
Slightly Damp	Below optimum moisture content for compaction
Moist	Near optimum moisture content, will moisten the hand
Very Moist	Above optimum moisture content
Wet	Visible free water, below water table

MATERIAL QUANTITY

trace	0-5%
few	5-10%
little	10-25%
some	25-45%
mostly	50-100%

OTHER SYMBOLS

R	Ring Sample
S	SPT Sample
B	Bulk Sample
▼	Ground Water

BASIC LOG FORMAT:

Group name, Group symbol, (grain size), color, moisture, consistency or relative density. Additional comments: odor, presence of roots, mica, gypsum, coarse particles, etc.

EXAMPLE:

SILTY SAND w/trace silt (SM-SP), Brown, loose to med. Dense, fine to medium grained, damp

UNIFIED SOIL CLASSIFICATION SYSTEM

TEST DRILLING EQUIPMENT & PROCEDURES


Description of Subsurface Exploration Methods

Drilling Equipment – Truck-mounted drill rigs powered with gasoline or diesel engines are used in advancing test borings. Drilling through soil or softer rock is performed with hollow-stem auger or continuous flight auger. Carbide insert teeth are normally used on bits to penetrate soft rock or very strongly cemented soils which require blasting or very heavy equipment for excavation. Where refusal is experienced in auger drilling, the holes are sometimes advanced with tricone gear bits and NX rods using water or air as a drilling fluid.

Sampling Procedures - Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In most cases, 2” outside diameter, 1 3/8” inside diameter, samplers are used to obtain the standard penetration resistance. “Undisturbed” samples of firmer soils are often obtained with 3” outside diameter samplers lined with 2.42” inside diameter brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samplers in 6-inch increments. These values are expressed in blows per foot on the boring logs. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. “Undisturbed” sampling of softer soils is sometimes performed with thin-walled Shelby tubes (ASTM D1587). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Where samples of rock are required, they are obtained by NX diamond core drilling (ASTM D2113).

Boring Records - Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the logs.

Appendix B

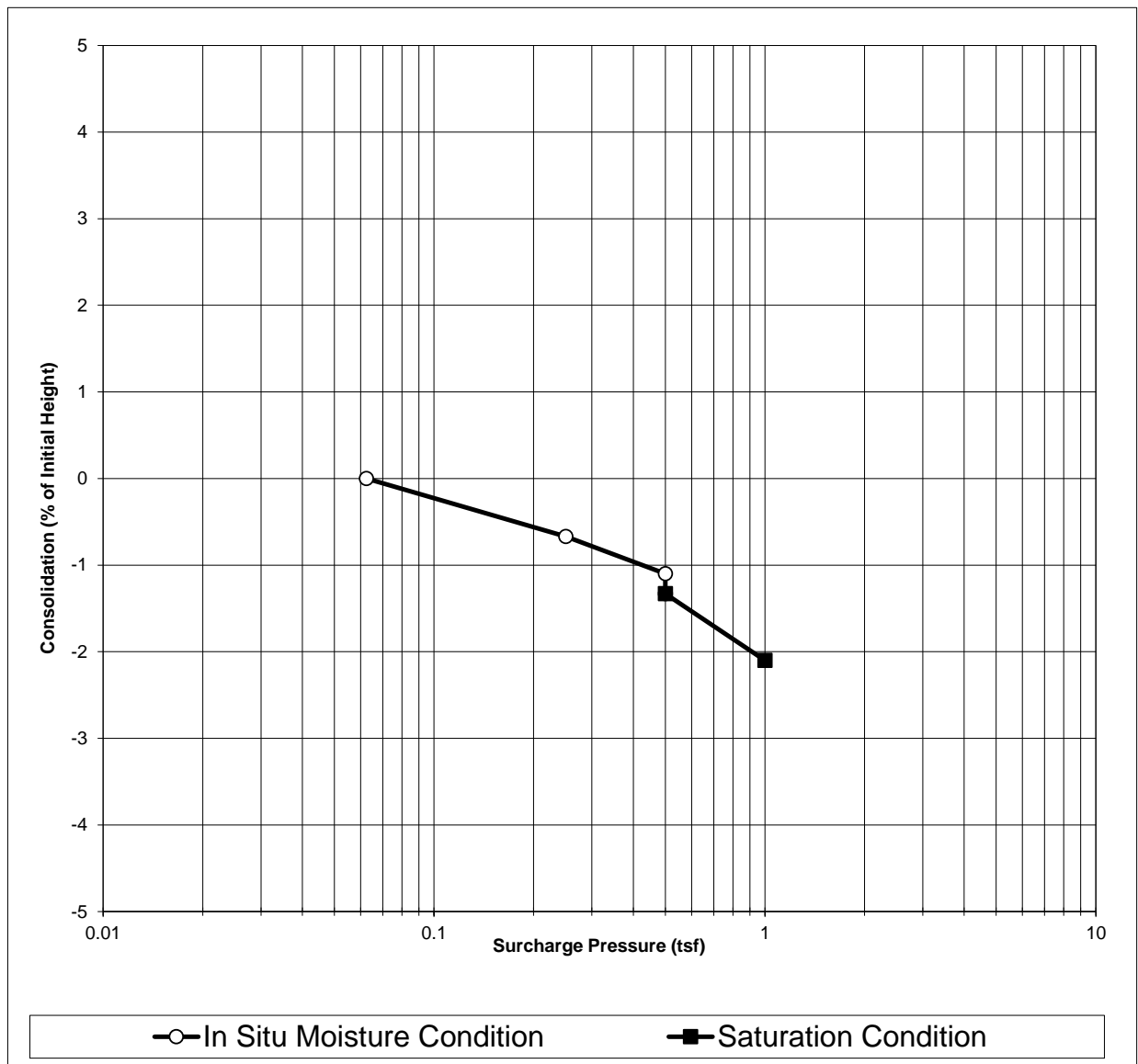
LAB NO.	BORING NO.	SAMPLE DEPTH (ft)	ASTM D698		MOISTURE CONT. (%)	DENSITY		ATTERBERG LIMITS			CONSOL TEST	% PASS #200 SIEVE	% PASSING .002 mm (HYDROMETER)	R-Value	CLASSIFICATION
			Density	Moisture		WET (pcf)	DRY (pcf)	LL	PL	PI					
6134	B-1	5.0	-	-	6.6	100.2	94.0	-	-	-	Attached	-	-	-	Clayey SAND (SC)
6135	B-3	5.0	-	-	6.8	100.8	94.4	-	-	-	Attached	-	-	-	Lean CLAY with sand (CL)
6136	B-4	1.0	-	-	-	-	-	40	17	23	-	65	-	16	Sandy lean CLAY (CL)
6137	B-5	2.5	-	-	7.5	94.6	88.0	-	-	-	Attached	-	-	-	Clayey SAND (SC)
6138	B-6	2.5	-	-	8.4	114.7	105.9	-	-	-	-	-	-	-	Clayey SAND (SC)
6139	B-6	0-5	-	-	-	-	-	38	17	21	-	68	25	17	Sandy lean CLAY (CL)
6140	B-10	5.0	-	-	6.9	97.8	91.5	45	18	27	-	79	-	12	Lean CLAY with sand (CL)
SUMMARY OF SOIL TESTS															
															
Project															
30 Unit Subdivision NHA NM15-34															
Job No.															
182-2953															
Location															
Crownpoint, New Mexico															
Date of Exploration															
3/16/2018															

PROJECT: 30 Unit Subdivision - NHA NM15-43
CLIENT: IDS+A
MATERIAL: Clayey SAND (SC)
SAMPLE SOURCE: B-1 @5'
SAMPLE PREP.: In Situ

JOB NO: 182-2953
WORK ORDER NO: NA
LAB NO: 6134
DATE SAMPLED: 3/16/2018
SAMPLED BY: SY

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL VOLUME (cu.in)	4.60	FINAL VOLUME (cu.in)	4.51
INITIAL MOISTURE CONTENT	6.6%	FINAL MOISTURE CONTENT	23.7%
INITIAL DRY DENSITY(pcf)	94.0	FINAL DRY DENSITY(pcf)	95.6
INITIAL DEGREE OF SATURATION	18%	FINAL DEGREE OF SATURATION	67%
INITIAL VOID RATIO	0.77	FINAL VOID RATIO	0.73
ESTIMATED SPECIFIC GRAVITY	2.651	SATURATED AT	0.5 tsf

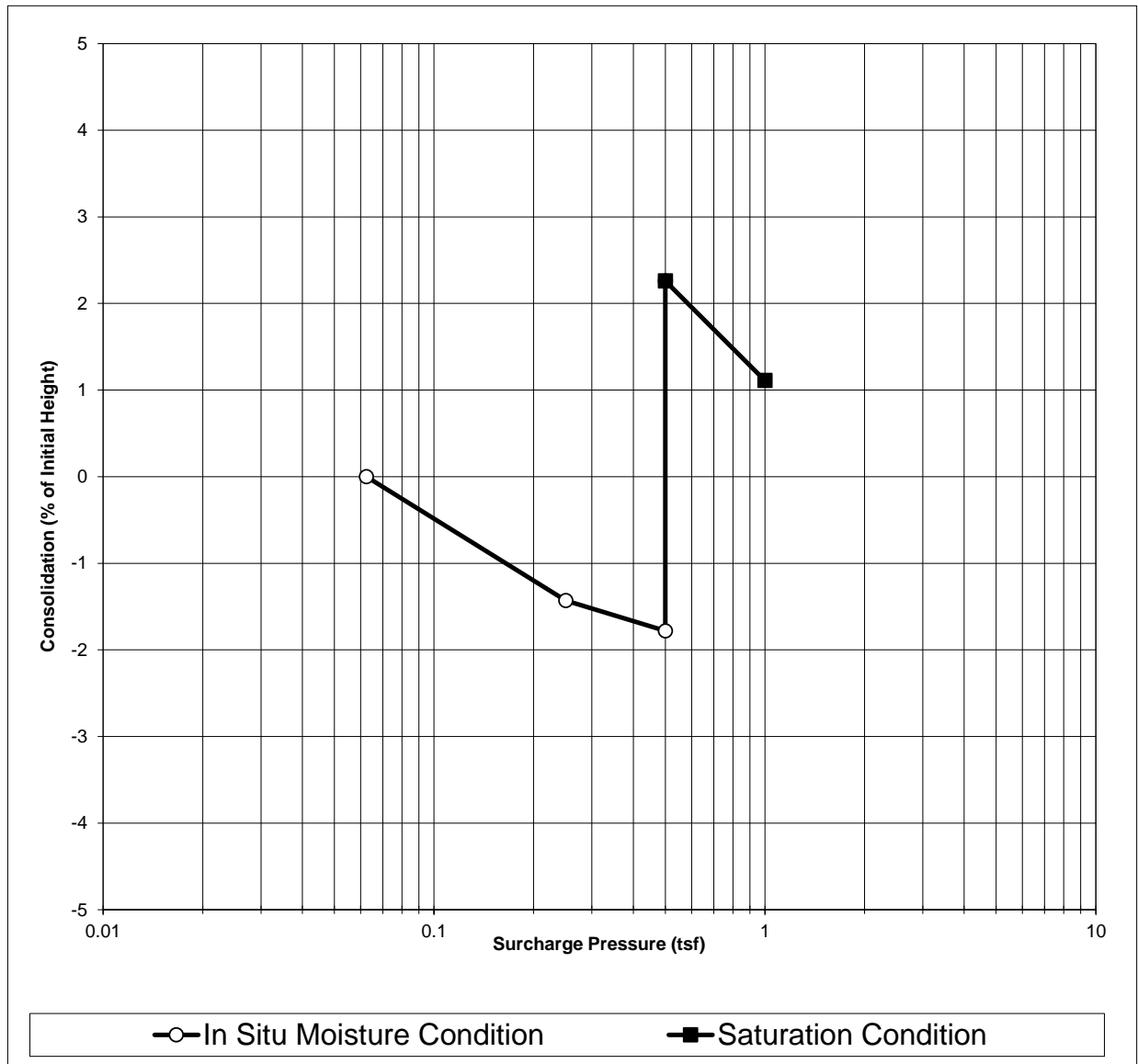


PROJECT: 30 Unit Subdivision - NHA NM15-43
CLIENT: IDS+A
MATERIAL: Clayey SAND (SC)
SAMPLE SOURCE: B-3 @5'
SAMPLE PREP.: In Situ

JOB NO: 182-2953
WORK ORDER NO: NA
LAB NO: 6135
DATE SAMPLED: 3/16/2018
SAMPLED BY: SY

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL VOLUME (cu.in)	4.60	FINAL VOLUME (cu.in)	4.66
INITIAL MOISTURE CONTENT	6.6%	FINAL MOISTURE CONTENT	23.7%
INITIAL DRY DENSITY(pcf)	94.0	FINAL DRY DENSITY(pcf)	92.5
INITIAL DEGREE OF SATURATION	18%	FINAL DEGREE OF SATURATION	63%
INITIAL VOID RATIO	0.77	FINAL VOID RATIO	0.79
ESTIMATED SPECIFIC GRAVITY	2.651	SATURATED AT	0.5 tsf

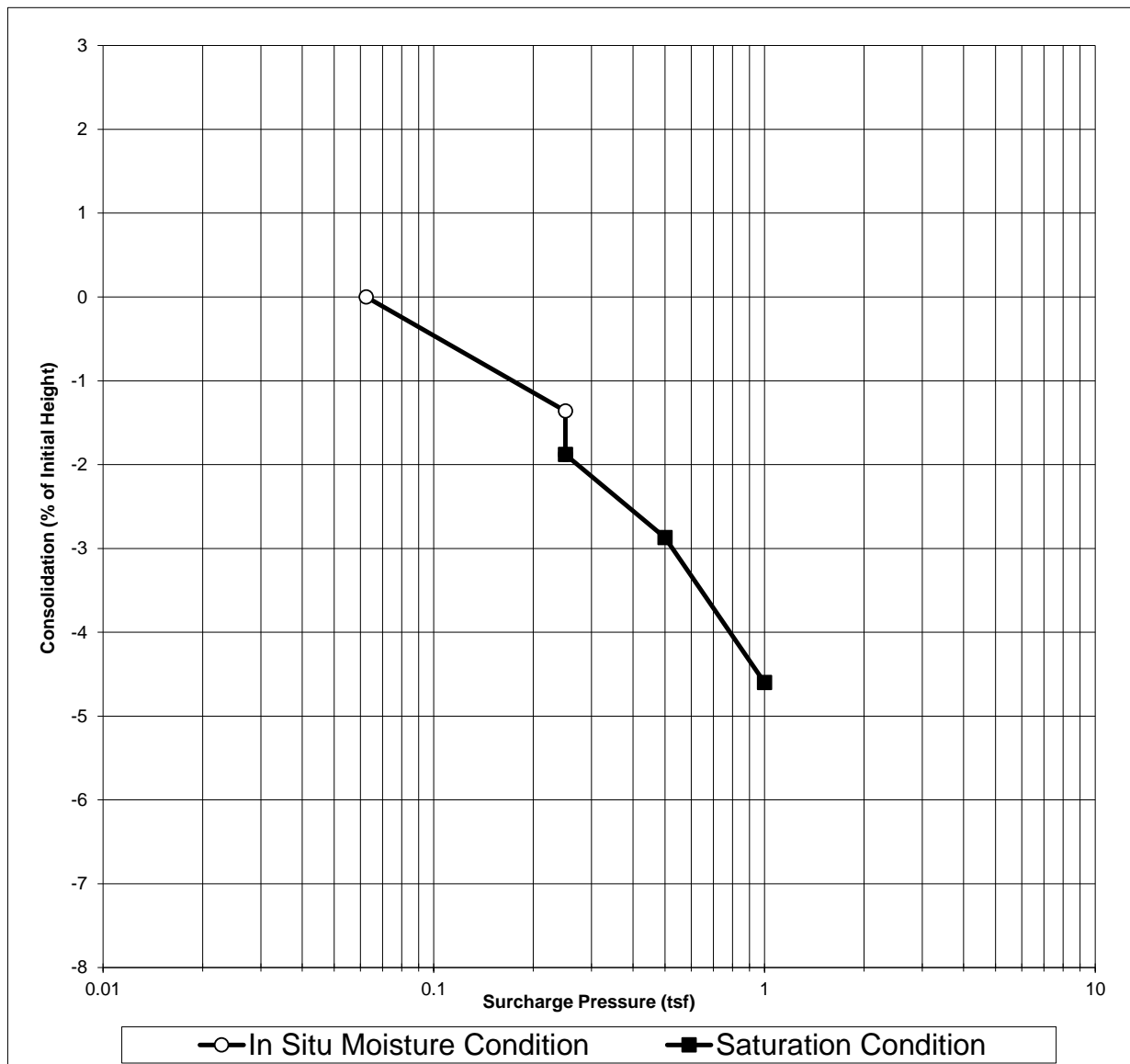


PROJECT: 30 Unit Subdivision - NHA NM15-43
CLIENT: IDS+A
MATERIAL: Clayey SAND (SC)
SAMPLE SOURCE: B-5 @ 2.5'
SAMPLE PREP.: In Situ

JOB NO: 182-2953
WORK ORDER NO: NA
LAB NO: 6137
DATE SAMPLED: 3/16/2018
SAMPLED BY: SY

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL VOLUME (cu.in)	4.60	FINAL VOLUME (cu.in)	4.39
INITIAL MOISTURE CONTENT	7.5%	FINAL MOISTURE CONTENT	24.3%
INITIAL DRY DENSITY(pcf)	88.0	FINAL DRY DENSITY(pcf)	91.8
INITIAL DEGREE OF SATURATION	18%	FINAL DEGREE OF SATURATION	64%
INITIAL VOID RATIO	0.89	FINAL VOID RATIO	0.80
ESTIMATED SPECIFIC GRAVITY	2.651	SATURATED AT	0.25 tsf



LABORATORY TESTING PROCEDURES

Consolidation Tests: One-dimensional consolidation tests are performed using “Floating-ring” type consolidometers. The test samples are approximately 2.5 inches in diameter and 1.0 inch high and are usually obtained from test borings using the dynamically-driven ring samplers. Test procedures are generally as outlined in ASTM D2435. Loads are applied in several increments to the upper surface of the test specimen and the resulting deformations are recorded at selected time intervals for each increment. Samples are normally loaded in the in-situ moisture conditions to loads which approximate the stresses which will be experienced by the soils after the project is completed. Samples are usually then submerged to determine the effect of increased moisture contents on the soils. Each load increment is applied until compression/expansion of the sample is essentially complete (normally movements of less than 0.0003 inches/hour). Porous stones are placed on the top and bottom surfaces of the samples to facilitate introduction of the moisture.

Expansion Tests: Tests are performed on either undisturbed or recompacted samples to evaluate the expansive potential of the soils. The test samples are approximately 2.5 inches in diameter and 1.0 inch high. Recompacted samples are typically remolded to densities and moisture contents that will simulate field compaction conditions. Surcharge loads normally simulate those which will be experienced by the soils in the field. Surcharge loads are maintained until the expansion is essentially complete.

Atterberg Limits/Maximum Density/Optimum Moisture Tests: These tests are performed in accordance with the prescribed ASTM test procedures.

Appendix C

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



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NAVAJO HOUSING AUTHORITY
NM15-043 Crownpoint - Home Ownership Unit

PROJECT MEMORANDUM

Subject: Pre-renovation Asbestos and Lead Based Paint Inspection Laboratory Results for the Various Navajo Housing Properties, Crownpoint, New Mexico, Navajo Nation.



NAVAJO HOUSING AUTHORITY
NM15-043 Crownpoint - Home Ownership Unit

The following are the laboratory results from the pre-renovation asbestos inspection performed at the subject site on May 9, 2018 by Ecosystem Management, Inc. The building materials listed below were reported to be asbestoscontaining:

<u>Building Material</u>	<u>Material Location</u>	<u>Laboratory Result</u>
BlackFloorTieMastic	Throughout Unit 22	4% Chrysotile
BlackFloorTileMastic	Throughout Unit 23	5% Chrysotile

The following building materials were sampled and reported to be non-detected for the presence of asbestos:

- Interior Sheetrock - Through out Unit 22.
- Tape Bed Mud - Throughout Unit 22.
- Wall Texture - Throughout Unit 22.
- Ceiling Texture - Throughout- Unit 22.
- Yellow Floor Linoleum, Backing, Mastic - Throughout Unit 22.
- Acoustical Ceiling Texture - Throughout Unit 22.
- 12" White/ gray Floor Tile - Throughout Unit 22.
- 12" White/ blue Floor Tile - Throughout Unit 22.
- Yellow Floor Tile Mastic - Throughout Unit 22.
- Black Roofing Shingles - Throughout Unit 22.
- Exterior Stucco (all layers) - Throughout Unit 22.

- Interior Sheetrock - Throughout Unit 1.
- Tape Bed Mud - Throughout Unit 1.
- Wall Texture - Throughout Unit 1.
- Acoustical Ceiling Texture - Throughout Unit 1.
- Gray Floor Linoleum, Backing, Mastic - Throughout Unit 1.
- 12" Wood Panel Floor Tile - Throughout Unit 1.
- Yellow Floor Tile Mastic - Throughout Unit 1.
- Ceiling Texture - Throughout Unit 1.
- 12" Tan Floor Tile - Throughout Unit 1.
- Black Floor Tile Mastic - Throughout Unit 1.
- Exterior Stucco (all layers) - Throughout Unit 1.
- Black Roofing Shingles - Throughout Unit 1.

NAVAJO HOUSING AUTHORITY
NM15-043 Crownpoint - Home Ownership Unit

The following building materials were sampled and reported to be non-detected for the presence of asbestos

- Interior Sheetrock - Throughout Unit 11.
- Tape Bed Mud - Throughout Unit 11.
- Acoustical Ceiling Texture - Throughout Unit 11.
- Smooth Ceiling Texture - Throughout Unit 11.
- Wall Texture - Throughout Unit 11.
- Rock Like Floor Linoleum, Backing, Mastic - Throughout Unit 11.
- 12" White / gray Floor Tile - Throughout Unit 11 .
- Orange Floor Tile Mastic - Throughout Unit 11.
- Exterior Stucco (all layers) - Throughout Unit 11. "
- Brown Roofing Shingles - Throughout Unit 11
- Interior Sheetrock - Throughout Unit 23.
- Tape Bed Mud - Throughout Unit 23.
- Acoustical Ceilingg Texture - Throughout Unit 23.
- Smooth Ceiling Texture - Throughout Unit 23.
- Wall Texture - Throughout Unit 23.
- Rock Like Floor Linoleum, Backing, Mastic - Throughout Unit 23.
- 12" White / blue Floor Tile - Throughout Unit 23.
- Yellow Floor Tile Mastic - Throughout Unit 23.
- 12? Tan Floor Tile - Throughout Unit 23.
- Brown Roofing Shingles - Throughout Unit 23.
- Exterior Stucco (all layers) - Throughout Unit 23

NAVAJO HOUSING AUTHORITY
NM15-043 Crownpoint - Home Ownership Unit

In 1990 the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations amended the Asbestos Hazard Emergency Response Act (AHERA) regulations to include an additional form of asbestos bulk sampling analysis known as point counting. The AHERA regulations only governs schools (K-12th grade), but the use of point counting has become an industry standard throughout the private sector. Due to the tightly woven matrix found in non-friable materials an accurate analysis can sometimes be more difficult than with PLM methods. The new rule allows for building owners to re-analyze those non-friable bulk samples, which were reported less than 10% asbestos under PLM analysis for more accurate fiber identification. When point counting methods are used, the results reported would take precedent over the PLM method results previously reported. Should you be Interested In having those non-friable samples that were reported between 1-5% asbestos Point Counted.

Samples were taken of various painted surfaces throughout the subject building, which were suspected to have had lead based paint applied to them. Windowsills, baseboards, exterior doors, steel framing, and interior walls were some of the areas inspected. All samples were labeled with a unique sample number, placed in sealable bags, sent to an independent accredited laboratory, using Flame Atomic Absorption (Flame AA) methods, and tested for total lead content.

NAVAJO HOUSING AUTHORITY
NM15-043 Crownpoint - Home Ownership Unit

The following table summarizes the samples taken as part of this Inspection

Material Type	Material Location	Condition	Lab Result&
White Paint	Throughout Unit 22	Good• Fair	670 ppm/ 0.067%
Light Blue Paint	Throughout Unit 22	Good - Fair	100 ppm/ 0.010%
Dark Blue Paint	Throughout Unit 22	Good - Fair	100 ppm/ 0.010%
Pink Paint	Throughout Unit 22	Good - Fair	170 ppm/ 0.017%
Cream Paint	Throughout Unit 22	Good - Fair	140 ppm/ 0.014%
Purple Paint	Throughout Unit 22	Good• Fair	330 ppm/ 0.033%
Aqua Paint	Throughout Unit 22	Good - Fair	180 ppm/ 0.018%
White Paint	Throughout Unit 1	Good - Fair	320 ppm/ 0.032%
Off White Paint	Throughout Unit 1	Good• Fair	430 ppm/ 0.043%
Dark GrayPaint	Throughout Unit 1	Good - Fair	170 ppm/ 0.017%
Light Green Paint	Throughout Unit 1	Good• Fair	100 ppm/ 0.010%
Blue Paint	Throughout Unit 11	Good - Fair	710 ppm/ 0.071%
Egg White Paint	Throughout Unit 11	Good• Fair	2670 ppm / 0.267%
Dark Cream Paint	Throughout Unit 11	Good - Fair	180 ppm/ 0.018%
Lavender Paint	Throughout Unit 11	Good• Fair	100 ppm / 0.010%
Rose Paint	Throughout Unit 11	Good - Fair	
Blue Green Paint	Throughout Unit 11	Good• Fair	760 ppm / 0.076%
OffWhite Paint	Throughout Unit 23	Good - Fair	310ppm/0.031%
Light Gray Paint	Throughout Unit 23	Good• Fair	260ppm/0.026%
Light Beige Paint	Throughout Unit 23	Good - Fair	380ppm/0.038%

NAVAJO HOUSING AUTHORITY
NM15-043 Crownpoint - Home Ownership Unit

The Lead Based Paint samples collected during this inspection were below the EPA threshold of 5,000 ppm for lead.

The asbestos containing building materials listed above may require special handling should they be disturbed during the renovation of the subject building. The final report will be submitted as soon as possible after the original laboratory reports are received at my office. Should any presumed asbestos containing building materials be encountered during the renovation of the subject area, which is not listed above, they should be assumed to be asbestos containing until proper sampling and analysis can be completed.

Concerning the asbestos bulk sampling and analysis of this report, Polarized Light Microscopy (PLM) is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative transmission electron microscopy (TEM) is currently the best method that can be used to determine if this material can be considered or treated as non-asbestos containing. Although PLM analysis is an approved EPA method to determine if asbestos is present in a building material, TEM analysis is a more accurate laboratory method.

The following table summarizes the samples taken as part of this Inspection

Material Type	Material Location	Condition	Lab Result &
White Paint	Throughout Unit 22	Good- Fair	670 ppm/ 0.067%
Light Blue Paint	Throughout Unit 22	Good - Fair	100 ppm/ 0.010%
Dark Blue Paint	Throughout Unit 22	Good - Fair	100 ppm/ 0.010%
Pink Paint	Throughout Unit 22	Good - Fair	170 ppm/ 0.017%
Cream Paint	Throughout Unit 22	Good - Fair	140 ppm/ 0.014%
Purple Paint	Throughout Unit 22	Good- Fair	330 ppm/ 0.033%
Aqua Paint	Throughout Unit 22	Good - Fair	180 ppm/ 0.018%
White Paint	Throughout Unit 1	Good - Fair	320 ppm/ 0.032%
Off White Paint	Throughout Unit 1	Good-Fair	430 ppm/ 0.043%
Dark Gray Paint	Throughout Unit 1	Good - Fair	170 ppm/ 0.017%
Light Green Paint	Throughout Unit 1	Good - Fair	100 ppm/ 0.010%
Blue Paint	Throughout Unit 11	Good - Fair	710 ppm/ 0.071%
Egg White Paint	Throughout Unit 11	Good- Fair	2670 ppm / 0.267%
Dark Cream Paint	Throughout Unit 11	Good - Fair	180 ppm/ 0.018%
Lavender Paint	Throughout Unit 11	Good-Fair	100 ppm / 0.010%
Rose Paint	Throughout Unit 11	Good - Fair	
Blue Green Paint	Throughout Unit 11	Good- Fair	760 ppm / 0.076%
Off White Paint	Throughout Unit 23	Good- Fair	310 ppm/ 0.031%
Light Gray Paint	Throughout Unit 23	Good- Fair	260 ppm/ 0.026%
Light Beige Paint	Throughout Unit 23	Good- Fair	380 ppm / 0.038%

The Lead Based Paint samples collected during this inspection were reported below the EPA threshold of 5,000 ppm for lead.

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wood framing.
2. Wood supports.
3. Wood blocking.
4. Wood cants.
5. Wood nailers.
6. Wood furring.
7. Wood grounds.
8. Plywood backing panels.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product indicated.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that materials comply with requirements.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses.

C. Research/Evaluation Reports: For the following:

1. Treated wood.
2. Power-driven fasteners.
3. Powder-actuated fasteners.
4. Expansion anchors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirement.

2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive stained or natural finish, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Meet or exceed those indicated per manufacturer's published values determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Wood Structural Panels:
 - 1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
 - 2. Oriented Strand Board: DOC PS 2.
 - 3. Comply with "Code Plus" provisions in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA C2 (lumber) and AWWA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWWA C31 with inorganic boron (SBX).
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
- C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

2.4 DIMENSION LUMBER

- A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated. Must match existing wood at the existing building. Architect will approve wood used.
- B. Non-Load-Bearing Interior Partitions: No. 2 grade and any of the following species:
 1. Mixed southern pine; SPIB.
 2. Eastern softwoods; NELMA.
 3. Northern species; NLGA.
 4. Western woods; WCLIB or WWPA.
- C. Framing Load-Bearing Partitions: No. 2 grade and any of the following species:
 1. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
 2. Southern pine; SPIB.
 3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
- D. Framing Load-Bearing Partitions: Any species and grade with a modulus of elasticity of at least **1,300,000 psi or 1,100,000 psi** and an extreme fiber stress in bending of at least **850 psi** 2-inch nominal thickness and 12-inch nominal width for single-member use.
- E. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 1. Mixed southern pine, No. 2 grade; SPIB.
 2. Eastern softwoods, No. 2 grade; NELMA.
 3. Northern species, No. 2 grade; NLGA.
 4. Western woods, No. 2 Common grade; WCLIB or WWPA.

2.5 TIMBER AND MISCELLANEOUS LUMBER

- A. For timbers of 5-inch nominal size and thicker, provide material complying with the following requirements:
 1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWPA.

2. Species and Grade: Eastern hemlock, Eastern hemlock-tamarack, or Eastern hemlock-tamarack (north); No. 1 grade; NELMA or NLGA.
 3. Species and Grade: Southern pine, No. 1 grade; SPIB.
- B. Provide miscellaneous lumber for support or attachment of other construction, including the following:
1. Rooftop equipment bases and support curbs.
 2. Blocking.
 3. Cants.
 4. Nailers.
 5. Furring.
 6. Grounds.
- C. For items of dimension lumber size, provide No. 2 grade lumber with 19 percent maximum moisture content of any species.
- D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
 2. Eastern softwoods, No. 2 grade; NELMA.
 3. Northern species, No. 2 grade; NLGA.
 4. Western woods, No. 2 Common grade; WCLIB or WWPA.

2.6 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.7 MISCELLANEOUS MATERIALS

- A. Fasteners:
1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 2. Power-Driven Fasteners: CABO NER-272.
 3. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- B. Metal Framing Anchors: Made from hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Manufacturers:
 - a. Alpine Engineered Products, Inc.
 - b. Cleveland Steel Specialty Co.
 - c. Harlen Metal Products, Inc.
 - d. KC Metals Products, Inc.
 - e. Silver Metal Products, Inc.
 - f. Simpson Strong-Tie Company, Inc.
 - g. Southeastern Metals Manufacturing Co., Inc.
 - h. United Steel Products Company, Inc.

 2. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.

 3. Allowable Design Loads: Meet or exceed those indicated per manufacturer's published values determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Building Paper: Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 15 asphalt felt), unperforated.
- D. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building wrap manufacturer for sealing joints and penetrations in building wrap.
- E. Sheathing Tape: Pressure-sensitive plastic tape for sealing joints and penetrations in sheathing and recommended by sheathing manufacturer for use with type of sheathing required.
- F. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- 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 furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

- B. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated lumber and plywood.

- C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
 2. Published requirements of metal framing anchor manufacturer..
 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in the Uniform Building Code.
 4. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.
 5. Table 2306.1, "Fastening Schedule," in the Standard Building Code.
 6. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in the International One- and Two-Family Dwelling Code.
- D. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
- E. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
- F. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- G. Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
1. Comply with "Code Plus" provisions in above-referenced guide.
- H. Apply building paper horizontally with 2-inch overlap and 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails. Cover upstanding flashing with 4-inch overlap.
- I. Apply sheathing tape to joints between sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Model code evaluation reports for foam-plastic sheathing and building wrap.
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- C. Material Certificates: For building sheathing specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Preservative-treated wood.
 - 2. Engineered wood products.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1.
- B. Oriented Strand Board: DOC PS 2.

2.2 TREATED PLYWOOD

- A. Preservative-Treated Plywood: AWWA C9.
 - 1. Use treatment containing no arsenic or chromium.
 - 2. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- B. Provide preservative treated plywood for plywood in contact with masonry or concrete, vapor barriers, and waterproofing.

2.3 EXTERIOR WALL SHEATHING

- A. Plywood Wall Sheathing: Exposure 1, Structural I sheathing.
- B. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural I sheathing.

2.4 MISCELLANEOUS PRODUCTS

- A. Fasteners: Size and type indicated.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 - 2. Power-Driven Fasteners: CABO NER-272.
- B. Sheathing Joint-and-Penetration Treatment Materials:
 - 1. Sealant for Gypsum Sheathing Board: Joint sealant recommended by sheathing manufacturer for application indicated.
 - 2. Sheathing Tape for Gypsum Sheathing Board: Self-adhering glass-fiber tape recommended by sheathing and tape manufacturers for application indicated.
 - 3. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.
- C. Adhesives for Field Gluing Panels to Framing: APA AFG-01.
- D. Flexible Flashing: Adhesive rubberized-asphalt compound, bonded to polyethylene film, with an overall thickness of **0.030 inch**.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Securely attach to substrates, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2).
- B. Sheathing Joint-And-Penetration Treatment: Seal sheathing joints according to sheathing manufacturer's written instructions.

END OF SECTION 061600

SECTION 06 17 53 - WOOD TRUSSES

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. Roof trusses.
 - 2. Truss accessories.

1.3 DEFINITIONS

- A. Metal-plate-connected wood trusses include planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Engineer, fabricate, and erect metal-plate-connected wood trusses to withstand design loads within limits and under conditions required.
 - 1. Design Loads: As indicated.
 - 2. Design trusses to withstand design loads without deflections greater than the following:
 - a. Roof Trusses: Vertical deflection of $1/240$ of span due to total load.
- B. Engineering Responsibility: Engage a fabricator who uses a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for metal-plate-connected wood trusses.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for lumber, metal-plate connectors, metal framing connectors, bolts, and fasteners.
- C. Shop Drawings detailing location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber to be used; splice details; type, size,

material, finish, design values, and orientation and location of metal connector plates; and bearing details.

1. To the extent truss design considerations are indicated as fabricator's responsibility, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Include truss Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Product certificates signed by officer of truss fabricating firm certifying that metal-plate-connected wood trusses supplied for Project comply with specified requirements and Shop Drawings.
- E. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.
- G. Warranty of chemical treatment manufacturer for each type of treatment.
- H. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee (ALSC) Board of Review.
- I. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:
1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to truss fabricator.
 3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.
- J. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.
1. Fire-retardant-treated wood.
 2. Metal-plate connectors.
 3. Metal framing connectors.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed wood truss installation similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
 - B. Fabricator's Qualifications: Engage a firm that complies with the following requirements for quality control and is experienced in fabricating metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance:
 - 1. Fabricator participates in a recognized quality-assurance program that involves inspection by SPIB; Timber Products Inspection, Inc.; Truss Plate Institute (TPI); or other independent inspecting and testing agency acceptable to Architect and authorities having jurisdiction.
 - C. Comply with applicable requirements and recommendations of the following publications:
 - 1. ANSI/TPI 1, "National Design Standard for Metal-Plate-Connected Wood Truss Construction."
 - 2. TPI HIB "Commentary and Recommendations for Handling Installing & Bracing Metal Plate Connected Wood Trusses."
 - 3. TPI DSB "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - D. Metal-Plate Connector Manufacturer's Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in ANSI/TPI 1.
 - E. Single-Source Responsibility for Connector Plates: Provide metal connector plates from one source and by a single manufacturer.
 - F. Wood Structural Design Standard: Comply with applicable requirements of AFPA's "National Design Specification for Wood Construction" and its "Supplement."
 - G. Single-Source Engineering Responsibility: Provide trusses engineered by metal-plate connector manufacturer to support superimposed dead and live loads indicated, with design approved and certified by a qualified professional engineer.
 - H. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated that have resulted in installing metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Handle and store trusses with care and comply with manufacturer's written instructions and TPI recommendations to avoid damage and lateral bending.
 - B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.8 SEQUENCING AND SCHEDULING

- A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fire-Retardant-Treated Materials, Interior Type A:

- a. Baxter: J. H. Baxter Co.
- b. Chemical Specialties, Inc.
- c. Continental Wood Preservers, Inc.
- d. Hickson Corporation.
- e. Hoover Treated Wood Products, Inc.

2. Fire-Retardant-Treated Materials, Exterior Type:

- a. American Wood Treaters, Inc.
- b. Hoover Treated Wood Products, Inc.

3. Metal Connector Plates:

- a. Alpine Engineered Products, Inc.
- b. Computrus, Inc.
- c. Mitek Industries, Inc.
- d. Robbins Manufacturing Company.
- e. Tee-Lok Corporation.
- f. Truswal Systems Corporation.

4. Metal Framing Anchors:

- a. Cleveland Steel Specialty Co.
- b. Harlen Metal Products, Inc.
- c. Silver Metal Products, Inc.
- d. Simpson Strong-Tie Company, Inc.
- e. Southeastern Metals Manufacturing Co., Inc.
- f. United Steel Products Co.

2.2 DIMENSION LUMBER

- A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority (Canadian).
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified, to comply with requirements indicated below:
 - 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
 - 2. Provide lumber with 15 percent maximum moisture content at time of dressing.
- E. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specification for Wood Construction" and its "Supplement."
- F. Grade and Species: Provide visually graded dimension lumber for truss chord and web members, of the following grade and species:
 - 1. Grade for Chord Members: No. 2.
 - 2. Grade for Web Members: No. 2.
 - 8. Species: Any species graded per WWPA rules.

.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
- B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber to a maximum moisture content of 19 percent.
- C. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber after drying and discard damaged or defective pieces.

2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of AWWPA C20 (lumber). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Research or Evaluation Reports: Provide fire-retardant-treated wood acceptable to authorities having jurisdiction and for which a current model code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated.
- B. Interior Type A: For interior locations, use chemical formulation that produces treated lumber with the following properties under conditions present after installation:
 - 1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency.
 - 2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
 - 3. Contact with treated wood does not promote corrosion of metal fasteners.
- C. Exterior Type: Use for exterior locations and where indicated.
- D. Inspect each piece of treated lumber after drying and discard damaged or defective pieces.

2.5 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates from metal complying with requirements indicated below.
- B. Hot-Dip Galvanized Steel Sheet: Structural-quality steel sheet, zinc coated by hot-dip process complying with ASTM A 653, G60 coating designation; Grade 33 and not less than 0.0359 inch thick.
- C. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591, structural-(physical) quality steel sheet, zinc coated by electrodeposition; 33,000-psi minimum yield strength, coating class C, and not less than 0.0474 inch thick.
- D. Aluminum-Zinc Alloy-Coated Steel Sheet: Structural-(physical) quality steel sheet, aluminum-zinc alloy-coated by hot-dip process complying with ASTM A 792, AZ50 coating designation; Grade 33 and not less than 0.0359 inch thick.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316, chromium nickel steel sheet; 33,000-psi minimum yield strength and not less than 0.035 inch thick.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified below for material and manufacture.

1. Where truss members are exposed to weather or to high relative humidities, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of stainless steel, Type 304 or 316.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts and Screws: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.7 METAL FRAMING ANCHORS

- A. General: Provide metal framing anchors of structural capacity, type, size, metal, and finish indicated that comply with requirements specified, including the following:
 1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for this Project.
 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316, chromium nickel steel sheet; 33,000-psi minimum yield strength.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- B. Protective Coatings: Provide one of the following coating systems:
 1. SSPC-Paint 22, epoxy-polyamide primer.
 2. SSPC-Paint 16, coal-tar epoxy-polyamide black or dark red paint.

3. SSPC-Paint 27 and SSPC-Paint 12, basic zinc chromate-vinyl butyral wash primer and cold-applied asphalt mastic.

2.9 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to size, configuration, thickness, and anchorage details required to withstand design loadings for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances of ANSI/TPI 1. Position members to produce design camber indicated.
 1. Fabricate wood trusses within manufacturing tolerances of ANSI/TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously into both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not install wood trusses until supporting construction is in place and is braced and secured.
- B. Before installing, splice trusses delivered to Project site in more than one piece.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to recommendations of TPI and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space, adjust, and align trusses in location before permanently fastening and as follows:
 1. Truss Spacing: As indicated on drawings. Maximum spacing at 24" o.c.
- G. Anchor trusses securely at all bearing points using metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
- J. Install wood trusses within installation tolerances of ANSI/TPI 1.

- K. Do not cut or remove truss members.
- L. Return wood trusses that are damaged or do not meet requirements to fabricator and replace with trusses that do meet requirements.
 - 1. Do not alter trusses in the field.

3.2 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Protective Coating: Clean and prepare exposed surfaces of embedded-metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.
 - 1. Apply materials to provide minimum dry film thickness recommended by manufacturer of coating system.

END OF SECTION 061753

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Shelving and clothes rods.
- B. See Section 064023 – Interior Architectural Woodwork for interior woodwork not specified in this Section.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- B. Samples: For each type of paneling indicated.

1.3 QUALITY ASSURANCE

- A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - 1. Shelving and clothes rods.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: AHA A135.4.
- D. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
- E. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.
- F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. Lumber: Comply with performance requirements in AWWA C20, Interior Type A. Kiln dry after treatment to a maximum moisture content of 19 percent.
- B. Plywood: Comply with performance requirements in AWWA C27, Interior Type A. Kiln dry after treatment to a maximum moisture content of 15 percent.
- C. Application: Where indicated.

2.3 SHELVING AND CLOTHES RODS

- A. Shelving: Made from one of the following materials, 3/4 inch (19 mm) thick. Do not use particleboard or MDF that contains urea formaldehyde.
 - 1. Particleboard with radiused and filled or solid-wood front edge.
 - 2. MDF with radiused or solid-wood front edge.
 - 3. MDO softwood plywood with solid-wood edge.
 - 4. Melamine-faced particleboard with radiused and filled front edge.
- B. Shelf Cleats: 3/4-by-3-1/2-inch (19-by-89-mm) boards, as specified above for shelving.
- C. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.
- D. Shelf Brackets without Rod Support: BHMA A156.16, B04041; prime-painted formed steel.
- E. Clothes Rods: 1-1/2-inch- (38-mm-) diameter, clear, kiln-dried hardwood.

2.4 MISCELLANEOUS MATERIALS

- A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue.
 - 1. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Paneling Adhesive: Comply with paneling manufacturer's written recommendations.
 - 1. Use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

3.2 INSTALLATION, GENERAL

- A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work.
 - 2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
 - 3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset.
 - 4. Install stairs with no more than 3/16-inch (4.7-mm) variation between adjacent treads and risers and with no more than 3/8-inch (9.5-mm) variation between largest and smallest treads and risers within each flight.

3.3 SHELVING AND CLOTHES ROD INSTALLATION

- A. Cut shelf cleats at ends of shelves about 1/2 inch (13 mm) less than width of shelves and sand exposed ends smooth.
- B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches (400 mm) o.c.
- C. Install shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches (900 mm) o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- D. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.

END OF SECTION 062023

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior standing and running trim.
 - 2. Interior frames and jambs.
 - 3. Wood cabinets.
 - 4. Plastic-laminate countertops.
 - 5. Shop finishing of woodwork.
- B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

- A. Product Data: For solid-surfacing material, cabinet hardware and accessories, and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 - 1. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
 - 2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.
 - 3. Plastic-laminates, for each type, color, pattern, and surface finish.
 - 4. Thermoset decorative panels, for each type, color, pattern, and surface finish.
 - 5. Solid-surfacing materials.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A minimum of 3 years working as a fabricator of woodwork.
- B. Kitchen and vanity cabinets must comply with and bear the seal of Kitchen Cabinet Manufacturers Association Certification program (KCMA).

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

- A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

- A. Wood Species and Cut for Transparent Finish: White Ash, plain sawn or sliced.
- B. Wood Products:
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
 - 2. Softwood Plywood: DOC PS 1.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Formica Corporation.
 - b. Nevamar Company, LLC; Decorative Products Div.
 - c. Wilsonart International; Div. of Premark International, Inc.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWWA C20 (lumber) and AWWA C27 (plywood). Use Exterior Type or Interior Type A. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Kiln-dry material after treatment.
- B. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

- C. Fire-Retardant Fiberboard: ANSI A208.2 medium-density fiberboard panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
- B. Butt Hinges: 2-3/4-inch (70-mm), 5-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:
 - 1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
 - 2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening.
- D. Back-Mounted Pulls: BHMA A156.9, B02011.
- E. Catches:
 - 1. Magnetic catches, BHMA A156.9, B03141.
 - 2. Push-in magnetic catches, BHMA A156.9, B03131.
 - 3. Roller catches, BHMA A156.9, B03071.
 - 4. Ball friction catches, BHMA A156.9, B03013.
- F. Drawer Slides: BHMA A156.9, B05091.
 - 1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted; full-extension type; zinc-plated steel with polymer rollers.
 - 2. Box Drawer Slides: Grade 1; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
- G. Door Locks: BHMA A156.11, E07121.
- H. Drawer Locks: BHMA A156.11, E07041.
- I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
 - 2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
 - 3. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
 - 4. Satin Stainless Steel: BHMA 630.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.6 FABRICATION

- A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - 1. Interior Woodwork Grade: Custom.
 - 2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.
 - 3. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.
- B. Interior Standing and Running Trim:
 - 1. For transparent-finished trim items wider than available lumber, use veneered construction. Do not glue for width.
 - 2. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
 - 3. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- C. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard or fire-retardant medium-density fiberboard with veneered, exposed surfaces and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Fire Rating: 20 minutes.
- D. Wood Cabinets for Transparent Finish:
 - 1. AWI Type of Cabinet Construction: Reveal overlay.
 - 2. WI Construction Style: Style B, Face Frame.
 - 3. WI Door and Drawer Front Style: Reveal overlay.
 - 4. Reveal Dimension: As indicated.
 - 5. Grain Direction: Horizontally for drawer fronts, doors, and fixed panels.
 - 6. Matching of Veneer Leaves: Book match.
 - 7. Veneer Matching within Panel Face: Center-balance match.
 - 8. Semiexposed Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
 - 9. Drawer Sides and Backs: Solid hardwood lumber.
 - 10. Drawer Bottoms: Hardwood plywood.
 - 11. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

- E. Plastic-Laminate Countertops:
 - 1. High-Pressure Decorative Laminate Grade: HGS.
 - 2. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of solid colors, patterns, matte finish.
 - 3. Edge Treatment: As indicated.
 - 4. Core Material at Sinks: Medium-density fiberboard made with exterior glue.

2.7 SHOP FINISHING

- A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.
- C. Transparent Finish:
 - 1. Grade: Custom.
 - 2. AWI Finish System: Conversion varnish.
 - 3. WI Finish System: 4, conversion varnish.
 - 4. Staining: None required.
 - 5. Wash Coat for Stained Finish: Apply a wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 - 6. Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
 - 7. Sheen: Flat, 15-30 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Shim as required with concealed shims.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use

fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
- G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
 - 1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No.10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips.
- H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION 064023

SECTION 066500 – PLASTIC SIMULATED WOOD TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Simulated Wood Trimboards.
2. Simulated Wood One-Piece Cornerboards.
3. Simulated Wood Fascia and Rake Boards.
4. Simulated Wood Window Trim.
5. Simulated Wood Door Trim.

B. Related Sections

1. Section 061000 – Rough Carpentry.
2. Section 061600 – Sheathing.
3. Section 073113 – Asphalt Shingles.
4. Section 074600 – Fiber Cement Siding and Soffit.
5. Section 076200 – Sheet Metal Flashing and Trim.
6. Section 079200 – Joint Sealants.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 792 – Density and Specific Gravity of Plastics by Displacement.
2. ASTM D 570 – Water Absorption of Plastics
3. ASTM D 638 – Tensile Property of Plastics.
4. ASTM D 790 – Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
5. ASTM D 792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
6. ASTM D 1761 – Mechanical Fasteners in Wood.
7. ASTM D 5420 – Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by Falling Weight.
8. ASTM D 256 – Determining the Pendulum Impact Resistance of Plastics.
9. ASTM D 696 – Coefficient of Linear Thermal Expansion of Plastics Between -30 deg C and 30 deg C with a Vitreous Silica Dilatometer.
10. ASTM D 635 – Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
11. ASTM E 84 – Surface Burning Characteristics of Building Materials.
12. ASTM D 648 – Deflection Temperature of Plastics Under Flexural Load in Edgewise Position.
13. ASTM 3679 – Standard Specification for Rigid Poly Vinyl Chloride (PVC) Siding.

B. Uniform Building Code Standards:

1. UBC Standard 14-1 – Kraft Waterproof Building Paper

1.3 SUBMITTALS

- A. Submit under provisions of Section 013300 – Submittal Procedures.
- B. Product Data: Manufacturer’s data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods, including nailing patterns.
- C. Verification samples: For each finish profile specified, two samples, minimum size 6 inches (150 mm) long, representing actual product and patterns finish.
- D. Manufacturer’s Certificates: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A minimum of 10 years in the manufacture of PVC products.
- B. Installer Qualifications: A minimum of 3 years in the installation of PVC products.
- C. Mock-Up: Provide a mock-up for evaluation of profiles and installation techniques and workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Include mock-up for each profile combination indicated on the Drawings.
 - 3. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 4. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

- 1. Store products in manufacturer’s unopened packaging until ready for installation.
- 2. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Field Measurements: Verify layout information for fascia and trim shown on the drawings in relation to the existing structure. Verify dimensions by field measurements.

1.7 WARRANTY

- A. Warranted to the original Owner under normal and proper use to be free of manufacturing defects for a period of 25 years.

1.8 COORDINATION

- A. Coordinate Work with other operations and installation of trim to avoid damage to installed materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include:
 - 1. CertainTeed Corp., CertainTeed Siding.
 - 2. Craftmaster Manufacturing, Inc.
 - 3. Alcoa Home Exteriors, Inc.
 - 4. Revere Building Products
 - 5. Versatex
 - 6. Kommerling USA

2.2 MATERIAL

- A. General: Product is to be a Freefoam Cellular PVC that is homogenous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square and top and bottom surfaces shall be flat with no convex or concave deviation.
- B. Physical Properties: Free foam cellular PVC material with a small-cell microstructure of 0.60 grams/cm³ in accordance with ASTM D 792 with the following physical and performance properties:
 - 1. Mechanical:
 - a. Tensile Strength: 1261 psi when tested in accordance with ASTM D 638.
 - b. Tensile Modulus: 79,463 psi when tested in accordance with ASTM D 638.
 - c. Flexural Strength: 4082 psi when tested in accordance with ASTM D 790.
 - d. Nail Hold: 66 (finish nail) lbf/in of penetration when tested in accordance with ASTM D 1761.
 - e. Screw Hold: 593 lbf/in of penetration when tested in accordance with ASTM D 1761.
 - f. Gardner Impact: 16 in-lbs when tested in accordance with ASTM D 4226.
 - g. Charpy Impact (23 deg C): 0.1526 ft-lbs/in when tested in accordance with ASTM D 256.
 - 2. Thermal:
 - a. Coefficient of Linear Expansion: 3.2 x10⁻⁵ in/in/deg F when tested in accordance with ASTM D 696.
 - b. Burning Rate: No burn when flame removed when tested in accordance with ASTM D 635.
 - c. Flame Spread Index: 20 when tested in accordance with ASTM E 84.
 - 3. Manufacturing Tolerances:
 - a. Variation in component length: minus 0.00 plus 1.00 inch.
 - b. Variation in component width: plus or minus 1/16 inch.
 - c. Variation in component edge cut: plus or minus 2 degrees.
 - d. Variation in Density: minus 0 percent to plus 10 percent.

C. Workmanship, Finish, and Appearance:

1. Products will be provided with a natural white color and a smooth finish on both sides.
2. Products will not require paint for protection but may be painted to achieve a custom color.

2.3 SIMULATED WOOD TRIM

A. General:

1. Provide simulated wood trim to the following profiles and to the configurations indicated on the Drawings.

B. Trim Boards Type B:

1. Nominal Thickness: 1 inch (25.5 mm).
2. Nominal Width:
 - a. 4 inches (102 mm).
 - b. 8 inches (203 mm)
3. Nominal Length: 12 feet (3.65 m).
4. Finish:
 - a. Smooth Natural White.

C. Trim Boards Type D:

1. Nominal Thickness: 5/4 inches (32 mm).
2. Nominal Width:
 - a. 4 inches (102 mm)
3. Nominal Length: 12 feet (3.65 m).
4. Finish:
 - a. Smooth Natural White.

D. One-Piece Corner Trim

1. Nominal Thickness: 5/4 inches (32 mm).
2. Nominal Size:
 - a. 4 inches (102 mm) by 4 inches (102 mm) by 10 feet (3.05 m) long.
3. Finish:
 - a. Smooth Natural White.

2.4 ACCESSORIES

A. Fasteners:

1. Use fasteners designed for wood trim and siding (thinner shank, blunt point, full round head).
2. Use a highly durable fastener such as stainless steel or hot dipped galvanized steel.
3. Staples, small brads and wire nails must not be used as fastening members.
4. Fasteners should be long enough to penetrate a solid wood substrate a minimum of 1-1/2 inch (38 mm).
5. The use of standard nail guns is acceptable.
6. Use two fasteners per every framing member for trimboard applications. Use additional fasteners for trimboards 12 inches (305 mm) or wider, as well as sheets.
7. Install fasteners no more than 2 inches (51 mm) from the end of the board.
8. Fasten trim into a flat, solid substrate. Fastening trim into hollow or uneven areas must be avoided.

9. Pre-drilling is typically not required unless a large fastener is used or product is being installed in low temperatures.

B. Adhesives:

1. Glue all trim joints (scarf or miter) with a cellular PVC cement/adhesive such as Gorilla PVC or Bond&Fill.
2. Glue joints should be secured with a fastener and/or fastened on each side of the joint to allow adequate bonding time.
3. Surfaces to be glued should be smooth, clean and in complete contact with each other.
4. Various adhesives may be used. Consult adhesive manufacturer to determine suitability.

C. Sealants:

1. Use urethane, polyurethane or acrylic based sealants without silicone as specified in Section 07910.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Prior to installation, verify governing dimensions of and condition of substrate.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Examine, clean, and repair as necessary any substrate conditions that would be detrimental to proper installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
 1. Comply with all terms necessary to maintain warranty coverage.
 2. Use trim details indicated on drawings.
 3. Touch up all field cut edges before installing.
- B. Cutting:
 1. Use a conventional woodworking saws.
 2. Use carbide tipped blades designed to cut wood. Do not use fine-tooth metal-cutting blades.
 3. Avoid rough edges from cutting caused by: excessive friction, poor board support, worn saw blades or badly aligned tools.

C. Drilling:

1. Do not use bits made for rigid PVC.
2. Avoid frictional build-up and remove shavings from the drill hole frequently as necessary.
3. Drill with standard woodworking drill bits.

D. Milling:

1. Mill using standard milling machines used to mill lumber.
2. Relief angle 20 to 30 degrees.
3. Cutting speed to be optimized with the number of knives and feed rate.

E. Routing:

1. Rout using standard bits and the same tools used to rout lumber.
2. The use of carbide tipped router bits is recommended.

F. Edge Finishing:

1. Edges can be finished sanding, grinding, or filling with traditional woodworking tools.

G. Nail Location:

1. Use two fasteners per every framing member for trimboard applications.
2. Trimboards over 12 inches (305 mm) or wider, as well as sheets, will require additional fasteners.
3. Install fasteners no more than 2 inches (51 mm) from the end of each board.

H. Thermal Expansion and Contraction:

1. Expansion and contraction will occur with changes in temperature.
2. When properly fastened, allow 1/8 inch (3 mm) per 18 foot (5.49 m) for expansion and contraction.
3. Joints between pieces should be glued to eliminate joint separation. When gaps are glued on a long run, allow for expansion and contraction at the end of the runs.

I. Finishing.

1. Correct dents and gouges before applying final coating.
2. Prepare surfaces and paint materials as recommended by the molding manufacturer. Paint as specified in Section 09900.
3. If moldings get dirty during installation, clean with a light detergent and warm water. For stubborn stains use denatured alcohol or one pint bleach to 5 parts water.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 066500

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Perimeter insulation.
 - 2. Perimeter wall insulation (supporting backfill).
 - 3. Cavity-wall insulation.
 - 4. Concealed building insulation.
 - 5. Vapor retarders.
 - 6. Sound attenuation insulation.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product test reports.
- C. Research/Evaluation Reports: For foam-plastic insulation.

1.3 QUALITY ASSURANCE

- A. Retain ASTM test method below based on product and kind of fire-resistance characteristic specified for each product in Part 2. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

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

2.2 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type [IV, 1.60 lb/cu. ft. (26 kg/cu. m)] [X, 1.30 lb/cu. ft. (21 kg/cu. m)] [VI, 1.80 lb/cu. ft. (29 kg/cu. m)] [VII, 2.20 lb/cu. ft. (35 kg/cu. m)] [V, 3.00 lb/cu. ft. (48 kg/cu. m)], with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
1. Available Manufacturers:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.
 - d. Pactiv Building Products Division.

2.3 GLASS-FIBER BLANKET INSULATION

- A. Available Manufacturers:
1. CertainTeed Corporation.
 2. Guardian Fiberglass, Inc.
 3. Johns Manville.
 4. Knauf Fiber Glass.
 5. Owens Corning.
- B. Unfaced, Glass-Fiber Blanket Insulation (Sound attenuation): ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- C. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.
- D. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
1. 5-1/2 inches thick with a thermal resistance of 19 deg F x h x sq. ft./Btu at 75 deg F.
 2. 6-1/2 inches thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F.
 3. 10-1/4 inches thick with a thermal resistance of 30 deg F x h x sq. ft./Btu at 75 deg F.

2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- D. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and with demonstrated capability to bond vapor retarders securely to substrates indicated.

2.5 AUXILIARY INSULATING MATERIALS

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 PERIMETER INSTALLATION

- A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.
- D. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.3 INSTALLATION OF CAVITY-WALL INSULATION

- A. On units of foam-plastic board insulation, install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates indicated.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm-in-winter side of construction, unless otherwise indicated.
 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.

5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 6. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
 - b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- E. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- F. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

3.5 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
- C. Before installing vapor retarder, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- D. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

- E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- F. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 072100

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed product and for each color and blend specified.
- C. Product test reports.
- D. Research/evaluation reports.
- E. Maintenance data.
- F. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

- A. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

1.4 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
 - 1. Material Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Multitab-Strip Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corporation.
 - b. GAF Materials Corporation.
 - c. Owens Corning.
2. Tab Arrangement: Three tabs, regularly spaced.
3. Cutout Shape: Square.
4. Butt Edge: Straight cut.
5. Strip Size: Manufacturer's standard.
6. Algae Resistance: Granules treated to resist algae discoloration.
7. Color and Blends: As selected by Architect from manufacturer's full range.

- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.2 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type I, asphalt-saturated organic felts, nonperforated.
- B. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil-thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied.

2.3 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, smooth shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.

2.4 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 1. Sheet Metal: Stainless 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.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with roofing nails.
 - 1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
 - 2. Install fasteners at no more than 36 inch o.c.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

3.2 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 - 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

3.3 ASPHALT SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.

- E. Fasten asphalt shingle strips with a minimum of four roofing nails located according to manufacturer's written instructions.
 - 1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
 - 2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 - 3. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.
- F. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- G. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
 - 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 073113

SECTION 074600 - SIDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fiber-cement siding.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For vinyl siding, include VSI's official certification logo printed on product data.
- B. Samples: For siding including related accessories.
- C. Qualification Data: For qualified vinyl siding Installer.
- D. Product certificates.
- E. Product test reports.
- F. Research/evaluation reports.
- G. Maintenance data.
- H. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- B. Siding Installer Qualifications: A qualified installer who employs a VSI-Certified Installer on Project.
- C. Siding Certification Program: Provide siding products that are listed in VSI's list of certified products.
- D. Source Limitations: Obtain siding, including related accessories, from single source from single manufacturer.

1.4 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: 50 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 1. 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. James Hardie.
 2. Horizontal Pattern: Boards 6-1/4 to 6-1/2 inches wide in plain style.
 - a. Texture: Wood.
 3. Panel Texture: 48-inch- wide sheets with smooth texture.
 4. Factory Priming: Manufacturer's standard acrylic primer.

2.1 FIBER-CEMENT SOFFIT

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. James Hardie.
- B. Pattern: 24-inch wide sheets with smooth texture.
- C. Ventilation: Provide unperforated soffit.
- D. Factory Priming: Manufacturer's standard acrylic primer.

2.2 ACCESSORIES

- A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.
 1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.
- B. Flashing: Provide Zinc-coated steel flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
- C. Fasteners:
 1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch into substrate.
 2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.

3. For fastening fiber cement, use hot-dip galvanized fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 1. Do not install damaged components.
 2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.
- B. Install fiber-cement siding and related accessories.
 1. Install fasteners no more than 24 inches o.c.
- C. Install joint sealants as specified in Division 07 Section "Joint Sealants" and to produce weathertight installation.

3.3 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074600

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof-edge flashings.
 - 2. Roof-edge drainage systems.
 - 3. Reglets and counter flashings.

1.2 PERFORMANCE REQUIREMENTS

- A. FM Approvals' Listing: Manufacture and install roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, and keyed details. Distinguish between plant and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Product test reports.
- E. Maintenance data.
- F. Warranty: Sample of special warranty.

1.4 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finishes: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- a. Two-Coat Fluoropolymer: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2.2 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
- C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 ROOF-EDGE FLASHINGS

- A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed- or extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.
 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. Hickman Company, W. P.
 - b. Metal-Era, Inc.
 - c. Metal-Fab Manufacturing, LLC.

2. Fascia Cover: Fabricated from the following exposed metal:
 - a. Formed Aluminum: 0.050 inches thick.
 - b. Zinc-Coated Steel: Nominal 0.034 inches thick.

B. Aluminum Finish: Two-coat fluoropolymer or Clear anodic.

1. Color: As selected by Architect from manufacturer's full range.

C. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

2.6 ROOF-EDGE DRAINAGE SYSTEMS

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. Architectural Products Company.
2. ATAS International, Inc.
3. Berger Building Products, Inc.
4. Castle Metal Products.
5. Cheney Flashing Company.
6. Hickman Company, W. P.
7. Merchant & Evans, Inc.
8. Metal-Era, Inc.
9. Metal-Fab Manufacturing, LLC.
10. MM Systems Corporation.

B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.050 inch thick.
 - b. Zinc-Coated Steel: Nominal 0.034-inch thickness.
2. Gutter Profile: Ogee according to SMACNA's "Architectural Sheet Metal Manual."
3. Applied Fascia Cover (Concealed Gutter): Exposed, formed aluminum, 0.040 inch thick, with factory-mitered corners, ends, and concealed splice joints.
4. Corners: Factory mitered and continuously welded.
5. Gutter Supports: Gutter brackets with finish matching the gutters.
6. Gutter Accessories: Continuous screened leaf guard with sheet metal frame.

C. Downspouts: Plain rectangular complete with smooth-curve elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Formed Aluminum: 0.050 inch thick.
2. Zinc-Coated Steel: Nominal 0.034-inch thickness.

- D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim, and built-in overflow.
 - 1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.032 inch thick.
 - b. Zinc-Coated Steel: Nominal 0.028-inch thickness.
- E. Aluminum Finish: Two-coat fluoropolymer or Clear anodic.
 - 1. Color: As selected by Architect from manufacturer's full range.
- F. Zinc-Coated Steel Finish: Two-coat fluoropolymer.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.7 REGLETS AND COUNTERFLASHINGS

- 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. Castle Metal Products.
 - 2. Cheney Flashing Company.
 - 3. Fry Reglet Corporation.
 - 4. Hickman Company, W. P.
 - 5. Keystone Flashing Company, Inc.
 - 6. Metal-Era, Inc.
 - 7. MM Systems Corporation.
- B. Counter flashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
 - 1. Formed Aluminum: 0.032 inch thick.
 - 2. Zinc-Coated Steel: Nominal 0.028-inch thickness.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 - 4. Torch cutting of roof specialties is not permitted.

5. Install underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, self-adhering, high-temperature sheet underlayment or polyethylene sheet.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Seal joints with sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
- 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. Tin edges of uncoated copper sheets using solder for copper. 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.

3.2 ROOF-EDGE FLASHING INSTALLATION

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.3 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 36 inches apart. Attach ends with rivets and to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
 2. Install continuous leaf guards on gutters with noncorrosive fasteners, removable cleaning gutters.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
- 3.4 REGLET AND COUNTERFLASHING INSTALLATION
- A. Counter flashings: Insert counter flashings into reglets or other indicated receivers; ensure that counter flashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Fit counter flashings tightly to base flashings.
- 3.5 CLEANING AND PROTECTION
- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 07720- SOFFIT VENTS

PART 1 - GENERAL

.1 SECTION INCLUDES

- A. Vents and accessories.
- B. Soffit vents.

.2 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry.
- B. Section 07310 - Roof Shingles.

.3 REFERENCES

- A. See ICC-ES Legacy Report No. 21-85 (BOCA).
- B. ICBO ES ER-5417 Legacy Report.

.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

.5 QUALITY ASSURANCE

- A. Ridge Vents, when properly installed with soffit or eave vents, meet or exceed the requirements of all recognized national building codes for ventilation. Ridge Vents were tested and passed all tests for weather infiltration as follows:
 - 1. BOCA International Evaluation Report No. 21-85, May 2002. See ICC-ES Legacy Report 21-85 (BOCA)

2. ICBO ES ER-5417 Legacy Report.

.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

.7 PROJECT CONDITIONS

- A. Maintain environmental conditions within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2- PRODUCTS

.1 MANUFACTURERS

- A. Acceptable Manufacturer:
1. Trimline Building Products.
2. Owens Corning
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

.2 MATERIALS

- A. Ridge Vents- General: a corrosion-free, laminated high-density polyethylene corrugated plastic with a thin spun bound non-absorbent polypropylene membrane bonded to it not permitting direct water or weather entry. Layers of corrugated product must be z-folded and glued, not stapled. Product must be backed by lifetime manufacturer's warranty and capable of being used on applications with pitches from 2/12 to 20/12.
1. Ridge Vents: Profile Rigid Vent
- Net Free Area: 13 inches (330 cm) per lineal foot.
 - Color: Black.
 - Dimensions: 9 inches (229 mm) wide by 4 feet (1.2 m) long by 5/8 inch (15.9 mm) high.
- B. Soffit Vents - General: Manufactured of corrosion-free, profile high-density polyethylene corrugated plastic. Layers of corrugated plastic must be stapled.
1. Soffit Vents: Ventilation.
- Net Free Area: 9-1/2 inches (12.5 mm) per lineal foot.
 - Color: Natural.

- c. Dimensions: 1 inch (25 mm) wide by 4 feet (1.2 m) long by 1-1/2 inches (12.5 mm) high.

PART 3 - EXECUTION

.1 EXAMINATION

- A. Do not begin installation until roof openings and substrates have been properly prepared.
- B. Verify deck surfaces are correctly framed, dry, free of ridges, warps, or voids.
- C. If openings and substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

.2 INSTALLATION

- A. General: Install in accordance with manufacturer's instructions.
- B. Ridge Vents:
 - 1. Place vent over the entire length of the ridge vent opening. Butt separate pieces tightly together.
 - 2. Install end caps at both ends of the ridge vent.
 - 3. Secure cap shingles and vents at the same time by nailing ridge caps with roofing nails in a common overlapping pattern. Nails should penetrate the wood deck a minimum of 1/2 inch (12.5 mm). Position ridge vent to maintain the pitch of the roof before nailing.
- C. Soffit Vents:
 - 1. Install continuous vents along full length of soffit unless otherwise noted.

.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Repair or replace damaged products before Substantial Completion.

END OF SECTION 07720

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Preformed joint sealants.

1.2 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- 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.
- D. Product test reports.
- E. Field-adhesion test reports.
- F. Warranties.

1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.4 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which 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's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those 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 MATERIALS, GENERAL

- A. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

- A. Neutral-Curing Silicone Joint Sealant: ASTM C 920.
 - 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. BASF Building Systems.
 - b. Dow Corning Corporation.
 - c. GE Advanced Materials - Silicones.
 - d. May National Associates, Inc.
 - e. Pecora Corporation.
 - f. Polymeric Systems, Inc.

- g. Schnee-Morehead, Inc.
 - h. Sika Corporation; Construction Products Division.
 - i. Tremco Incorporated.
2. Type: Single component (S) or multicomponent (M).
 3. Grade: Pourable (P) or nonsag (NS).
 4. Class: 100/50.
 5. Uses Related to Exposure: Traffic (T) and Nontraffic (NT).

2.3 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C 920.

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. BASF Building Systems.
 - b. Bostik, Inc.
 - c. Lyntal, International, Inc.
 - d. May National Associates, Inc.
 - e. Pacific Polymers International, Inc.
 - f. Pecora Corporation.
 - g. Polymeric Systems, Inc.
 - h. Schnee-Morehead, Inc.
 - i. Sika Corporation; Construction Products Division.
 - j. Tremco Incorporated.
2. Type: Single component (S) or multicomponent (M).
3. Grade: Pourable (P) or nonsag (NS).
4. Class: 50.
5. Uses Related to Exposure: Traffic (T) and Nontraffic (NT).

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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. BASF Building Systems.
 - b. Bostik, Inc.
 - c. May National Associates, Inc.
 - d. Pecora Corporation.
 - e. Schnee-Morehead, Inc.
 - f. Tremco Incorporated.

2.5 PREFORMED JOINT SEALANTS

- A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.
 - 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. Dayton Superior Specialty Chemicals.
 - b. EMSEAL Joint Systems, Ltd.
 - c. Sandell Manufacturing Co.
 - d. Schul International, Inc.
 - e. Willseal USA, LLC.

2.6 JOINT SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.7 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.

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 of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- 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.
1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- 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 according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

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

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints in brick pavers.
 - b. Isolation and contraction joints in cast-in-place concrete slabs.
 - c. Joints between plant-precaster architectural concrete paving units.
 - d. Joints in stone paving units, including steps.
 - e. Tile control and expansion joints.
 - f. Joints between different materials listed above.
 - g. Other joints as indicated.
 - 2. Joint Sealant: Silicone.
 - 3. Joint Sealant: Urethane.
 - 4. Joint Sealant: Preformed foam.
 - 5. Joint-Sealant Color: As selected by Architect 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. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in dimension stone cladding.
 - e. Joints in glass unit masonry assemblies.
 - f. Joints in exterior insulation and finish systems.
 - g. Joints between metal panels.
 - h. Joints between different materials listed above.
 - i. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - j. Control and expansion joints in ceilings and other overhead surfaces.
 - k. Other joints as indicated.
2. Joint Sealant: Silicone.
 3. Joint Sealant: Urethane.
 4. Joint Sealant: Preformed foam.
 5. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in stone flooring.
 - c. Control and expansion joints in brick flooring.
 - d. Control and expansion joints in tile flooring.
 - e. Other joints as indicated.
 2. Joint Sealant: Silicone.
 3. Joint Sealant: Urethane.
 4. Joint Sealant: Preformed foam.
 5. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical joints on exposed surfaces of walls and partitions.
 - e. Joints on underside of plant-precast structural concrete beams and planks.
 - f. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
 - g. Other joints as indicated.
 2. Joint Sealant: Latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated.
2. Joint Sealant: Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081114 - CUSTOM STEEL DOORS AND FRAMES

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. Steel doors.
 - 2. Steel door frames.
- B. Related Sections include the following:
 - 1. Division 8 Section "Flush Wood Doors" for wood doors.
 - 2. Division 8 Sections for door hardware and weather stripping.
 - 4. Division 9 Section "Gypsum Board Assemblies" for wood stud and gypsum board partitions.
 - 5. Division 9 Section "Painting" for field painting primed doors and frames.

1.3 DEFINITIONS

- A. Uncoated steel sheet thicknesses are indicated as the minimum thickness according to HMMA 803, Steel Tables.
- B. Metallic-coated steel sheet thicknesses are indicated as the minimum thickness of the uncoated base metal.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, sound and fire-resistance ratings, and finishes for each type of door and frame specified.
- B. Shop Drawings: Show fabrication and installation of doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, dimensions of profiles and hardware preparation, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessories.

- C. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Drawings.
 - 1. Coordinate glazing frames and stops with glass and glazing requirements.
- D. Samples for Initial Selection: Manufacturer's color charts showing the full range of finishes or colors available for units with factory-applied color finishes.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples not less than 3 by 5 inches (75 by 125 mm) and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Product Certificates: Signed by manufacturers of doors certifying that products furnished comply with or exceed the acceptance criteria of ANSI A250.4 for Level A doors.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing custom steel doors and frames 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.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palleted, wrapped, or crated to provide protection during transit and Project site storage. Do not use nonvented plastic.
- B. Inspect doors and frames, on delivery, for damage. Minor damage may be repaired provided refinished items match new work and are approved by Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames under cover at building site. Place units on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering doors and frames that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Steel Doors and Frames:

- a. Amweld Building Products, Inc.
- b. BRS Products.
- c. Ceco Door Products.
- d. Curries Company.
- e. Deronde Products, Inc.
- f. Kewanee Corporation.
- g. National Custom Hollow Metal Doors & Frames.
- h. Precision Metals, Inc.
- i. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, CS (commercial steel), Type B.
- B. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, CS (commercial steel), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating.
- C. Stainless-Steel Sheets: ASTM A 666, austenitic stainless steel, Type 304.
- D. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, zinc coat according to ASTM A 153/A 153M, Class C or D as applicable.

2.3 DOORS

- A. General: Provide flush-design doors, 1-3/4 inches thick, of seamless hollow construction, unless otherwise indicated. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges.
 1. Visible joints or seams around glazed or louvered panel inserts are permitted.
 2. For single-acting swing doors, bevel both vertical edges 1/8 inch in 2 inches.
 3. For double-acting swing doors, round vertical edges with 2-1/8-inch radius.
- B. Nonmetallic Core Construction: Provide the following core construction laminated with waterproof adhesive to both door faces:
 1. Honeycomb Core: Resin-impregnated kraft paper with maximum 1-inch cells and minimum 42-psi crushing strength.
 2. Polyurethane Core: Minimum 20-psi compressive strength and not less than 1.8-lb/cu. ft. density foamed-in-place or rigid board polyurethane.
 3. Polystyrene Core: Minimum 0.9-lb/cu. ft. density with not less than 18-psi shear strength, rigid, foam polystyrene core board complying with ASTM C 578, Type I.
- C. Astragals: As required by NFPA 80 to provide fire ratings indicated.
- D. Top and Bottom Channels: Spot weld metal channel not less than thickness of face sheet to face sheets not more than 6 inches o.c.

1. Reinforce tops and bottoms of doors with inverted horizontal channels of same material as face sheet so flanges of channels are even with bottom and top edges of face sheets.
 2. For exterior doors, close bottom edge with metallic-coated steel closing channel and top edge with filler channel of same material, so webs of channels are flush with bottom and top door edges.
- E. Hardware Reinforcement: Fabricate reinforcing plates from the same material as door to comply with the following:
1. Hinges and Pivots: 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Lock Face, Flush Bolts, Closers, and Concealed Holders: 0.093 inch thick.
 3. All Other Surface-Mounted Hardware: 0.053 inch thick.
- G. Exterior Steel Doors: Fabricate face sheets of doors from two 0.045-inch- thick, stretcher-leveled, metallic-coated steel sheets. Provide weep-hole openings in bottom of doors to permit entrapped moisture to escape. Seal joints in top edges of doors against water penetration.

2.4 PANELS

- A. Provide panels of same materials, construction, and finish as specified for doors.

2.5 FRAMES

- A. Fabricate frames of full-welded unit construction, with corners mitered, reinforced, and continuously welded full depth and width of frame. Knockdown frames are not acceptable.
1. For exterior use, form frames from 18 gauge steel, metallic-coated steel sheets.
- B. Hardware Reinforcement: Fabricate from same material as frame. Minimum thickness of steel reinforcing plates for the following hardware:
1. Hinges and Pivots: 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Strikes, Flush Bolts, and Closers: 0.093 inch.
 3. Surface-Mounted Hold-Open Arms and Panic Devices: 0.093 inch.
- E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- F. Frames of 18 gauge steel sheet for exterior doors:
1. Level 1 steel doors, otherwise indicated.
- G. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of same material as frame, 0.067 inch thick, as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners, welded to bottom of jambs and mullions.
 2. Separate Topping Concrete Slabs: Adjustable type with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
- H. Head Anchors: Provide 2 head anchors for frames more than 42 inches wide and mounted in steel-stud walls.
- K. Head Reinforcement: For frames more than 48 inches wide in masonry wall openings, provide continuous steel channel or angle stiffener, 0.093 inch thick for full width of opening, welded to back of frame at head.
- M. Rubber Door Silencers: Except on weather-stripped doors, drill stop in strike jamb to receive three silencers on single-door frames and drill head jamb stop to receive two silencers on double-door frames. Install plastic plugs to keep holes clear during construction.

2.7 STOPS AND MOLDINGS

- A. Provide stops and moldings around solid, glazed, and louvered panels where indicated.
- B. Form fixed stops and moldings integral with frame, unless otherwise indicated.

2.8 FABRICATION

- A. Fabricate doors and frames rigid, neat in appearance, and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
 1. Fabricate doors to comply with acceptance criteria of ANSI A250.4 for a Level A door.
- B. For doors with metallic core construction, weld cores to both door face sheets.
- C. For doors with nonmetallic core construction, laminate core material to both door face sheets with waterproof adhesive.
- D. Exposed Fasteners: Provide countersunk flat or oval heads for exposed screws and bolts, unless otherwise indicated.
- E. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors and frames fabricated as thermal-insulating assemblies and tested according to ASTM C 236 or ASTM C 976.
- G. Hardware Preparation: Prepare doors and frames to receive hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final hardware schedule and

templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series specifications for door and frame preparation for hardware.

1. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
2. Locate hardware as indicated or, if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

2.9 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for cleaning, treating, priming, and when specified, finishing.
- B. Finish products specified in this Section after fabrication.

2.11 STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- B. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.02 mm).
 1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, corrosion-inhibiting, lead- and chromate-free, universal primer complying with ANSI A224.1 acceptance criteria; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.
- C. Factory-Applied Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, air-dried-enamel, baked-enamel, or polyester finish consisting of prime coat and topcoat that complies with ANSI A250.3 acceptance criteria. Comply with paint manufacturer's instructions for applying and baking to achieve a minimum dry film thickness of 1.25 mils (0.03 mm) for topcoat.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install doors and frames according to DHI A115.IG and manufacturer's written instructions.

- B. Frames: Install steel frames for doors, transoms, sidelights, borrowed lights, and other openings, of size and profile indicated.
 - 1. Set masonry anchorage devices where required for securing frames to in-place concrete or masonry construction.
 - a. Set anchorage devices opposite each anchor location according to details on Shop Drawings and anchorage device manufacturer's written instructions. Leave drilled holes rough, not reamed, and free of dust and debris.
 - 2. Floor anchors may be set with powder-actuated fasteners instead of masonry anchorage devices and machine screws, if so indicated on Shop Drawings.
 - 3. Placing Frames: Set frames accurately in position; plumb; align, and brace securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
- C. Doors: Fit non-fire-rated doors accurately in their respective frames, with the following clearances:
 - 1. Jambs and Head: 3/32 inch.
 - 2. Meeting Edges, Pairs of Doors: 1/8 inch.
 - 3. Bottom: 3/8 inch, if no threshold or carpet.
 - 4. Bottom: 1/8 inch, at threshold or carpet.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items just before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- C. Factory-Finish Touchup: Immediately after erection, sand to feather-edge minor scratched, chipped, or damaged areas and apply touchup of compatible air-drying paint. Minor finish imperfections may be repaired provided finish matches new work finish and is approved by Architect; otherwise, remove and replace.

END OF SECTION 081114

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hollow-core doors with wood-veneer faces.

1.2 SUBMITTALS

- A. Product Data: For each type of door indicated.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Algoma Hardwoods, Inc.
 - 2. Ampco, Inc.
 - 3. Eagle Plywood & Door Manufacturing, Inc.
 - 4. Eggers Industries.
 - 5. Mohawk Flush Doors, Inc.; a Masonite company.
- B. Hollow-Core Doors:
 - 1. Construction: Standard hollow core.
- C. Interior Hollow-Core Doors:
 - 1. Grade: Custom (Grade A faces).
 - 2. Species: Select white ash.
 - 3. Cut: Plain sliced (flat sliced).
 - 4. Match between Veneer Leaves: Book match.

5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Construction: Seven plies.

2.2 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied.

2.3 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.
- C. Transparent Finish:
 1. Grade: Custom.
 2. Finish: WDMA TR-6 catalyzed polyurethane.
 3. Staining: As selected by Architect from manufacturer's full range.
 4. Effect: Open-grain finish.
 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated.

END OF SECTION 081416

SECTION 085313 - VINYL WINDOWS

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 single-hung vinyl-framed windows.

1.3 DEFINITIONS

- A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. LC: Light Commercial.
- B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Design pressure number in pounds force per square foot used to determine the structural test pressure and water test pressure.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide vinyl windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of test size indicated below:
 - 1. Size required by AAMA/WDMA 101/I.S.2/NAFS for gateway performance for both gateway performance and optional performance grade.
 - 2. Size indicated on Drawings.
- B. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 or AAMA 506 and requirements of authorities having jurisdiction.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of vinyl window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Expansion provisions.

4. Flashing and drainage details.
 5. Weather-stripping details.
 6. Glazing details.
 7. Window cleaning provisions.
 8. For installed products indicated to comply with design loads, include structural analysis data prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of vinyl windows, and used to determine structural test pressures and design pressures from basic wind speeds indicated.
- C. Samples for Verification: For vinyl windows and components required, prepared on Samples of size indicated below.
1. Main Framing Member: 12-inch- long, full-size sections of window frame with factory-applied color finish.
 2. Window Corner Fabrication: 12-by-12-inch- long, full-size window corner including full-size sections of window frame with factory-applied color finish, weather stripping, and glazing.
 3. Operable Window: Full-size unit with factory-applied finish.
 4. Hardware: Full-size units with factory-applied finish.
 5. Weather Stripping: 12-inch- long sections.
- D. Qualification Data: For Installer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, class, grade, and size of vinyl window. Test results based on use of downsized test units will not be accepted.
- F. Maintenance Data: For operating hardware, weather stripping and finishes to include in maintenance manuals.
- G. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to vinyl window manufacturer for installation of units required for this Project.
1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of data for vinyl windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- C. Source Limitations: Obtain vinyl windows through one source from a single manufacturer.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for vinyl windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated

by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

- E. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Provide AAMA/WDMA-certified vinyl windows with an attached label.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify vinyl window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating vinyl windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - b. Faulty operation of movable sash and hardware.
 - c. Deterioration of vinyl, other materials, and finishes beyond normal weathering.
 - d. Failure of insulating glass.
 - 2. Warranty Period:
 - a. Window: Three years from date of Substantial Completion.
 - b. Glazing: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Milgard Manufacturer's Inc.
 - 2. Alenco, Inc.
 - 3. Better-built Windows, Inc.

2.2 MATERIALS

- A. Vinyl Extrusions: Rigid (unplasticized) hollow PVC extrusions, formulated and extruded for exterior applications, complying with AAMA/WDMA 101/I.S.2/NAFS and the following:
 - 1. PVC Formulation: High impact, low heat buildup, lead free, nonchalking, and color and UV stabilized.
- B. Vinyl Trim and Glazing Stops: Material and finish to match frame members.
- C. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with vinyl window members, cladding, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Reinforcing Members: Aluminum, or nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- F. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and for complete concealment when vinyl window is closed.
 - 1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.
- G. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
 - 1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

2.3 WINDOW

- A. Window Type: Single hung sliding window.
- B. AAMA/WDMA Performance Requirements: Provide vinyl windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS unless more stringent performance requirements are indicated.
 - 1. Performance Class and Grade: LC25.
- C. Condensation-Resistance Factor (CRF): Provide vinyl windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.

- D. Thermal Transmittance: Provide vinyl windows with a whole-window, U-factor maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to AAMA 1503/ASTM E 1423/NFRC 100.
- E. Solar Heat-Gain Coefficient (SHGC): Provide vinyl windows with a whole-window SHGC maximum of 0.50, determined according to NFRC 200 procedures.
- F. Sound Transmission Class (STC): Provide glazed windows rated for not less than 26 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
- G. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.
 - 1. Maximum Rate: 0.3 cfm/sq. ft. of area at an inward test pressure of 1.57 lbf/sq. ft..
- H. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.
- I. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.
- J. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

2.4 GLAZING

- A. Glass Tinted, insulating-glass units, argon gas filled, with low-E coating pyrolytic on second surface or sputtered on second or third surface, complying with Division 08 Section "Glazing."
- B. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal and complies with requirements for windborne-debris resistance.

2.5 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with vinyl; designed to smoothly operate, tightly close, and securely lock vinyl windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals.
- B. Counterbalancing Mechanism: Comply with AAMA 902.
- C. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- D. Roller Assemblies: Low-friction design.

2.6 INSECT SCREENS

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on inside or outside of window and provide for each operable exterior sash or ventilator.
- B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, adjustable rollers, and removable PVC spline/anchor concealing edge of frame.
 - 1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
 - 2. Finish: Manufacturer's standard.
- C. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch- diameter, coated aluminum wire.
 - 1. Wire-Fabric Finish: Charcoal gray.
- D. Wickets: Provide sliding or hinged wickets, framed and trimmed for a tight fit and for durability during handling.

2.7 ACCESSORIES

- A. Dividers (False Muntins): Provide dividers in designs indicated for each sash lite, one permanently located between glazing lites in the airspace.
 - 1. Material: Extruded, rigid PVC.
 - 2. Design: Rectangular.
 - 3. Color: White.

2.8 FABRICATION

- A. Fabricate vinyl windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
 - 1. Welded Frame Corners: Miter-cut and fusion welded.
 - 2. Mechanically Fastened Sash/Ventilator Corners: Double-butt coped and fastened with concealed screws.
- B. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.
- C. Mullions: Provide mullions and cover plates as shown, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units. Provide manufacturer's standard finish to match window units.
- D. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Provide manufacturer's standard finish to match window units. Provide subframes capable of withstanding design loads of window units.

- E. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

2.9 VINYL FINISHES

- A. Integral Finish and Color: Uniform, solid, homogeneous white interior and exterior.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.2 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 085313

SECTION 086250 - TUBULAR DAYLIGHTING SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Tubular daylighting system, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.
- B. Accessories.

1.2 RELATED SECTIONS

- A. Section 07 – Thermoplastic Membrane Roofing.
- B. Section 07 – Roof Accessories.

1.3 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2001.
- B. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2001a.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2001a.
- D. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.
- E. ASTM D-1929 - Test Method for Ignition Properties of Plastics.
- F. UL 181 - Factory Made Air Ducts and Air Connectors; 1998
- G. UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials; 1997.
- H. ICBO/ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2003.

1.4 PERFORMANCE REQUIREMENTS

- A. Completed tubular daylighting system assemblies shall be capable of meeting the following performance requirements:
 - 1. Air Infiltration Test: Air infiltration will not exceed .30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
 - 2. Water Resistance Test: No uncontrolled water leakage at 16.5 psf pressure differential with water rate of 5 gallons/hours/sf when tested in accordance with ASTM E 331.
 - 3. Uniform Load Test:
 - a. No breakage, permanent damage to fasteners, hardware parts, or damage to make system inoperable or cause permanent deflection of

any section in excess of 1 percent of its span at a Positive Load of 110 psf (5.27 kPa) or Negative Load of 60 psf (2.87 kPa).

- b. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
4. Fire Testing:
 - a. Class B Burning Brand - The burning brand shall self-extinguish without transferring the fire to the dome Per: U.B.C. Standard 15-2 Class B Burning Brand Test. See ASTM E 108 and UL 790.
 - b. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929-68 (1975).
 - c. Smoke Density - Rating no greater than 75 Per: U.B.C. Standard 26-5. (See ASTM D-2843-70) or no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84-91A) in way intended for use.
 - d. Rate of Burn - Minimum Burning Rate: 2.5 inches/min (64 mm/min) Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635-74.

1.5 SUBMITTALS

- A. Product Data : Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- B. Shop Drawings.
- C. Verification Samples: As requested by Architect.
- D. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.6 QUALITY ASSURANCE

- A. Engaged in manufacture of tubular skylights.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

- A. Tubular Daylighting System: Manufacturer's standard warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Solatube International, Inc. or equal.

2.2 TUBULAR DAYLIGHTING SYSTEM

- A. Tubular Daylighting System General or equal : Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICBO/ICC AC-16.
- B. Brighten Up Series: Solatube Model 290 DS, 14 Inch Daylighting System, or equal.
1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - a. Outer Dome Glazing: Type DA, 0.125 inch (3 mm) minimum thickness injection molded acrylic classified as CC2 material and meeting characteristics of DR-101 blend.
 - b. Optional Shock Inner Dome Glazing: Type DI, 0.115 inch (2.9 mm) minimum thickness high impact injection molded acrylic required for high velocity wind zones.
 2. Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
 - a. Base Material: Sheet steel, corrosion resistant, meeting ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 inch (0.7 mm) thick.
 - b. Base Pitch (Slope): Flat, no pitch 4 inches (102 mm) and 6 inches (152 mm) high.
 3. Dome Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact acrylic; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
 4. Reflective Extension Tube: Aluminum sheet, thickness 0.015 inch (0.4 mm).
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
 - b. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
 - c. Tube Diameter: Approximately 14 inches.
 5. Ceiling Ring: Injection molded, impact resistant acrylic. Nominal thickness is 0.110 inches.
 6. Dress Ring: Injection molded, impact resistant acrylic. Nominal thickness is 0.100 inches. Prevents air infiltration and condensation from attic spaces.
 7. Dual Glazed Diffuser Assembly:
 - a. Upper Glazing: Acrylic plastic classified as CC2. The nominal thickness is 0.040 inches (1.02 mm).
 - b. Lower Glazing (Optiview Fresnel Lens): Molded polycarbonate plastic

classified as CC1 material. The nominal thickness is 0.022 inches (0.61 mm).

8. Accessories:
 - a. Flashing Turret Extensions: Provide manufacturer's standard extensions for applications requiring:

2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 086250

SECTION 087100 - FINISH HARDWARE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Door hardware

1.02 QUALITY ASSURANCE

A. SUPPLIER QUALIFICATIONS

- 1. The hardware supplier must have in his/her employment an Architectural Hardware Consultant (AHC), as recognized by the Door And Hardware Institute, with a minimum of 10 years of Architectural Hardware experience or an equivalent person with 20 years of Architectural Hardware experience, who shall be responsible for the detailing , scheduling, and ordering of the finish hardware for this Contract.

B. DESIGN CRITERIA

- 1. Provide Underwriter’s Laboratory listed hardware for fire or accident hazard where scheduled or required to maintain rating of openings. Comply with requirements of door and door frame labels. Comply with NFPA No. 80 and local codes that are in effect in the area of the project.

1.03 SUBMITTALS

- A. Hardware Schedule: Within 10 days after receipt of a contract for the finish hardware, prepare a complete schedule and submit 6 copies of the hardware schedule with 3 copies of catalogue cuts, highlighted to show each different hardware item to the Architect for review.
- B. Do not order hardware until an approved copy of the schedule is returned to the supplier bearing the approval of the Architect.

This schedule shall indicate the following details:

Door numbers	Frame materials
Location	Hand of door
Size and thickness of door	Degree of opening
Door material	Type of attachment

- C. Templates: After receipt of the approved corrected hardware schedule, upon request the hardware supplier shall send 4 sets of templates and corrected hardware schedule

to the general contractor for distribution to the wood door, metal door, and frame manufacturers/suppliers.

- D. Maintenance Manuals: Furnish 1 (one) copy of maintenance manual covering the finish hardware for this project. The manual shall consist of printed sheets from the hardware manufacturer bound in a three-ring binder and properly indexed.
 - 1. Include the following information in the maintenance manuals:
 - a. Address and telephone number of the hardware supplier.
 - b. Address and telephone number of each hardware manufacturer.
 - c. Maintenance instructions and parts list for each type of operating hardware including:
 - 1) Locks
 - d. Warranty for all other hardware.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hardware to the jobsite only after proper provision for storage has been made. NO DIRECT SHIPMENTS WILL BE ALLOWED.
- B. Properly package and clearly identify each item relative to the hardware schedule.
- C. The hardware supplier shall authorize his representative to be present when all finish hardware is delivered to the jobsite and shall check-in each item and turn over to the General Trades Contractor for storage in a secure place under lock and key.

1.05 WARRANTY

- A. Furnish 3 copies of the following written warranty to be included in the Maintenance Manual:
 - 1. Warranty against failure of parts of all hardware for a period 1 year.
 - 5. Starting date for all warranty periods to be the date of substantial completion of building by Architect.

PART 2 PRODUCTS

- | | | | |
|----|----------------------------|------------------------------|-----|
| A. | Butts: | Ives, Bommer, Hager, Stanley | IVE |
| B. | Locksets: | Falcon, Schlage, Sargent | FAL |
| E. | Thresholds & Weatherstrip: | National Guard, Reese, Zero | NGP |
| F. | Stops & Door Trim: | Ives, Trimco, Rockwood | IVE |

2.01 SCHEDULED HARDWARE

- A. Requirements for design: grade, function, finish, size, and other distinctive qualities of each type of Builders Hardware are indicated in the Hardware Schedule at the end of this section. Products are identified by manufacturer's hardware product numbers.
- B. Manufacturer's Product Designation: One or more manufacturers are listed for each hardware type required. The initial after the manufacturer's name indicates whose product designation is used in the Hardware Schedule for purposes of establishing minimum requirements. Provide either the product designated or where more than one manufacturer is listed, the comparable product of one of the other manufacturers that comply with requirements including those specified elsewhere in the section.

2.02 MATERIALS AND FABRICATION

- A. Hand of Door: The drawings show the direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of the door movement as shown.
- B. Base Metals: Produce hardware units of the basic metal and forming method indicated using the manufacturer's standard metal alloy, composition, temper, and hardness. Do not Furnish "optional" materials or forming methods for those indicated except as otherwise specified.
- C. Fasteners: Manufacture hardware to conform to published templates generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping screws except as specifically indicated.
 - 1. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match the hardware finish or if exposed in surfaces of other work to match the finish of such other work as closely as possible including "prepared for paint" in surfaces to receive painted finish.
 - 2. Provide concealed fasteners for hardware units that are exposed when the door is closed except to the extent no standard units of the type specified are available with concealed fasteners. Do not use thru bolts for installation where the bolt head or the nut on the opposite face is exposed in other work except where it is not feasible to adequately reinforce the work.

2.03 BUTTS, HINGES, AND PIVOTS

- A. Templates: Provide only template produced units.
- B. Screws: Furnish Phillips flat-head all purpose or machine screws for installation of units except furnish Phillips flat-head all purpose wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.
- C. Hinge Pins: Except as otherwise indicated provide hinge pins as follows:

1. Steel Hinges: Steel pins
 2. Non-ferrous Hinges: Stainless steel pins
 3. Exterior Doors: Non-removable pins (NRP)
 4. Interior Doors: Non-rising pins
 5. Tips: Flat button and matching plug finished to match leaves.
- D. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90” or less in height and 1 additional hinge for each 30” of additional height.
- E. Size of Hinge Leaves: 4.5” high, except 5” for doors over 3’6” wide.
- F. Width of Hinges: Shall be sufficient to clear trim projection when door swings 180 degrees.
- G. Fire Rated doors over 8’0” shall have heavy weight hinges.
- H. All hinges SHALL be made of steel and have steel ball bearings where specified.

2.04 KEYING

- A. The hardware supplier shall make available to the Architect and/or Owner a representative for the purpose of consulting and reviewing the project’s keying requirements and make a written proposal of the complete key system.
- B. Proposed key plan shall include expansion potential for the Owner’s future requirements.
- C. All locksets and cylinders SHALL be keyed to the instructions as provided by the Architect/Owner. All locksets and cylinders shall be construction masterkeyed or have construction cores/cylinders.
- D. It is the material suppliers responsibility to de-activate the construction keying and to deliver all permanent key blanks and other security keys direct to Owner’s representative.
- E. Keys Required: Furnish quantity of keys as follows:
1. Five (5) Master Keys.
 2. Two (2) keys per lock or cylinder.
 3. Fifteen (15) construction keys.
- F. All keys shall be made of nickel silver.

2.05 CYLINDRICAL TYPE LOCKSETS

- A. All locksets and latchsets shall have steel cylindrical cases with interior parts made of steel or brass. No plastic, die cast or aluminum mechanisms will be allowed.
- B. All steel parts shall be bronze plated or coated with zinc-dichromate to resist rusting and corrosion.
- C. Locksets and cylinders shall have 6 pins.
- D. Furnish wrought boxes with all lock strikes.
- E. Strikes lips shall not project more than 1/8" beyond the frame at single doors or face of the inactive leaf at pairs of doors.

2.06 DEADLOCKS

- A. Deadlocks shall be cylindrical type with interior parts made of steel or bronze.
- B. All steel parts shall be bronze plated or coated with zinc-dichromate to resist rusting and corrosion.

2.07 TOOLS FOR MAINTENANCE

- A. Furnish a complete set of specialized tools as needed for Owner's continued adjustment, maintenance and removal or replacement of finish hardware.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: All finish hardware shall be installed by General Contractor.
- B. Furnish all items of hardware with attachment screws, bolts, nuts, etc., as required to attach hardware to type of material involved and with finish to match hardware with that they are to be used. Make all attachments to metal by template machine screws.
- C. Provide sex nuts and bolts for door closers, forearm shoes of closers, and holding devices.
- D. Attach hardware to masonry or concrete with expansion bolts or similar drilled anchors to develop full strength of attached device.
- E. Run weatherstripping full height of both jambs and full width of head. Run thresholds full width of opening. Run door bottoms full width of doors. Set expansion anchors in solid masonry, not mortar joints. Set thresholds in caulking by sealant contractor.

3.02 PROTECTION

- A. Do not install door silencers, door bottoms, and wall stops until after painting is complete. Loosen locksets and panic hardware prior to painting and re-tighten after painting is complete. Mask all hardware or otherwise protect during painting operation.

3.03 ADJUST AND CLEAN

- A. Check and adjust each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- C. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes during the final adjustment of hardware.
- D. Adjust all closers to meet ADA Requirements for sweep time and opening force. Set the closer's backcheck valve to slow the doors opening from 85 degrees on.

3.04 HARDWARE SCHEDULE

- A. It is intended the following schedule include all item of finish hardware necessary to complete the work; if a discrepancy is found in the schedule, such as a missing item, improper hardware for frame, door, or fire codes, the Preamble will be the deciding document.
- B. All items shall be of proper type for attaching securely to type of material on that they occur.
- C. The schedule of materials is as follows:

HW SET: HC-01
DOOR NUMBER: 1
HC - FRONT/BACK

EACH TO HAVE:

3	EA	HINGE	5PB1 4.5 X 4.5	652	IVE
1	EA	DEADLOCK	D241P-6	626	FAL
1	EA	ENTRY LOCK - LEVER	W511P-6 Q	626	FAL
1	EA	DOOR STOP	60	673	IVE
1	EA	THRESHOLD	425E X D.W.	AL	NGP
1	SET	SEALS	155V X D.S.	AL	NGP
1	EA	DOOR BOTTOM	35VA X D.S.	AL	NGP

HW SET: HC-02
DOOR NUMBER: 2
HC - BED/BATH

EACH TO HAVE:

1	EA	PRIVACY LOCK - LEVER	W301S Q	626	FAL
1	EA	DOOR STOP	60	673	IVE
3	EA	SILENCER	SR66	GRY	IVE

ALL OTHER HARDWARE BY PRE-HANGER

HW SET: HC-03
DOOR NUMBER: 3
HC-CLOSET

EACH TO HAVE:

1	EA	PASSAGE SET - LEVER	W101S Q	626	FAL
1	EA	DOOR STOP	60	673	IVE
3	EA	SILENCER	SR66	GRY	IVE

ALL OTHER HARDWARE BY PRE-HANGER

HW SET: HC-04
DOOR NUMBER: 3
HC - FURN / W-H

EACH TO HAVE:

1	EA	PASSAGE SET - LEVER	W101S Q	626	FAL
1	EA	DOOR STOP	60	673	IVE
1	SET	SEALS	155V X D.S.	AL	NGP

ALL OTHER HARDWARE BY PRE-HANGER

HW SET: HC-05
DOOR NUMBER: 1
HC- STORAGE

EACH TO HAVE:

3	EA	HINGE	5PB1 4.5 X 4.5 NRP	652	IVE
1	EA	DEADLOCK	D241P-6	626	FAL
1	EA	ENTRY LOCK - LEVER	W511P-6 Q	626	FAL
1	EA	DOOR STOP	60	673	IVE
1	EA	THRESHOLD	425E X D.W.	AL	NGP
1	SET	SEALS	155V X D.S.	AL	NGP
1	EA	DOOR BOTTOM	35VA X D.S.	AL	NGP

HW SET: HC-06

NM15-43 30 Units Crownpoint NM
Indigenous Design Studio + Architecture

DOOR NUMBER: 1
HC – STORM DOOR
EACH TO HAVE:

ALL HARDWARE BY DOOR SUPPLIER

HW SET: STD-01
DOOR NUMBER: 1
STD - FRONT/BACK

EACH TO HAVE:

3	EA	HINGE	5PB1 4.5 X 4.5	652	IVE
1	EA	DEADLOCK	D241P-6	626	FAL
1	EA	ENTRY LOCK - KNOB	W511P-6 HAN	626	FAL
1	EA	DOOR STOP	60	673	IVE
1	EA	THRESHOLD	425E X D.W.	AL	NGP
1	SET	SEALS	155V X D.S.	AL	NGP
1	EA	DOOR BOTTOM	35VA X D.S.	AL	NGP

HW SET: STD-02
DOOR NUMBER: 2
STD - BED/BATH

EACH TO HAVE:

1	EA	PRIVACY LOCK - KNOB	W301S HAN	626	FAL
1	EA	DOOR STOP	60	673	IVE
3	EA	SILENCER	SR66	GRY	IVE

ALL OTHER HARDWARE BY PRE-HANGER

HW SET: STD-03
DOOR NUMBER: 3
STD - CLOSET

EACH TO HAVE:

1	EA	PASSAGE SET - KNOB	W101S HAN	626	FAL
1	EA	DOOR STOP	60	673	IVE
3	EA	SILENCER	SR66	GRY	IVE

ALL OTHER HARDWARE BY PRE-HANGER

HW SET: STD-04
DOOR NUMBER: 3
STD- FURN / W-H

EACH TO HAVE:

1	EA	PASSAGE SET - KNOB	W101S HAN	626	FAL
1	EA	DOOR STOP	60	673	IVE
1	SET	SEALS	155V X D.S.	AL	NGP

ALL OTHER HARDWARE BY PRE-HANGER

HW SET: STD-05
DOOR NUMBER: 1
STD - STORAGE

EACH TO HAVE:

3	EA	HINGE	5PB1 4.5 X 4.5 NRP	652	IVE
1	EA	DEADLOCK	D241P-6	626	FAL
1	EA	ENTRY LOCK - KNOB	W511P-6 HAN	626	FAL
1	EA	DOOR STOP	60	673	IVE
1	EA	THRESHOLD	425E X D.W.	AL	NGP
1	SET	SEALS	155V X D.S.	AL	NGP
1	EA	DOOR BOTTOM	35VA X D.S.	AL	NGP

HW SET: STD-06
DOOR NUMBER: 1
STD – STORM DOOR

EACH TO HAVE:

ALL HARDWARE BY DOOR SUPPLIER

END OF SECTION

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.

1.2 SUBMITTALS

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

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.3 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. American Gypsum Co.
- b. BPB America Inc.
- c. G-P Gypsum.
- d. Lafarge North America Inc.
- e. National Gypsum Company.
- f. PABCO Gypsum.
- g. USG Corporation.

- B. Type X:
 - 1. Thickness: 5/8 inch or as indicated.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- C. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
 - 1. Thickness: 5/8 inch or as indicated.
 - 2. Long Edges: Tapered.
- D. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
 - 1. Core: 5/8 inch, Type X or as indicated.
 - 2. Long Edges: Tapered.

2.1 TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M or ASTM C 1396/C 1396M.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum Co.
 - b. G-P Gypsum.
 - c. Lafarge North America Inc.
 - d. National Gypsum Company.
 - e. USG Corporation.
 - 2. Core: 5/8 inch, Type X.
- B. Cementitious Backer Units: ANSI A118.9.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Custom Building Products; Wonderboard.
 - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - c. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: 5/8 inch.

2.2 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - e. Expansion (control) joint.
 - f. Curved-Edge Cornerbead: With notched or flexible flanges.

2.3 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - 2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
- F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

2.5 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.

- B. Polystyrene Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E 84.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. G-P Gypsum; Georgia-Pacific Regency Ceiling Textures/Polystyrene.
 - b. National Gypsum Company; Perfect Spray.
 - c. USG Corporation; SHEETROCK Ceiling Spray Texture, QT.
 - 2. Texture: Medium.
- C. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. G-P Gypsum; Georgia-Pacific Ceiling Textures/Vermiculite.
 - b. USG Corporation; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).
 - 2. Texture: Light spatter, "orange peel."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

3.2 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: All walls and ceilings.
 - 2. Ceiling Type: All ceilings.
 - 3. Moisture- and Mold-Resistant Type: Wet areas in kitchen, bathrooms and laundry.

3.3 APPLYING TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.

- B. Cementitious Backer Units: ANSI A108.1, at showers, tubs, and where indicated.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
 - 1. Level 1: Ceiling plenum areas, exterior storage room concealed areas.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 3: Ceilings that will have aggregate finish.
 - 4. Level 4: All wall panel surfaces that will be exposed to view.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.6 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite

these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.7 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vinyl sheet floor covering, without backing.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- C. Samples: In manufacturer's standard size, but not less than 6-by-9-inch (150-by-230-mm) sections of each different color and pattern of floor covering required.
- D. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor coverings.
- B. Close spaces to traffic during floor covering installation.
- C. Close spaces to traffic for 48 hours after floor covering installation.
- D. Install floor coverings after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL SHEET FLOOR COVERING

- A. Products: Subject to compliance with requirements, provide one of the following
 - 1. Armstrong World Industries, Inc.
 - 2. Congoleum Corporation;
 - 3. Mannington Mills, Inc.
 - 4. Tarkett, Inc.
- B. Unbacked Vinyl Sheet Floor Covering: ASTM F 1913, 0.125 inches thick.

- C. Wearing Surface: Embossed
- D. Sheet Width: As standard with manufacturer
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor coverings until they are same temperature as space where they are to be installed.
 - 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

- E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.2 FLOOR COVERING INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor coverings.
- B. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- C. Lay out floor coverings as follows:
 - 1. Maintain uniformity of floor covering direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in floor covering substrates.
 - 3. Match edges of floor coverings for color shading at seams.
 - 4. Avoid cross seams.
- D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor covering.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
 - 1. Apply two coats.
- C. Cover floor coverings until Substantial Completion.

END OF SECTION 096516

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- C. Samples: Full-size units of each color and pattern of floor tile required.
- D. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE

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

1. Armstrong World Industries, Inc.; Standard Excelon Imperial texture or equivalent.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).
- C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Aluminum (not anodized or otherwise coated).
 - 5. Wood.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As selected by Architect from manufacturer's full range.

2.2 PRIMERS/SEALERS

- A. Alkali-Resistant Primer: MPI #3.
 - 1. VOC Content: E Range of E1.

NM15-43 30 Units Crownpoint NM
Indigenous Design Studio + Architecture

- B. Bonding Primer (Water Based): MPI #17.
 - 1. VOC Content: E Range of E1.
- C. Bonding Primer (Solvent Based): MPI #69.
 - 1. VOC Content: E Range of E1.

2.3 METAL PRIMERS

- A. Alkyd Anticorrosive Metal Primer: MPI #79.
 - 1. VOC Content: E Range of E1.
- B. Quick-Drying Alkyd Metal Primer: MPI #76.
 - 1. VOC Content: E Range of E1.
- C. Cementitious Galvanized-Metal Primer: MPI #26.
 - 1. VOC Content: E Range of E1.
- D. Waterborne Galvanized-Metal Primer: MPI #134.
 - 1. VOC Content: E Range of E1.
 - 2. Environmental Performance Rating: EPR 1.
- E. Quick-Drying Primer for Aluminum: MPI #95.
 - 1. VOC Content: E Range of E1.

2.4 WOOD PRIMERS

- A. Exterior Latex Wood Primer: MPI #6.
 - 1. VOC Content: E Range of E2.

2.5 EXTERIOR LATEX PAINTS

- A. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.6 EXTERIOR ALKYD PAINTS

- A. Exterior Alkyd Enamel (Semigloss): MPI #94 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.7 QUICK-DRYING ENAMELS

- A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.8 ALUMINUM PAINT

- A. Aluminum Paint: MPI #1.
 - 1. VOC Content: E Range of E1.

2.9 FLOOR COATINGS

- A. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.
 - 1. VOC Content: E Range of E1.

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 work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Wood: 15 percent.
 - 3. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System:
 - a. Prime Coat: Interior/exterior clear concrete floor sealer (water based).
 - b. Intermediate Coat: Interior/exterior clear concrete floor sealer (water based).
 - c. Topcoat: Interior/exterior clear concrete floor sealer (water based).

B. Steel Substrates:

1. Quick-Drying Enamel System:
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Quick-drying enamel matching topcoat.
 - c. Topcoat: Quick-drying enamel semigloss.
2. Alkyd System:
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel semigloss.
3. Aluminum Paint System:
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Aluminum paint.
 - c. Topcoat: Aluminum paint.

C. Galvanized-Metal Substrates:

1. Latex System:
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex semigloss.
2. Alkyd System:
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel semigloss.

D. Aluminum Substrates:

1. Latex System:
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex semigloss.
2. Alkyd System:
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel semigloss.

E. Glue-Laminated Beam and Column Substrates:

1. Latex System:
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex semigloss.
 2. Latex Over Alkyd Primer System:
 - a. Prime Coat: Exterior alkyd or oil wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex semigloss.
- F. Wood Panel Substrates: Including plywood siding, fascias, and soffits.
1. Latex System:
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat.
 2. Latex Over Alkyd Primer System:
 - a. Prime Coat: Exterior alkyd wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex flat.
- G. Dimension Lumber Substrates, Nontraffic Surfaces: Including board siding and fencing.
1. Latex System:
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex semigloss.
 2. Latex Over Alkyd Primer System: MPI EXT 6.2A.
 - a. Prime Coat: Exterior alkyd or oil wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex semigloss.
 3. Alkyd System:
 - a. Prime Coat: Exterior alkyd or oil wood primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel semigloss.
- H. Exterior Gypsum Board Substrates:
1. Latex System:
 - a. Prime Coat: Exterior latex matching topcoat.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex semigloss.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

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 surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Wood.
 - 3. Gypsum board.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Benjamin Moore & Co.
 2. Dunn-Edwards Corporation.
 3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. Material Compatibility:
 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 3. Floor Coatings: VOC not more than 100 g/L.
 4. Shellacs, Clear: VOC not more than 730 g/L.
 5. Flat Topcoat Paints: VOC content of not more than 50 g/L.
 6. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
 7. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.
 1. VOC Content: E Range of E1.

- B. Interior Alkyd Primer/Sealer: MPI #45.
 - 1. VOC Content: E Range of E1.
- C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.4 WOOD PRIMERS

- A. Interior Latex-Based Wood Primer: MPI #39.
 - 1. VOC Content: E Range of E2.

2.5 LATEX PAINTS

- A. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).
 - 1. VOC Content: E Range of E1.
- B. Interior Latex (Satin): MPI #43 (Gloss Level 4)
 - 1. VOC Content: E Range of E1.
- C. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.
- D. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.6 ALKYD PAINTS

- A. Interior Alkyd (Eggshell): MPI #51 (Gloss Level 3).
 - 1. VOC Content: E Range of E1.
- B. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.7 QUICK-DRYING ENAMELS

- A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.8 FLOOR COATINGS

- A. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.
 - 1. VOC Content: E Range of E1.
- B. Interior/Exterior Latex Floor and Porch Paint (Low Gloss): MPI #60 (maximum Gloss Level 3).
 - 1. VOC Content: E Range of E2.

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 work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Wood: 15 percent.
 - 3. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating 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 plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Sand surfaces that will be exposed to view, and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
1. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Tanks that do not have factory-applied final finishes.
 - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 2. Electrical Work:
 - a. Switchgear.
 - b. Panelboards.

- c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Traffic Surfaces:
 1. Latex Floor Enamel System: MPI INT 3.2A.
 - a. Prime Coat: Interior/exterior latex floor and porch paint (low gloss).
 - b. Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
 - c. Topcoat: Interior/exterior latex floor and porch paint (low gloss).
 2. Alkyd Floor Enamel System: MPI INT 3.2B.
 - a. Prime Coat: Exterior/interior alkyd floor enamel (gloss).
 - b. Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).
 - c. Topcoat: Exterior/interior alkyd floor enamel (gloss).
 3. Clear Sealer System: MPI INT 3.2F.
 - a. First Coat: Interior/exterior clear concrete floor sealer (solvent based).
 - b. Topcoat: Interior/exterior clear concrete floor sealer (solvent based).

4. Water-Based Clear Sealer System: MPI INT 3.2G.
 - a. First Coat: Interior/exterior clear concrete floor sealer (water based).
 - b. Topcoat: Interior/exterior clear concrete floor sealer (water based).

- B. Dressed Lumber Substrates: Including architectural woodwork and doors.
 1. Latex System: MPI INT 6.3T.
 - a. Prime Coat: Interior latex-based wood primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex semigloss.

 2. Latex Over Alkyd Primer System: MPI INT 6.3U.
 - a. Prime Coat: Interior alkyd primer/sealer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex semigloss.

 3. Alkyd System: MPI INT 6.3B.
 - a. Prime Coat: Interior alkyd primer/sealer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd eggshell.

- C. Gypsum Board Substrates:
 1. Latex System: MPI INT 9.2A.
 - a. Prime Coat: Interior latex primer/sealer or matching topcoat.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex eggshell.

 2. Alkyd Over Latex Primer System: MPI INT 9.2C.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd eggshell.

END OF SECTION 099123

SECTION 102800 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Vanity accessories.
 - 2. Bathroom accessories.
 - 3. Underlavatory guards.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule:
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 VANITY ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Specialties, Inc.
 - 2. A & J Washroom Accessories, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corporation.
 - 5. Tubular Specialties Manufacturing, Inc. (TSM Inc.)
- A. Towel Bar:
 - 1. Description: 1-inch-round tube with circular end brackets.
 - 2. Mounting: Flanges with exposed fasteners.
 - 3. Length: 24 inches.
 - 4. Material and Finish: Stainless steel, No. 4 finish (satin).
- B. Medicine Cabinet:
 - 1. Description: 3-inch recessed medicine cabinet with mirror.
 - 2. Mounting: Recess mounted, attached to side studs.
 - 3. Dimension: 18" width, 30" height, 3" – 3 ½" depth.

4. Operation: Right-hinged cabinet.
5. Material: Aluminum trim with glass shelves.

C. Mirror Unit:

1. Frame: Stainless-steel angle, 0.05 inch thick.
 - a. Corners: Welded and ground smooth.
2. Size: As indicated on Drawings.

2.2 BATHROOM ACCESSORIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. General Accessory Manufacturing Co. (GAMCO).

B. Toilet Tissue Holder:

1. Description: Standard Tissue Holder.
2. Mounting: Surface mounted.
3. Operation: Spring-loaded spindle can be removed for tissue replacement.
4. Capacity: One standard toilet tissue roll.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Grab Bar: (in Handicap Accessible Units Only).

1. Mounting: Flanges with exposed fasteners.
2. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
3. Outside Diameter: 1-1/2 inches.
4. Configuration and Length: As indicated on Drawings.

D. Shower Curtain Rod:

1. Description: 1-1/4-inch OD; fabricated from nominal 0.05-inch- thick stainless steel.
2. Mounting Flanges: Stainless-steel flanges designed for exposed fasteners.
3. Finish: No. 4 (satin).

E. Soap Dish:

1. Description: With washcloth bar.
2. Mounting: Surface mounted.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

F. Robe Hook:

1. Description: Double-prong unit.
2. Material and Finish: Stainless steel, No. 4 finish (satin).

G. Towel Bar:

1. Description: 1-inch-round tube with circular end brackets.
2. Mounting: Flanges with exposed fasteners.
3. Length: 24 inches.
4. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 UNDERLAVATORY GUARDS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Plumberex Specialty Products, Inc.
2. TCI Products.
3. Truebro, Inc.

B. Underlavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies, that prevent direct contact with and burns from piping, and allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded-plastic, white.

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

END OF SECTION 102800

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and maintenance data.
- C. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Amerex Corporation.
 - b. Badger Fire Protection; a Kidde company.
 - c. Buckeye Fire Equipment Company.
 - d. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - e. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - f. Larsen's Manufacturing Company.
 - g. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
 - h. Pyro-Chem; Tyco Safety Products.
 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in steel container: UL-rated 2-A:10 -B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
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. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International Ltd.
 - c. Badger Fire Protection; a Kidde company.
 - d. Buckeye Fire Equipment Company.
 - e. Fire End & Croker Corporation.
 - f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - g. Larsen's Manufacturing Company.
 - h. Potter Roemer LLC.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 1. Cooking equipment including ranges.
 2. Ventilation range hoods.
 3. Refrigerator/freezers.
 4. Wood-Burning stove and accessories.
 5. UFAS/ADA/Hearing and Visual Impaired: Compliant Units.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed finish.
- C. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Residential Appliances: Comply with NAECA standards.
- D. Energy Ratings: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
- E. UFAS/ADA/Hearing and Visual Impaired: Designated compliant units per project site and floor plans.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
 1. Electric Range and Hood: Five-year limited warranty for in-home service on surface-burner elements.
 2. Refrigerator/Freezer: Five-year limited warranty for in-home service on the sealed refrigeration system.
 3. Wood Stove: Five-year limited warranty.

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

2.2 COOKING APPLIANCES

- A. Range: Freestanding/Slide-in, electric.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified:
 - a. Amana Appliances
 - b. Electrolux Home Products
 - c. General Electric Company
 - d. Hotpoint
 - e. Jenn-Air
 - f. Kenmore
 - g. KitchenAid
 - h. Maytag
 - i. Whirlpool Corporation
 2. Type: Standard, 30" 5.3 Cu.ft.; ADA , 30" 5.4 Cu.ft. Front Controls
 3. Cooktop: Four burners Flat Cooktop.
 4. Oven(s): One, electric.
 5. Finish: Stainless Steel.
 6. Electric: Must provide recommended outlets for unit and clock requirements.
- B. Exhaust Hood:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified:
 - a. Dynamic Cooking Systems, Inc.
 - b. General Electric Company
 - c. Hotpoint
 - d. KitchenAid
 - e. Maytag
 - f. Viking Range Corporation
 - g. Whirlpool Corporation
 2. Type: 30-inches, wall-mounted range hood.
 3. Exhaust Fan: Variable-speed fan, 550 cfm, built-in hood.
 4. Finish: Stainless steel.
 5. ADA, provide electric switch for range hood control at base cabinet.

2.3 REFRIGERATION APPLIANCES

- A. Refrigerator/Freezer:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified:
 - a. Amana Appliances
 - b. General Electric Company
 - c. Hotpoint
 - d. Jenn-Air
 - e. Kenmore
 - f. KitchenAid
 - g. Maytag
 - h. Whirlpool Corporation.
2. Type: Freestanding, frost-free, standard top Freezer & ADA with freezer on bottom.
3. Storage Capacity:
 - a. Fresh Food Compartment Volume: 18 cu. ft. (Standard) 28 cu.ft. (ADA)
 - b. Freezer Volume: 5.13 cu. ft. (Standard) 8.6 cu.ft. (ADA)
4. Front Panel: Stainless-steel door front and lower access panel.

2.4 WOOD BURNING STOVE AND ACCESSORIES

A. Wood Burning Stove:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified:
 - a. Pleasant Hearth
 - b. US Stove
 - c. Rocky Mountain
 - d. Lopi
2. Type: 30”H x 31”W 27” D, Freestanding, Variable Speed Blower, Brick-lined fire-box, stainless steel handles, air wash system, cleanliness of glass window.
3. BTU Output: min 70,000 BTU
4. Electric: 110 V
5. Finish: Steel
6. 2020 EPA certified.

B. Floor Hearth:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified:
 - a. Northline Express
2. Type: 48”x48” Double Cut Hearth Pad
3. Color/Pattern: Provide full color/patterns from Manufacture’s complete line.

C. Wall Protection:

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

- a. Northline Express
2. Type: 48"x48" Wall Board.
3. Color/Pattern: Provide full color/patterns from Manufacture's complete line.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Utilities: Refer to Divisions 15 and 16 for plumbing and electrical requirements.

END OF SECTION 113100

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Horizontal louver blinds with aluminum slats.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
 - 1. Include details of installation in headrails locations.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hunter Douglas Contract.
 - 2. Levolor Contract; a Newell Rubbermaid company.
- B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.
 - 1. Width: 1 inch (25 mm)
 - 2. Thickness: Manufacturer's standard.

3. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
 - C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.
 1. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full operating range.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Operator: Clear-plastic wand.
 3. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
 4. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard.
 - D. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.
 1. Type: Manufacturer's standard.
 - E. Ladders: Braided cord.
 - F. Valance: Manufacturer's standard.
 - G. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
 - H. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
 - I. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.
 - J. Colors, Textures, Patterns, and Gloss:
 1. Slats: As selected by Architect from manufacturer's full range.
- ## 2.2 HORIZONTAL LOUVER BLIND FABRICATION
- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.

- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.
- B. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.
- C. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

END OF SECTION 122113

SECTION 123530 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Kitchen cabinets.
 2. Vanity cabinets.
 3. Plastic-laminate countertops and backsplashes.

1.2 SUBMITTALS

- A. Product Data: For cabinets, plastic-laminate countertops, and cabinet hardware.
- B. Shop Drawings: For cabinets and countertops. Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, hardware, edge and backsplash profiles, methods of joining countertops, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

1.3 QUALITY ASSURANCE

- A. Quality Standards: Unless otherwise indicated, comply with the following standards:
1. Cabinets: KCMA A161.1.
 2. Plastic-Laminate Countertops: KCMA A161.2.

PART 2 - PRODUCTS

2.1 CABINET MATERIALS

- A. General:
1. Hardwood Lumber: Kiln dried to 7 percent moisture content.
 2. Softwood Lumber: Kiln dried to 10 percent moisture content.
 3. Hardwood Plywood: HPVA HP-1.
 4. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
 5. Hardboard: AHA A135.4, Class 1 Tempered.
- B. Exposed Materials:
1. Exposed Wood Species: Maple.
 - a. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - b. Staining and Finish: As selected by Architect from manufacturer's full range.
 2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
 3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.

4. Plastic Laminate: Medium Density Fiberboard faced with high-pressure decorative laminate complying with NEMA LD 3, Grade VGS.
 - a. Colors, Textures, and Patterns: As selected by Architect from cabinet manufacturer's full range.
- C. Semiexposed Materials: Unless otherwise indicated, provide the following:
 1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces or stained to be compatible with exposed surfaces.
 2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces or stained to be compatible with exposed surfaces.
 3. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with NEMA LD 3, Grade VGS.
 - a. Colors, Textures, and Patterns: As selected by Architect from cabinet manufacturer's full range.
- D. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; medium-density fiberboard; or hardboard.

2.2 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Architect from manufacturer's full range.
- B. Pulls: Back-mounted decorative pulls.
- C. Hinges: Concealed butt hinges.
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or B05091.

2.3 COUNTERTOP MATERIALS

- A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 1. Grade: HGS.
 2. Colors, Textures, and Patterns: As selected by Architect from countertop manufacturer's full range.
 3. Medium-Density Fiberboard: ANSI A208.2, Grade MD..
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- C. Solid Wood Edges and Trim: Clear hard maple lumber, free of defects, selected for compatible grain and color, and kiln dried to 7 percent moisture content.

2.4 CABINETS

- A. Available Products: Subject to compliance with requirements, cabinets that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. American Woodmark Corporation
 - 2. Armstrong Cabinet Products
 - 3. Brandom Cabinets Inc.
 - 4. Cabinets Southwest Inc.
 - 5. Canac
 - 6. Legacy Cabinets Inc.
 - 7. MasterBrand Cabinets, Inc.
- C. Face Style: Lipped overlay.
- D. Cabinet Style: Frameless.
- E. Door and Drawer Fronts: Solid-wood stiles and rails, 3/4 inch thick, with 1/4-inch thick, veneer-faced plywood center panels.
- F. Exposed Cabinet End Finish: Wood veneer

2.5 PLASTIC-LAMINATE COUNTERTOPS

- A. Configuration: Provide countertops with the following front, cove (intersection of top with backsplash), backsplash, and endsplash style:
 - 1. Front: Rolled.
 - 2. Cove: Cove molding (one-piece postformed laminate supported at junction of top and backsplash by wood cove molding).
 - 3. Backsplash: Curved or waterfall shape.
 - 4. Endsplash: Square edge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.
- B. Install cabinets without distortion so doors and drawers fit openings and are aligned. Complete installation of hardware and accessories as indicated.
- C. Install casework level and plumb to a tolerance of 1/8 inch in 8 feet.
- D. Fasten cabinets to adjacent units and to backing.

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1. Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
- E. Fasten plastic-laminate countertops by screwing through corner blocks of base units into underside of countertop. Form seams using splines to align adjacent surfaces, and secure with glue and concealed clamping devices designed for this purpose.
- F. Fasten solid-surfacing-material countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces, and form seams to comply with manufacturer's written instructions using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- G. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 123530

SECTION 22 0500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Equipment installation requirements common to equipment sections.
8. Concrete bases.
9. Supports and anchorages.

1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

- A. Welding certificates.

1.4 QUALITY ASSURANCE

- A. Comply with 2012 UPC, and 2010 NFPA 24 and 2012 NFPA 1.
- B. Comply 2010 NFPA 24 and NFPA 1.
- C. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

- D. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- E. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8, BCuP Series or BAgl, unless otherwise indicated.
- E. Welding Filler Metals: Comply with AWS D10.12.
- F. Solvent Cements for Joining Plastic Piping:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.

2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.

- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150-psig minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.4 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Plastic. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: Polished chrome-plated.

2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.

- K. Select system components with pressure rating equal to or greater than system operating pressure.
 - L. Install escutcheons for penetrations of walls, ceilings, and floors.
 - M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 - O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 - P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
 - Q. Verify final equipment locations for roughing-in.
 - R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- 3.2 PIPING JOINT CONSTRUCTION
- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
 - B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 - F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
 - H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
 - I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
 - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
 - J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
 - K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- 3.3 PIPING CONNECTIONS
- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.6 GROUTING

- A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 22 0500

SECTION 22 0700 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Insulation Materials:
 - a. Flexible elastomeric.
 - b. Mineral fiber.
 - 2. Adhesives.
 - 3. Sealants.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 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. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

D. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide the following:
 - a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000(Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation. ASJ requires field-applied adhesive and staples. ASJ with SSL does not require field-applied adhesive and staples, resulting in reduced installation labor.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-96.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-33.
 - c. Marathon Industries, Inc.; 290
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

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. Aeroflex USA Inc.; Aeroseal.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
 - d. RBX Corporation; Rubatex Contact Adhesive.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-76.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 - f. Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
5. Color: White or gray.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.

- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- N. For above ambient services, do not install insulation to the following:
 - 1. Testing agency labels and stamps.
 - 2. Nameplates and data plates.
 - 3. Cleanouts.

3.3 PENETRATIONS

- A. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).

4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
 - D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 1. Comply with requirements in Division 07 Section "Penetration Firestopping" and fire-resistive joint sealers.
 - E. Insulation Installation at Floor Penetrations:
 1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."
- ### 3.4 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION
- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 - B. Insulation Installation on Pipe Flanges:
 1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 - C. Insulation Installation on Pipe Fittings and Elbows:
 1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 - D. Insulation Installation on Valves and Pipe Specialties:
 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 3. Install insulation to flanges as specified for flange insulation application.
 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.5 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
2. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.7 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.8 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold, Hot, and Recirculated Hot Water: Insulation shall be the following:
 - 1. Flexible Elastomeric: 1 inch (25 mm) thick.
 - 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inch (50 mm) thick.
- B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be one of the following:
 - 1. Flexible Elastomeric: 1/2 inch (13 mm) thick.
 - 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

END OF SECTION 22 0700

SECTION 22 1116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Encasement for piping.
3. Flexible connectors.
4. Escutcheons.
5. Sleeves and sleeve seals.
6. Wall penetration systems.
7. Potable hot and cold water distribution system, using crosslinked polyethylene (PEX) tubing and ASTM F1960 cold expansion fittings.

1.2 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. ASTM International
1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
 2. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials
 3. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
 4. ASTM F876 Standard Specification for Cross-linked Polyethylene (PEX) Tubing
 5. ASTM F877 Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
 6. ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing
- C. American National Standards Institute (ANSI)/National Sanitation Foundation (NSF)
1. ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials
 2. ANSI/NSF Standard 61 Drinking Water System Components - Health Effects
- D. American National Standards Institute (ANSI)/Underwriters Laboratories, Inc. (UL)
1. ANSI/UL 263 Standard for Safety for Fire Tests of Building Construction and Materials
- E. Canadian Standards Association (CSA)
1. CAN/CSA B137.5: Cross-linked Polyethylene (PEX) Tubing Systems for Pressure applications
- F. International Code Council (ICC)

1. International Plumbing Code (IPC)
 2. ICC Evaluation Service (ES) Evaluation Report No. ESR 1099
- G. Building Officials and Code Administrators International (BOCA)
1. 1993 BOCA National Plumbing Code
- H. International Association of Plumbing Officials (IAPMO)
1. Uniform Plumbing Code (UPC)
- I. National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)
1. National Standard Plumbing Code (NSPC)
- J. U.S. Department of Housing and Urban Development (HUD)
1. HUD Material Release No. 1269
- K. Plastics Pipe Institute (PPI)
1. PPI Technical Report TR-4/06
- L. Uponor, Inc.
1. Uponor Professional Plumbing Installation Guide, 2006

1.3 SYSTEM DESCRIPTION

A. Design Requirements

1. Standard grade hydrostatic pressure ratings from Plastics Pipe Institute (PPI) in accordance with TR-3 as listed in TR-4. The following three standard-grade hydrostatic ratings are required.
 - a. 200°F (93°C) at 80 psi (551 kPa)
 - b. 180°F (82°C) at 100 psi (689 kPa)
 - c. 73.4°F (23°C) at 160 psi (1,102 kPa)
2. Certification of flame spread/smoke development rating of 25/50 in accordance with ASTM E84 provided the installation meets one of the following requirements.
 - a. Tubing spacing is a minimum of 18 inches apart for the following sizes.
 1. $\frac{3}{8}$ inch [9.53mm]
 2. $\frac{1}{2}$ inch [12.7mm]
 3. $\frac{5}{8}$ inch [15.88mm]
 4. $\frac{3}{4}$ inch [19.05mm]
 - b. Tubing is wrapped with $\frac{1}{2}$ " fiberglass insulation with a flame spread of not more than 20 and a smoke-developed rating of not more than 30 and a nominal density of 4.0 to 4.5 pcf. Tubing can run with three tubes separated by zero inches and then 18 inches between the next group of three tubes for the following sizes.
 1. $\frac{3}{8}$ inch [9.53mm]
 2. $\frac{1}{2}$ inch [12.7mm]
 3. $\frac{5}{8}$ inch [15.88mm]
 4. $\frac{3}{4}$ inch [19.05mm]
 5. 1 inch [25.4mm]

- B. Performance Requirements: To provide a PEX tubing hot and cold potable water distribution system, which is manufactured, fabricated and installed to comply with regulatory agencies and

to maintain performance criteria stated by the PEX tubing manufacturer without defects, damage or failure.

1. Comply with ANSI/NSF Standard 14.
2. Comply with ANSI/NSF Standard 61.
3. Show compliance with ASTM F877.
4. Show compliance with ASTM E119 and ANSI/UL 263 through certification listings with Underwriters Laboratories, Inc. (UL).
 - a. UL Design No. L557 — 1 hour wood frame floor/ceiling assemblies
 - b. UL Design No. K913 — 2 hour concrete floor/ceiling assemblies
 - c. UL Design No. U372 — 1 hour wood stud/gypsum wallboard wall assemblies
 - d. UL Design No. V444 — 1 hour steel stud/gypsum wallboard wall assemblies

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic, potable domestic water piping and components.
- C. Comply with NSF 61 for potable domestic water piping and components.
- D. Installer Qualifications: Use an installer with demonstrated experience on projects of similar size and complexity and possessing documentation proving successful completion of PEX plumbing installation training by the PEX tubing manufacturer.
- E. Regulatory Requirements and Approvals: Provide domestic potable system that complies with requirements of the following:
 1. International Code Conference (ICC) – International Plumbing Code (IPC)
 - a. ICC Evaluation Service (ES) Evaluation Report No. ESR 1099
 2. Building Officials and Code Administrators International (BOCA)
 - a. 1993 BOCA National Plumbing Code
 3. Uniform Plumbing Code (UPC)
 - a. IAPMO Files 3558, 3946 and 3960
 4. National Standard Plumbing Code (NSPC)
 5. HUD Material Release No. 1269
- F. Certifications: Provide letters of certification as follows:
 6. Installer is trained by the PEX tubing manufacturer to install the PEX potable water distribution system.
 7. Installer will use skilled workers holding a trade qualification license or equivalent, or apprentices under the supervision of a licensed trades professional.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Tubing
 - 1. Material: Crosslinked polyethylene (PEX) manufactured by PEX-a or Engel method
 - 2. Type: Wirsbo AQUAPEX
 - 3. Material Standard: Manufactured in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third party agency
 - 4. Standard grade hydrostatic design and pressure ratings from PPI
 - 5. Fire-rated assembly listings in accordance with ANSI/UL 263
 - a. UL Design No. L557 — 1-hour wood frame floor/ceiling assemblies
 - b. UL Design No. K913 — 2-hour concrete floor/ceiling assemblies
 - c. UL Design No. U372 — 1-hour wood stud/gypsum wallboard wall assemblies
 - d. UL Design No. V444 — 1-hour steel stud/gypsum wallboard wall assemblies
 - 6. Minimum Bend Radius (cold bending): No less than six times the outside diameter. Use a bend support as supplied by the PEX tubing manufacturer for tubing with a bend radius less than stated.
 - 7. Nominal Inside Diameter: Provide tubing with nominal inside diameter, in accordance with ASTM F876 as indicated.
 - a. $\frac{3}{8}$ inch [9.53mm]
 - b. $\frac{1}{2}$ inch [12.7mm]
 - c. $\frac{3}{4}$ inch [19.05mm]
 - d. 1 inch [25.4mm]
- C. Fittings
 - 8. Material: Uponor Engineered Plastic (EP).
 - 9. Material Standard: Comply with ASTM F1960.
 - 10. Type: PEX-a cold expansion fitting.
 - a. Assembly consists of the appropriate ProPEX insert with a corresponding ProPEX Ring.
- D. Manifolds
 - 1. Material
 - b. Type L copper body with UNS 3600 series brass ProPEX outlet connections
 - c. Engineered Plastic (EP) body with ProPEX outlet connections
 - 2. Manifold Type
 - a. Uponor ProPEX 1" Copper Manifold
 - b. Uponor engineered plastic (EP) Manifold
 - 3. All manifolds manufactured with the appropriate-sized ProPEX fittings on the manifold supply inlets.
- E. Accessories
 - 1. Angle stops and straight stops that are compatible with PEX tubing are supplied by the PEX tubing manufacturer.
 - 2. Bend supports designed for maintaining tight radius bends are supplied by the PEX tubing manufacturer.

3. ProPEX expander tool to install the ASTM F1960 compatible fittings are supplied by the PEX tubing manufacturer.
4. The tubing manufacturer provides clips and/or PEX rails for supporting tubing runs.
5. All horizontal tubing hangers and riser clamps are epoxy-coated material.

2.2 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.

2.3 TRANSITION FITTINGS

- A. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- B. Sleeve-Type Transition Coupling: AWWA C219.

2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
 - a. Pressure Rating: 150 psig (1035 kPa) at 180 deg F (82 deg C).
 - b. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Couplings:
 - a. Galvanized-steel coupling.
 - b. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
 - c. End Connections: Female threaded.
 - d. Lining: Inert and noncorrosive, thermoplastic.
- D. Dielectric Nipples:
 - a. Electroplated steel nipple complying with ASTM F 1545.
 - b. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
 - c. End Connections: Male threaded or grooved.
 - d. Lining: Inert and noncorrosive, propylene.

2.5 FLEXIBLE CONNECTORS

- A. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
- B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

2.6 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One Piece, Stamped Steel: Chrome-plated finish with spring clips.
- C. Split Plate, Stamped Steel: Chrome-plated finish with concealed hinge, setscrew or spring clips.

2.7 SLEEVES

- A. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40..

2.8 SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.

2.9 GROUT

- A. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Wirsbo AQUAPEX Tubing
 - 1. Install Wirsbo AQUAPEX tubing in accordance with the tubing manufacturer's recommendations and as indicated in the installation handbook.
 - 2. Do not install PEX tubing within 6 inches [152 mm] of gas appliance vents or within 12 inches [305 mm] of any recessed light fixtures.

3. Do not solder within 18 inches [457 mm] of PEX tubing in the same waterline. Make sweat connections prior to making PEX connections.
4. Do not expose PEX tubing to direct sunlight for more than 30 days.
5. Ensure no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the tubing manufacturer.
6. Use grommets or sleeves at the penetration for PEX tubing passing through metal studs.
7. Protect PEX tubing with sleeves where abrasion may occur.
8. Use strike protectors where PEX tubing penetrates a stud or joist and has the potential for being struck with a screw or nail.
9. Use tubing manufacturer-supplied bend supports where bends are less than six times the outside tubing diameter.
10. Minimum horizontal supports are installed not less than 32 inches between hangers in accordance with model plumbing codes and the installation handbook.
11. PEX riser installations require epoxy-coated riser clamps installed at the base of the ceiling per floor.
12. A mid-story support is required for riser applications.
13. Pressurize Wirsbo AQUAPEX tubing with air in accordance with applicable codes or in the absence of applicable codes to a pressure of 25 psi (173 kPa) above normal working pressure of the system.
14. Comply with safety precautions when pressure testing, including use of compressed air, where applicable. Do not use water to pressurize the system if ambient air temperature has the possibility of dropping below 32°F (0°C).

3.3 VALVE INSTALLATION

- A. Install shutoff valve, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 (DN 50) and smaller.
- B. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.

3.4 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings.

3.5 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings or nipples.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flange kits.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

3.7 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
 - 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, stamped steel with set screw or spring clips.
 - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece or split plate, stamped steel with set screw.
 - 4. Bare Piping in Unfinished Service Spaces: One piece, stamped steel with set screw or spring clips.
 - 5. Bare Piping in Equipment Rooms: One piece, stamped steel with set screw or spring clips.
 - 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

3.8 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Permanent sleeves are not required for holes formed by removable PE sleeves.
- C. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.

- D. Install sleeves in new partitions, slabs, and walls as they are built.
- E. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- F. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals specified in this Section.
- G. Seal space outside of sleeves in concrete slabs and walls with grout.
- H. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
- I. Install sleeve materials according to the following applications:
 - 1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
 - 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe.
 - a. Extend sleeves 2 inches (50 mm) above finished floor level.
 - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Steel pipe sleeves for pipes smaller than NPS 6 (DN 150).
 - b. Galvanized-steel sheet sleeves for pipes NPS 6 (DN 150) and larger.
 - c. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
- J. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

3.9 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

- B. Piping Inspections:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- C. Piping Tests:
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.11 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Under-building-slab, domestic water, building service piping, NPS 3 (DN 80) and smaller, shall be the following:
 - 1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); wrought-copper solder-joint fittings; and brazed joints.
- D. Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be the following:
 - 1. PEX Tubing.

3.13 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. .
 - 2. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
 - 3. Drain Duty: Hose-end drain valves.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 22 1116

SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Hose bibbs.
5. Wall hydrants.
6. Drain valves.

B. Related Sections include the following:

1. Division 22 Section "Domestic Water Piping".

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa), unless otherwise indicated.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. NSF Compliance:

1. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ames Co.

- b. Cash Acme.
 - c. Conbraco Industries, Inc.
 - d. FEBCO; SPX Valves & Controls.
 - e. Rain Bird Corporation.
 - f. Toro Company (The); Irrigation Div.
 - g. Watts Industries, Inc.; Water Products Div.
 - h. Zurn Plumbing Products Group; Wilkins Div.
3. Standard: ASSE 1001.
 4. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
 5. Body: Bronze.
 6. Inlet and Outlet Connections: Threaded.
 7. Finish: Chrome plated.

B. Hose-Connection Vacuum Breakers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrowhead Brass Products, Inc.
 - b. Cash Acme.
 - c. Conbraco Industries, Inc.
 - d. Legend Valve.
 - e. MIFAB, Inc.
 - f. Prier Products, Inc.
 - g. Watts Industries, Inc.; Water Products Div.
 - h. Woodford Manufacturing Company.
 - i. Zurn Plumbing Products Group; Light Commercial Operation.
 - j. Zurn Plumbing Products Group; Wilkins Div.
3. Standard: ASSE 1001.
4. Body: Bronze, nonremovable, with manual drain.
5. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
6. Finish: Chrome or nickel plated.

2.2 BACKFLOW PREVENTERS

A. Intermediate Atmospheric-Vent Backflow Preventers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cash Acme.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.

- d. Honeywell Water Controls.
 - e. Legend Valve.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Plumbing Products Group; Wilkins Div.
3. Standard: ASSE 1012.
 4. Operation: Continuous-pressure applications.
 5. Size: As noted on drawings.
 6. Body: Bronze.
 7. End Connections: Union, solder joint.
 8. Finish: Rough bronze.
 9. Domestic connection to be 'upstream' from fire protection system's fire department connection, control valves/check valves; etc. (See NFPA 13, Annex B.1)
Domestic System's potential draw on the pressure/flow available to the fire protection system shall be applied to the fire protection system's hydraulic calculations.

2.3 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cash Acme.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Zurn Plumbing Products Group; Wilkins Div.
3. Standard: ASSE 1003.
4. Pressure Rating: Initial working pressure of 150 psig (1035 kPa).
5. Size: As noted on drawings.
6. Design Flow Rate: As noted on drawings.
7. Design Inlet Pressure: As noted on drawings.
8. Design Outlet Pressure Setting: As noted on drawings.
9. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).
10. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

2.4 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig (860 kPa) minimum, unless otherwise indicated.
2. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 (DN 65) and larger.

3. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
4. Screen: Stainless steel with round perforations, unless otherwise indicated.
5. Perforation Size:
 - a. Strainers NPS 2 (DN 50) and Smaller: 0.020 inch (0.51 mm).
 - b. Strainers NPS 2-1/2 to NPS 4 (DN 65 to DN 100): 0.045 inch (1.14 mm).
6. Drain: Factory-installed, hose-end drain valve.

2.5 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig (860 kPa).
7. Vacuum Breaker: Integral or field-installation, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Rough bronze.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Wheel handle.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.6 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. Prier Products, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Woodford Manufacturing Company.
 - h. Zurn Plumbing Products Group; Light Commercial Operation.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.

3. Standard: ASME A112.21.3M for exposed-outlet, self-draining wall hydrants.
4. Pressure Rating: 125 psig (860 kPa).
5. Operation: Loose key.
6. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
7. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).
8. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
9. Box: Deep, flush mounting with cover.
10. Box and Cover Finish: Polished nickel bronze.
11. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
12. Nozzle and Wall-Plate Finish: Polished nickel bronze.
13. Operating Keys(s): One with each wall hydrant.

B. Vacuum Breaker Wall Hydrants:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrowhead Brass Products, Inc.
 - b. Mansfield Plumbing Products LLC.
 - c. McDonald, A. Y. Mfg. Co.
 - d. Prier Products, Inc.
 - e. Smith, Jay. R. Mfg. Co.; Division of Smith Industries, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Woodford Manufacturing Company.
 - h. Zurn Plumbing Products Group; Light Commercial Operation.
3. Standard: ASSE 1019, Type A or Type B.
4. Type: Freeze-resistant, automatic draining with integral air-inlet valve.
5. Classification: Type B, for automatic draining with hose removed or with hose attached and nozzle closed.
6. Pressure Rating: 125 psig (860 kPa).
7. Operation: Loose key.
8. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
9. Inlet: NPS 1/2 or NPS 3/4 (DN 15 or DN 20).
10. Outlet: Exposed with garden-hose thread complying with ASME B1.20.7.

2.7 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy.

5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 1. Locate backflow preventers in same room as connected equipment or system.
 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
 3. Do not install bypass piping around backflow preventers.
- C. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve.
- D. Install water hammer arresters in water piping according to PDI-WH 201.
- E. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- F. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:
 1. Test each backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.3 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.

END OF SECTION 22 1119

SECTION 22 1316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following soil and waste, sanitary drainage and vent piping inside the building:
 - 1. Pipe, tube, and fittings.
 - 2. Special pipe fittings.

1.2 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

1.3 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; and "NSF-drain" for plastic drain piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Solid-Wall PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
 - 2. Solvent Cement and Adhesive Primer:
 - a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Aboveground, soil, waste, and vent piping NPS 4 (DN 100) and smaller shall be the following:
 - 1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- C. Underground, soil, waste, and vent piping NPS 4 (DN 100) and smaller shall be any of the following:
 - 1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.2 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."
- D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Common Work Results for Plumbing."
- E. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- G. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- H. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- I. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- J. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 CONNECTIONS

- A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- B. Connect drainage and vent piping to the following:
1. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3.5 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
2. Prepare reports for tests and required corrective action.

3.6 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 1316

SECTION 22 3400 - FUEL-FIRED DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following fuel-fired water heaters:

1.03 DEFINITIONS

- A. NG: Natural Gas
- B. LP Gas: Liquefied-petroleum fuel gas.

1.04 SUBMITTALS

- A. Product Data: For each type and size of water heater indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Product Certificates: For each type of water heater, signed by product manufacturer.
- C. Operation and Maintenance Data: For water heaters to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

- A. Comply with 2009 NFPA 54, "National Fuel and Gas Code" and, as applicable NFPA 58, "Liquefied Petroleum Gas Code".
- B. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004.
- F. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

G. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9" for all components that will be in contact with potable water.

1.06 COORDINATION

A. Coordinate size and location of concrete bases with Architectural and Structural Drawings.

1.07 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
2. Warranty Period(s): From date of Substantial Completion:
 - a. Household, Gas Water Heaters:
 - 1) Storage Tank: Five years.
 - 2) Controls and Other Components: Two years.

PART 2 - PRODUCTS

2.01 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.

2.02 GAS WATER HEATERS

A. High-Efficiency, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.

1. Manufacturers:

- a. Bradford White Corporation.
 - b. Smith, A. O. Water Products Company.
 - c. State Industries, Inc.
2. Description: Manufacturer's proprietary design to provide at least 84 percent combustion efficiency at optimum operating conditions. Following features and attributes may be modified or omitted if water heater otherwise complies with requirements for performance.
 3. Storage-Tank Construction: ASME-code steel with 150-psig minimum working-pressure rating.
 - a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Lining: Glass complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 4. Factory-Installed, Storage-Tank Appurtenances:
 - a. Anode Rod: Replaceable magnesium.
 - b. Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - c. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - e. Jacket: Steel with enameled finish.
 - f. Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 5. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for high-efficiency water heaters and for natural-gas fuel.
 6. Temperature Control: Adjustable thermostat.
 7. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
 8. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
 9. Draft Hood: Draft diverter; complying with ANSI Z21.12.

2.03 WATER HEATER ACCESSORIES

- A. Gas Shutoff Valves: ANSI Z21.15/CGA 9.1, manually operated. Furnish for installation in piping.
- B. Gas Pressure Regulators: ANSI Z21.18, appliance type. Include pressure rating, capacity, and pressure differential required between gas supply and water heater.

- C. Gas Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.
 - D. Combination Temperature and Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select each relief valve with sensing element that extends into storage tank.
 - 1. Gas Water Heaters: ANSI Z21.22/CSA 4.4.
 - E. Pressure Relief Valves: Include pressure setting less than working-pressure rating of water heater.
 - 1. Gas Water Heaters: ANSI Z21.22/CSA 4.4.
 - F. Water Heater Stand and Drain Pan Units: High-density-polyethylene-plastic, 18-inch- high, enclosed-base stand complying with IAPMO PS 103 and IAS No. 2. Include integral or separate drain pan with raised edge and NPS 1 drain outlet with ASME B1.20.1 pipe thread.
 - G. Water Heater Stands: Water heater manufacturer's factory-fabricated steel stand for floor mounting and capable of supporting water heater and water. Provide dimension that will support bottom of water heater a minimum of 18 inches above the floor.
 - H. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water.
 - I. Drain Pans: Corrosion-resistant metal with raised edge. Provide dimensions not less than base of water heater and include drain outlet not less than NPS 3/4.
 - J. Piping Manifold Kits: Water heater manufacturer's factory-fabricated inlet and outlet piping arrangement for multiple-unit installation. Include piping and valves for field assembly that is capable of isolating each water heater and of providing balanced flow through each water heater.
 - K. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1-2004 or ASHRAE 90.2-2004.
- 2.04 SOURCE QUALITY CONTROL
- A. Test and inspect water heater storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
 - B. Hydrostatically test water heater storage tanks before shipment to minimum of one and one-half times pressure rating.
 - C. Prepare test reports.

PART 3 - EXECUTION

3.01 WATER HEATER INSTALLATION

- A. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- B. Install seismic restraints for heaters. Anchor to substrate.
- C. Install gas water heaters according to NFPA 54.
- D. Install gas shutoff valves on gas supplies to gas water heaters without shutoff valves.
- E. Install gas pressure regulators on gas supplies to gas water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
- F. Install automatic gas valves on gas supplies to gas water heaters, if required for operation of safety control.
- G. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater, relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- H. Install combination temperature and pressure relief valves in water piping for water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- I. Install water heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 22 Section "Domestic Water Piping Specialties" for hose-end drain valves.
- J. Fill water heaters with water.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

3.04 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain instantaneous and commercial water heaters. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 22 3400

SECTION 22 4000 - PLUMBING FIXTURES

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 conventional plumbing fixtures and related components:
 - 1. Faucets for lavatories, bathtub/shower, showers and sinks.
 - 2. Toilet seats.
 - 3. Protective shielding guards.
 - 4. Water closets.
 - 5. Lavatories.
 - 6. Bathtubs
 - 7. Individual showers.
 - 8. Kitchen Sinks

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.
- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.4 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- C. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Regulatory Requirements: Comply with requirements in 2010 ADA Standards for Accessible Design (ADA).
- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 - 2. Plastic Lavatories: ANSI Z124.3.
 - 3. Plastic Shower Enclosures: ANSI Z124.2.
 - 4. Plastic Sinks: ANSI Z124.6.
 - 5. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 - 6. Slip-Resistant Bathing Surfaces: ASTM F 462.
 - 7. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
 - 8. Stainless-Steel Residential Sinks: ASME A112.19.3.
 - 9. Vitreous-China Fixtures: ASME A112.19.2M.
 - 10. Water-Closet, Tank Trim: ASME A112.19.5.

- H. Comply with the following applicable standards and other requirements specified for bathtub/shower and shower faucets:
1. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
 2. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
 3. Deck-Mounted Bath/Shower Transfer Valves: ASME 18.7.
 4. Faucets: ASME A112.18.1.
 5. Hand-Held Showers: ASSE 1014.
 6. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
 7. Hose-Coupling Threads: ASME B1.20.7.
 8. Manual-Control Antiscald Faucets: ASTM F 444.
 9. Pipe Threads: ASME B1.20.1.
 10. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
 11. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 12. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
1. Atmospheric Vacuum Breakers: ASSE 1001.
 2. Brass and Copper Supplies: ASME A112.18.1.
 3. Dishwasher Air-Gap Fittings: ASSE 1021.
 4. Plastic Tubular Fittings: ASTM F 409.
 5. Brass Waste Fittings: ASME A112.18.2.
- J. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Disposers: ASSE 1008 and UL 430.
 2. Dishwasher Air-Gap Fittings: ASSE 1021.
 3. Flexible Water Connectors: ASME A112.18.6.
 4. Floor Drains: ASME A112.6.3.
 5. Grab Bars: ASTM F 446.
 6. Hose-Coupling Threads: ASME B1.20.7.
 7. Hot-Water Dispensers: ASSE 1023 and UL 499.
 8. Pipe Threads: ASME B1.20.1.
 9. Plastic Shower Receptors: ANSI Z124.2.
 10. Plastic Toilet Seats: ANSI Z124.5.
 11. Supply and Drain Protective Shielding Guards: ICC A117.1.
 12. Whirlpool Bathtub Equipment: UL 1795.

1.6 WARRANTY

- A. Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
1. Warranty Period: One year(s) from date of Substantial Completion.
 - a. Structural failures of unit shell.

- b. Faulty operation of controls, blowers, pumps, heaters, and timers.
- c. Deterioration of metals, metal finishes, and other materials beyond normal use

PART 2 - PRODUCTS

2.1 LAVATORY FAUCETS

A. Lavatory Faucets:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Bradley Corporation.
 - c. Chicago Faucets.
 - d. Delta Faucet Company.
 - e. Eljer.
 - f. Elkay Manufacturing Co.
 - g. Fisher Manufacturing Co.
 - h. Grohe America, Inc.
 - i. Just Manufacturing Company.
 - j. Kohler Co.
 - k. Moen, Inc.
 - l. Royal Brass Mfg. Co.
 - m. Sayco; a Briggs Plumbing Products, Inc. Company.
 - n. Speakman Company.
 - o. T & S Brass and Bronze Works, Inc.
 - p. Zurn Plumbing Products Group; Commercial Brass Operation.
 - q. Brasstech Inc.; Newport Brass Div.
 - r. Broadway Collection.
 - s. Central Brass Manufacturing Company.
 - t. Eljer.
 - u. Franke Consumer Products, Inc.; Kitchen Systems Div.
 - v. Gerber Plumbing Fixtures LLC.
 - w. Geberit Manufacturing, Inc.
 - x. Hansgrohe Inc.
 - y. Hydrotek International, Inc.
 - z. Intersan Manufacturing Company.
 - aa. Pegler, Ltd.
 - bb. Price Pfister, Inc.
 - cc. Rohl LLC.
 - dd. Royal Brass Mfg. Co.
 - ee. Sayco; a Briggs Plumbing Products, Inc. Company.
 - ff. Speakman Company.
 - gg. Wolverine Brass, Inc.

hh. Tempering Device: Thermostatic.

2.2 SHOWER FAUCETS

A. Shower Faucets:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Brasstech Inc.; Newport Brass Div.
 - c. Broadway Collection.
 - d. Central Brass Manufacturing Company.
 - e. Chicago Faucets.
 - f. Delta Faucet Company.
 - g. Eljer.
 - h. Gerber Plumbing Fixtures LLC.
 - i. Hansgrohe Inc.
 - j. Kohler Co.
 - k. Leonard Valve Company.
 - l. Moen, Inc.
 - m. Paul Decorative Products.
 - n. Pegler, Ltd.
 - o. Powers; a Watts Industries Co.
 - p. Price Pfister, Inc.
 - q. Rohl LLC.
 - r. Royal Brass Mfg. Co.
 - s. Sayco; a Briggs Plumbing Products, Inc. Company.
 - t. Speakman Company.
 - u. Sterling Plumbing Group, Inc.
 - v. St. Thomas Creations.
 - w. Symmons Industries, Inc.
 - x. T & S Brass and Bronze Works, Inc.
 - y. Wolverine Brass, Inc.
 - z. Zurn Plumbing Products Group; AquaSpec Commercial Faucet Operation.
 - aa. Zurn Plumbing Products Group; Wilkins Operation.

2.3 TOILET SEATS

A. Toilet Seats:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Bemis Manufacturing Company.
 - c. Centoco Manufacturing Corp.
 - d. Church Seats.
 - e. Eljer.
 - f. Kohler Co.
 - g. Olsonite Corp.
 - h. Sanderson Plumbing Products, Inc.; Beneke Div.
 - i. Sperzel.
 - j. Bemis Manufacturing Company.
 - k. Centoco Manufacturing Corp.
 - l. Church Seats.
 - m. Kohler Co.
 - n. Olsonite Corp.
 - o. Pressalit A/S.
 - p. Sanderson Plumbing Products, Inc.; Beneke Div.
 - q. Sperzel.

2.4 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers, :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Engineered Brass Co.
 - b. Insul-Tect Products Co.; a Subsidiary of MVG Molded Products.
 - c. McGuire Manufacturing Co., Inc.
 - d. Plumberex Specialty Products Inc.
 - e. TCI Products.
 - f. TRUEBRO, Inc.
 - g. Zurn Plumbing Products Group; Tubular Brass Plumbing Products Operation.
3. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with uniform Federal Accessibility Standards (UFAS) requirements.

2.5 SHOWER RECEPTORS

A. Shower Receptors:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following:
 - a. Crane Plumbing, L.L.C./Fiat Products.
 - b. Florestone Products Co., Inc.
 - c. Aker Plastics Co., Inc.
 - d. Crane Plumbing, L.L.C./Fiat Products.
 - e. LASCO Bathware.
 - f. Mustee, E. L. & Sons, Inc.
 - g. Sterling Plumbing Group, Inc.
 - h. Swan Corporation (The).
 - i. Acryline USA, Inc.
 - j. American Standard Companies, Inc.
 - k. Jacuzzi, Inc.
 - l. Jason International, Inc.
 - m. Kohler Co.
 - n. Praxis Industries, Inc.; Aquarius Products.
 - o. Royal Baths Manufacturing Co.
 - p. Acorn Engineering Company.
 - q. Precast Terrazzo Enterprises, Inc.
 - r. Stern-Williams Co., Inc.
 - s. Bradley Corporation.
 - t. Formica Corporation.
 - u. Lippert Corporation.
4. Description: Cast-polymer base for built-up-type shower fixture.
 - a. Type: Handicapped/wheelchair.

2.6 WATER CLOSETS

A. Water Closets:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Barclay Products, Ltd.
 - c. Briggs Plumbing Products, Inc.
 - d. Crane Plumbing, L.L.C./Fiat Products.
 - e. Duravit USA, Inc.
 - f. Eljer.
 - g. Gerber Plumbing Fixtures LLC.
 - h. Kohler Co.

- i. Mansfield Plumbing Products, Inc.
- j. Peerless Pottery, Inc.
- k. Sanitarios Azteca, S.A. de C.V.
- l. Sterling Plumbing Group, Inc.
- m. St. Thomas Creations.
- n. TOTO USA, Inc.
- o. Water Management, Inc.
- p. Capizzi.
- q. St. Thomas Creations.
- r. American Standard Companies, Inc.
- s. Gerber Plumbing Fixtures LLC.
- t. Kohler Co.
- u. Mansfield Plumbing Products, Inc.
- v. St. Thomas Creations.
- w. <Insert manufacturer's name.>
- x. Crane Plumbing, L.L.C./Fiat Products.
- y. Eljer.
- z. Peerless Pottery, Inc.
- aa. Water Management, Inc.
- bb. Briggs Plumbing Products, Inc.
- cc. American Standard Companies, Inc.
- dd. Briggs Plumbing Products, Inc.
- ee. Capizzi.
- ff. Crane Plumbing, L.L.C./Fiat Products.
- gg. Eljer.
- hh. Kohler Co.
- ii. Mansfield Plumbing Products, Inc.
- jj. Peerless Pottery, Inc.
- kk. Sanitarios Azteca, S.A. de C.V.
- ll. St. Thomas Creations.
- mm. TOTO USA, Inc.

2.010 LAVATORIES

A. Lavatories:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide [the product indicated on Drawings] <Insert manufacturer's name; product name or designation> or a comparable product by one of the following:
 - a. Crane Plumbing, L.L.C./Fiat Products.
 - b. RSI Home Products.
 - c. Rynone Manufacturing Corp.
 - d. Avonite, Inc.
 - e. DuPont, Corian Products.
 - f. Formica Corporation.

- g. Lippert Corporation.
 - h. Swan Corporation (The).
 - i. Wilsonart International.
4. Description: Accessible countertop with integral bowl fixtures for mounting on base unit.
- a. Backsplash: [Integral with countertop] [Separate, same material as countertop] [Not required].
 - b. Overall Rectangular Top .
 - c. Faucet Hole Punching: See drawings
 - d. Faucet Hole Location: See drawings
 - e. Faucet(s): See drawings
 - f. Supplies: NPS 3/8 (DN 10) chrome-plated copper with stops.
 - g. Drain(s): [See faucets] [Grid] [Grid with offset waste] <Insert drain>.
 - 1) Location: See drawings
 - h. Drain Piping: See drawings

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- C. Install counter-mounting fixtures in and attached to casework.
- D. Install fixtures level and plumb according to roughing-in drawings.
- E. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

- F. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- G. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- H. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
- I. Install toilet seats on water closets.
- J. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- K. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- L. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- M. Install shower flow-control fittings with specified maximum flow rates in shower arms.
- N. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
- O. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.
- P. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Install in sink deck. Connect inlet hose to dishwasher and outlet hose to disposer.
- Q. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."
- R. Transfer showers that are to be UFAS accessible are to be 36" x 36".
- S. UFAS accessible roll-in showers are to be 60" (min) wide.
- T. Set shower receptors and service basins in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results for Plumbing."
- U. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.4 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Operate and adjust disposers. Replace damaged and malfunctioning units.
- C. Adjust water pressure at faucets to produce proper flow and stream.
- D. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 4000

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

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:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

- A. Qualification Data: Within 15 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 15 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.

2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by NEBB.
 1. TAB Field Supervisor: Employee of the TAB contractor and certified by NEBB.
 2. TAB Technician: Employee of the TAB contractor and who is certified by NEBB as a TAB technician.
- B. TAB Conference: Meet with Construction Manager on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.
 1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Construction Manager.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, flow-control devices, fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- J. Examine heat-transfer units (gas-fired heat exchangers) for correct piping connections.
- K. Examine operating safety interlocks and controls on HVAC equipment.

- L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

2.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational – i.e. THERMOSTATS
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Windows and doors can be closed so indicated conditions for system operations can be met.

2.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."
- B. Cut insulation, ducts, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

2.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.

- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

2.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow at the air handling unit(s); (AKA: heating furnace).
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets, (AKA diffusers and grilles), and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - 3. Measure static pressure across each component that makes up an air-handling unit equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Measure static pressures entering and leaving other devices, under final balanced conditions.
 - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

6. Obtain approval from Construction Manager for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

2.6 PROCEDURES FOR MOTORS

- A. Motors: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.

2.7 TOLERANCES

- A. Set HVAC system's air flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.

2.8 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

2.9 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.
 - 3. Field test reports prepared by system and equipment installers.
 - 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB supervisor who certifies the report.
 - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.

- c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Fan drive settings including settings and percentage of maximum pitch diameter.
 - d. Inlet vane settings for variable-air-volume systems.
 - e. Settings for supply-air, static-pressure controller.
 - f. Other system operating conditions that affect performance.
- D. Air-Handling-Unit Test Reports: For air-handling units, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Return airflow in cfm.
- E. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.

- F. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.

2.10 INSPECTIONS

- A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - c. Verify that balancing devices are marked with final balance position.
 - d. Note deviations from the Contract Documents in the final report.
- B. Final Inspection:
1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Construction Manager.
 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Construction Manager.
 3. Construction Manager shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

END OF SECTION 23 0593

SECTION 23 0700 -HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:
 - a. Cellular glass.
 - b. Flexible elastomeric.
 - c. Mineral fiber.
2. Insulating cements.
3. Adhesives.
4. Mastics.
5. Sealants.
6. Tapes.
7. Securements.
8. Corner angles.

1.2 Division Related Sections:

1. Division 22 Section "Plumbing Insulation."
2. Division 23 Section "Metal Ducts" for duct liners.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- ##### A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- ##### A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 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. Cell-U-Foam Corporation; Ultra-CUF.
 - b. Pittsburgh Corning Corporation; Foamglas Super K.
 - c. Aeroflex USA Inc; Aerocel
 - 2. Block Insulation: ASTM C 552, Type I.
 - 3. Special-Shaped Insulation: ASTM C 552, Type III.
 - 4. Board Insulation: ASTM C 552, Type IV.
 - 5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - 6. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
 - 7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- E. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 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. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 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. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.

2.2 INSULATING CEMENTS

- A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
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. Insulco, Division of MFS, Inc.; SmoothKote.
 - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
 - c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-96.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-33.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
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. Aeroflex USA Inc.; Aeroseal.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
 - d. RBX Corporation; Rubatex Contact Adhesive.
 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
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. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.

- c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 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. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 - f. Vimasco Corporation; 749.
 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 5. Color: White.

2.5 SEALANTS

- A. Joint Sealants:
 1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-76.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 - f. Vimasco Corporation; 750.
 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 3. Permanently flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
 5. Color: White or gray.

6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
1. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 2. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- O. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.3 MINERAL-FIBER INSULATION INSTALLATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
 - b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation

- joints. Install additional pins to hold insulation tightly against surface at cross bracing.
- c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).
5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.
- a. .
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.
- 3.4 FIELD QUALITY CONTROL
- A. Perform tests and inspections.
 - B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system defined in the "Duct Insulation Schedule, General" Article.
2. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
3. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.5 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in nonconditioned space.
4. Indoor, exposed return located in nonconditioned space.
5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
7. Outdoor, concealed supply and return.
8. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.6 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket, 1-1/2 inches (38 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m)] nominal density.
- B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket, 1-1/2 inches (38 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m)] nominal density

1. .

3.7 INDOOR PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Flexible Tubing: Flexible elastomeric, 1 inch (25 mm) thick.

3.8 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping: Insulation shall be[one of] the following:

1. Flexible Elastomeric: 2 inches (50 mm) thick.

B. Refrigerant Suction and Hot-Gas Flexible Tubing: Insulation shall be[one of] the following:

1. Flexible Elastomeric: [2 inches (50 mm) thick.

END OF SECTION 23 0700

SECTION 23 3113 - DUCTWORK

PART 1 - GENERAL

All suspended piping and equipment shall be supported from the structure. Hangers and supports shall not be suspended from roof deck.

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.3 SUBMITTALS

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

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.

8. Seam and joint construction.
 9. Penetrations through fire-rated and other partitions.
 10. Equipment installation based on equipment being used on Project.
 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment , seismic restraints, and vibration isolation.
- C. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Penetrations of smoke barriers and fire-rated construction.
 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable

sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches (1524 mm): Flanged.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Exposed Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60 (Z180)
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.

- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.4 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corporation; Insulation Group.
 - b. Johns Manville.
 - c. Knauf Insulation.
 - d. Owens Corning.
 - 2. Maximum Thermal Conductivity:
 - a. Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K) at 75 deg F (24 deg C) mean temperature.
 - b. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F (0.033 W/m x K) at 75 deg F (24 deg C) mean temperature.
 - 3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 - 4. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- (3.5-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.

2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
- C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."
1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 3. Butt transverse joints without gaps, and coat joint with adhesive.
 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm (12.7 m/s).
 7. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.
 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm (12.7 m/s) or where indicated.
 9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - a. Sheet Metal Inner Duct Perforations: 3/32-inch (2.4-mm) diameter, with an overall open area of 23 percent.
 10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches (76 mm)
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.7 SEISMIC-RESTRAINT DEVICES – SEISMIC ZONE A

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2. Ductmate Industries, Inc.
 - 3. Hilti Corp.
 - 4. Kinetics Noise Control.
 - 5. Loos & Co.; Cableware Division.
 - 6. Mason Industries.
 - 7. TOLCO; a brand of NIBCO INC.
 - 8. Unistrut Corporation; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 - 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment

to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

- D. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.

3.2 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Outdoor, Supply-Air Ducts: Seal Class A.
 - 3. Outdoor, Exhaust Ducts: Seal Class C.
 - 4. Outdoor, Return-Air Ducts: Seal Class C.
 - 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class B.
 - 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class A.
 - 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
 - 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
 - 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class C.
 - 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class B.
 - 11. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.4 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
 - 1. Space lateral supports a maximum of 40 feet (12 m) o.c., and longitudinal supports a maximum of 80 feet (24 m) o.c.
 - 2. Brace a change of direction longer than 12 feet (3.7 m).
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction.
- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- G. Drilling for and Setting Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
 - 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
 - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.

3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.7 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.8 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:
 1. Underground Ducts: Fiber-Glass Re-enforced Plastic as manufactured by Spunstrand.
- B. Supply Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units
 - a. Pressure Class: Positive 1-inch wg (250 Pa)
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12
 2. Ducts Connected to Variable-Air-Volume Air-Handling Units :
 - a. Pressure Class: Positive 3-inch wg (750 Pa).
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 3.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- C. Return Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units
 - a. Pressure Class: Positive or negative 1-inch wg (250 Pa).
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 1-inch wg (250 Pa).
 - b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.

END OF SECTION 23 3113

SECTION 23 3300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Manual volume dampers.
3. Turning vanes.
4. Remote damper operators
5. Duct-mounted access doors.
6. Flexible connectors.
7. Flexible ducts.
8. Duct accessory hardware.

1.2 SUBMITTALS

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

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control damper installations.
 - d. Fire-damper and smoke-damper installations, including sleeves; and duct-mounted access doors.
 - e. Wiring Diagrams: For power, signal, and control wiring.

C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Comply with 2012 NFPA 5000, 2013 NFPA 72, NFPA 90A, [25 IAM S&H Handbook, Topic 26.5], "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with AMCA 500-D testing for damper rating.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60 (Z180)
 - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Air Balance Inc.; a division of Mestek, Inc.
 - 2. American Warming and Ventilating; a division of Mestek, Inc.
 - 3. Cesco Products; a division of Mestek, Inc.
 - 4. Duro Dyne Inc.
 - 5. Greenheck Fan Corporation.
 - 6. Lloyd Industries, Inc.
 - 7. Nailor Industries Inc.
 - 8. NCA Manufacturing, Inc.
 - 9. Pottorff; a division of PCI Industries, Inc.
 - 10. Ruskin Company.
 - 11. SEMCO Incorporated.
 - 12. Vent Products Company, Inc.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 2000 fpm (10 m/s).

- D. Maximum System Pressure: 1-inch wg (0.25 kPa).
- E. Frame: 0.052-inch- (1.3-mm-) thick, galvanized sheet steel with welded corners and mounting flange].
- F. Blades: Multiple single-piece blades, center-pivoted, maximum 6-inch (150-mm) width, 0.025-inch- (0.6-mm-) thick, roll-formed aluminum with sealed edges.
- G. Blade Action: Parallel.
- H. Blade Seals: Neoprene, mechanically locked.
- I. Blade Axles:
 - 1. Material: Galvanized steel.
 - 2. Diameter: 0.20 inch (5 mm).
- J. Tie Bars and Brackets: Aluminum.
- K. Return Spring: Adjustable tension.
- L. Bearings: Steel ball
- M. Accessories:
 - 1. Adjustment device to permit setting for varying differential static pressure.
 - 2. Counterweights and spring-assist kits for vertical airflow installations.
 - 3. Electric actuators.
 - 4. Chain pulls.
 - 5. Screen Mounting: Front mounted in sleeve.
 - a. Sleeve Thickness: 20-gage (1.0-mm) minimum.
 - b. Sleeve Length: 6 inches (152 mm) minimum.
 - 6. Screen Mounting: Rear mounted.
 - 7. Screen Material: Galvanized steel
 - 8. Screen Type: Bird
 - 9. 90-degree stops.

2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Locking Quadrant Manual Volume Dampers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. Flexmaster U.S.A., Inc.
 - d. McGill AirFlow LLC.

- e. METALAIRE, Inc.
 - f. Nailor Industries Inc.
 - g. Pottorff; a division of PCI Industries, Inc.
 - h. Ruskin Company.
 - i. Trox USA Inc.
 - j. Vent Products Company, Inc.
2. Dampers must be Locking Quadrant Type. Non locking and simple wing nut type will NOT be acceptable.
 3. Standard leakage rating, with linkage outside airstream.
 4. Suitable for horizontal or vertical applications.
 5. Frames:
 - a. Hat-shaped, galvanized steel channels, 0.064-inch (1.62-mm) minimum thickness.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 6. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch (1.62 mm) thick.
 7. Blade Axles: Galvanized steel.
 8. Bearings:
 - a. Oil-impregnated bronze.
 - b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 9. Tie Bars and Brackets: Galvanized steel.
- 2.4 TURNING VANES
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Ductmate Industries, Inc.
 2. Duro Dyne Inc.
 3. METALAIRE, Inc.
 4. SEMCO Incorporated.
 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 - B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."
- E. Vane Construction: Single wall.
- F. Vane Construction: Single wall for ducts up to 48 inches (1200 mm) wide and double wall for larger dimensions.

2.5 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cesco Products; a division of Mestek, Inc.
 - 2. Ductmate Industries, Inc.
 - 3. Flexmaster U.S.A., Inc.
 - 4. Greenheck Fan Corporation.
 - 5. McGill AirFlow LLC.
 - 6. Nailor Industries Inc.
 - 7. Pottorff; a division of PCI Industries, Inc.
 - 8. Ventfabrics, Inc.

Access doors to fire and smoke dampers to be Labeled "Fire Damper", "Fire/Smoke Damper", "Smoke Damper", as applicable. (NFPA 5000, 8.8.8.4 and 8.10.5.4(6)).

- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 - 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches (300 mm) Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches (460 mm) Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches (600 by 1200 mm): Three hinges and two compression latches.

- d. Access Doors Larger Than 24 by 48 Inches (600 by 1200 mm): Four hinges and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Single wall with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set at 10-inch wg (2500 Pa).
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch- (25-mm-) thick, fibrous-glass or polystyrene-foam board.

2.6 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.

- B. Materials: Flame-retardant or noncombustible fabrics.

- C. Coatings and Adhesives: Comply with UL 181, Class 1.

- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) wide attached to 2 strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized sheet steel or 0.032-inch- (0.8-mm-) thick aluminum sheets. Provide metal compatible with connected ducts.

- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).

- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd. (810 g/sq. m).
2. Minimum Tensile Strength: 500 lbf/inch (88 N/mm) in the warp and 440 lbf/inch (77 N/mm) in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F (Minus 45 to plus 121 deg C).

- G. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch (6-mm) movement at start and stop.

2.7 FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
1. Flexmaster U.S.A., Inc.
 2. McGill AirFlow LLC.
 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 2. Maximum Air Velocity: 4000 fpm (20 m/s).
 3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004, R=4.
- C. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
1. Pressure Rating: 4-inch wg (1000 Pa) positive and 0.5-inch wg (125 Pa) negative.
 2. Maximum Air Velocity: 4000 fpm (20 m/s).
 3. Temperature Range: Minus 20 to plus 175 deg F (Minus 29 to plus 79 deg C).
 4. Insulation R-Value: Comply with ASHRAE/IESNA 90.1-2004, R=4.
- D. Flexible Duct Connectors:
1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.
 2. Non-Clamp Connectors: Liquid adhesive plus tape.

2.8 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and Fire/Smoke dampers according to UL listing.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream and downstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors; and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.

7. At each change in direction and at maximum 50-foot (15-m) spacing.
 8. Control devices requiring inspection.
 9. Elsewhere as indicated.
- I. Install access doors with swing against duct static pressure.
- J. Access Door Sizes:
1. One-Hand or Inspection Access: 8 by 5 inches (200 by 125 mm).
 2. Two-Hand Access: 12 by 6 inches (300 by 150 mm).
 3. Head and Hand Access: 18 by 10 inches (460 by 250 mm).
 4. Head and Shoulders Access: 21 by 14 inches (530 by 355 mm).
 5. Body Access: 25 by 14 inches (635 by 355 mm).
 6. Body plus Ladder Access: 25 by 17 inches (635 by 430 mm).
- K. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. Install flexible connectors to connect ducts to equipment.
- M. For fans developing static pressures of 5-inch wg (1250 Pa) and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal units to supply ducts[directly or] with maximum [12-inch (300-mm)] <Insert value> lengths of flexible duct. Do not use flexible ducts to change directions.
- O. Connect diffusers or light troffer boots to ducts[directly or] with maximum [60-inch (1500-mm)] <Insert value> lengths of flexible duct clamped or strapped in place.
- P. Connect flexible ducts to metal ducts with [adhesive] [liquid adhesive plus tape] [draw bands] [adhesive plus sheet metal screws].
- Q. Install duct test holes where required for testing and balancing purposes.
- R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop of fans.
- 3.2 FIELD QUALITY CONTROL
- A. Tests and Inspections:
1. Operate dampers to verify full range of movement.
 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 4. Inspect turning vanes for proper and secure installation.

END OF SECTION 23 3300

SECTION 23 3713 DIFFUSERS, REGISTERS, AND GRILLES

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:
 - 1. Rectangular and square ceiling diffusers.
 - 2. Louver face diffusers.
 - 3. Fixed face registers and grilles.
- B. Related Sections:
 - 1. Division 23 Section "Air Duct Accessories" for and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
- B. Samples for Initial Selection: For diffusers, registers, and grilles with factory-applied color finishes.
- C. Samples for Verification: For diffusers, registers, and grilles, in manufacturer's standard sizes to verify color selected.
- D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Ceiling suspension assembly members.
 - 2. Method of attaching hangers to building structure.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 5. Duct access panels.
- E. Source quality-control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Rectangular and Square Ceiling Diffusers <Insert drawing designation>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. A-J Manufacturing Co., Inc.
 - b. Anemostat Products; a Mestek company.
 - c. Carnes.
 - d. Hart & Cooley Inc.
 - e. Krueger.
 - f. METALAIRE, Inc.
 - g. Nailor Industries Inc.
 - h. Price Industries.
 - i. Titus.
 - j. Tuttle & Bailey.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.
5. Face Size: 24 by 24 inches, 24 by 12 inches and 12 by 12 inches.
6. Face Style: Three cone.
7. Mounting: Surface or T-bar.
8. Pattern: Fixed.
9. Accessories:
 - a. Equalizing grid.
 - b. Plaster ring.
 - c. Safety chain.
 - d. Wire guard.
 - e. Sectorizing baffles.
 - f. Operating rod extension.

B. Louver Face Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings] or comparable product by one of the following:
 - a. A-J Manufacturing Co., Inc.
 - b. Anemostat Products; a Mestek company.
 - c. Carnes.
 - d. METALAIRE, Inc.
 - e. Nailor Industries Inc.
 - f. Price Industries.
 - g. Titus.
 - h. Tuttle & Bailey.

3. Devices shall be specifically designed for variable-air-volume flows.
4. Material: Steel.
5. Finish: Baked enamel, color selected by Architect.
6. Mounting: Surface or T-bar.
7. Pattern: Four-way core style.
8. Accessories:
 - a. Square to round neck adaptor.
 - b. Adjustable pattern vanes.
 - c. Throw reducing vanes.
 - d. Equalizing grid.
 - e. Plaster ring.
 - f. Safety chain.
 - g. Wire guard.
 - h. Sectorizing baffles.
 - i. Operating rod extension.

2.2 REGISTERS AND GRILLES

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. A-J Manufacturing Co., Inc.
 - b. Anemostat Products; a Mestek company.
 - c. Carnes.
 - d. Dayus Register & Grille Inc.
 - e. Hart & Cooley Inc.
 - f. Krueger.
 - g. METALAIRE, Inc.
 - h. Nailor Industries Inc.
 - i. Price Industries.
 - j. Titus.
 - k. Tuttle & Bailey.
3. Material: Steel.
4. Finish: Baked enamel, color selected by Architect.

B. Fixed Face Register:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. A-J Manufacturing Co., Inc.
 - b. Anemostat Products; a Mestek company.
 - c. Carnes.
 - d. Dayus Register & Grille Inc.
 - e. Hart & Cooley Inc.

- f. Krueger.
- g. Nailor Industries Inc.
- h. Price Industries.
- i. Titus.
- j. Tuttle & Bailey.

- 3. Material: Steel.
- 4. Finish: Baked enamel, color selected by Architect.
- 5. Face Arrangement: 1/2-by-1/2-by-1/2-inch grid core.
- 6. Core Construction: Integral.
- 7. Frame: 1-1/4 inches wide.
- 8. Mounting: Countersunk screw.

C. Fixed Face Grille:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

- a. A-J Manufacturing Co., Inc.
- b. Anemostat Products; a Mestek company.
- c. Carnes.
- d. Dayus Register & Grille Inc.
- e. Hart & Cooley Inc.
- f. Krueger.
- g. Nailor Industries Inc.
- h. Price Industries.
- i. Titus.
- j. Tuttle & Bailey.

- 3. Material: Steel.
- 4. Finish: Baked enamel, color selected by Architect] <Insert finish>.
- 5. Face Arrangement: 1/2-by-1/2-by-1/2-inch grid core.
- 6. Core Construction: Integral.
- 7. Frame: 1-1/4 inches wide.
- 8. Mounting: Countersunk screw.
- 9. Accessory: Filter.

2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 3713

SECTION 23 5400 - FUEL FIRED AND ELECTRIC FURNACES

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. Gas-fired, condensing and Electric furnaces and accessories complete with controls.
 - 2. Air filters.
 - 3. Air cleaners.
 - 4. Ultraviolet germicidal lights.
 - 5. Humidifiers.
 - 6. Ventilation heat exchangers.
 - 7. Refrigeration components.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each of the following:
 - 1. Furnace.
 - 2. Thermostat.
 - 3. Air filter.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For each furnace to include in emergency, operation, and maintenance manuals for each of the following:
 - 1. Furnace and accessories complete with controls.
 - 2. Air filter.
- D. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."
- D. Comply with NFPA 70.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:
 - 1. Warranty Period, Commencing on Date of Substantial Completion:
 - a. Furnace Heat Exchanger: 10 years.
 - b. Integrated Ignition and Blower Control Circuit Board: Five years.
 - c. Draft-Inducer Motor: Five years.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Disposable Air Filters: Furnish two complete sets.

PART 2 - PRODUCTS

2.1 GAS-FIRED FURNACES, NONCONDENSING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carrier Corporation; Div. of United Technologies Corp.
 2. Goodman Manufacturing Company, L.P.
 3. Heil Heating & Cooling Products; a division of International Comfort Products, LLC.
 4. Lennox Industries Inc.
 5. Rheem Manufacturing Company; Air Conditioning Division.
 6. Ruud Air Conditioning Division.
 7. Trane.
 8. York International Corp.; a division of Unitary Products Group.
- C. General Requirements for Gas-Fired, Noncondensing Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces," and with NFPA 54.
- D. Cabinet: Steel.
1. Cabinet interior around heat exchanger shall be factory-installed insulation.
 2. Lift-out panels shall expose burners and all other items requiring access for maintenance.
 3. Factory paint external cabinets in manufacturer's standard color.
 4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- E. Fan: Centrifugal, factory balanced, resilient mounted, direct drive.
1. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 2. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Division 23 Section "Common Motor Requirements for HVAC Equipment," and with internal thermal protection and permanent lubrication.
 3. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 4. Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.
- F. Type of Gas: Natural.
- G. Heat Exchanger: Aluminized steel.
- H. Burner:
1. Gas Valve: 100 percent safety two-stage main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
- I. Gas-Burner Safety Controls:
1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.

- J. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.
- K. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.
- L. Vent Materials: Comply with requirements in Division 23 Section "Breechings, Chimneys, and Stacks" for Type B metal vents.
- M. Capacities and Characteristics:
 - 1. Airflow Configuration: as indicated on drawings.
 - 2. Gas:
 - a. Type: Natural.
 - b. Venting Type: Power venter.
 - c. Minimum Efficiency AFUE: 85% percent.
 - d. Minimum Thermal Efficiency: <Insert value> percent.
 - 3. Fan:
 - a. Airflow: as indicated on drawings.
 - b. External Static Pressure: as indicated on drawings.
 - c. Motor:
 - 1) Size: as indicated on drawings
 - 2) Speed: as indicated on drawings.
 - d. Volts: as indicated on drawings.
 - e. Phase: as indicated on drawings.
 - f. Hertz: as indicated on drawings.
 - g. Full-Load Amperes: as indicated on drawings.
 - h. Minimum Circuit Ampacity: as indicated on drawings.
 - i. Maximum Overcurrent Protection: as indicated on drawings.
 - 4. Furnace Electrical Connection:
 - a. Volts: <Insert value>.
 - b. Phase: <Insert value>.
 - c. Hertz: <Insert value>.
 - d. Full-Load Amperes: <Insert value>.
 - e. Minimum Circuit Ampacity: <Insert value>.
 - f. Maximum Overcurrent Protection: <Insert amperage>.

2.2 ELECTRIC FURNACES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Lennox Industries Inc.
 - 2. Rheem Manufacturing Company; Air Conditioning Division.
 - 3. Ruud Air Conditioning Division.
 - 4. Trane
 - 5. York International Corp.; a division of Unitary Products Group.
- C. General Requirements for Electric Furnaces: Factory assembled, piped, wired, and tested.
- D. Cabinet: Steel, with duct liner.
 - 1. Duct Liner: Fiberglass, minimum 1/2 inch thick, complying with ASTM C 1071 and having a coated surface exposed to airstream complying with NFPA 90A or NFPA 90B and with NAIMA's "Fibrous Glass Duct Liner Standard."
 - a. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 - 2. Factory paint external cabinets in manufacturer's standard color.
- E. Fan: Centrifugal, factory balanced, resilient mounted, direct drive.
 - 1. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - 2. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Division 23 Section "Common Motor Requirements for HVAC Equipment," and with internal thermal protection and permanent lubrication.
 - 3. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - 4. Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.
- F. Electric-Resistant Heating Elements: Helix-wound, nickel-chromium wire-heating elements in ceramic insulators mounted on steel supports.
- G. Heating-Element Control: Sequencer relay with relay for each element; switches elements on and off, with delay between each increment; initiates, stops, or changes fan speed.
- H. Summer Fan Switch: Connected to permit independent on-off switch of unit fan.
- I. Capacities and Characteristics:
 - 1. Airflow Configuration: as indicated on drawings.
 - 2. Electric Heating Element:
 - a. Capacity: as indicated on drawings.
 - b. Number of Steps: as indicated on drawings.
 - c. Volts: as indicated on drawings.
 - d. Phase: as indicated on drawings.
 - e. Hertz: as indicated on drawings.

- f. Full-Load Amperes: as indicated on drawings.
- g. Minimum Circuit Ampacity: as indicated on drawings.
- h. Maximum Overcurrent Protection: as indicated on drawings.

2.3 THERMOSTATS

- A. Solid-State Thermostat: Wall-mounting, programmable, beep-based unit, seven-day programmability with minimum of four temperature presets per day, vacation mode and battery backup protection against power failure for program settings.
- B. Control Wiring: Unshielded twisted-pair cabling.
 - 1. No. 24 AWG, 100 ohm, four pair.
 - 2. Cable Jacket Color: Blue.
- C. Controls shall comply with requirements in ASHRAE/IESNA 90.1-2004, "Controls."

2.4 AIR FILTERS

- A. Disposable Filters: 1-inch thick fiberglass media with ASHRAE 52.2 MERV rating of 6 or higher in sheet metal frame.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine factory-installed insulation before furnace installation. Reject units that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for gas piping systems to verify actual locations of piping connections before equipment installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.
 - 1. Anchor furnace to substrate to resist code-required seismic acceleration.
- B. Controls: Install thermostats and humidistats at mounting height of 60 inches above floor.

- C. Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.

3.3 CONNECTIONS

- A. Gas piping installation requirements are specified in Division 23 Section "Facility Natural-Gas Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.
- B. Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors. Type B vents and their installation requirements are specified in Division 23 Section "Breechings, Chimneys, and Stacks"
- C. Connect ducts to furnace with flexible connector. Comply with requirements in Division 23 Section "Air Duct Accessories."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform electrical test and visual and mechanical inspection.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
 - 3. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

3.5 STARTUP SERVICE

- A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - 1. Inspect for physical damage to unit casings.
 - 2. Verify that access doors move freely and are weathertight.
 - 3. Clean units and inspect for construction debris.
 - 4. Verify that all bolts and screws are tight.
 - 5. Adjust vibration isolation and flexible connections.
 - 6. Verify that controls are connected and operational.
- B. Adjust fan belts to proper alignment and tension.
- C. Start unit according to manufacturer's written instructions and complete manufacturer's operational checklist.
- D. Measure and record airflows.

- E. Verify proper operation of capacity control device.
- F. After startup and performance test, lubricate bearings.

3.6 ADJUSTING

- A. Adjust initial temperature set points.
- B. Set controls, burner, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.

3.7 CLEANING

- A. After completing installation, clean furnaces internally according to manufacturer's written instructions.
- B. Install new filters in each furnace within 14 days after Substantial Completion.

END OF SECTION 23 5400

SECTION 260010 - GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Conform with applicable provisions of the General Provisions, Special Conditions and General Requirements.

1.02 REQUIREMENTS

- A. Furnish all labor, materials, service, equipment and appliances required to complete the installation of the complete electrical system in accordance with the specifications and contract drawings.

1.03 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

- A. Regulatory Agencies: Installation, materials, equipment and workmanship shall conform to the applicable provisions of the latest edition of the National Electrical Code (NEC) - latest edition of the New Mexico State Code, the National Electrical Safety Code (NESC), and the terms and the conditions of the authorities having lawful jurisdiction pertaining to the work required. All modifications required by these codes, rules, regulations and authorities shall be made by the Contractor without additional charge to the Owner.
- B. Underwriter's Laboratories (UL): All materials, appliances, equipment or devices shall conform to the applicable standards of Underwriter's Laboratories, Inc. The label of, or listing by, UL is required.

1.04 DEFINITIONS

- A. "Install" shall mean to place, fix in position, secure, anchor, etc., including necessary appurtenances and labor so the equipment or installation will function as specified and intended.
- B. "Supply" shall mean to purchase and supply equipment or components.
- C. "Provide" shall mean "Furnish and Install".
- D. "Or approved equal" shall mean equal in type, design, quality, etc., as determined by the Architect.

PART 2 - PRODUCTS

2.01 EQUIPMENT REQUIREMENTS

- A. The electrical requirements for equipment specified or indicated on the drawings are based on information available at the time of design. If equipment furnished for installation has electrical requirements other than indicated on the electrical drawings, the Contractor shall make all adjustments to wire and conduit size, controls, overcurrent protection and installation as required to accommodate the equipment supplied, without additional charge to the Owner. The complete responsibility and costs for such adjustments shall be assigned to the respective section of this specification under which the equipment is furnished.

2.02 MATERIALS

- A. All similar materials and equipment shall be the product of the same manufacturer.
- B. Where no specific material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be used, providing it conforms to the contract requirements and meets the approval of the Engineer.
- C. Material and equipment shall be the standard products of manufacturers regularly engaged in the productions of such material and shall be the manufacturer's current and standard design.
- D. Altitude: Equipment affected by altitude shall perform satisfactorily for the function intended at an altitude of the project site.

PART 3 - EXECUTION

3.01 GENERAL

- A. Fabrication, erection and installation of the complete electrical system shall be done in a first class workmanlike manner by qualified personnel experienced in such work and shall proceed in an orderly manner so as not to hold up progress of the project. The Electrical Contractor shall check all areas and surfaces where electrical equipment material is to be installed, removed or relocated and report any unsatisfactory conditions before starting work. Commencement of work signifies this Contractor's acceptance of existing conditions. In the acceptance or rejection of the finished installation, no allowance will be made for lack of skill on the part of workmen.

3.02 PERFORMANCE TESTS

- A. Thoroughly test all fixtures, services and all circuits for proper operating condition and freedom from grounds and short circuits before acceptance is requested. All equipment, appliances, and devices shall be operated under load conditions.

3.03 AS-BUILT DRAWINGS

- A. During progress of the work, maintain an accurate record of the installation of the system, locating each circuit precisely by dimension. Upon completion of the installation, transfer all record data to blue line prints of the original drawings.

3.04 DRAWINGS

- A. General: The electrical drawings show the general arrangement of all conduit, equipment, etc. and shall be followed as closely as actual building construction and the work of other trades will permit. The architectural drawings shall be considered as part of the work insofar as these drawings furnish the contractor with information relating to the design and construction of the building. Architectural drawing shall take precedence over electrical drawings. Because of the small scale of the electrical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, elbow, pullboxes, and accessories as may be required to meet such conditions.
- B. Field Measurements: The Contractor shall verify the dimensions governing the electrical work at the building. No extra compensation shall be claimed or allowed on account of differences between actual dimensions and those indicated on the drawings.

END OF SECTION 260010

SECTION 260519 - CONDUCTORS

PART 1 - GENERAL

1.01 CONFORMANCE

- A. Conform with applicable provisions of the General Conditions, Special Conditions, and General Requirements.

PART 2 - PRODUCTS

2.01 WIRES AND CABLES (600 VOLTS)

- A. Type: Copper conductors with 600 volts insulation unless otherwise specified or noted on the drawings.
- B. Use of aluminum conductors will not be permitted for conductors smaller than #2AWG.
- C. Insulation: Type THHN/THWN insulation, and smaller unless otherwise specified or noted on the drawings.
- D. Size: No. 12 minimum unless otherwise specified or noted on the drawings.
- E. Color Coding: Color coding shall be A-black, B-red, N-white, for 120/240 volts, with green for all ground conductors.
- F. Type NM, NMC and UF cables shall be permitted in all concealed areas, and where permitted by NEC.

2.02 CONNECTORS AND LUGS

- A. For Copper Conductors No. 6 and Smaller: 3M Scotch-Lok or T & B Sta-Kon compression or indent type connectors with integral or separate insulating caps.
- B. For Copper Conductors Larger than No. 6: Solderless, indent, hex screw or bolt type pressure conductors, properly taped or insulated.

PART 3 - EXECUTION

3.01 SPLICES

- A. Permitted only at outlets or accessible enclosures.

3.02 CABLE BENDS

- A. Radius of ends not less than 10 times the outer diameter of the cable.

END OF SECTION 260519

SECTION 260526 - GROUNDING

PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

- A. Section 16010, General Provisions; Section 16110, Raceways, Boxes and Fittings; Section 16120, Conductors; Section 16133, Cabinets; Section 16140, Wiring Devices and Plates; Section 16160, Panelboards; Section 16170, Motor and Circuit Disconnects; Section 16400, Service and Distribution.

PART 2 - PRODUCTS

2.01 GROUNDING SYSTEM

- A. Materials, equipment and devices related to the grounding system are specified under other sections of these specifications.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install two separate grounding systems: a service grounding system and an equipment grounding system. The service equipment, conduit systems, supports, cabinets, equipment, and neutral conductor shall be grounded in accordance with the minimum code requirements and as further indicated on the drawings or specified. Connect the two grounding systems together only at the main service equipment and at the secondary terminals of transformers creating separately derived distribution systems such as dry-type transformers.

3.02 SERVICE GROUNDING SYSTEM

- A. General: The service grounding system is provided for the AC service neutral ground. Current return conductors, such as neutrals of the service entrance, feeder circuits and branch circuits, shall not be used for equipment grounding. Care must be exercised to insure that neutral bars are not bonded to the enclosures of panelboards, etc., which are not part of the main service equipment.
Except for separately derived systems, the neutral conductors shall be grounded only in the main service equipment.

3.03 EQUIPMENT GROUNDING SYSTEM

- A. General: Provide a complete equipment grounding system in accordance with the minimum code requirements and as further indicated on the drawings or specified. The equipment ground (green conductor) consists of metallic conditions to ground of non-current carrying metal parts of the wiring system or apparatus connected to the system. The primary purpose of equipment grounding is to provide greater safety by limiting the electrical potential between non-current carrying parts of the system to provide a low impedance path to ground for possible ground fault currents.

3.04 GROUNDING ELECTRODES

- A. The service ground electrodes shall be utilized. One shall be the main cold water metallic water piping system and the other shall be a made electrode consisting of not less than twenty feet of bare copper conductor encased along the bottom of a concrete foundation footing which is in direct contact with the earth (NEC 250-83a). Make the connections to the cold water pipe inside the building at the point of entrance. The grounding electrode for separately derived systems shall be approved for this application.

3.05 GROUNDING CONDUCTORS

- A. The grounding conductors for both service ground electrodes shall be insulated or bare copper, sized in accordance with NEC 250-94(a), including the conductor for the made electrode. The conductors shall be continuous without joint or splice and shall be installed in conduit with the conduit bonded to the conductor at each end. Install the conductor to permit the shortest and most direct path and terminate in the main service equipment on the common ground point. Equipment grounding conductors shall be green insulated conductors equivalent to the insulation on the associated phase conductor, but not less than Type TW. The equipment grounding conductor or straps shall be sized in accordance with NEC. Where one feeder serves a series of panelboards or transformers, the equipment grounding conductor shall be continuous without splices. Grounding conductors shall not be installed through metal-sheathed holes. All connections shall be available for inspection and maintenance.

3.06 GROUND CONNECTIONS

- A. Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated the coating must be removed down to the bare metal. After the coating has been removed, apply a non-corrosive approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal, it shall be painted or touched up with "Galvanox", or equal.

3.07 TESTS

- A. Test the completed grounding system with a meggar at the service ground bar and submit a written report to the Architect for approval. The service shall not be energized if the test shows more than 5 ohms, unless approved by the Engineer.

END OF SECTION 260526

SECTION 260533 - RACEWAYS, BOXES AND FITTINGS

PART 1 - GENERAL

1.01 CONFORMANCE

- A. Conform with applicable provisions of the General Conditions, Special Conditions and General Requirements.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 16010, General Provisions; Section 16450, Grounding.

PART 2 - PRODUCTS

2.01 CONDUITS

- A. Electrical Metallic Tubing (EMT): Mild steel, zinc coated on the outside and either zinc coated or coated with an approved corrosion resistant coating on the inside. Maximum, size 2 inch electrical trade size unless noted on the drawings or specifically approved.
- B. Flexible Conduit: Commercial greenfield, galvanized steel, with a separate grounding bond wire installed in the conduit in addition to other wires.
- C. Liquid Tight Flexible Conduit: Flexible galvanized steel tubing with extruded liquid tight PVC outer jacket and a continuous copper bonding conductor wound spirally between the convolutions. Where a separate grounding conductor is installed in the conduit, bonding conductor in the convolutions may be omitted.

2.02 CONDUIT FITTINGS

- A. Connectors and Couplings: EMT couplings and connectors either steel or malleable iron only. Connectors to have insulated throats.
- B. Bushings: Insulated type, designed to prevent abrasion of wires without impairing the continuity of the conduit grounding system, for connectors for EMT.
- C. EMT Fittings: Iron or steel only.
- D. Liquid Tight Flexible Conduit Fittings: With threaded grounding cone, a steel, nylon or equal plastic compression ring and a gland for tightening. Either steel or malleable iron only with insulated throats and male thread and locknut or male bushing with or without "O" ring seat. Each connector shall provide a low resistance ground connection between the flexible conduit and the outlet box, conduit or other equipment to which it is connected.
- E. Flexible Conduit Fittings (Commercial Greenfield): Either steel or malleable iron only, with insulated throats.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATIONS

- A. Conduit Systems: EMT conduit unless noted. Use flexible conduit only for motor or equipment connections and then only to the extent of minimum lengths required for connections. Install flexible conduit connections at all resilient mounted equipment. Provide liquid tight flexible conduit in exterior, wet or damp locations and for connections to the pipe mechanical system. Use conduit only where applicable: at service entrance, etc. Use NM, NMC and UF cabling where permitted by NEC.

3.02 CONDUIT SUPPORTS

- A. Supports: Provide supports for horizontal conduits and EMT not more than 8 feet apart with not less than two supports for each 10 foot straight length and one support near each elbow or bend including runs above suspended ceilings and within 3 feet of all junction boxes, switches, fittings, etc.
- B. Straps: Install one hole pipe straps on conduits 1 1/2 inch or smaller. Install individual pipe hangers for conduits larger than 1 1/2 inch. Spring steel fasteners with hanger rods may be used in dry locations in lieu of pipe straps.

END OF SECTION 260533

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.01 CONFORMANCE

- A. Conform with applicable provisions of the General Provisions, Special Conditions, and General Requirements.

1.02 SUBMITTALS

- A. Submit complete shop drawings with outline dimensions, descriptive literature and complete descriptions of the frame size, trip setting, class and interrupting rating of all overcurrent devices. Identify available space.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Dead front, safety type with voltage ratings as scheduled. Panelboards shall be of the loadcenter type required for the short circuit and duty ratings indicated on the drawings or specified. All panelboards shall have a neutral bus and a ground bus.

2.02 BRANCH CIRCUIT PANELS

- A. All branch circuit panels for lighting and single phase loads shall be "Quick-lag" circuit breakers with 10,000 amps interrupting capacity, main lugs or main breaker as indicated on the drawings.
- B. Breakers: Molded case as scheduled or required. Provide quick make and quick break toggle mechanism, inverse time trip characteristics and trip free operation on overload or short circuit.
- C. Directories: Provide typewritten circuit descriptions .

PART 3 - EXECUTION

3.01 CIRCUIT NUMBERING

- A. Circuit numbering shown on the drawings is based on pole position in the panelboard and not consecutive numbering.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES AND PLATES

PART 1 - GENERAL

1.01 CONFORMANCE

- A. Conform with applicable provisions of the General Conditions, Special Conditions and General Requirements.

PART 2 - PRODUCTS

2.01 SNAP SWITCHES

- A. Unless otherwise specified, each snap switch (flush tumbler-toggle) shall be of the A.C. General use type for mounting in a single gang spacing, fully rated 20 amperes minimum at 120/277 volts. Ivory color handles unless otherwise indicated on the drawings. Silver or silver alloy contacts.

2.02 RECEPTACLES

- A. General: Fire resistant, non-absorptive, hot welded, phenolic composition or equal bodies and bases with metal plaster ears (integral with the supporting member). Ivory color unless otherwise noted on the drawings. Double grip contacts for each prong.
- B. Grounding Type: All receptacles shall be grounding type with a green colored hexagonal equipment ground screw of adequate size to accommodate an insulated grounding jumper

2.03 DEVICE PLATES

- A. General: Provide ivory phenolic device plates for each switch, receptacle, signal and telephone outlet.

PART 3 - EXECUTION

3.01 DEVICE PLATES

- A. Install with alignment tolerance of one-sixteenth inch and all edges in continuous contact with wall surfaces.

END OF SECTION 262726

SECTION 265113 - LIGHTING EQUIPMENT

PART 1 - GENERAL

1.01 CONFORMANCE

- A. Conform with applicable provisions of the General Conditions, Special Conditions, and General Requirements.

1.02 SUBMITTALS

- A. Submit for approval complete shop drawings, catalog cuts, special installation instructions, photometric data and descriptive literature.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Furnish all lighting fixtures throughout the type indicated on the drawings, complete with lamps, sockets, wiring, fitters, hangers, plaster rings, canopies, etc., as required.

2.03 LED FIXTURES

- A. All fixtures and drivers shall be quiet in operation.

PART 3 - EXECUTION

3.01 SUPPORTS

- A. Support ceiling fixtures to metal supports provided for that purpose of suitable strength and stability, adequately attached to and supported by joists, trusses, or other structural members.

3.02 CLEAN-UP

- A. At final inspection all fixtures and lighting equipment shall be in first class operating order, in perfect condition as to finish and free from defects, completely lamped, clean and free from dust, plaster or paint spots and complete with the required glassware, reflectors, side panels, louvers or other components necessary to complete the fixtures.

END OF SECTION 265113

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Temporary erosion- and sedimentation-control measures.

- B. Related Sections:

1. Section 01 5000 "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

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

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or videotape.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference as needed.

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 Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- F. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.

- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- I. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 2000 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches above the ground.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

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 walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. General: Protect trees and plants remaining on-site.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 3. Use only hand methods for grubbing within protection zones.
 - 4. 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 earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 6 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth indicated on Drawings in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within protection zones.
 - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 2000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, and pavements.
3. Base course for concrete walks and concrete and asphalt paving.
4. Excavating and backfilling trenches for utilities

B. Related Documents

1. A Geotechnical Study was performed by Geomat Inc. and a report "Geotechnical Engineering Report 30 Unit Subdivision NHA NM15-43 Crownpoint, New Mexico" issued for this project. Geomat Inc. can be reached at phone number (505) 327-7928.

1.2 DESCRIPTION OF WORK:

- A. Fill construction shall consist of the placing and compacting of approved material within areas where unsuitable material has been removed; the placing and compacting of material in holes, pits and other depressions.
- B. Preparation of sub grade for walks and pavements is included as part of this work.
- C. Backfilling of trenches included as part of this work.
- D. Definition – "Excavation" consists of removal of material encountered to sub grade elevations indicated and subsequent disposal of materials removed.

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. Base Course: Aggregate layer placed between the subgrade and hot-mix asphalt paving and concrete walks and paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. 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.
- I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below base course, drainage fill, drainage course, or topsoil materials.
- J. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct pre-excavation conference at Project site.

1.5 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Geotextiles.
 - 2. Warning tapes.
- B. Samples for Verification: For the following products, in sizes indicated below:
 - 1. Geotextile: 12 by 12 inches.
 - 2. Warning Tape: 12 inches long; of each color.
- C. Testing Reports: Submit following reports directly to the Architect/Engineers from a qualified testing agency, with copy to Contractor.
 - 1. Test reports for onsite and borrow material for fill and backfill.
 - 2. Inspection of sub grade to check actual soil conditions.
 - 3. Field density test reports.
 - 4. One optimum moisture-maximum density curve for each type of soil encountered.
 - 5. Report of testing performed to determine suitability of materials used.

1.6 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

- B. Testing and Inspection Service: Employ, at Contractor's expense, testing laboratory to perform soil testing and inspection service for quality control testing during earthwork operations.

1.7 PROJECT CONDITIONS

- A. Site Information: Data on indicated subsurface conditions are not intended a representations or warranties of accuracy or continuity between soil bearings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn there from by Contractor. Data are made available for convenience of Contractor.
- B. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.
- C. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- D. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
- E. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
- F. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperated with Architect/Engineer and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- G. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by the Architect/Engineer and then only after acceptable temporary utility services have been provided.
- H. Provide a minimum of 48-hour notice to the Architect/Engineer, and received written notice to proceed before interrupting any utility.
- I. Use of Explosives: The use of explosives is not permitted.
- J. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
- K. Operate warning lights as recommended by authorities having jurisdiction.
- L. Protect structures, utilities, sidewalks, pavements and other facilities from damage cause by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

- M. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 01 Section "Temporary Facilities and Controls," are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide material in accordance with the project geotechnical report. Use the requirements below for items not specifically addressed in the project geotechnical report. Imported materials may be required to meet the criteria given in the geotechnical report and noted below.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand.
 - 1. Coarse Aggregate Type: Conforming to New Mexico State Department of Transportation standard specification requirements of Section 303 for Type II Base Course.
- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
 - 3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
 - 4. Tear Strength: 56 lbf; ASTM D 4533.
 - 5. Puncture Strength: 56 lbf; ASTM D 4833.
 - 6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
 - 7. Permittivity: 0.2 per second, minimum; ASTM D 4491.
 - 8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

- B. In the placement of the geotextile for drainage applications, the geotextile shall be placed loosely with no wrinkles or folds, and with no void spaces between the geotextile and the ground surface. Successive sheets of geotextiles shall be overlapped a minimum of 12 in., with the upstream sheet overlapping the downstream sheet.
- C. Should the geotextile be damaged during installation or riprap placement, a geotextile patch shall be placed over the damaged area extending beyond the damaged area a distance of 12 in., or the specified seam overlap, whichever is greater.

2.3 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

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. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavation is Unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect/Engineer. Unauthorized excavation, as well as remedial work directed by the Architect/Engineer, shall be at Contractor's expense.
- C. Under retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the Architect/Engineer.
- D. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Architect/Engineer.
- E. Additional Excavation: When excavation has reached required sub grade elevations, notify Architect/Engineer who will make an inspection of conditions.
 - 1. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Architect/Engineer and/or as outlined in the geotechnical engineering reports.
- F. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 - 1. Maintain sides and slopes of excavations in safe conditions until completion of backfilling.
- G. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Trenching for site utilities coordinate with Navajo Tribal Utility Authority's Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities.
- B. Excavation for Trenches: Dig trench to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
 - 1. For pipes or conduit 5" or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

2. For pipes or conduit 6" or larger in nominal size, tanks and other mechanical/electrical work indicated to receive sub-base, excavate to sub-base depth indicated, or, if not otherwise indicated, to 6" below bottom or work to be supported. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is not less than 3'-6" below finished grade.
 3. Grade bottoms of trenches as indicated, notching under pipe bells to provide soil bearing for entire body of pipe.
 4. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the Architect/Engineer. Use care in backfilling to avoid damage or displacement or pipe systems.
- C. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
1. Do not allow water to accumulate in excavations. Remove water to prevent soil changes detrimental to stability of subgrades. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 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 3000 psi, may be used when approved by Architect.
 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 1. Located and retain soil materials away from edge of excavations. Do not store within drop line of trees indicated to remain.
 2. Dispose of excess soil material and waste materials as herein specified.

3.9 UTILITY TRENCH BACKFILL

- A. Utility trenching and backfilling shall be in accordance with N.T.U.A. Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities, Technical Provision (TP) 1.0.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 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 by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION, GENERAL

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification as outlined in the geotechnical engineering reports.
 - 1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. General: Place acceptable soil material in layers to required subgrade elevations, for each areas classification listed below, as outlined in the geotechnical engineering reports.
- B. In excavation, use satisfactory excavated or borrow material.
- C. Under grassed areas, use satisfactory excavated or borrow material.
- D. Under walks and pavements, use sub-base material, or satisfactory excavated or borrow material, or combination of both.

- E. Under steps, use sub-base material.
- F. Under piping and conduit, use sub-base material where sub-base is indicated under piping or conduit; shape to fit bottom 90° of cylinder.
- G. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance of construction below finish grade including, where applicable, damp-proofing, waterproofing and perimeter insulation.
 - 2. Inspection, testing, approval and recording locations of underground utilities.
 - 3. Removal of concrete formwork.
 - 4. Removal of trash and debris.
 - 5. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
- H. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil material, obstructions and deleterious materials from ground surface prior to placement of fills. Plow, strip or bread-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
 - 1. When existing ground surface has a density less than that specifies under “Compaction” for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content and compact to required depth and percentage of maximum density.
- I. Placement and Compaction: Place backfill and fill materials in layers not more than 8” in loose depth for material compacted by heavy compaction equipment, and not more than 4” in loose depth for material compacted by hand-operated tampers. Coordinate with requirements as outlined in the geotechnical engineering report.
 - 1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each areas classification. Do not place backfill or fill material on surfaces that are muddy, frozen or contain frost or ice.
 - 2. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

3.14 GRADING

- A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- C. Finish surfaces free from irregular surface changes, and as follows:
- D. Lawn or Unpaved Areas: Finish area to receive topsoil to within now more than 0.10’ above or below required subgrade elevations.

- E. Walks and Pavements: Shape surface or areas under pavement to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.
- F. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each areas classification as outlined in the geotechnical engineering reports.

3.15 BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements and walks as follows:
 - 1. Shape base course to required crown elevations and cross-slope grades.
 - 2. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 3. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.16 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor will engage a qualified special inspector to perform the following special inspections:
 - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 - 2. Determine that fill material and maximum lift thickness comply with requirements.
 - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. 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 materials to depth required; recompact and retest until specified compaction is obtained.
- E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.

- F. If, in the opinion of the Architect/Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

3.17 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.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, 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.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Soil treatment with termiticide.
- B. See Division 06 Section "Rough Carpentry" for wood preservative treatment by pressure process.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the EPA-Registered Label.
- B. Product certificates.
- C. Soil Treatment Application Report: Include the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Brand name and manufacturer of termiticide.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application used.
 - 6. Areas of application.
 - 7. Water source for application.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.
- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Termiticides:
 - a. Aventis Environmental Science USA LP; Termidor.
 - b. Bayer Corporation; Premise 75.
 - c. Dow AgroSciences LLC; Dursban TC.
 - d. FMC Corporation, Agricultural Products Group; Talstar.
 - e. Syngenta; Demon TC.

2.2 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

3.2 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 3. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
 4. Masonry: Treat voids.
 5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 313116

SECTION 31 3700 - RIP RAP

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Placement of loose riprap.
 - 2. Placement of hand-placed riprap.

1.2 DESCRIPTION OF WORK:

- A. Rip Rap construction shall consist of the hand placing of approved materials for erosion protection.

1.3 SUBMITTALS

- A. Submit prior to use in the Work product data showing riprap source, gradation, aggregate wear and placement technique.

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout Work.
- B. Perform Work according to industry standards.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Riprap:
 - 1. Durable, angular, hard stone free from seams and cracks.
 - 2. Graded in size to produce a reasonably dense mass.
 - 3. The greatest dimension of 25 percent of the stones shall be at least, equal to but not more than 1-1/2 times the thickness of riprap indicated.
 - 4. The greatest dimension of 50 percent of the stone shall be at least 3/4, but not more than 1-1/2 times the thickness of riprap indicated.
 - 5. Not more than 10 percent of the aggregate shall have a dimension less than 0.1 times the thickness of riprap.
 - 6. At least 95 percent of the stones shall have a minimum of 2 fractured or clean angular faces.
- B. Accessories
 - 1. Geotextile fabric, Section 31 2000 Earth Moving.

- C. Source Quality Control
 - 1. Riprap: Wear not greater than 40 percent when tested, ASTM C 535.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove all brush, trees, stumps, and other objectionable materials and dress area to a smooth surface. Make Excavation to provide a firm foundation and protect against undercutting. Secure approval prior to backfilling.
- B. Install required geotextile in accordance with Section 31 2000 Earth Moving.

3.2 LOOSE-PLACED RIPRAP

- A. Place stones to secure a Rock mass with the minimum thickness and height indicated. Manipulate Rock to secure a regular surface of graded size and mass stability.

3.3 HAND-PLACED RIPRAP

- A. Place and bed the Rocks, one against the other, and key together. Fill irregularities between stones with suitable size spalls.
- B. Place so that finished surface of riprap is even, tight, and true to line and grade. Extend riprap sufficiently below ground surface to secure a firm foundation.

END OF SECTION

SECTION 32 1216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hot-mix asphalt patching.
 - 2. Hot-mix asphalt paving.
 - 3. Asphalt traffic-calming devices
 - 4. Pavement-marking paint applied to asphalt pavement.
- B. Related Sections:
 - 1. Section 31 2000 "Earth Moving" for subgrade and aggregate base courses.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs – New Mexico Sites: NMDOT Mix SP-IV per NMDOT Standard Specifications for Highway and Bridge Construction 2014. Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
 - 2. Job-Mix Designs: For each job mix proposed for the Work.
 - 3. Pavement Markings.
- B. Material Certificates: For each paving material, from manufacturer.
- C. Material Test Reports: For each paving material, by a qualified testing agency.
- D. Field quality-control reports.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the Department of Transportation of the state in which the Project is located.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the NMDOT Standard Specifications for Highway and Bridge Construction 2014 for asphalt paving work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
- C. Testing Agency Qualifications: Qualified according to ASTM D3666 for test indicated.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
1. Prime Coat: Minimum surface temperature of 60 degrees F.
 2. Tack Coat: Minimum surface temperature of 60 degrees F.
 3. Asphalt Base Course: Minimum surface temperature of 40 degrees F and rising at the time of placement.
 4. Asphalt Surface Course: Minimum surface temperature of 60 degrees F at time of placement.
 5. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D 1073 sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: ASTM D 242 rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 64-22.
- B. Tack Coat: ASTM D 977 emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. Emulsified Asphalt Prime Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.

2.4 MIXES

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Hot-Mix Asphalt – New Mexico Sites: NMDOT Mix SP-IV per NMDOT Standard Specifications for Highway and Bridge Construction 2014. Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Base Course: Per NMDOT Standard Specifications for Highway and Bridge Construction 2014.
 - 3. Surface Course: Per NMDOT Standard Specifications for Highway and Bridge Construction 2014.

2.5 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N, colors complying with FS TT-P-1952.
 - 1. Color: As indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify gradients and elevations of base.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 EXAMINATION FOR PAVEMENT MARKING

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.3 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.10 gal/sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- C. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.

3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Spread mix at minimum temperature of 250 deg F
 - 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.

2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.1 ASPHALT TRAFFIC-CALMING DEVICES

- A. Construct hot-mix asphalt speed humps over compacted pavement surfaces. Apply a tack coat unless pavement surface is still tacky and free from dust. Spread mix at a minimum temperature of 250 deg F.
 1. Tack Coat Application: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
 2. Asphalt Mix: Same as pavement surface-course mix.

3. Before installation, mill pavement that will be in contact with bottom of traffic-calming device. Mill to a depth of 3/4 inch from top of pavement to a clean, rough profile.
- B. Place and compact hot-mix asphalt to cross section indicated, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.2 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 1. Base Course: Plus or minus 1/2 inch.
 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 12-foot straightedge applied transversely or longitudinally to paved areas:
 1. Base Course: 1/4 inch.
 2. Surface Course: 1/8 inch.
 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.
- C. Asphalt Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus 1/4 inch of height indicated above pavement surface.

3.3 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

- D. Asphalt Traffic-Calming Devices: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Replace and compact hot-mix asphalt where core tests were taken.
- G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.5 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION

SECTION 32 1313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes concrete paving for:
 - 1. Concrete driveways and roadways.
 - 2. Concrete curbs and gutters.
 - 3. Concrete sidewalks.
- B. Related Sections:
 - 1. Section 033053 "Miscellaneous Exterior Cast-in-Place Concrete".
 - 2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, and ground granulated blast-furnace slag.

1.3 SUBMITTALS

- A. Product Data: For each Type of product indicated.
- B. Design Mixtures:
 - 1. For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For qualified Installer of ready-mix concrete manufacturer and testing agency.
- D. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or epoxy adhesive.
 - 8. Joint fillers.
- E. Material Test Reports: For each of the following:
 - 1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

- F. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: 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.
- C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- D. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- E. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
 - 2. Require representatives of each entity directly concerned with concrete paving 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 paving subcontractor.

1.5 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

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

2.2 STEEL REINFORCEMENT:

- A. Reinforcing Steel: ASTM A615, 40 ksi yield grade, deformed billet bars.
- B. Welded Plain Wire Fabric: ASTM A185; in flat sheets; galvanized finish.
- C. Dowels: ASTM A615; 40 ksi yield strength, plain steel bars; cut to length indicated on Drawings, square ends with burrs removed.
- D. Plain Steel Wire: ASTM A82, minimum 16 gage.

2.3 CONCRETE MATERIALS:

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. ASTM C150, Type II Portland type. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or Class F.
- B. Fine and Coarse Aggregates: ASTM C33, Class 4, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C94.
- D. Air Entrainment: ASTM C260.
- E. Chemical Admixture: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water Reducing Admixture: ASTM C494, Type A.
 - 2. Retarding Admixture: ASTM C 494, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.4 Curing Materials

- A. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- B. Liquid Membrane-Forming Curing Compound: ASTM C309, Type 1, Class A or B.

- C. Absorptive Cover: AASHTO M182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

2.5 RELATED MATERIALS

- A. Joint Filler: Preformed durable resilient bituminous material and comply with ASTM D1751 or AASHTO M213.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength at 28 days: 3,000 psi.
 - 2. Maximum Water-Cementitious Material Ratio at Point of Placement: 0.50
 - 3. Slump: 4 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 5-1/2 percent plus or minus 1.5 percent for 1-1/2-inch nominal maximum aggregate size.
 - 2. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.
 - 3. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch nominal maximum aggregate size.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing 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.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Pozzolan: 25 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch plant located on or near the project site.
 - 1. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 31 2000 Earth Moving.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 INSTALLATION

- A. Edge Forms and Screed Construction
 - 1. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
 - 2. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.
- B. Steel Reinforcement
 - 1. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 2. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
 - 3. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

C. Joints:

1. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - a. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
2. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - a. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
3. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
4. Expansion Joints: Expansion joints shall be constructed to the full depth and width of the concrete. The expansion joint material shall extend fully through the concrete and one inch into the subgrade with the top of the expansion joint material one-quarter inch below the top surface. Expansion joint material shall be secured in place prior to placement of concrete. Expansion joints shall be installed along all abutting structures to provide complete separation from the structure. Sidewalk, curb, and gutter expansion joints shall be installed at all radius points, at both sides of each driveway.
5. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Unless otherwise specified, the large aggregate in contraction joints shall be separated to either side of the joint for a minimum depth equal to 25% of the concrete thickness; the finished depth shall be a minimum of 3/4 inch.
6. Edging: After initial floating, all exposed edges shall be shaped with a suitable tool to form edges having the shape as indicated on the referenced detail. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

D. Placing Concrete:

1. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
2. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
3. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
4. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
5. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
6. Deposit and spread concrete in a continuous operation between transverse joints.
7. Do not push or drag concrete into place or use vibrators to move concrete into place. Do not disturb reinforcing or formwork components during concrete placement.
8. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
9. Screed paving surface with a straightedge and strike off.
10. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

11. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - a. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - b. Do not use frozen materials or materials containing ice or snow.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
 12. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - a. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - c. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
- E. Finishing:
1. General: Do not add water to concrete surfaces during finishing operations.
 2. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - a. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 - b. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 - c. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
 3. Driveway and Roadway Surfaces: Light broom.
 4. Sidewalk Surfaces: Light broom, trowel joint edges.
 5. Curbs and Gutters: Light broom.
 - a. Flow Lines: Smooth finish.
 6. Apply curing compound on exposed concrete surfaces immediately after finishing.
- F. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
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 lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches

and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.4 TOLERANCES

A. Driveway and Roadway:

1. All finished concrete elevations shall not deviate from the elevations shown on the plans, or indicated by typical sections or standard details referenced within the construction documents, by more than 1/2 inch.

B. Curb and Gutter:

1. The face, top, back, and flow line of the curb and gutter shall not deviate in excess of 1/4-inch over 10 feet, as tested with a 10-foot straightedge or curve template, longitudinally along the surface.

C. Sidewalk:

1. Surface of concrete sidewalk shall not deviate in excess of 1/8-inch over 5 feet as tested with a 5-foot straightedge except for the 1/4-inch recess of the preformed material in expansion joints.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections. Inspect reinforcing placement for size, spacing, location, support.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.6 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 1373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes cold and hot-applied pavement joint sealants in the following locations:
 - 1. Portland Cement concrete pavement expansion and contraction joints.
 - 2. Joints between Portland Cement concrete and asphalt pavement

1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each kind and color of joint sealant required.
- C. Product test reports.
- D. Sealant compatibility and adhesion test reports.

1.3 QUALITY ASSURANCE

- A. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 GENERAL, MATERIALS

- 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.

1. Primers: Product recommended in writing by joint sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from sealant compatibility and adhesion tests and prior experience.
- B. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.
 1. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.
 2. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
 3. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Multicomponent Jet-Fuel-Resistant Sealant for Concrete: ASTM C 920, pourable, chemically curing elastomeric formulation.
 1. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
 - a. Products:
 - 1) Pecora Corporation; Urexpam NR-300.
 - 2) Engineer Approved.
 2. Coal-Tar-Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
 - a. Products:
 - 1) Meadows, W. R., Inc.; SEALTIGHT GARDOX.
 - 2) Engineer Approved.
 3. Bitumen-Modified Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
 - a. Products:
 - 1) Mameco International; Vulkem 202.
 - 2) Sonneborn Building Products Div., ChemRex, Inc.; Sonomeric 2.
 - 3) Engineer Approved.
- B. Nonsag Silicone Sealant for Concrete: ASTM D 5893, Type NS, single-component, low-modulus, neutral-curing, nonsag silicone sealant.
 1. Products:
 - a. Crafcoc Inc.; Roadsaver Silicone-SL.
 - b. Dow Corning; 888.
 - c. Engineer Approved.
- C. Self-Leveling Silicone Sealant for Concrete and Asphalt: ASTM D 5893, Type SL, single-component, low-modulus, neutral-curing, self-leveling silicone sealant.
 1. Products:
 - a. Dow Corning; 890-SL.
 - b. Engineer Approved.

- D. Multicomponent Low-Modulus Sealant for Concrete and Asphalt: Proprietary, pourable, self-leveling formulation of reactive petropolymer and activator.
 - 1. Products:
 - a. Meadows, W. R., Inc.; SOF-SEAL.
 - b. Engineer Approved.

2.4 HOT-APPLIED JOINT SEALANTS

- A. Elastomeric Sealant for Concrete: ASTM D 3406.
 - 1. Products:
 - a. Crafcoc, Inc.; Superseal 444/777.
 - b. Meadows, W. R., Inc.; POLY-JET 3406.
 - c. Engineer Approved.
- B. Sealant for Concrete and Asphalt: ASTM D 3405.
 - 1. Products:
 - a. Crafcoc Inc.; ROADSAVER 221.
 - b. Koch Materials Company; Product #9005.
 - c. Meadows, W. R., Inc.; SEALTIGHT HI-SPEC.
 - d. Engineer Approved.

PART 3

3.1 INSTALLATION

- A. Clean out joints immediately before installing joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or recommended in writing by joint sealant manufacturer, based on sealant compatibility and adhesion tests and prior experience. Confine primers to areas of joint-sealant bond; do not spill primers or allow them to migrate onto adjoining surfaces.
- C. Sealant Installation: Comply with applicable recommendations in ASTM C 1193.
- D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability.
 - 1. Do not leave gaps between ends of backer materials.
 - 2. Do not stretch, twist, puncture, or tear backer materials.
 - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials
- E. Install sealants at same time backer materials are installed.
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths optimize sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants 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.
- G. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Chain-Link Fences: Industrial.
 - 2. Commercial Gates: horizontal slide & swing.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations, components, materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.
- C. Samples:
 - 1. Steel wire for fabric.
 - 2. Framing and accessories.
- D. Maintenance Data: For finishes.

1.3 QUALITY ASSURANCE

- A. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for automatic gate operators serving as a required means of access.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

- A. General: Height indicated on Drawings. Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:
 - 1. Steel Wire Fabric: Metallic coated wire with a diameter of 0.192 inch.
 - a. Mesh Size: 2 inches.
 - b. Aluminum Coating: ASTM A 491, Type I.

- c. Metallic (Zinc) Coating: ASTM A 392, Type II.

2. Selvage: Knuckled at both selvages.

2.2 INDUSTRIAL FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:
 1. Group: IA, round steel pipe, Schedule 40.
 2. Fence Height: 6 feet
 3. Strength Requirement: Heavy industrial according to ASTM F 1043.
 4. Horizontal-Slide Gate Post: According to ASTM F 1184
 5. Coating for Steel Framing:
 - a. Metallic coating.

2.3 TENSION WIRE

- A. General: Provide horizontal tension wire at top and bottom of fence fabric.
- B. Location: Extended along top of extended posts and top of fence fabric for supporting barbed tape.
- C. Metallic-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824.
 1. Metallic Coating: Type III, Zn-5-Al-MM alloy.

2.4 INDUSTRIAL SWING GATES

- A. General: Comply with ASTM F 900 for single & double swing gate types.
 1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1083 and ASTM F 1043 for materials and protective coatings.
- B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 900 and the following:
 1. Gate Fabric Height: 2 inches less than adjacent fence height or as indicated.
 2. Leaf Width: 36 inches or as indicated, verify with drawings.
 3. Frame Members:
 - a. Tubular Steel: 1.90 inches round.

- C. Frame Corner Construction:
 - 1. Welded or assembled with corner fittings and 5/16-inch- diameter, adjustable truss rods for panels 5 feet wide or wider.
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame 12 inches or as indicated.
- E. Hardware: Latches permitting operation from both sides of gate, hinges, center gate stops and keepers for each gate leaf more than 5 feet wide. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.5 INDUSTRIAL HORIZONTAL-SLIDE GATES

- A. General: Comply with ASTM F 1184 for single slide gate types.
 - 1. Classification: Type II Cantilever Slide, Class 1 with external roller assemblies.
 - 2. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1184 for materials and protective coatings.
- B. Frames and Bracing: Fabricate members from square, galvanized steel tubing with outside dimension and weight according to ASTM F 1184 and the following:
 - 1. Gate Fabric Height: 6 feet or as indicated.
 - 2. Gate Opening Width: As indicated.
 - 3. Frame Members:
 - a. Tubular Steel: 2 inches rectangular.
 - 4. Bracing Members:
 - a. Tubular Steel: 2 inches rectangular.
- C. Frame Corner Construction:
 - 1. Welded frame with panels assembled with bolted or riveted corner fittings and 5/16-inch-diameter, adjustable truss rods for panels 5 feet wide or wider.
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame 12 inches or as indicated.
- E. Roller Guards: As required per ASTM F 1184 for Type II, Class 1 gates.
- F. Hardware: Latches permitting operation from both sides of gate, locking devices, roller assemblies and stops fabricated from galvanized malleable iron. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.6 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Finish:
 - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.

2.7 CAST-IN-PLACE CONCRETE

- A. Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33, and potable water.
 - 1. Concrete Mixes: Normal-weight concrete air entrained with not less than 3000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

2.8 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 - 1. Material above Finished Grade: Copper.
 - 2. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Grounding Rods: Comply with UL 467.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
- D. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment.
- E. Line Posts: Space line posts uniformly at 10 feet o.c.

- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567. Install braces at end and gate posts and at both sides of corner and pull posts.
- G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing.
- H. Top Rail: Install according to ASTM F 567.
- I. Bottom Rails: Install, spanning between posts.
- J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches between finish grade or surface and bottom selvage, unless otherwise indicated.
- K. Tie Wires: Attach wire per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
- L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.2 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.3 GROUNDING AND BONDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet.
- B. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet .
 - 1. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.
- C. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
 - 1. Connections: Make connections so possibility of galvanic action or electrolysis is minimized.
- D. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

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3.4 FIELD QUALITY CONTROL

- A. Grounding-Resistance Testing: Engage a qualified independent testing agency to perform field quality-control testing.

END OF SECTION 323113

SECTION 33 0000 - SITE UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavation, Trenching, & Backfilling for Water & Wastewater Utilities.
 - 2. Water and Wastewater Line Separation Requirements.
 - 3. Water Mains and Appurtenances.
 - 4. Wastewater Mains and Appurtenances.
 - 5. Final Site Utility Inspection Requirements.

1.2 SUBMITTALS

- A. Product Data: Pipe materials, pipe accessories, pipe fittings, valves, and accessories.
- B. Manufacturer's Certificate: Products meet or exceed specified requirements.
- C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record locations of pipe runs, connections, and manholes, cleanouts, and invert elevations.

1.4 QUALITY ASSURANCE

- A. Perform Work according to Navajo Tribal Utility Authority Construction Requirements and Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities.

1.5 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Furnish materials according to Navajo Tribal Utility Authority Construction Requirements and Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and support existing utility lines and appurtenances as Work progresses.

3.2 INSTALLATION

- A. Installation Standards: Install Work according to Navajo Tribal Utility Authority Construction Requirements and Technical Specifications for Materials and Workmanship for Water and Wastewater Facilities.

NAVAJO TRIBAL UTILITY AUTHORITY CONSTRUCTION REQUIREMENTS

**Reviewed by:
NAVAJO NATION and HIS STANDARDS COMMITTEE**



TECHNICAL SPECIFICATIONS FOR MATERIALS AND WORKMANSHIP FOR WATER AND WASTEWATER FACILITIES

REVISED SEPTEMBER 2008

**TECHNICAL SPECIFICATIONS FOR MATERIAL AND WORKMANSHIP OF WATER
AND WASTEWATER FACILITIES**

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DRAWING STANDARDS AND LEGEND

DEFINITION OF TERMS:

Owner: The organization or its representative authorizing and administering the construction project.

Contractor: The organization or its representative performing the construction.

Operating Utility: The organization or its representative operating the water and wastewater utility affected by the construction.

Roadway Authority: The authority or agency with jurisdiction over the roadway.

Or Approved Equal (OAE): A substitute in material that is considered by the **Operating Utility** to be equal to or better than the item listed in the specifications or standards.

NTUA: The utility owner, **Navajo Tribal Utility Authority**

TECHNICAL PROVISIONS 1.0

TP 1.0 EXCAVATION, TRENCHING, AND BACKFILLING FOR WATER AND WASTEWATER UTILITIES

1.01 Scope of Work

The work covered by this section includes the furnishing of all plant, labor, tools, equipment, and material, and performing all operations in connection with excavating, trenching, and backfilling, for installations of all water/wastewater utility pipelines, related structures, and accessories. This includes the necessary clearing and grubbing, pavement cutting, compaction, pavement restoration, grading, and cleanup, all in accordance with these Technical Provisions and applicable drawings. The final installation also shall meet the requirements of Section 2.0, Water, and Wastewater Line Separation Requirements.

If there is a conflict between these Technical Provisions and any other section of the specifications and/or drawings, then the most stringent, as determined by the Owner and/or NTUA shall apply.

1.02 Layout and Staking

All layout and staking for site work shall be performed by a licensed engineer or land surveyor, approved by the Owner and/or NTUA, who is to be paid by the Contractor, unless other arrangements are negotiated. Copies of survey notes shall be submitted to the Owner and the NTUA, with one or more copies remaining on the job site at all times.

1.03 Protection of Excavations

The Contractor shall provide suitable sheathing, shoring, and bracing to protect all excavations as required, to provide safe working conditions as directed by the NTUA. and in conformance with applicable OSHA and all other safety regulations. The Contractor at his expense shall repair damages resulting from settlements, slides, cave-ins, flooding, pipeline breaks, and other causes. Suitable signs shall be so placed as to show in advance where construction, barricades, or detours exists.

The Contractor shall at all times perform his work to insure the least possible obstruction to traffic, inconveniences to the general public and residents in the vicinity of the work, and to insure the protection of persons and property in a manner satisfactory to the Owner and the NTUA.. No road or street shall be closed to the public except with the permission of the proper authority. Fire hydrants on or adjacent to the work site shall be kept accessible to fire-fighting

equipment at all times. Temporary provisions shall be made by the Contractor to insure the use of sidewalks, and the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches.

1.04 Protection of Existing Utilities

It shall be the Contractor's responsibility to determine the locations of all known existing underground utilities not shown on the drawings and to confirm the exact locations of those existing utilities shown on the drawings. All existing utilities shall be protected from damage, during excavation and backfilling of trenches and if damaged, shall be repaired at the expense of the Contractor.

1.05 Excavation

1.05.01 General

It is expected that all excavation required for the performance of the work shall be made by open cut methods unless otherwise specified and shown on the drawings or as required by applicable permits.

1.05.02 Grading and Stacking

All grading in the vicinity of the construction shall be controlled to prevent surface water from flowing into the excavation. Any water accumulated in the excavation shall be removed by pumping or other approved method. During excavation, material suitable for embedment and backfilling shall be piled in an orderly manner, a sufficient distance back from the edges of the bank to avoid overloading and to prevent slides or cave-ins. Material unsuitable for backfilling shall be hauled from the job site and disposed of by the Contractor at approved disposal sites.

1.05.03 Pavement Cutting

Where it is necessary to remove sections of asphalt pavement, the asphalt shall be clean-cut with approved equipment in a neat line 6 inches back from the outside edge of the excavation, in order to provide a key when restored.

Where it is necessary to remove sections of concrete pavement, the concrete shall be saw-cut to a depth of not less than 1-1/2-inches with neat vertical lines in such a manner that the adjoining surfaces will not be damaged.

1.05.04 Rock Excavation

If given special consideration, rock is considered to exist when excavation cannot be accomplished using a 790E John Deere Class track hoe with a rock bucket, without stressing the machine. The NTUA shall be the sole party in determining the existence of rock and the appropriate means of removal. The quantity of rock shall be determined in cubic yards of material removed. All other trenching and excavations, regardless of materials encountered, equipments used, or methods required for excavation, will be unclassified.

1.05.05 Dewatering

The Contractor shall remove and dispose of all water entering the trenches and shall keep the trenches water free until the water or wastewater lines and other appurtenances are in place. In no case shall water, earth, or any foreign materials be allowed to enter the water or wastewater pipelines.

1.05.06 Excavation for Structures

Excavation for appurtenances such as manholes, valves, foundations, catch basins, culverts, subterranean formwork, and other structures shall be to the necessary depth and sufficient width to leave at least 12-inches of space between the structure's outer surface and the embankment or shoring used to stabilize the banks.

1.05.07 Over-Excavation

Whenever solid or loose rock, rocky soil with rocks larger than 3/4-inches in their largest dimension, or otherwise unsuitable soils which are incapable of properly supporting the pipe or structure are encountered in the trench bottom, all unsuitable material, as determined by the Owner and NTUA, shall be over-excavated to a minimum depth of 6-inches below the pipe or structure and removed.

Except at locations where over-excavation is required, care shall be exercised not to excavate below the depths indicated. In the event of accidental over-excavation, the trench bottom grade will be restored in the same manner as areas specified to be over-excavated.

1.05.08 Trench Excavation

The sides of all trenches for the installation of utility piping system shall be as nearly vertical as soil conditions will allow from ground level to the pipe. Except for the trenching of 1-inch water service lines, the width of the trench shall be a minimum of 16-inches and a maximum of 30-inches wider than the outside diameter of the pipe. Trench

excavation shall be centered on pipe alignment such that a minimum clearance of 8-inches is provided on each side of the pipe. Trench width above the level of the top of the pipe may be as wide as necessary for shoring or sheathing and for proper installation of the work.

The depth of all trenches shall be as indicated on the drawings. If not otherwise specified, the depth of all trenches shall be in accordance with the specifications for the installation of waterlines and wastewater lines.

Unless otherwise required by applicable permits, the maximum length of trench that may be left open at any one time shall not exceed 500 feet.

1.06 Placement and Compaction of Pipe Embedment and Backfill Material

1.06.01 Pipe Embedment

Pipe embedment: Pipe embedment is defined as that material required to bring the trench bottom up to surface grade and that material placed alongside and above the pipe to a level of at least 6-inches over the top of the pipe. Pipe embedment shall be selected earth or sand, which contain no stones, dry or frozen lumps greater than 3/4-inch in diameter, or other unsuitable material as defined by the NTUA. Embedment and the first 6-inches of backfill, above the top of the pipe in rock excavation shall be done in the presence of the NTUA. Any backfilling, done in violation of this provision shall be cause for removal and replacement of the embedment, at the expense of the Contractor even though the work is found to be in accordance with these specifications.

Bedding: Bedding is that portion of pipe embedment zone beneath the pipe. If the native soil is suitable for bedding, the bottom of the trench shall be accurately shaped to provide uniform bearing and support for the entire length of the pipe. Bell holes shall be excavated to provide minimum clearances of 2-inches below the couplings or bells. Imported bedding material shall likewise be placed to provide uniform and adequate longitudinal support under the pipe. Bedding material shall be placed and compacted in lifts not to exceed 6-inches in loose measure.

Haunching: Haunching is that portion of the pipe embedment zone from the bottom of the pipe to the spring line of the pipe. Haunching material shall be placed and hand tamped to provide adequate side support to the pipe while avoiding both vertical and lateral displacement of the pipe from proper alignment.

Initial Backfill: Initial backfill is that portion of the pipe embedment zone from the spring line of the pipe to a minimum of 6-inches above the top of the pipe. Initial backfill material shall be placed and

compacted in lifts not to exceed 6-inches in loose measure. Compaction shall be performed in such a manner so as to avoid damage and disturbance of the embedded pipe.

Final Backfill: Final backfill is defined as that material used in the area between the initial backfill and the existing ground surface. Material shall be placed and compacted in lifts not to exceed 6-inches in loose measure except as otherwise specified.

1.06.02 Compaction Requirements

Unless otherwise specified by permit issued by the roadway authority or by special arrangement between the NTUA, bedding, haunching, initial backfill, final backfill, and gravel resurfacing shall be compacted to the following percentages of the maximum density as determined by ASTM D1557. (If using Standard Proctor ASTM D-698, add 5% to all compaction requirements listed in the table below). In-place densities of materials shall be determined by the sand-cone method, ASTM D1556 or by the nuclear method, ASTM D2922.

Percent of Maximum Density - D1557

Backfill Location	Bedding Backfill	Haunching Backfill	Initial Backfill	Final Backfill
Roadway Rights-of-Way Within Roadway Prism	95% *	95%	95%	95%
Roadway Rights-of-Way Outside of Roadway Prism	90% *	90%	90%	95%
All Other Conditions	90%	90%	90%	90%

* or the existing condition within the undisturbed bottom of the trench.

1.06.03 Water Jetting

The introduction of water to the pipe embedment or final backfill material shall not be permitted as a means of compaction.

1.07 Imported Backfill

1.07.01 Imported Pipe Embedment

If the native soil is unsuitable, the Contractor shall import suitable pipe embedment material. Pipe embedment shall be select earth or sand which contains no stones, dry lumps, or frozen lumps greater than 3/4-inches in diameter and shall be defined as 100% passing 3/4-inches, 40-99% passing # 4 sieve and 30% or less passing # 200 sieve.

Unsuitable material is defined as solid or loose rock, soils with rocks larger than 3/4-inches in their largest dimension, or other unsuitable soils which are, as determined by the NTUA, incapable of properly supporting the pipe.

1.07.02 Imported Final Backfill

If the native soil is unsuitable for use as final backfill, the Contractor shall import suitable final backfill. Imported final backfill may be any material, which is locally available and is capable of being compacted to the required density. This material shall be free of boulders and rocks larger than 6-inches in their smallest dimension, frozen clumps of dirt, organic material, or rubble, which could damage the pipe.

1.08 Bedding and Backfill for Structures

1.08.01 Bedding

Bedding material for structures is defined as that material beneath the structure. This material shall be as specified in the standard detail for each structure.

1.08.02 Backfill

Backfill for structures is defined as that material from the bottom of the structure to the existing ground surface. This material and the required compaction of such shall be the same as that specified for in the final backfill on pipelines, or as specified in the drawings.

1.09 Settlement of Adjacent Structures

Throughout the 1-year warranty period, the Contractor shall be required to fill and compact any areas where settlement has taken place and shall also be responsible for the settlement of any adjacent structure or object caused by any excavation performed under his contract.

1.10 Surface Restoration and Resurfacing

1.10.01 Surface Restoration

The following requirements shall be followed unless alternative specifications are set forth by the roadway or other rights-of-way crossing permits, or as arranged between the NTUA and the NMDOT.

After the piping and structures have been installed and all backfilling completed, areas, which were disturbed, shall be brought to true grades.

All slopes shall be trimmed and dressed, and all surface graded to maintain existing drainages. All streets, alleys, driveways, sidewalks, curbs, or other surfaces, which have been disturbed or damaged, shall be resurfaced or replaced. The Contractor shall properly dispose of all excess excavated materials.

As required by the operating utility, the contractor shall install the utility brand Carsonite markers at all road crossings, water valves, fittings, junctions, connections, points of intersection, or at a minimum, every 1500 feet. Naturally, this would apply only within the rural areas, along stretches of roadways, or as requested by the operating utility. This is also a requirement for marking sewer manholes, cleanouts, and service connections.

1.10.02 Roadway Patching

Whenever existing roadways are disturbed during the course of construction, the Contractor shall restore the roadways to their original condition.

For ease of compaction, the Contractor may use well-graded gravel, crushed stone, or flowable fill as backfill, from a Ready Mix plant as approved by the appropriate roadway agency. The material shall be clean, varying in size from 3/8-inches to 1-1/4-inches, with not more than 10 percent of the material less than 3/8-inches in size and shall be compacted in 6-inch layers or as directed by the NMDOT. Flowable fill is defined as one bag concrete, with gradations of 100% passing the 3/8 sieve, and less than 25% passing the #200 sieve. The slump should be between 5-inches and 8-inches, and the 28-day strength should be between 50 and 150-PSI.

Surfacing shall be replaced where the roadway has gravel, crushed stone, asphaltic, or concrete surfacing. Gravel or crushed stone shall be replaced in quantities and locations as directed by or as required by the roadway permitting authority. Asphalt mix or concrete surfacing shall be replaced, in the case of asphalt, appropriately compacted in roadways to a depth equal to existing roadway surface but not less than 2-inches in asphalt or 6-inches in concrete. A compacted stabilized gravel or crushed stone base 6-inches in depth shall be placed in the roadway at all locations where surfacing is required prior to placement of the bituminous or concrete wear course, unless other requirements are stipulated by the roadway authority.

The Contractor shall obtain any and all necessary written permissions, easements, and permits from federal, state, and county agencies prior to beginning any roadway excavation.

TECHNICAL PROVISIONS 2.0

TP 2.0 WATER AND WASTEWATER LINE SEPARATION REQUIREMENTS

2.01 General

Water lines located near wastewater facilities present conditions for serious potential cross contamination. Protection from cross contamination can be provided by separation of the facilities and use of special piping materials. For measuring separation between pipes, all measurements shall be the clearances between pipes. (Pipe O.D. to pipe O.D.).

2.02 Horizontal Separation of Water and Wastewater Lines

When water and wastewater lines are laid parallel to each other, the horizontal distance between the water and wastewater lines shall not be less than 10 feet. Each line shall be laid in separate trenches. The requirements for this separation shall apply to all other buried utilities, except the distance may be reduced to 5 feet for secondary electric and gas distribution lines less than 60-PSIG; however, all stipulations of the electric, gas, or other sub-surface utilities shall be met.

When physical conditions such as an existing obstruction, will not allow the required 10-foot horizontal separation, the water and wastewater mains may be laid closer than 10 feet if the bottom of the water main is a minimum of 12 inches above the top of the wastewater main and prior written approval is granted by the NTUA.

2.03 Vertical Separation of Water and Wastewater Lines

2.03.01 Water Above Wastewater

When waterlines cross wastewater lines, the waterline shall cross above the wastewater line with a minimum vertical separation of 12 inches. If necessary, the depth of bury for the waterline may be reduced to 36 inches (normally 42 inches) at the crossing to maintain the 12-inch vertical separation. No joints in new waterlines shall be permitted within 10 feet of crossing a wastewater line.

2.03.02 Wastewater Above Water

When a waterline must cross below a wastewater line, the minimum vertical separation between the lines is 12 inches. Backfill of the trenches shall be compacted to provide adequate support to prevent settling of the wastewater line and damaging the water line.

For new water construction, the waterline shall be normal PVC water pipes with 20-foot pipe sections centered on the wastewater crossing. No joints of new waterline construction shall be permitted within 10 feet of crossing a wastewater line. While it is desirable to have all crossings perpendicular or normal, new waterlines (centered on the crossing) may cross under a wastewater line at a maximum of 25° from perpendicular.

For new wastewater construction, the wastewater line shall be ductile iron pipe with gasketed joints, or approved equal (OAE), with an 18-foot section centered on the crossing. No joints in new wastewater line construction shall be permitted within 9 feet of crossing a water line.

For water and wastewater lines crossing electric, gas, or other buried facilities; the standards established by that other specific utility must be met.

2.04 Water Main Separation from Wastewater Manholes

No waterline pipe shall pass through, under, or come into contact with any part of a wastewater manhole.

2.05 Water and Wastewater Service Line Separation Within 5 feet of the House

This section shall apply to that portion of water and wastewater service lines located within 5 feet of the house. All lines within 5 feet of the house will be considered as part of the house plumbing. For new construction, all service lines shall have a 10-foot minimum horizontal separation. This can be accomplished by having the water and wastewater service lines exit the house 10 feet apart or from different sides. If the 10-foot separation cannot be maintained and prior written approval is obtained from the NTUA, the service lines can be laid closer than 10 feet, if the bottom of the water service line is at least 12-inches above the top of the wastewater service line; and the water service line is continuous with no joints until the separation requirement is met.

2.06 Separations Between Waterlines and Components of the Wastewater Disposal System

Waterlines shall not be installed within 10 feet of a septic tank, within 25 feet of a drain field, or 50 feet from an outhouse. Also, waterlines shall not be installed within 100 feet of the perimeter fence of an **individual** lagoon, or within 500 feet of the perimeter fence of a **community** lagoon.

2.07 Separation Between Residences and Wastewater Lagoons

No permanent residence shall be within 1000 feet from the perimeter fence line of a **community** sewer lagoon, or within 300 feet from the perimeter fence line of an **individual** sewer lagoon without written consideration of the Operating Utility.

TECHNICAL PROVISIONS 3.0

TP 3.0 WATER MAINS, WATER SERVICE LINES, AND APPURTENANCES

3.01 Scope of Work

The work covered by this section includes the furnishing of all labor, equipment and tools, and material; performing all operations in connection with the construction of water mains, including the placing of all necessary valves, hydrants, fittings, and appurtenances, and the construction of water service lines and appurtenances, in accordance with these technical provisions and applicable drawings.

3.02 Water Mains

3.02.01 Polyvinyl Chloride (PVC) Pipe and Fittings

Fittings for PVC pipe 4-inch and larger shall be Class 350 SSB mechanical joint, ductile iron conforming to AWWA C153 and shall be cement mortar-lined conforming to AWWA C104 or if shown on the plans, may be Class 200 PVC Bell and Gasket, conforming to ASTM D3139 and D1784, Type 1, Grade 1, and ASTM D2241.

PVC pipe shall conform to ASTM D2241 and the pipe shall be PVC 1120, SDR 21 and 200-PSI pressure rating or SDR 26 and 160-PSI, as specified on the plans. All PVC pipe joints shall be rubber compression ring type gaskets conforming to ASTM D3139 - Rieber type or equal. Special piping provisions are required when higher pressures are encountered.

Plastic pipe with scratches, gouges, or grooves deeper than one-tenth (0.10) of the wall thickness shall be rejected. Damaged sections of pipe shall be completely destroyed or immediately removed from the job site.

Ductile Iron pipe of specific class and type as shown on the plans may be required under certain circumstances. The pipe may require polyethylene encasement. In cases where the soil environment is corrosive -the soil resistivity is less than 1000 ohm-cm, the PH is less than 4 or greater than 8.5, or sulfides or high moisture content exist in the soil, etc. -the Contractor shall be required to wrap all mechanical joint fittings and all Ductile Iron pipe with 9 mill polyethylene film per

AWWA C105/A21.5.

3.02.02 Water Main Installation

Pipe and fittings shall be installed generally in accordance with the manufacturer's printed instructions and specifications, to the standards of the AWWA for installing the type of pipe used, and in accordance with the NTUA Technical Provisions. Minimum bury depth shall be 42-inches, unless otherwise specified, with a maximum depth of 72-inches, unless specifically exempted by the NTUA Engineer.

Pipe and fittings shall be carefully handled to avoid damage. Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material shall be removed, cleaned, and re-laid. When pipe installation is not in progress, the open ends of the pipe shall be closed with a watertight plug.

Long radius curves, either horizontal or vertical, may be installed with standard pipe by deflecting at the joints. The amount of deflection at each pipe joint shall not exceed the manufacturer's printed recommended deflections. When rubber gasket pipe is laid on a curve, the pipe shall be jointed in a straight alignment and then deflected to the curved alignment. Trenches shall be excavated wider on curves for this purpose.

3.02.03 Connections to Existing Mains

A permission to tap permit shall be obtained from the local NTUA office by the Contractor and all work shall be in conformance with said tapping permit.

Connections to existing mains shall be dry connections, made in a neat and workmanlike manner, unless otherwise permitted by the NTUA. Each connection to an existing waterline shall be made at a time and under conditions which will least interfere with water services to customers affected thereby, or as authorized by the NTUA and as evidenced by an approved tapping permit. Such connections shall be made to the satisfaction of the NTUA. Proper tools and fittings to suit actual conditions encountered in the field in each case shall be utilized. The cutting of pipe for inserting fittings or closure pieces shall be done in strict accordance with the recommendations of the pipe manufacturer, without damage to the pipe, or coating, and so as to leave a smooth end at right angle to the axis of the pipe.

Great care shall be taken to prevent pipeline contamination when cutting into and making connections with existing pipelines used for the conveyance or distribution of water for domestic or public use. The Contractor shall coordinate and cooperate with the NTUA, in locating services and shall conduct his operations in such a manner that trench water, mud, or other contaminations are not allowed to enter the connected line or lines, at any time during the progress of the work. The interior of all pipe, fittings, and valves installed in such connections shall be thoroughly cleaned and then swabbed with or dipped in strong chlorine solution having a chlorine content of 200 parts per million (PPM).

3.03 Valves For Water Mains

3.03.01 Gate Valves

All gate valves shall conform to AWWA Specification C509, iron body, epoxy coated, bronze mounted, resilient wedge, counter clockwise opening, inside screw, non-rising stem with O-ring seals, and a 2-inch square wrench nut. Valve working pressure rating shall be 200-PSI minimum. The valves shall be Mueller, Kennedy, Waterous, Dresser M & H, Clow, or an approved equal (OAE) with mechanical joints as specified on the plans with appropriate transition gaskets. For operating pressures greater than 200-PSI, special considerations shall be followed.

3.03.02 Valve Boxes

Valve boxes shall be installed on all buried valves and shall be 5-1/4-inch nominal diameter shaft, two-piece adjustable screw type equal to Tyler No. 6850 Series. The length of the box shall be sufficient to permit access to the valve at the specified depth of bury. Tyler Series extensions will be utilized to extend the valve box where required. The word "Water" shall be cast onto the lid.

3.03.03 Valve Installation

Before installing the valve, care shall be taken to see that all foreign material and objects are removed from the interior of the valve. The valve shall be opened and closed to see that all moving parts are in working order, prior to installation.

All valves shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connecting ends furnished. All valves shall be set in and tied to poured in-place concrete support blocks as per the NTUA standard detail. Valves and valve boxes shall be set

plumb. The cast iron valve boxes shall be placed over valves in such a manner that the valve boxes do not transmit shock or stress to the valve. The valve box cover shall be set flush with, or slightly above the finished grade, as shown per the NTUA standard detail. A 2-foot square by 4-inch deep reinforced concrete pad shall be poured around each valve box. Before the concrete hardens, the Contractor shall neatly scribe in the concrete pad, the valve and pipe size and type, and a line indicating the direction of flow of water through the valve.

3.04 Fire Hydrant Assembly

3.04.01 Fire Hydrant

Fire hydrants shall be of standard manufacture with the name of the manufacturer and direction of opening cast on the hydrant top. Fire hydrants shall conform to AWWA C502. The end connections shall be mechanical joint. The hydrants shall be equipped with a breakaway safety flange and safety stem coupling at or near the bury line such that a heavy impact would minimize breakage of hydrant parts. The hydrants shall open counter clockwise, have a 5 1/4-inch or larger main valve opening, 6-inch inlet, 1 1/2-inch tapered pentagonal operating nut, 2 hose nozzles 2 1/2-inches in diameter, and a 4 1/2-inch pumper nozzle, all with National Standard hose threads. The hydrant shall be Mueller A423, Kennedy K81A, or an approved equal OAE.

3.04.02 Hydrant Connections and Auxiliary Gate Valves

An auxiliary gate valve and valve box shall be installed adjacent to each fire hydrant per the standard detail or as specified on the plans. The pipe between the fire hydrant and the auxiliary gate valve and between the auxiliary gate valve and the main shall be 6-inch minimum.

3.04.03 Fire Hydrant and Guard Installation

Before installing any hydrant, care shall be taken to see that all foreign materials and objects are removed from the interior of the barrel. The hydrant shall be opened and closed to see that all moving parts are in working order.

Hydrants shall be installed plumb with the pumper nozzle toward the street. The hydrant shall be set per the standard detail for the hydrant and guard.

3.05 Thrust Blocking

Thrust blocking as detailed in the standard drawings shall be placed at all bends,

caps, tees, crosses, and fire hydrants. Blocking shall be concrete mix poured in place. Concrete blocking shall bear against solid undisturbed earth at the sides and bottom of the trench excavation and shall be shaped so as not to block weep holes or obstruct access to the joints of the pipes or fittings. The concrete shall not cover nuts and bolts of joints or fittings. Ductile Iron Joint Restraints used in conjunction with Mechanical Joint fittings may be used as a substitute for concrete blocking.

3.06 Water Main Crossings

3.06.01 Wash Crossings

Water mains shall be installed as shown on the plans. The Contractor shall divert surface flows, conduct dewatering, and perform all steps necessary to maintain proper bedding conditions and alignment. A minimum 6-foot depth of bury is required at the centerline of all wash crossings.

3.06.02 Road Crossings

In lieu of boring, roads may be open cut for water line and casing installation. The original surface pavement on all open cut roadways shall be either cut square or sawed straight. As with open cut, if boring is required the steel conduit shall be extended from right-of-way to right-of-way. The Contractor shall obtain written permission from the appropriate agency prior to beginning any roadway excavation. Backfill within the limits of a roadway prism may require special compaction in accordance with the requirements of the roadway crossing permits.

Surfacing shall be replaced where the roadway has gravel, concrete, or asphaltic paving in the same thickness as were removed, or as specified by the roadway agency, and completed as soon as possible following backfilling.

Ductile iron pipes resting on the bells within the steel casing shall be used as the carrier pipes. PVC waterline road crossings may also be installed within the steel casing on approved casing chocks or redwood skids secured to the pipe with stainless steel straps. The casing ends shall be sealed with an approved rubber boot or 9-mil plastic sheeting with stainless steel clamps. Casing pipe shall be straight welded Schedule 10 steel pipe, .25-inch wall thickness, unless otherwise specified. An alternate method for roadway crossing is to install ductile iron pipe, Class 52, bell and spigot, direct bury by open cut excavation from right of way to right of way. This would be considered when crossing minor roads or trails, or for congested area within an urban

setting.

For pressure testing purposes, gate valves will be required on the up stream and downstream side of roadway crossings.

3.07 Water Service Connections Material

3.07.01 Polyethylene (PE) Pipe

Polyethylene (PE) pipe shall be 1-inch IPS, 200 psi, SIDR 7 in conformance with ASTM D2239. The pipe shall be produced from a high density ultra-high molecular weight PE pipe compound, PE 3406 or PE 3408 which conforms to the latest revision of ASTM D1248. The pipe shall be equal to Driscopipe 5100 Ultral-line or Yardley Ultra-high Molecular Weight PE. The designation PE 3406 or PE 3408 shall be stamped on the pipe.

3.07.02 Service Line Fittings and Connections

Fittings and connections for PE pipe shall be made with non-flare compression connections and shall be Mueller Insta-Tite H-15426, or approved equal. All threaded connections from the water main to and including the inlet of the domestic stop shall be standard iron pipe (I.P.) threads.

3.07.03 Saddles

Saddles shall be specific for the type, size, and pressure rating of the mainline as recommended by the saddle manufacturer. Saddles shall be double strapped, double banded, or of the contoured band type. Saddles and saddle components shall be brass, bronze, or stainless steel. Tap threads shall be FIP. Acceptable saddles include Ford S71 and Mueller H-13478 for IPS PVC O.D. pipe, or Ford 202B or approved equal for DI and AC O.D. pipe.

3.07.04 Corporation Stops

Corporation stops shall be bronze alloy with MIP threads inlet by FIP threads outlet. They shall be equal to Mueller H-10046 corporation stops or Ford Type FB1700.

3.07.05 Curb Stops

Curb stops shall be 1-inch bronze alloy, quarter turn check, FIPT x FIPT end connections, with tee head and 30-inch (approx.) stationary operating rod. Curb stops shall be Minneapolis pattern top threads with

resilient O-rings seals and equal to the Mueller B-20287, or Ford B11-444M or AY McDonald 6105.

3.07.06 Curb Stop Boxes

Curb stop boxes shall be the extension type, cast iron with 1 1/2-inch upper section. Curb box lid shall be cast iron and have a countersunk brass pentagon head plug. The curb stop boxes shall be Minneapolis pattern 2-inch base bushed to 1 1/2-inch and equal to Mueller H-10302 or Ford Type PXL. The finished elevation of the plug shall be such that it extends just slightly above the ground surface. The stationary rod shall be sized so that the top extends 2 to 4 inches below the top of the curb box. An 18-inch by 18-inch by 4-inch depth reinforced concrete collar shall be poured around each curb box.

3.07.07 Water Meters

Water meters shall be of cast bronze construction with magnetic drive and a hermetically sealed register which reads in gallons. The meter shall accurately record flows from 1/4 to 20 gpm and shall be a 5/8-inch by 3/4-inch Sensus SR model with frost plate. The Sensus SR II model is not acceptable.

3.07.08 Meter Yokes/Coppersettters

Yokes or coppersettters for water meters shall have 3/4-inch ID x 12-inch riser, with a ball valve with padlock wing angle on the inlet, with a meter nut on the outlet side, and in the base, a 1-inch double purpose union swivel inlet and outlet connection. Yokes shall have an eye for the insertion of a cross brace and equal to Ford VB 72-12W-11-44 or AY McDonald 20-212WX-DD-44. The cross brace shall be a 1/2-inch OD PVC pipe or # 4 rebar 18-inches in length. The tandem coppersetter shall have an "S" tube with two bronze adapters, iron thread by meter nut, for the pressure regulators. The PRV shall be Watts Series 25AUB or approved equal.

3.07.09 Meter Boxes

Meter boxes shall be 20-inches diameter, 30-inches high nonmetallic by DFW or approved equal and shall be extended a minimum of 1-inch below the service line. The meter box lid shall be a cast iron, double lid cover with 11-1/2-inches lid opening, plastic or aluminum inner lid, and locking outer lid with pentagon head worm type lock. The meter box cover shall be equal to Castings model M 70.

3.07.10 Domestic Stops (Not part of the NTUA's facilities)

Domestic stops shall be a 1-inch bronze alloy, quarter turn check, FIPT x FIPT end connections, with tee head and 3/8-inch stationary operating rod. They shall have resilient O-rings seals and equal to the Ford B11-444 or AY McDonald 610.

3.07.11 Domestic Stop Valve Boxes (Not part of the NTUA's facilities)

The domestic stop valve box shall consist of 3-inch diameter PVC-DWV pipe with a 3-inch hub by FIP threaded adapter with a 3-inch MIP threaded plug for the lid. The finished elevation of the plug shall be such that the stationary rod is located immediately below or within the plug so that the rod can be operated with an adjustable wrench from ground surface with the plug removed. The 3-inch diameter PVC-DWV pipe shall be cut so that the top of the adapter extends 3 to 6-inches above ground surface.

3.08 Water Service Line Installation

Water service lines and appurtenances shall be installed in accordance with TP 1.0, Excavation, Trenching, and Backfilling for Water and Sewer Utilities, and TP 2.0, Water and Sewer Line Separation Requirements. A minimum of 3 feet of cover is required for water service lines.

Service lines shall be cut using tools specifically designed to leave a smooth, even, and square end on the pipe. The cut ends shall be reamed to the full inside diameter of the pipe. Pipe ends are to be connected using fittings which seal to the outside surface of the pipe which shall be cleaned to a sound smooth finish before installation. Splices shall be kept to a minimum and no splices shall be made within 10 feet of any sewer line.

All 1-inch service connections to water mains 4-inches or larger shall be made using saddles (tap tees are permitted for new construction). Service connections to 2-inch pipe shall be made using tees. Particular care shall be exercised to assure that the main is not damaged by the installation of the saddle. The saddle shall be aligned on the water main so that it is at a 45 degree angle above the springline of the pipe. The hole drilled into the pipe through the saddle shall be no smaller than 1/8-inch less than the size of the saddle.

Where required, the Contractor shall reconnect existing water service connections to the new water mains using materials specified herein. Individual pressure reducing valves, where required, shall be installed on a tandem meter yoke as shown on the standard detail. Prior to installation of the meter and connection to the building or house, the entire water service line and appurtenances shall be flushed.

3.09 Pressure Tests

Where any section of a waterline is provided with concrete thrust blocking for fittings or hydrants, the pressure tests shall not be conducted until at least 48 hours after installation of the concrete thrust blocking, unless otherwise specified.

3.09.01 Pressure Test

All labor, test equipment, water for testing; appurtenances and material, and performance of all operations in accordance with the specifications, are the responsibility of the Contractor.

All pipelines shall be tested for water tightness up to the individual service meter or domestic stop. The test equipment will not be provided, but is subject to inspection by the NTUA. Arrangements for water used in pipeline testing and payment for the water shall be coordinated with the local NTUA office. Pressure gauges used for pressure testing, shall be graduated at a maximum of 5-PSI increments. Two gauges will be used simultaneously for verification of the gauges functionality. Prior to the actual test, the pipeline shall be pressured to 10-PSI above the test pressure. The pressure will then be decreased to the test pressure, after the required time, so that gauge responsiveness can be observed.

The minimum test pressure shall be at least 160-PSI, measured at the lowest point of elevation in the test section. No section shall be tested that is greater than one mile in length or that has greater than 25-PSI pressure change, due to elevation. The test shall be conducted in such a manner that existing mains, services lines, and service user's plumbing are not damaged. Damage caused by testing shall be corrected at the expense of the Contractor. All connections, valves, blow-offs, hydrants, and house services up to the meter yoke shall be tested with the main, as far as are practicable. When testing piping systems designed to operate above 160-PSI, it will be tested as if it were rated at 160-PSI.

No air testing shall be allowed.

The test section shall be filled slowly with potable water and all air shall be vented from the line. The test shall not begin until the pipe has been filled with water for at least 24 hours to allow for absorption. The test shall have a minimum duration of two hours with the two-hour period beginning when the test pressure is attained and the pump ceases operation.

No pipe installed shall be accepted if the leakage is greater than that determined by the following formula:

$$Q = \frac{N \cdot D \cdot (P)^{1/2}}{7400}$$

in which,

Q = Allowable leakage in gallons per hour

N = Number of joints in the pipeline being tested, this "N" being the standard length of pipe furnished divided into the length being tested with no allowance for double gasket joint caused by use of couplings instead of integral bell pipe or for joints at branches, blow-offs, fittings, etc.

D = Nominal diameter of pipe in inches

P = The test pressure in PSI gauge as discussed in the third paragraph of this procedure.

During the test, the test pressure should not lose more than 5-PSIG without being pumped back up to the test pressure. The total of the gallons of water required to hold the test pressure during the two hours plus the amount of water required to return the line to the test pressure at the end of the two-hour test period is the total leakage. If the total leakage is less than the allowable leakage, the line can be accepted. All visible leaks will be repaired, regardless of the amount of leakage. Should the test on any section of the pipeline show leakage greater than the allowable leakage, the Contractor shall locate and repair the defective pipe, fitting, or joint until the leakage is within the allowable leakage for the two-hour test duration.

3.09.02 Observation of Tests

The NTUA shall witness the pressure testing of waterlines. Prior to the actual test, the Contractor shall have all equipment set up completely, ready for operation and shall have previously successfully performed the test to verify that the test section will pass. The Contractor shall notify both the NTUA and the NMDOT a minimum of three working days in advance of the date that the Contractor plans to perform the pressure tests.

The NTUA shall observe the testing to verify that the testing was performed according to the specifications and that the test data were properly and accurately recorded. The Contractor shall complete the required certification forms and submit them to the NTUA for approval. A letter of approval or disapproval of the test results will be sent from

the Operating Utility to the Contractor.

3.10 Disinfection

A liquid chlorine solution shall be introduced continuously into one end of the system and allowed to flow along and through all lines and appurtenances to be disinfected until a minimum of 50-PPM of chlorine is detected at representative points throughout the line. A contact period of 24 hours shall be maintained before the system is flushed out with clean water until a maximum of 0.4-PPM chlorine residual is attained. All valves shall be operated several times during the 24-hour contact period.

After disinfection, the Contractor shall collect bacteriological samples for testing at his expense. A laboratory certified by the State Health Department or the U.S. Environmental Protection Agency shall perform the analysis. If an unsatisfactory bacteriological test result (positive result) is obtained, the system shall be disinfected and re-tested by the Contractor. This shall be repeated until a satisfactory bacteriological test (negative result) is obtained. Disinfection by introducing granular or tablet chlorine compounds in each pipe length is not an acceptable method of disinfection and will not be allowed.

EXHIBIT A OF TP-3
WATER LINE PRESSURE TEST CERTIFICATION

LOCATION OF LINE TESTED: _____
Include Project Name & Number

DATE(S) TEST WAS CONDUCTED: _____

GAUGES MANUFACTURER AND MODEL: 1) _____
2) _____

STANDARD LENGTH OF PIPE IN TEST SECTION: _____ FEET.

TEST SECTION: _____
(Sta.-Sta., Line No., etc.)

Length (Sta.-Sta.) Time-Start/End	Line Size/Type (Inch)	Pipe Pressure Rating (PSI)	Test Pressures (PSIG)	Observed Pressure Range (PSIG)	Total Leakage (Gal./2hrs.)	Allowable Leakage (Gal./2hrs.)

THE TEST AND ATTACHED INFORMATION IS CERTIFIED BY:

Signature/Printed Name: _____

Organization/Address: _____

Address: _____

Telephone Number: _____

TEST RESULTS CHECKED AND APPROVED ON: _____
Date

BY: _____ PASSED _____ FAILED _____
NTUA Representative

COPY OF APPROVAL OF TEST SENT TO: _____

Print Name/Title

EXHIBIT C OF TP-3

WATER LINE PRESSURE TEST WORKSHEET 2

Test Section: _____
(Sta-Sta, Line No., Etc.)

Length (Sta.-Sta.)	Line Size & Type	Pipe Pressure Rating	Test Pressure	Observed Pressure Range	Total Leakage	Allowable Leakage
Time: Start & End	(Inch)	(PSI)	(PSIG)	(PSIG)	(Gal./2hrs.)	(Gal./2hrs.)

TECHNICAL PROVISIONS 4.0

TP 4.0 WASTEWATER MAINS AND APPURTENANCES

4.01 Scope of Work

The work covered by this section includes the furnishing of all labor, equipment, and material; performing all operations in connection with the construction of gravity wastewater mains and service lines, including manholes and other appurtenances, in accordance with these technical provisions and applicable drawings.

4.02 General

The wastewater line shall be constructed in the location and to the grade and size shown on the drawings or as directed in writing by the NTUA. Excavation, trenching, and backfilling shall be in accordance with TP 1.0 of these specifications. Inspection of wastewater lines and manhole connections shall be accomplished before backfilling, but work covered by this section will not be accepted until backfilling has been completed satisfactorily. Any section of wastewater that is found defective in material, alignment, and/or grade shall be corrected to the satisfaction of the NTUA and the NMDOT.

4.03 Materials

4.03.01 Polyvinyl Chloride (PVC) Wastewater Pipe

Except for extensions to dead ends of 400 feet or less where 6-inch is permitted, minimum wastewater main pipe size and slope, shall be 8-inch nominal diameter at 0.4% slope; and minimum wastewater service pipe size shall be 4-inch nominal diameter at 2.0% slope. All PVC wastewater pipe shall be made of materials conforming to the requirements of ASTM-D1784, Type I, Grade I for Rigid Polyvinyl Chloride compounds. The PVC wastewater pipe shall be SDR 35, Type PSM, with elastomeric gasket joints and shall meet the requirements of ASTM-D3034. The pipe shall have an integral bell with a solid cross section rubber ring, which has been factory assembled and securely locked in place to prevent displacement. Standard lengths shall be 20 feet.

4.03.02 Polyvinyl Chloride (PVC) Wastewater Pipe Fittings

All PVC wastewater pipe fittings shall be SDR 35, Type PSM, with

elastomeric gasket joints and shall meet the requirements of ASTM D-3034. Service connections to new wastewater mains shall be wye fittings. Connections to existing wastewater mains may be wye saddles.

4.03.03 Ductile Iron Wastewater Pipe

Ductile Iron Pipe shall meet the requirements of AWWA C151, with either mechanical or push-on joints, with an interior lining of 40-mil polyurethane or ceramic epoxy and an exterior of standard bituminous coating. Thickness shall be Class 52 in all sizes.

4.03.04 Ductile Iron Wastewater Pipe Fittings

Service connections to ductile iron pipe shall be via saddle-type fittings equal to the " or AOE. Connections between wastewater PVC pipe and ductile iron pipe shall be via the appropriate size Calder coupling; however, the ductile iron pipe should be extended from manhole to manhole to minimize the use of adapters.

4.03.05 Pre-cast Concrete Manhole Sections

Manhole sections shall conform to ASTM C 478. A polyisoprene rubber connector meeting the material and performance requirements of ASTM C-923 and equal to the "A-Lok" Connector as manufactured by A-Lok Products Inc., Trenton, N.J., shall be used to seal between the pre-cast manhole and the sewer pipe. "Ram-Nek" flexible gasket or the "Butyl-Lok" preformed sealant tape by A-Lok Products, Inc., or an approved equal shall be used to seal between manhole sections, grade rings, and cover ring. Bottom manhole sections shall have integral pre-cast base or reinforced concrete floor slabs.

4.03.06 Manhole Covers and Frames

The frames and covers shall be cast iron, equivalent to a Deeter 1257, 330 pounds, with a Type C surface pick slot. The cover minimum opening shall be 24-inches in diameter with a 6-inch high ring. The lid shall not have any holes including pick holes, which penetrate the entire thickness of the lid. A ¾"-inch by 2-inch by 2-inch recessed slot with a ½-inch diameter pin, crossing the small dimension and centered along the long dimension, shall be provided in the lid, in lieu of a pick hole.

4.03.07 Manhole Steps

Manhole steps shall be made of ½-inch steel rod encapsulated with copolymer polypropylene or approved equal and shall conform to ASTM C478. The ALCO 12653A aluminum step is also acceptable.

Steps shall have minimum projections of 4-inches, spaced no more than 16-inches apart, minimum overall widths of 14-inches, and thoroughly anchored into the walls.

4.03.08 Concrete

All concrete in addition to the concrete used in precast sections shall have a compressive strength of not less than 3,000 pounds per square inch at 28 days of age. The aggregates, Portland cement, and concrete shall comply with the provisions of ASTM C144 and C33, ASTM C150, Type II. The concrete mix shall be approved by the Owner and shall include no less than 5-1/2 bags of Portland cement per cubic yard. When directed by the Owner, the Contractor shall have compressive strength tests made of the concrete in accordance with ASTM Standard Specifications.

4.03.09 Wastewater Cleanout and Frame

Where required on the plans, a Neenah R1791A or approved equal cast iron cleanout cover and frame shall be used on all 8-inch wastewater cleanouts.

4.04 Installation of Wastewater Pipe

4.04.01 Pipe Laying

All trenching, excavation, and backfilling shall be performed in accordance with TP 1.0 of these specifications. The bottom of the trench shall be shaped to give substantial uniform bearing and support for each section for the entire length of the pipe. Bell holes shall be excavated to provide a minimum clearance of 2 inches below the coupling or bell. Pipe laying shall proceed upgrade, with the spigot end pointing in the direction of the flow. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe. As the work progresses, the interior of the sewer shall be cleared of all dirt and superfluous materials of every description. If the maximum width of the trench at the top of the pipe specified in TP 1.0 of these specifications is exceeded for any reason other than by direction, the Contractor shall install such concrete cradling, encasement, gravel base or other bedding as may be required to satisfactorily support the added load of the backfill.

Trenches shall be kept free from water and the pipe shall not be laid when conditions of the trench or the weather are unsuitable for such work. At all times when work is not in progress, all open ends of pipe and fittings shall be securely closed so that no trench water, earth, or

other substances will enter the pipe.

4.04.02 Depth of Bury

All sewage collection lines shall be ductile iron if less than 3 feet of cover is provided within streets and less than 2 feet of cover is provided in all other areas.

4.04.03 Installation of Service Connections

Wye fittings shall be provided and installed for sewer service connections to new sewer mains. Service saddles are not appropriate for service connections to newly constructed sewer mains but may be used for connections to existing sewer mains. The wye shall be installed such that it is at about a 45-degree angle with the vertical.

4.05 Manhole Installation

4.05.01 General

Manholes shall be installed in the locations shown on the plans and shall be constructed in accordance with the standard details. Manholes shall be spaced no more than 400 feet apart, and shall be installed at every change in grade, pipe size, or direction.

The invert channel shall be smooth and U-shaped. The lower portion shall conform to the inside of the adjacent sewer section and the upper portion shall be greater in height than the diameter of the largest pipe. A minimum invert elevation drop of 1/10 of a foot from the entrance to the outlet shall be provided in all manholes where there is a change in direction or grade. Changes in size and grade of the channel shall be made gradually and evenly. The invert channel may be formed directly in the concrete, or where there is no change in grade or direction between incoming and outgoing sewers, may be constructed by laying a full section of sewer pipe through the manhole and cutting out the top half after the surrounding concrete has hardened.

The floor of the manhole outside the channel shall be smooth and shall slope toward the channel not less than one inch per foot and not more than 2-inches per foot. Drop inside the manhole shall not exceed 2 feet, measured from the invert of the inlet pipe to the invert of its corresponding channel. If the drop exceeds 2 feet, then a drop manhole shall be installed. A channel must be formed in the concrete of an ogee shape so there is no free drop. Joints between manhole sections,

adjustment rings, and cover rings shall be sealed with Ram-Nek flexible gasket or approved equal; and a concrete collar shall be installed in accordance with the standard details.

All sewers extending from manholes shall be supported with compacted gravel from where the sewer pipe leaves the manhole to where the pipe is supported by undisturbed soil.

4.05.02 Connection to Existing Manhole

The Contractor shall obtain a tapping permit from the NTUA prior to making connections to existing manholes. The connection to the existing manhole shall be made in accordance with the approved plans. Care should be exercised when connecting to the existing manhole so that limited fracture and cracking will occur on the existing manhole. Also, placement of the new wastewater main should be correctly aligned to the invert elevation so as to allow for proper flow of sewage through the manhole. Excessive damage to the existing manhole or improper installation of the new wastewater main, as determined by the NTUA, shall be cause for replacement of the existing facilities within the construction area by the Contractor. This replacement shall be done to the satisfaction of the NTUA and NMDOT.

4.06 Wastewater Main Crossings

4.06.01 Wash Crossings

Wastewater mains shall be installed as shown on the approved plans. The Contractor shall divert surface flows, conduct dewatering, and perform all steps necessary to maintain proper bedding conditions and alignment.

4.06.02 Road Crossings

In lieu of boring, the roadway may be open cut for sewer line within casing installation. The original surface pavement on all open cut roadways shall be either cut square or sawed straight. As with open cut, if boring is required, the steel casing shall be extended from right of way to right of way. The Contractor shall obtain written permission from the appropriate agency prior to beginning any roadway excavation. Backfill within the limits of a roadway prism may require special compaction in accordance with the roadway crossing permits.

Surfacing shall be replaced where the roadway has gravel, concrete, or asphaltic paving in the same thicknesses as were removed, or as specified by the Owner, and completed as soon as possible following

backfilling.

PVC wastewater line road crossings shall be installed within steel casing on acceptable casing chocks or redwood skids secured to the pipe with stainless steel straps. Ductile Iron pipe resting on the bells also may be used as the carrier pipes. The casing ends shall be sealed with an approved rubber boot or 9 mil plastic sheeting with stainless steel clamps. Casing pipe shall be straight welded SCH 10 steel pipe ¼" wall unless otherwise specified. An alternative method for roadway crossing is to install ductile iron pipe, Class 52, bell and spigot, direct bury by open cut excavation from right of way to right of way. This would be considered when crossing minor roads or trails, or for congested area within an urban setting.

A manhole shall be installed on each side of the roadway right of way, unless specified otherwise. The minimum grade of all road crossings should be 1.0% unless exempted by the NTUA and the NMDOT.

4.07 Sewer Service Line Installations (Not part of the Utility company's facilities)

4.07.01 General

All trenching, excavating, and backfilling should be performed in accordance with TP 1.0 and TP 2.0 of these specifications. All new construction shall provide a minimum slope of 1/4-inch per foot (2%) and maintain at least 2 feet of cover over the line. Clean outs should be placed at the house, at any in-line bend greater than 45 degree, and at 100-foot intervals. Bends greater than 45 degrees are discouraged. Services should not enter a manhole but should enter the main line at least 10 feet either side of the manhole.

4.07.02 Connection to Wyes or Main

Sewer service lines should be connected to the sewer wyes provided with the new sewer main. If connecting to an existing main without existing wyes, the connections shall be made with wye saddles. The Contractor shall obtain from the Operating Utility tapping permits before making sewer service connections to existing sewer mains. The saddle shall be aligned on the sewer main such that it is at about a 45 degree angle with vertical and in no case shall deviate, by more than 15 degrees from either side of 45 degrees without prior approval. During the installation of the sewer saddle, the Contractor shall not allow the pipe cutout or other foreign objects to enter the sewage collection system.

4.08 Wastewater Line Testing

4.08.01 Alignment Test

The Contractor shall notify the NTUA two working days in advance of the date that the Contractor is ready for inspection of sewer alignment. The wastewater main shall be checked by the Contractor and verified by the NTUA, to determine whether any displacement of the pipe has occurred, after the trench has been backfilled to 2 feet above the pipe and tamped as specified. The test shall be made as follows: A light shall be flashed between ends of line by means of a flash light or reflected light. Any deviation from true line or grade, causing less than a full lamped circle, may be cause for rejection. Any ponding of water in the wastewater line may be cause for rejection. A full lamp circle is when a full circle of light is seen from any position around the pipe perimeter.

4.08.02 Deflection Test

The maximum allowable deflection (reduction in vertical inside diameter) for PVC pipe shall be five percent. Deflection testing may not be required in all cases; however, the NTUA reserves the right to require the Contractor to perform random deflection tests. If three successive tests are determined to be unsatisfactory, the Contractor shall perform deflection tests on the entire project. All locations with excessive deflection shall be excavated and repaired by re-bedding or replacement of pipe. Acceptable methods of deflection testing include use of properly sized go-no-go mandrels or other proposals suitable to the operating utility.

4.08.03 Ex-filtration Test

The Contractor shall conduct an ex-filtration test on each section of wastewater mains between manholes. The Contractor shall provide at his own expense all necessary equipment and materials required for the tests. One of the following testing methods shall be used.

Air Testing: Testing equipment shall be equal to the “Air-Loc” low pressure air testing system manufactured by Cherne Industrial, Inc. of Edina Minnesota. The gauge used for the air test shall have a minimum division of 0.10-PSI.

Testing shall be conducted in accordance with ASTM C924 (Testing Sewer Lines by the Low-Pressure Air Test Method), except as modified herein. Air testing shall be done between consecutive manholes throughout the entire length of the installed line. Air shall be added to the plugged test section until the internal air pressure reaches 4.0 psig. At least two minutes shall be allowed for the air pressure to stabilize.

The air supply shall then be disconnected and the time required for the pressure to drop from 3.5 to 3.0 psig shall be measured with a stopwatch. No one shall enter a manhole when a line into it is pressurized. If the groundwater level is above any portion of the test section, the test pressure shall be increased, by an amount equal to the average hydrostatic pressure of the groundwater.

The test section will be accepted if the time required for the pressure to decrease from 3.5 to 3.0 PSIG is equal to or greater than the time in the following table. The pipe diameter shall be based on the nominal size of the sewer main. If the time measured is less than the time specified in the table, the Contractor shall locate and repair any leaks and retest the sewer until it is acceptable.

Minimum Duration for Pressure Drop (400 feet Max.)	
Pipe Diameter (Inches)	Time (Minutes)
4	2.5
6	4.0
8	5.0
10	6.5
12	7.5

The following formula should be utilized to determine the minimum duration for pressure drop for test sections greater than 400 feet or pipe sizes greater than 12 inches.

$$T = 0.000371 \cdot D^2 \cdot L \div 2$$

Where: T = Time in Minutes
 D = Nominal Diameter in Inches
 L = Pipe Length in Feet

Water Testing: One gallon of water may be lost in 2 hours, per each section between manholes, when testing any size main up to 12-inches. The line shall not be tested with the manhole. At least 4 feet of head shall be used for the test. Service lines need not be tested, but they must be plugged to conduct the test of the main. If any leakage in excess of the allowable occurs in any section of the sewerline, that section(s) shall be repaired and re-tested after the leaks are located.

4.08.04 Groundwater Infiltration

Infiltration of groundwater in excess of 200 gallons per day per inch diameter per mile of wastewater line indicates that the line is not watertight. Infiltration less than this amount does not relieve the Contractor of the requirement to perform ex-filtration testing. If excess infiltration is noted after ex-filtration tests have been completed, it shall be considered as evidence that the original test was in error or that subsequent failure of the pipeline has occurred.

4.09 Manhole Testing

Manholes shall be tested for water tightness. Each manhole shall be tested by itself. All lift holes shall be plugged with an approved non-shrink grout. All mains into and out of the manhole shall be plugged with a suitable device. If the manhole fails the initial test, necessary repairs shall be made and the manhole shall be retested. One of the following methods shall be used.

Vacuum Testing: Vacuum testing should be conducted, in accordance with ASTM C1244 (Vacuum Test for Concrete Manholes), except as modified below. The vacuum test head shall be placed inside the top section and the seal inflated in accordance with the manufacturers' recommendations. A vacuum of 10-inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9-inches. The manhole shall pass if the time is greater than 60 seconds for 48-inches diameter, 75 seconds for 60-inches, and 90 seconds for 72-inches diameter manholes.

Hydrostatic Testing: Hydrostatic testing shall be conducted in accordance with ASTM C969, except as modified below. The manhole shall be filled with water to the ring. The maximum loss shall be 5 gallons in a 2-hour test regardless of the manhole depth. The amount of loss shall be determined by measuring the volume of water required to maintain the water level in the manhole within 2-inches of the top of the cone or flat top throughout the entire duration of the 2-hour test.

4.10 Observation of Pressure Tests

The NTUA is to witness the pressure testing of wastewater lines and manholes. Prior to the test, the Contractor shall have all equipment set up, completely ready for operation and shall have previously successfully performed the test to verify that the test section or manhole will pass. The Contractor shall notify both the NTUA and the NMDOT, a minimum of two working days in advance of the date that the Contractor plans to perform the pressure tests. The Contractor will complete the required certification forms and submit them to the NTUA for approval. A copy of the approval or disapproval of the test results will be sent from the NTUA to the Contractor (see "Exhibit A & C of TP-4).

EXHIBIT A OF TP 4.0

WASTEWATER MAINLINE/MANHOLE WATER TEST 1 CERTIFICATION

LOCATION OF LINE TESTED: _____
Include Project's Name & Number

DATE(S) TEST WAS CONDUCTED: _____

STANDARD LENGTH OF PIPE IN TEST SECTION: _____ FEET.

THE TEST AND INFORMATION IS CERTIFIED BY:

Signature/Printed Name: _____

Organization/Address: _____

Address: _____

Telephone Number: _____

WASTEWATER TEST 1 RESULTS CHECKED AND APPROVED ON: _____
Date

BY: _____
NTUA Representative

PASSED _____ FAILED _____

COPY OF APPROVAL OF THE TEST SENT TO: _____
Project Agency Involved

ON _____ BY _____
Date NTUA

EXHIBIT B OF TP 4.0

WASTEWATER MAINLINE/MANHOLE WATER TEST 1-WORKSHEET

LOCATION OF LINE TESTED: _____

Include Project Name & Number

DATE(S) TEST WAS CONDUCTED: _____

(Allowable Leakage: 1 gal/section/2 hrs. for 8" PVC to 12" PVC, regardless of length, using 4-feet of head test pressure.)

SEWER MAIN

Sewer Main (MH# to MH#)	Size (in)	Length (ft.)	Actual Leakage (gal.)	Pass/Fail (P or F)	Remarks

Verified By: _____

NTUA Representative/Date

 Print Name/Title

(Allowable Ex-filtration: 5 gal./MH/2 hrs. regardless of height. Lamp testing shall be conducted at completion of final grading.)

SEWER MANHOLE

Manhole No.	Station	Actual Leakage (gal.)	Pass/Fail (P or F)	Remarks

Verified By: _____

NTUA Representative/Date

 Print Name/Title

EXHIBIT C OF TP 4.0

WASTEWATER MAINLINE/MANHOLE AIR/VACUUM TEST 2 CERTIFICATION

LOCATION OF LINE TESTED: _____
Include Project Name & Number

DATE(S) TEST WAS CONDUCTED: _____

THE GAUGE USED FOR TESTING SHALL HAVE MIN. DIVISION OF 0.10 PSI.

STANDARD LENGTH OF PIPE USED ON THIS PROJECT IS _____ FEET.

THE TEST AND ATTACHED INFORMATION IS CERTIFIED BY:

Signature/Printed Name: _____

Organization/Address: _____

Address: _____

Telephone Number: _____

WASTEWATER TEST 2 RESULTS CHECKED AND APPROVED ON: _____
Date

BY: _____
NTUA Representative

PASSED _____ FAILED _____

COPY OF APPROVAL OF THE TEST SENT TO: _____
Project Agency Involved

ON _____ BY _____
Date NTUA

EXHIBIT D OF TP 4.0

WASTEWATER MAINLINE/MANHOLE AIR/VACUUM TEST 2 WORKSHEET

LOCATION OF LINE TESTED: _____
 Include Project's Name & Number

DATE(S) TEST WAS CONDUCTED: _____

Air testing shall be conducted between consecutive manholes. The test section shall be acceptable if the time required for the pressure to drop from 3.5 to 3.0 PSIG is greater than or equal to the time in the "Minimum Duration for Pressure Drop" table of TP-4.08.03.

SEWER MAIN AIR TEST

Sewer Main MH# to MH#	Size (in.)	Length (ft.)	Start Test Pressure (Psig)	Stop Test Pressure (Psig)	Elapsed Time (Min/Sec.)	Pass/Fail (P or F)	Remarks

Verified By: _____ Date: _____

Title/Company: _____

Manhole shall pass if time is greater than 60 seconds for 48" Dia. MH, 75 seconds for 60" Dia. MH, and 90 seconds for 72" Dia. MH.

MANHOLE VACUUM TEST

Manhole No.	Station	Start Vacuum of 10" of Mercury (Inch)	Stop Vacuum (Inch)	Elapsed Time (Min/Sec.)	Pass/Fail (P or F)	Remarks

Verified By: _____ Date: _____

Title/Company: _____

* Lamp test shall be conducted after completion of street construction and final grading.

TP 4.11 Individual Subsurface Disposal Systems (Not part of the Utility Company's Facilities)

4.11.01 General

The Contractor shall install individual subsurface disposal systems at the locations shown on the plans. The work shall consist of furnishing and installing a double compartment 1,000-gallon or larger septic tank, 4-inch sewer pipe, and leachfield system in accordance with these technical provisions and applicable drawings. All construction will be done in a workmanlike manner. All sites will be left with a neat appearance.

4.11.02 Septic Tanks

4.11.02.01 General

All septic tanks shall have a minimum liquid capacity of 1,000 gallons and double compartment. Liquid capacity shall be split with two-thirds in the first compartment and one-third in the second compartment. The liquid depth of the septic tanks shall be at least 4 feet but not more than 5 feet.

The inlet and outlet on all tanks shall be provided with vertical tee fittings of cast iron or PVC plastic. In concrete tanks, oval box shaped or slab type baffles of pre-cast reinforced concrete with a minimum thickness of 2-inches may be used. The inlet baffle or tee must penetrate at least 5-inches below the liquid level but in no case shall it be greater than the penetration of the outlet baffle or tee. Both inlet and outlet baffles or tees shall extend 6-inches or more above the liquid level and end 1-inch from the underside of the tank top to allow gases to escape. The outlet baffle or tee shall extend below liquid level 40 percent of the liquid depth for rectangular tanks and 35 percent for circular tanks. The common wall passage shall also be located at the 40 percent liquid level depth. The inlet invert should be at least 2-inches above the liquid level in the septic tank. Four copies of drawings indicating pertinent dimensions, type, and location of steel reinforcing in concrete tanks, and important details shall be submitted by the Contractor for approval by the Owner prior to the installation of any septic tank.

4.11.02.02 Concrete Tanks

Concrete septic tanks shall be of pre-cast, mechanically vibrated,

4,000 psi minimum strength, watertight concrete containing adequate steel reinforcement to facilitate handling. Minimum wall thickness shall be 3-inches. The top and bottom shall have a minimum thickness of 4-inches. Minimum steel reinforcement will be No. 3 reinforcing bars spaced 2 feet on centers in both directions in the top, bottom, and sides. The equivalent shall be used around manhole inspection ports and construction joints. Minimum steel reinforcement of the access cover or lid shall be No. 4 rebars spaced 6-inches on center in both direction or equivalent. The manhole and inspection opening covers shall be provided with steel lifting handles of No. 3 or No. 4 rebar.

Tanks shall be free of cracks from casting or handling (including placement). No wire mesh or rebar shall be exposed at any point on the tank interior or exterior.

Adequate access shall be provided into the septic tank either through a removable section or manhole with a minimum of 20-inches in the least dimension. The access manhole may be placed partially over the inlet to serve as an inspection hole; otherwise, inspection openings with a minimum of 7inches in the least dimension shall be provided above the inlet, outlet, and the inter-compartment piping. The access manhole shall be provided with a 6-inch PVC coupling that extends through the center. A 6-inch diameter inspection pipe shall be installed so that it is connected to the access manhole coupling and extends to a point 12-inches above the ground surface. The pipe shall be 160 psi, SDR 26, PVC, shall terminate above ground surface with a 6-inch slip joint PVC cap, and shall be painted red on those portions above the ground surface.

4.11.03 Septic Tank Installation

Excavation shall be approximately 1 foot wider and longer than the tank. All tanks shall be set on a smooth level surface. The septic tank shall be placed plumb and true so that the inlet and outlet are at the highest possible elevations and so that the outlet pipe is not less than 2-inches nor more than 5-inches below the inlet pipe. The minimum bury for the septic tank inlet pipe shall be 18-inches. The maximum dirt cover for the septic tank shall be 36-inches. Where over excavation occurs, the bottom shall be raised to final elevation in 6-inch compacted lifts. Any water in the excavation must be removed and elevations checked before setting the tank. After setting the tank, it shall be filled with water to prevent floating. Both the septic tank inlet and outlet lines shall be grouted to the septic tank. Backfill around the tank shall be compacted and shall be sufficient to allow for no settlement.

4.11.04 Sewer Pipe and Fittings

All 4-inch pipe and fittings, except clean out tees, risers, hub adapters, and plugs, shall be PVC, SDR 35, solvent-weld joints and shall comply with ASTM Specifications D-3033 and D-3034. All PVC shall be Type 1, Grade 1, PVC 1140 conforming to ASTM Specification D-1784.

Cleanout tees, risers, hub adapters, and plugs shall be PVC/DWV and comply with ASTM Specification D-2665.

4.11.05 Sewer Pipe Installation

All trenching, excavating, and backfilling shall be performed in accordance with TP 1.0 of these specifications. All construction shall provide a slope of 1/4" per foot (2%) and maintain at least 18-inches of cover over the line between the house and the septic tank. A minimum cover of 12-inches is required between the septic tank and drainfield system. Cleanout tees shall be two-way, 4" x 4" x 4", all solvent-weld hubs, PVC/DWV fittings. Cleanout risers for DWV cleanout shall be 4-inch PVC/DWV and shall terminate 3 to 6-inches above the ground surface with a PVC/DWV 4-inch hub adapter (solvent-weld hub by FIPT) and MIPT plug. Cleanout shall be placed at the house and at any in-line bends greater than 45 degree (bends greater than 45 degrees are discouraged) and at 100 foot intervals.

4.11.06 Drainfield Materials

4.11.06.01 Gravel

Drainfield gravel shall comply with the requirements for coarse aggregate under Federal Specification SS-A-281b, "Aggregate; (for Portland-Cement-Concrete", and shall be Size 3 (2" to 1" nominal size). The amount of deleterious substances in the coarse aggregate shall not exceed the limits given in Section 3.2.3 of Federal Specification SS-A-281b.

4.11.06.02 Pipe and Fittings

All PVC shall be Type 1, Grade 1, PVC 1140 conforming to ASTM Specification D-1784. All 4-inch solid PVC pipe and fittings shall be PVC, SDR 35, solvent-weld joints and shall comply with ASTM Specifications D-3033 and D-3034. All 4-inch perforated PVC pipe shall be solvent-weld joints and shall comply with ASTM Specification D-2729 or D-3033 and D-3034. Perforations shall be 1/2 to 5/8 inch diameter holes on 5-inch centers in two rows spaced 90 to 120 degrees apart.

4.11.06.03 Drainage Fabric

The drainfield fabric shall be non-woven and composed of polypropylene filaments and shall be inert to biological degradation and naturally encountered chemicals, alkalies, and acids. The fabric shall have a minimum average grab tensile strength of 120 pounds, a minimum average burst strength of 285 psi, a minimum average coefficient of permeability of 0.3 cm/sec, and a minimum thickness of 60 mils. The drainage fabric shall be equal to the Mirafi 140N non-woven fabric as manufactured by Mirafi, Inc., P.O. Box 240967, Charlotte, North Carolina.

4.11.07 Drainfield Installation

The trench width in the drainfield shall normally be 24-inches and shall not exceed 36-inches nor be less than 12-inches without the consent of the Owner. Trench bottoms shall be smooth and level from beginning of trench to end. All smeared or compacted surfaces of the trenches or bed shall be raked to expose the natural texture of the soil. All loose material shall be removed from the trench before the gravel is placed. The drainfield trench shall be kept as shallow as possible but with a minimum depth of 24-inches and a maximum depth of 60-inches. Drainfields shall be built so that all lines are looped. Where rock, clay, or ground water are encountered, the Contractor shall immediately notify the Owner and shall cease work on the drainfield installation. The bottom of the trench shall be covered with a 6-inch minimum depth lift of gravel. The lift shall be leveled (but not compacted) by hand to within \pm 1-inch throughout the entire length of the trench. The 4-inch perforated plastic pipe shall then be laid level \pm 1-inch by hand and centered in the trench. After the pipe has been laid, a second 6-inch lift of gravel shall be placed by hand and not compacted. The gravel shall be placed so that it extends 2-inches above the pipe. A layer of synthetic drainage fabric then shall be placed over the gravel and folded up the sides of the trench to prevent backfill soil from coming in contact with the gravel.

The trench shall then be backfilled and not compacted. The top shall then be mounded with a 8 to 12-inch crown and shall not be compacted. No mechanical or vehicular traffic shall be used to compact the trench. Backhoes shall not be allowed on trenches during or after the backfilling operation.

Four, red T-type, steel posts shall be placed at the outside corners of the drainfield. The post shall be driven a minimum of 14-inches into the ground and shall extend a minimum of 36-inches above the ground. The Contractor shall leave the premises in a neat and orderly condition. Excess dirt shall be spread evenly over the ground in the immediate area or disposed of in a manner approved by the Owner.

4.11.08 Gravel-less Drainfield Materials

The gravel-less drainfield shall consists of interlocking leaching chamber units,

opened end plates, and closed end plates constructed from molded high density polyethylene. Gravel-less drainfield components shall be equal to the Infiltrator as manufactured by Infiltrator Systems Inc., P.O. Box 768, Old Saybrook, CT 06475, or an approved equal.

4.11.09 Gravel-less Drainfield Installation

In place of perforated pipe and gravel for distribution and storage of waste water, leaching chambers or gravel-less drainfield systems can be employed.

The trench width for a gravel-less drainfield shall normally be 36-inches or as specified by the supplier of system. Trench bottoms shall be smooth and level from beginning of trench to end. All smeared or compacted surfaces of the trenches or bed shall be raked to expose the natural texture of the soil. All loose material shall be removed from the trench before the chamber units are installed. The trench shall be kept as shallow as possible but with a minimum depth of 24-inches and a maximum depth of 36-inches.

The installation of the gravel-less system shall be per the manufacturer's recommendations. Where rock, clay, or ground water are encountered, the Contractor shall immediately notify the Owner and shall cease work on the drainfield installation. The area between the leach chamber and trench wall shall be backfilled and compacted. The minimum cover for the gravel-less drainfield is 12-inches. The top shall then be mounded with an 8 to 12-inch crown and shall not be compacted. No mechanical or vehicular traffic shall be used to compact the trench. Backhoes shall not be allowed on trenches during or after the backfilling operation.

A 4-inch solid sewer PVC-DWV inspection port with adapter hub and plug shall be installed at the end of each line. The Contractor shall leave the premises in a neat and orderly condition. Excess dirt shall be spread evenly over the ground in the immediate area or disposed of in a manner approved by the Owner.

TECHNICAL PROVISIONS 5.0

TP 5.0 FINAL SITE UTILITY INSPECTION REQUIREMENTS

5.01 Final Inspection Package

The Contractor shall submit a complete site utility inspection package, which shall include the following items; all copies of which shall be legible.

5.01.01 As-Built Drawings

Four (4) sets of Size D "as-built" drawings which contain:

- A. Cover Sheet
- B. Rights of Way Plat Sheets
- C. Utility Plan View Sheets
- D. Water/Wastewater Plan and Profile Construction Sheets
- E. Details Sheets - Standard and Specific Drawings

5.01.02 As-Built Notebook

Four (4) three ring, loose-leaf binders, containing the following information:

- A. Water Pressure Test Certification and Test Results Approved by the NTUA. See "Exhibit A" of TP-3.
- B. Wastewater Main and Manhole Test Certifications and Test Results Approved by the NTUA. See "Exhibit A" or "Exhibit C" of TP-4
- C. Executed Transfer Agreement with Cost of Plant attached. See Exhibit "A" and "B" of TP-5.
- D. Water Meter Serial Number Listing and Current Meter Readings.
- E. Approved Tapping Permits.
- F. Approved Water/Wastewater Material Submittals.
- G. A set of plans on CD in the AutoCAD version specified.

5.02 Scheduling Final Inspection

The scheduling for the final inspection shall be coordinated with the NTUA by the Contractor. A complete as-built package is to be provided to the NTUA for review, a minimum of 21 calendar days prior to the scheduled inspection.

5.03 As-Built Drawing Requirements

Each project site that contains utilities to be transferred to the NTUA must be submitted with the following requirements and sheets.

5.03.01 General Requirements for All Sheets

5.03.01.01 Each sheet must be stamped by an A/E* and prominently labeled, signed, and dated by the Contractor (excepting cover and rights of way sheets):

AS BUILT _____
(Name) (Date)

“I certify that I have constructed this project following the standards set forth in TPs 1 - 4, and I have complied with all vertical and horizontal pipeline separation requirements.”

5.03.01.02 All facilities shall be shown as constructed and references to "proposed" or "future" deleted.

5.03.01.03 Where appropriate, each sheet must have a north arrow. Whenever possible, the arrow shall be up or to the right of the sheet.

5.03.01.04 Where appropriate, each sheet must have a standard legend and bar scale. All existing mains must be solid lines and sewer manholes must be solid circles.

5.03.01.05 All sheets must be numbered sequentially beginning with “Sheet 1 of (Total) Sheets.”

5.03.02 Cover Sheet

5.03.02.01 Since drawings occasionally cover several project sites, the location for each as-built site must be prominently identified by project number and project site location.

5.03.02.02 A map of the Navajo Nation that shows the project location, a vicinity map with a scale of 1" = 2 miles, and a north arrow is to be provided. These maps may be on a separate sheet or on the topographic boundary sheet.

5.03.02.03 The project site location, with the project number(s), should be shown on both the Navajo Nation and vicinity maps.

5.03.03 Plat Sheet

5.03.03.01 Show site boundaries with bearings and distances, complete with ties to permanent state plane markers (Section Corners, established monuments, etc.) and bearing references. All bearings shall be in the appropriate State Plane System in NAD 83 if possible; all distances shall be ground distances. Indicate basis of bearing.

5.03.03.02 Show and describe location of elevation and vertical datum references. A broken line may be utilized if the benchmark is not within the drawing scope or scale.

5.03.03.03 Show each lot and street boundary defined with bearings and distances, if appropriate. Show street centerline bearing, distance, and curve data.

5.03.03.04 Provide statements "Street Rights of Way are Dedicated to the Common Use of Utilities" if appropriate, and "the operating utility is not responsible for the repair or replacements of improvements in utility easements disturbed during operation and maintenance activities."

5.03.03.05 Show minimum 20-foot wide easements for each utility (electric, natural gas, water, sewers, telephones, cable) not located within the street right of way. Add an additional 10-foot width for each additional parallel utility. The NTUA will provide to the Contractor as-built drawings of utilities not constructed by the Contractor.

5.03.03.06 Utility or street rights of way may require expansion in localized areas to include all utility appurtenances (e.g., fire hydrant guards), which are not within the normal easement.

5.03.03.07 Provide a narrative legal description of the site boundary.

5.03.04 Utility Plan View Sheet(s)

5.03.04.01 On a sheet with a scale between 1"=20' and 1"=50', provide a plan view of the site that shows all utilities (e.g., propane, water, sewers, electric, natural gas, telephones, cable).

5.03.04.02 Show all lot, street, and easement boundary lines without

bearing and distances.

5.03.04.03 Label all houses with final house numbers. Numbers must be consistent with a swing tie table.

5.03.04.04 Provide a legend, north arrow, and bar scale.

5.03.04.05 Show as-built routing of all water and sewer mains and service lines. Emphasize water and sewer mains by using bolder lines. Use a smaller but bold line for service lines. Reference the standard NTUA legend.

5.03.04.06 Label water mains with size, type of material, pressure rating, and length of pipe from P.I. to P.I. Example: 6" PVC, SDR 21, 232.00'.

5.03.04.07 Label wastewater mains with size, type of material, and distances between manholes. Example: 8" PVC, SDR 35, 389.00'.

5.03.04.08 Label water and wastewater main tap points, to previous projects with previous project number and as-built sheet number. Contractor shall contact the Operating Utility to determine this information.

Examples: White Cone Composite	Red Water Housing
IHS NA 88-114	NHA AZ 12-106
Sheet 15 of 43	Sheet C-8

5.03.04.09 Show and label depth of bury at all locations where water main varies from the standard depth of bury of 42 inches.

5.03.04.10 For fire hydrants, gate valves, tees, bends, water meters, curb stops, and saddles state the manufacturer model number and type of joint for the actual item used. As an option this information can be shown on the standard detail sheet next to the appropriate detail, or include submittals.

5.03.04.11 Show and label all water main fittings actually used. G.V., 6" DI TEE, 6" DI 45° BEND. Examples: 6" G.V., 6" DI TEE, 6" DI 45° BEND.

5.03.04.12 Provide swing ties in table format for all gate valves, water meters, domestic stops, curb stops, water main taps, manholes, main line clean out, yard clean outs, and sewer wyes. Swing ties shall be measured from building corners or

other permanent structures.

SWING TIES (Examples)

House No.	Domestic Stop		Water Meter		Curb Stop		Water Main Tap		Yard Clean out		Sewer Wye	
	A	B	A	B	A	B	A	C	A	B	A	C
1	31.6	3.8	34.8	32.9	36.7	35.8	42.0	65.0	22.4	11.6	57.0	73.0

Item	House No.	Distance	
		A	B
MH 11A-3	3	56.2	68.4
GV-1	5	43.4	63.6
GV-2	5	43.6	61.6
MH 11A-1-2	15	93.4	73.0
CO-2	14	64.8	61.5

5.03.04.13 Label corners of each building or structure, as necessary, to provide references for swing tie tables.



5.03.04.14.1 Provide pipe information for each size and type of pipe in a table with the following format:

Use	Size (in)	Type of Material	Joint Type	SDR	Pressure Rating PSI	Dimensions (in)			ASTM No.
						O.D.	I.D.	Wall Thick	

Water	6	PVC	Slip	21	200	6.625	5.993	0.316	D2241
Water	1	PE	Stab	7	200	1.349	1.049	0.150	D2239
Sewer	8	PVC	Slip	35	N/A	8.400	7.920	0.240	D3034
Sewer	4	PVC	Slip	35	N/A	4.215	3.975	0.120	D3034

PIPE DIMENSIONAL DATA 5.03.05

5.03.05 Water/Wastewater Plan and Profile Sheet(s)

5.03.05.01 Plan View

Provide all items from the utility plan view sheet requirements on the Utility Plan View Sheets portion; TP 5.03.04.

5.03.05.02 Profile View

5.03.05.02.01 Label all manholes and wastewater main clean-outs with manholes and clean-out numbers. Provide rim elevations with inlet and outlet invert elevations. The manhole numbers must conform to the existing manhole numbering system. Station all manholes and connections.

5.03.05.02.02 Label all wastewater mains with size, type of material, slope, and distance. Distance shall be the actual distance of the pipeline. (O.D. of manholes to O.D. of manholes).

5.03.05.02.03 Show all water mains that cross the sewer main and dimension Pipe O.D. to Pipe O.D. the vertical separation. Station all water mains and appurtenances.

EXHIBIT A OF TP 5.0

Note: (This is an example only. The actual Cost of Plant shall be developed by the Contractor and attached to the Transfer Agreement.)

COST OF PLANT
 NHA Project AZ 12-51
 Kayenta, Arizona

ITEM	QUANTITY	UNIT	LABOR	MATERIAL	TRANS.	TOTAL
8" PVC Sewer Main	1745	LF	\$7,187.22	\$5,750.00	\$1,437.44	\$14,374.66
Precast Manhole	7	EA.	\$2,101.10	\$1,681.68	\$ 420.00	\$ 4,209.78
8" Sewer Clean out	1	EA.	\$ 123.50	\$ 68.75	\$ 24.75	\$ 216.50
Sewer Service Connection	30	EA.	\$2,415.00	\$1,932.00	\$ 483.00	\$ 4,830.00
					Subtotal:	<u>\$23,630.94</u>
6" PVC Water Main	1707	LF	\$16,438.41	\$13,150.73	\$3,287.68	\$32,876.82
Fire Hydrant	3	EA.	\$ 750.00	\$ 600.00	\$ 150.00	\$ 1,500.00
6" Gate Valves	9	EA.	\$ 948.47	\$ 758.00	\$ 189.00	\$ 1,895.47
1" Water Service Line w/Meters	30	EA.	\$ 6,420.00	\$ 5,136.00	\$1,284.00	\$12,840.00
					Subtotal:	<u>\$49,112.29</u>
TOTAL COST OF UTILITY PLANT:						<u>\$72,743.23</u>
Less: Sewer Service Connection not transferred to Operating Utility:						<u>-\$ 4,830.00</u>

TOTAL OF PLANT TRANSFERRED: \$67,913.23

EXHIBIT B OF TP 5.0

UTILITY TRANSFER AGREEMENT
FOR
WATER AND WASTEWATER FACILITIES

This agreement is made between _____, hereinafter called the Grantor, and the **NAVAJO TRIBAL UTILITY AUTHORITY**, hereinafter, call the Grantee.

WHEREAS, the Grantor has constructed or caused to have constructed water and wastewater facilities located at or near _____ as shown on the plans titled _____, designed by _____, and dated _____ and said facilities and related final as-built plans already have been inspected, accepted and approved by the Grantee, and;

WHEREAS, the Grantor wishes to convey to the Grantee all his interest in these facilities and appurtenances constructed at the above-mentioned location on or about the above-mentioned time, along with all rights, rights of way, and privileges so that the Grantee may own, operate, and maintain all such facilities and appurtenances.

NOW THEREFORE IT IS AGREED:

For consideration of \$1.00, the receipt of which already has been acknowledged, the Grantor transfers, assigns, grants, and conveys to the Grantee all rights, titles, interests, easements, and rights of way in the aforementioned facilities, and;

The Grantee agrees to accept such aforementioned facilities, and further agrees to own, operate, and maintain such facilities in a reasonable and prudent manner until such facilities are determined to be no longer of any value. Further, the Grantor hereby warranties all such facilities against defects in workmanship and materials, and for design deficiencies, errors, and omissions for the period of one year beginning on _____ and ending on _____.

A listing of the total inventory and Cost of Plant determined by the Grantor, to be transferred to the Grantee, is attached as EXHIBIT ____ and made a part of this Utility Transfer Agreement. The total Cost of Plant as appears on this document is \$_____.

IN WITNESS THEREOF, both parties have signed and dated this agreement.

Grantor: by _____ Date: _____
Signature

Printed Name

NM15-43 30 Units Crownpoint NM
Indigenous Design Studio + Architecture

Navajo Tribal Utility Authority: by _____ Date: _____

Signature

Printed Name

SECTION 33 4213 - PIPE CULVERTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe culverts.
 - 2. Joints and accessories.
 - 3. Bedding.
 - 4. Slope protection at pipe end.

- B. Related Sections:
 - 1. Section 31 2000 – Earth Moving: Excavating and backfilling for culvert piping.
 - 2. Section 31 3700 – Riprap: Erosion protection at culvert ends.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M36 – Corrugated Steel Pipe, Metallic Coated, for Sewers and Drains.
 - 2. AASHTO M190 – Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - 3. AASHTO M196 – Corrugated Aluminum Pipe for Sewers and Drains.
 - 4. AASHTO M294 - Specification for Corrugated Polyethylene Pipe, 305- to 915- mm (12- to 36-In.) Diameter.
 - 5. AASHTO M294 - Corrugated Polyethylene Pipe

- B. ASTM International:
 - 1. ASTM A929 - Standard Specification for Steel Sheet, Metallic-Coated by the HotDip Process for Corrugated Steel Pipe.
 - 2. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - 3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 5. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 6. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 7. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

- C. Standard Specifications:
 - 1. Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-14.

1.3 SUBMITTALS

- A. Product Data: Submit data on pipe, fittings and accessories.
- B. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. Accurately record actual locations of pipe runs, connections, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- B. Operation and Maintenance Data: Procedures for submittals.

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPING

- A. Reinforced Concrete Pipe (RCP): ASTM C76, bell and spigot or tongue and groove ends.
 - 1. Pipe Class: Class III with Wall Type B, unless otherwise shown on Drawings.
 - 2. Fittings: Reinforced concrete.
 - 3. Joints: ASTM C443, rubber compression gasket.
- B. HDPE Corrugated Polyethylene Pipe: AASHTO M294, Type S or Type D.
 - 1. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252, Type S, with watertight joints.
 - a. Watertight Joints: ASTM D3212.
 - b. Gaskets: ASTM F477.
 - 2. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294, Type S, or ASTM F2306 with watertight joints.
 - a. Watertight Joints: ASTM D3212.
 - b. Gaskets: ASTM F477.
- C. Corrugated Metal Pipe (CMP):
 - 1. Steel Pipe: AASHTO M36, Gage 16 for 6" through 48", Gage 14 for 54", Gage 12 for 60".
 - 2. Fittings: Corrugated Steel or Aluminum to match pipe.
 - 3. Joints: Corrugated coupling bands, galvanized steel or aluminum to match pipe, minimum 10 inches wide; connected with two neoprene "O" ring gaskets per and two galvanized steel bolts.

- D. Bituminous Coated CMP: AASHTO M 190, Coated inside and out with 0.050 inch thick bituminous coating.

2.2 BEDDING AND COVER MATERIALS

- A. General: Conform to Section 31 2000 for bedding and backfill around and on top of pipe.
- B. Bedding for Rigid Pipe (RCP): Clean sand, slightly silty sand, or slightly clayey sand having a Unified Soil Classification of SP, SP-SM or SP-SC.
- C. Bedding for Flexible Pipe (HDPE and CMP): Clean course aggregate Gradation No. 57 conforming to FP-14 Standard Specifications.
- D. Cover and Fill: Conform to Section 31 2000.

2.3 ACCESSORIES

- A. Geotextile Fabric: Non-woven, non-biodegradable conforming to Section 31 2000.
- B. Concrete: Concrete conforming to Section 706 of the FP-14 Standard Specifications.
 - 1. Compressive strength of 3,000 psi at 28 days.
 - 2. Air entrained.
 - 3. Water cement ratio of 0.488 with rounded aggregate and 0.532 with angular aggregate.
 - 4. Maximum slump of 3.5 inch for vibrated concrete and 4 inch for non-vibrated concrete.
 - 5. Minimum cement content of 564 pounds per cubic yard for vibrated concrete and 602 pounds per cubic yard for non-vibrated concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 EXCAVATION AND BEDDING

- A. Excavate pipe trench in accordance with Section 31 2000.

- B. Excavate to lines and grades shown on Drawings or required to accommodate installation of encasement.
- C. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- D. Place bedding material at trench bottom, level continuous layer not exceeding 8-inch compacted depth; compact to 95 percent per Section 31 2000.
- E. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION – PIPE

- A. Install in accordance with manufactures instructions and as indicated on Drawings.
- B. Install plastic pipe, fittings, and accessories in accordance with ASTM D2321.
- C. Seal joints watertight.
- D. Begin at downstream end and progress upstream.
- E. Keep pipe and fittings clean until work is completed and accepted by Engineer.
- F. Lay bell and spigot pipe with bells upstream.
- G. Repair surface damage to pipe with protective coating with two coats of compatible bituminous paint coating.
- H. Install cover at sides and over top of pipe

3.5 PIPE ENDS

- A. Place fill at pipe ends to match embankment slopes, concrete aprons, adjacent construction, end sections, or end walls as indicated on Drawings.

3.6 ERECTION TOLERANCES

- A. Section 01 4000 - Quality Requirements: Tolerances.
- B. Lay pipe to alignment and slope gradients noted on Drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Maximum Variation from Intended Elevation of Culvert Invert: 1/2 inch.
- D. Maximum Offset of Pipe From Indicated Alignment: 1 inch.

- E. Maximum Variation in Profile of Structure from Intended Position: 1 percent.

3.7 FIELD QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Request inspection prior to and immediately after placing bedding.
- C. Soil Compaction Testing: In accordance with Section 31 2000.
- D. When tests indicate Work does not meet specified requirements, remove work, replace, and retest.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 7700 - Closeout Requirements: Protecting installed construction.
- B. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

END OF SECTION

