

Project Manual

Navajo Housing Authority

ADVERTISEMENT FOR BIDS – IFB# 606

OJO AMARILLO NM15-32

46 PUBLIC RENTAL UNITS



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

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 01-GENERAL REQUIREMENTS

011000	SUMMARY
011000	

- 012600 CONTRACT MODIFICATIONS
- 012900 PAYMENT PROCEDURES
- 013100 PROJECT MANAGEMENT AND COORDINATION
- 013200 CONSTRUCTION PROGRESS DOCUMENTATION
- 013300 SUBMITTAL PROCEDURES
- 014000 QUALITY REQUIREMENTS
- 015000 TEMPORARY FACILITIES AND CONTROLS
- 016000 PRODUCT REQUIREMENTS
- 017300 EXECUTION
- 017700 CLOSEOUT PROCEDURES
- 017823 OPERATION AND MAINTENANCE DATA
- 017839 PROJECT RECORD DOCUMENTS
- 017900 DEMONSTRATION AND TRAINING

DIVISION 02 – EXISTING CONDITIONS

021000 EXISTING SITE CONDITIONS (GEOTEHCNICAL & HAZ-MAT REPORT)

DIVISION 03 – CONCRETE

031000 CONCRETE FORMING AND ACCESSORI

- 032000 CONCRETE REINFORCEMENT
- 033000 CAST INPLACE CONCRETE
- 033800 POST TENSIONED STRUCTURAL CONCRETE

DIVISION 04 – MASONRY

042000 UNIT MASONRY

DIVISION 05 – METALS

NOT IN CONTRACT

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

- 061000 ROUGH CARPENTRY
- 061600 SHEATHING
- 061753 SHOP FRABRICATED WOOD TRUSSES
- 062023 INTERIOR FINISH CARPENTRY
- 064023 INTERIOR ARCHITECTURAL WOODWORK
- 066500 PLASTIC SIMULATED WOOD TRIM

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

- 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

DIVISION 08 – OPENINGS

- 081100 STORM DOORS
- 081114 CUSTOM STEEL DOORS AND FRAMES
- 081416 FLUSH WOOD DOORS
- 085313 VINYL WINDOWS
- 086250 TUBULAR DAYLIGHTING SYSTEM
- 087100 DOOR HARDWARE

DIVISION 09 – FINISHES

- 092900 GYPSUM BOARD
- 096513 RESILIENT ACCESSORIES
- 096519 RESILIENT TILE FLOORING
- 099113 EXTERIOR PAINTING
- 099123 INTERIOR PAINTING

DIVISION 10 – SPECIALTIES

102600	WALL AND DOOR PROTECTION
100000	

- 102800 TOILET AND BATH ACCESSORIES
- 104416 FIRE EXTINGUISHERS

DIVISION 11 – EQUIPMENT

113100 RESIDENTIAL APPLIANCES

DIVISION 12 – FURNISHINGS

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

- 220719 PLUMBING PIPING INSULATION
- 221005 PLUMBING PIPING
- 221006 PLUMBING PIPING SPECIALITIES
- 223000 PLUMBING EQUIPMENT
- 224000 PLUMBING FIXTURES

DIVISION 23 – HEATING VENTILATION AND AIR CONDITIONING

- 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

DIVISION 26 – ELECTRICAL

- 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

DIVISION 31 – EARTHWORK

- 311000 SITE CLEARING
- 312000 EARTH MOVING
- 312311 EARTHWORK FOR BUILDING CONSTRUCTION

313116 TERMITE CONTROL

313700 RIP RAP

DIVISION 32 – EXTERIOR IMPROVEMENTS

- 321313 CONCRETE PAVING
- 321373 CONCRETE PAVING JOINT SEALANTS
- 323113 CHAIN LINK FENCES AND GATES

DIVISION 33 – UTILITIES

330000 SITE UTILITIES NAVAJO TRIBAL UTILITY AUTHORITY (NTUA) TECHNICAL SPECIFICATIONS



Navajo Housing Authority Procurement Department

P.O. Box 4980, Window Rock, AZ 86515

ADDENDUM NUMBER TWO (2) Issued: June 30, 2023

Project Name: Advertised - IFB #589 Construction Services for Demolition and Rebuilding of Public Rental Units

To All Interested Bidders:

This addendum forms a part of the contract Documents and modifies the Original Bidding Documents and any Subsequent addenda. Acknowledge Receipt of this addendum in the space provided on the bid form, failure to do so is subject to bidder disqualification by the NHA.

This addendum consists of the following:

- I. Section I General Information, Answers to 6. Inquiries: Any and All questions shall be submitted in writing... All responses will be made in writing to all General Contractors.
- II. INQUIRIES Questions and Answers
 - 1. Does Navajo Nation Environmental Protection Agency (NNEPA) require a construction permit for Modernization Projects (Existing Housing) or is it just for New Housing Development? NHA Response: There is no new water and wastewater connection source, typical for NNEPA coordination and construction permit.
 - 2. Painted Cement Lap Sliding is a usual standard for NHA. Will this be an alternative price to stucco?

NHA Response: No, NHA had requested EIFS System finishes to keep with the overall existing subdivision exterior finishes – Stucco Exterior (Anticipate Three Color Schemes).

- 3. Sewer and Water line plan notes state that water line should not go under driveway. The actual plan shows water lines routed under driveways. Please verify. NHA Response: The sewer and water line plans with notes of the waterline are for the interior of the housing units, the exterior site where water lines cross the driveway have been confirmed with NHA as acceptable.
- 4. Site Lighting: Please verify that all the current solar will remain in place. Any other site light lighting will be NTUA's responsibility. NHA Response: No construction work is anticipated for the existing solar street lights. The current street lights will remain in place.
- 5. Hearth Pad and Wood Burning Stove specification is missing. Please provide. NHA Response: : See attached Specification SECTION 113100- RESIDENTAL APPLIANCES.
- 6. Are there any cut and fill estimations for the site as a whole? NHA Response: The Bidders are to provide their own bid quantities and costs.
- 7. Most of the specification don't state that an "equal" manufacture will be allowed. Please verify.

NHA Response: See attached Specification, <u>SECTION 012500 SUBSTITUTION</u> <u>PROCEDURES</u>, bidders are to submit the product substitution form for approval, confirming as equal or better.

- 8. Who will be the 3rd party inspector on this project? NHA Response: The Code Inspection services will be provided by NHA's third party consultant WHPacific, Inc. All other costs for quality testing i.e., soils, concrete, asphalt etc. is the contractor's responsibility.
- 9. Residential Appliance specification is missing. Please provide. NHA Response: See attached Specification SECTION 113100- RESIDENTAL APPLIANCES.
- 10. Fence Lines: In many cases the fence lines are going directly over existing meter cans and curb stops. Moving these fence lines for bidding purposes could plus or minus the amount of fence. Should we bid as is to be installed over the meter cans show on plan? NHA Response: There are approximately 20 fence-utility encroachment locations where

fencing intrudes on utility equipment, please anticipate for a minor adjustment of the fencing alignment and additional pole+ foundation locations to provide maintenance access.

11. Windows: Are mini blinds required in between the window glass? If so, are the window grids applicable? Please verify.

NHA Response: No mini blinds are required within the window glazing. However there are vinyl blinds at window units per <u>SECTION 122113-HORZONTAL LOUVER BLINDS</u>, see attached.

12. Windows: The specification call for windborne debris resistance glazed windows, "impact resistance windows". These are normally used in hurricane and tornado areas. Please verify this is required in spec.

NHA Response: No need for windborne debris resistance glazed windows, "impact resistance windows" required.

- 13. Exhibit K-1: Most Divisions look reasonable to give cost breakdowns on. The Mechanical/Plumbing/Electrical 220719-265100 seem to VERY busy and broken out to where it seems it would be better to make those item may 3 items total? For example: Mech= one price, Plumbing= one price, Electrical= one price. Please verify is this possible. NHA Response: No. The items were broken down per product specification in the project manual, so that items are verified and are not overlooked or were not included.
- 14. Is termite treatment required for these pads at pre-pour? We could not find a spec. Please verify.

NHA Response: The project manual- specification has <u>SECTION 313116- TERMITE</u> <u>CONTROL. Please obtain all documents at Academy Reprographics.</u>

- 15. Specification for CMU Block Masonry was not found in specification book? For example: gray, split face, etc.... Please verify. NHA Response: See attached Specification <u>SECTION 042200- REINFORCED UNIT</u> <u>MASONRY</u>.
- 16. There is a hardware specification shown on the plan and in the spec book. Which one is to be followed?

NHA Response: Please use the hardware requirements specified in the Project Manual.

17. All Reflected ceiling plans call for ½" drywall and all wall legends call for 5/8 drywall. It is confusing what is required. Please verify.

NHA Response: ¹/₂" drywall is acceptable, provide Moisture Resistance at Kitchens, Bathrooms, Showers, Washer/Dryer rooms and Water Heater/Mech. Rooms.

- Perimeter gravel: Is there a specification on what the perimeter gravel supposed to be? NHA Response: Please provide an overall 5" thick - Color Tan- Crushed Rock, with 5" Steel Lawn Edging.
- 19. It is assumed that orange peel drywall texture will be allowable. We could not find a note for that callout. Please verify.

NHA Response: Yes, Orange Peel Drywall Texture is acceptable.

20. The specifications was has a section for Residential Appliance (section 113100) but is not in the Specifications.

NHA Response: See attached Specification SECTION 113100- RESIDENTAL APPLIANCES.

21. The specification has a section for Wall and Door Protection (section 102600) but is not in the Specifications.

NHA Response: The project manual- specification has <u>SECTION 102600- WALL AND DOOR</u> <u>PROTECTION. Please obtain all documents at Academy Reprographics.</u>

- 22. The drawings has Wood Stoves, wall and floor protectors but there is not specification for these items. Can you provide? Are Rental units allowed to have wood stoves? NHA Response: See attached Specification <u>SECTION 113100- RESIDENTAL APPLIANCES</u>. At this time, provide as an alternate bid. The cost for this shall be included in the base bid and also in Deductive Alternate #1 on Exhibit "K" - Form of Bid.
- 23. The structural framing for Shear Walls indicate to frame the gable end walls from the floor to the bottom of deck or lookers. Can we install a gable end trusses and frame all exteriors and interiors walls at 8'1" (typical residential framing). NHA Response: Shear wall sheathing (OSB) needs go all the way up to the underside of deck/eave over-hang, placed and attached over the gable-end truss.
- 24. Some of the Wood Truss spacing are not 24 inches on center. This issues caused more roof sheathing. Can all trusses to set at 24" O.C.? NHA Response: Yes truss spacing can be 24 inches O.C. as they are laid out generally. The trusses that do not fall exactly on 24" o.c. are strictly due to geometrical constraints and bay spacing. This was needed to facilitate the unique hips, ridges and valleys. With this roof plan layout, there will always be an odd spacing of trusses on a few areas.
- 25. No specifications on the interior doors. Can we change these to Pre-hung 6 panels pine wood on the interior doors. Wood will be stain and frame will be painted. NHA Response: Yes, please change hollow-core <u>interior door units</u> to Pre-Hung – 6 Panels solid pine wood interior doors, premium stain and frame painted per NHA coordination.

All other provisions of this Invitation for Bid shall remain unchanged. Please ensure you acknowledge this Addendum Number Two (2) Exhibit "K" – Form of Bid, failure to do so is subject to bidder disqualification by the NHA.

Doris Yonnie, Procurement Specialist NHA Procurement Department

Page 3 of 3

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 surfaceburner 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 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION 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 product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions 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. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

- i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
- j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
- k. Cost information, including a proposal of change, if any, in the Contract Sum.
- 1. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
- m. 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 seven 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 seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution will not adversely affect Contractor's construction schedule.

- c. Requested substitution has received necessary approvals of authorities having jurisdiction.
- d. Requested substitution is compatible with other portions of the Work.
- e. Requested substitution has been coordinated with other portions of the Work.
- f. Requested substitution provides specified warranty.
- g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

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. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>Hunter Douglas Contract</u>.
 - 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.

HORIZONTAL LOUVER BLINDS

- 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 042200 - REINFORCED UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes the construction of reinforced hollow core unit masonry, masonry veneer and special shapes. It includes all split face units and smooth face units, as well as masonry mortar and grout.

1.2 RELATED REQUIREMENTS

- A. Section 03 20 00 Concrete Reinforcement
- B. Division 07 Section "Water Repellents" for water repellents applied to unit masonry assemblies.
- C. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
- D. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel" and Division 13 Section "Metal Building Systems".
- E. Products installed, but not furnished, under this Section include the following:
 - 1. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Fabrications".

1.3 REFERENCE STANDARDS

- A. ASTM International (ASTM), latest versions;
 - 1. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 2. ASTM C90 Standard Specification for Load bearing Concrete Masonry Units
 - 3. ASTM C780 Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Pain and reinforced Masonry
 - 4. ASTM C270 Standard Specification for Mortar for Unit Masonry
 - 5. ASTM C476 Standard Specification for Grout for Masonry
 - 6. ASTM C1019 Standard Test Method for Sampling and Testing Grout
- B. American Concrete Institute (ACI), latest versions:
 - 1. ACI 530.1 Specification for Masonry Structures

1.4 SUBMITTALS

- A. Product Data: Submit sample of exposed masonry unit of each color and texture to be used to complete the work. Submit copies of test reports performed within last 12 months for representative specimens to be used in accordance with ASTM C 140 for strength, absorption and moisture content, and ASTM C 426 for drying shrinkage.
- B. Test Reports: Submit copies of test reports for masonry units, mortar and grout.
- 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING
 - A. Store masonry units above ground on level platforms, which allows air circulation under stacked units.
 - B. Cover and protect against wetting prior to use.
 - C. Handle units on pallets or flat bed barrows.
 - D. Store cementitious ingredients in weather-tight enclosures.
 - E. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
 - 1. Separate and recycle waste materials in accordance with the Waste Management Plan and to the maximum extent economically feasible.
 - a. Fold up metal banding; flatten and place in designated area for recycling.
 - b. Collect wood packing shims and pallets; place in designated area.
 - 2. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.
 - 3. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil contaminated sand, by crushing and mixing with fill material as fill is placed.
 - a. Crush masonry waste to less than 2 inches in greatest dimension.
 - b. Mix masonry waste with at least 2 parts specified fill material for each part masonry waste. Fill material is specified in Division 31 Section "Earth Moving".
 - c. Do not dispose of masonry waste as fill within 18 inches of finished grade.
 - 4. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste and legally dispose of off Owner's property.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hollow Core Units: ASTM C90. See architect for standard smooth tan finish.
- B. Mortar: ASTM C 270 "Standard Specification for Mortar for Unit Masonry," Type S, f'c = 1800psi.
- C. Grout: ASTM C 476 "Standard Specification for Grout for Masonry."
- D. Cell Reinforcing: ASTM A 615 "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," Grade 60. Comply with Section 03 20 00.
- E. Bond Beam and Lintel Reinforcing: ASTM A 615, Grade 60. Comply with Section 03 20 00.
- F. Joint Reinforcing: Hot Dipped Galvanized, Standard Ladder Type 9 Gage Wire Dur-O-Wal or approved equal.
- G. Control Joint Material: Rubber, neoprene or PVC joint material for use with standard sash block by Dur-O-Wal or approved equal.
- H. Vertical Bar Positioner: Steel by Dur-O-Wal or approved equal.
- I. Mortar Plasticizer: Easy Spread by American Colloid Company or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide jamb, header, lintel, bond beam, etc. units as required to complete the work. Lay only dry and unfrozen masonry units.
- B. All exposed masonry shall be scoria aggregate, split face, scored finish unless noted otherwise on the drawings. Masonry not exposed to view may be smooth finished.
- C. Discard any broken, chipped, or discolored masonry units.
- D. Use masonry saws to cut and fit masonry units.
- E. Lay units in running bond pattern with vertical joints located at center of masonry units in alternate course below.
- F. Set units plumb, true to line and with level courses accurately spaced.
- G. Adjust masonry unit to final position while mortar is soft and plastic.
- H. Anchors, flashing accessories and similar devices shall be built in as masonry progresses.

3.2 MORTAR

A. Mix all cementitious materials and sand in a mechanical batch mixer for a minimum of 5 minutes. Adjust the consistency of the mortar to the satisfaction of the mason, but add only as much water as is compatible with convenience in using the mortar. REINFORCED UNIT MASONRY

If the mortar begins to stiffen from evaporation or from absorption of a pat if the mixing water, re-temper the mortar immediately by adding water, and remix the mortar.

- B. Mortar for exterior walls shall have waterproofing added in accordance with the manufacturer's recommendations.
- C. Addition of admixtures or re-tempering of mortar at the mixer to extend its use will not be permitted.

3.3 RE-TEMPERING

A. All mortar shall be used within 2-1/2 hours of initial mixing and no mortar shall be used after it has begun to set. Re-tempering of mortar in which setting has saturated will not be permitted. However, mortar shall be re-tempered, except as above qualified, as necessary to keep it plastic.

3.4 JOINTS

- A. Provide joints 3/8 inch nominal thickness and tooled unless shown otherwise on drawings.
- B. Construct uniform joints.
- C. Units shall be placed with sufficient pressure to extrude mortar and provide a tight joint.

3.5 REINFORCEMENT

- A. Reinforcement shall be secured against displacement prior to grouting at a spacing not greater than 4 feet.
- B. Provide rebar lap lengths specified in the General Structural Notes on the drawings. Provide 6 inches minimum lap for all ladder type joint reinforcing.

3.6 GROUTING

- A. Grout all cells, which are below grade.
- B. Grout lintel blocks over masonry openings and each jamb of masonry openings.
- C. Grout pours shall not exceed 5 feet in height.
- D. Grout all cells solid, which contain reinforcing.

Grout shall have a slump range of 8 to 11 inches tested in accordance with ASTM C143.

Consolidate grout pours 12 inches or less in height by mechanical vibration or by puddling. Consolidate pours exceeding 12 inches in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred. Typically this occurs within 2-4 minutes of placement of grout.

Place grout within 1-1/2 hours from introducing water in the mixture and prior to initial set.

3.7 POINTING AND CLEANING

- A. At completion of unit masonry work, fill holes in joints and tool.
- B. Cut out and repoint defective joints.
- C. Dry brush masonry surface after mortar has set, at end of each day's work and after final pointing.
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

3.8 PROTECTION OF WORK

- A. Protect sills, ledges, and offsets from mortar drippings or other damage during construction.
- B. Remove misplaced mortar or grout immediately.
- C. Cover top of walls with non-staining waterproof coverings when work is not in progress.
- D. Provide adequate bracing during construction to prevent damage from wind loads.

3.9 WEATHER CONDITIONS

- A. Do not place concrete masonry units when air temperature is below 20 degrees F.
- B. For temperatures between 20 degrees F and 40 degrees F, sand and mixing water shall be heated to produce mortar temperatures between 40 degrees F and 120 degrees F. Mortar shall be maintained above 32 degrees F during placement.
- C. Masonry shall be protected from freezing for 24 hours after placement.

3.10 FIELD QUALITY CONTROL

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Concrete Masonry Units (CMU): Test in accordance with ASTM C 140. "Standard Test Methods of Sampling and Testing Concrete Masonry Units." Six units shall be sampled and tested for each lot of 10,000 units or less delivered to the job site. Twelve units shall be sampled from each lot of more than 10,000 units and less than 100,000 units.
- C. Mortar: By proportions according to ASTM C 780 "Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Masonry."

REINFORCED UNIT MASONRY 042200 - 5 D. Grout: Mold and test 4 test specimens in accordance with ASTM C 1019 "Test Method for Sampling and Testing Grout" from each day's grout placement. Test grout slump prior to each day's grouting process. Submit slump value with test specimen results. See General Structural Notes for required strength.

END OF SECTION 042200



Page 20 of 22

EXHIBIT "K" – Form of Bid

BID FOR: Advertised - IFB #606 General Construction for Demolition and Rebuilding of Public Rental Units

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

Gentlemen:

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 Rebuilding of Public Rental Units under the authority of Navajo Housing Authority, all in accordance with the above, for the lump sum of:

TOTAL BID (Base Bid):

DEDUCTIVE ALTERNATE 1 (WOOD STOVES):

Deduction for wood stove, floor hearth, wall protection and chimney/roof accessories as specified in Section 113100 Residential Appliances and as indicated on drawings.

Deductive alternate Number 1:

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 (<u>) has</u>, or (<u>) has not</u> 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 (<u>) has</u>, or (<u>) has not</u> 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:		
Ву:		
	Print Name	
Title:		
Phone:		

(Sign Original Only)

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: NM15-32 46 Units Ojo Amarillo
 - 1. Project Location: Ojo Amarillo, New Mexico
- B. Owner: Navajo Housing Authority
 - 1. Owner's Representative:

Nolen Nelson, 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, water, sewer, and electric systems, asphalt paving and concrete pads, wood framing, wood fabrications, carpentry, exterior insulation and finish system (EIFS Stucco), interior architectural woodwork, thermal insulation, asphalt shingles, metal doors & frames, wood doors,

vinyl windows, hardware, storage shelving, plaster, gypsum board, ceramic tile, VCT and vinyl sheet plank 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 <u>AIA Document G710</u>, <u>"Architect's Supplemental Instructions."</u>

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: <u>Architect may issue a Work Change Directive on</u> <u>AIA Document G714.</u> 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 <u>AIA Document G703 Continuation Sheets.</u>
 - 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 <u>AIA Document G702 and AIA Document G703 Continuation</u> <u>Sheets AIA Document G702/CMa and AIA Document G703 Continuation Sheets as form for</u> <u>Applications for Payment.</u>
- 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)

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.
 - 1. 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.

- 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)

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.

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.
 - 1. 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.
- 1. 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 qualitycontrol 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.

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 qualityassurance 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.

NM15-32 46 Units Ojo Amarillo, NM

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- 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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 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.

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."

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)
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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 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.
 - 1. 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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 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

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of information on existing site conditions, including the geotechnical investigation report and the hazardous materials testing report.

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



GEOTECHNICAL ENGINEERING REPORT NAVAJO HOUSING AUTHORITY NHA TASK ORDER DCSD NM15-032 OJO AMARILLO, NEW MEXICO

Submitted To:

Nathan Wero, NCARB, CDT Indigenous Design Studio + Architecture, LLC 8008 Pennsylvania Circle NE Albuquerque, New Mexico 87110

Submitted By:

GEOMAT Inc.

915 Malta Avenue Farmington, New Mexico 87401

August 31, 2020 GEOMAT Project 202-3553



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August 31, 2020

Nathan Wero, NCARB, CDT

Indigenous Design Studio + Architecture, LLC 8008 Pennsylvania Circle NE Albuquerque, New Mexico 87110

RE: Geotechnical Engineering Study Navajo Housing Authority NHA Task Order DCSD NM15-032 Oio Amarillo, NM GEOMAT Project No. 202-3553

GEOMAT Inc. (GEOMAT) has completed the geotechnical engineering exploration for residential housing and pavement improvements in the Navajo Housing Authority (NHA) NM15-32 subdivision in Ojo Amarillo, New Mexico. This study was performed in general accordance with our Proposal No. 202-05-14, dated May 15, 2020 and discussions with the project civil and structural engineers during their respective assessments in accordance with their NHA on-call contracts.

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, we have presented options for the rehabilitation or reconstruction of NHA units, as well as, pavement sections recommendations for the reconstructing the roadways.

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.

Bot. Slagt

Robert "Bob" Flegal, P.E. Senior Engineer



Matthew J. Cramer, P.E. President, Principal

Copies to: Addressee (1)

TABLE OF CONTENTS

Page	No.
INTRODUCTION	. 1
PROPOSED CONSTRUCTION	. 1
SITE EXPLORATION	2
Field Exploration	2
Laboratory Testing	2
SITE CONDITIONS	3
SUBSURFACE CONDITIONS	4
Soil Conditions	4
Groundwater Conditions	5
Laboratory Test Results	5
OPINIONS AND RECOMMENDATIONS	6
Geotechnical Considerations	6
Foundations for New Construction of Units 113/118	6
Discussion on Repair of Existing Units Exhibiting Distress	8
Corrosion and Cement Type	9
Site Classification	10
Lateral Earth Pressures	10
Pavement Design and Construction	11
Slopes	13
Earthwork	.13
General Considerations	.13
Site Clearing	.14
Excavation	14
Fill Materials	.15
Placement and Compaction	15
Compliance	16
Drainage	16
Surface Drainage	16
Subsurface Drainage	16
GENERAL COMMENTS	17

TABLE OF CONTENTS (continued)

APPENDIX A

Site Plan Logs of Borings Unified Soil Classification Drilling and Exploration Procedures

APPENDIX B

Laboratory Test Results Laboratory Test Procedures

APPENDIX C

Important Information About This Geotechnical Engineering Report (Taken From GBA)

GEOTECHNICAL ENGINEERING REPORT NAVAJO HOUSING AUTHORITY NHA TASK ORDER DCSD NM15-032 OJO AMARILLO, NEW MEXICO) GEOMAT PROJECT NO. 202-3553

INTRODUCTION

This report contains the results of our geotechnical engineering exploration for residential housing and pavement improvements located in the Navajo Housing Authority (NHA) NM15-32 subdivision in Ojo Amarillo, New Mexico, as shown on the Site Plan in Appendix A of this report.

The purpose of these services is to support the structural and civil engineering assessments of the subdivision and to provide information and geotechnical engineering recommendations about:

- subsurface soil conditions
- groundwater conditions
- lateral soil pressures
- earthwork
- foundation repair discussion

- foundation design and construction
- slab design and construction
- street 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 that Units 113 and 118 were demolished and are proposed to be rebuilt in the same locations as the original structures. We anticipate that the new buildings will be similar to existing structures - single-story, wood-framed units. We also understand that the foundation options being considered include conventional spread footings with concrete slab-on-grade floors, suspended wood floors with crawl spaces, or post-tensioned slabs. Based on our experience with similar projects, we estimate the maximum structural loads will be 1 klf for walls and 15 kips for columns. 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.

For existing residences, we understand that several of the units have been assessed by the project structural engineer and have shown evidence of possible structural distress with cracking and separation of walls, both on the interior and exterior surfaces. A discussion on possible causes of the distress and possible options for repair are included herein.

Also, we understand that several locations in the Ojo Amarillo housing development roadways are displaying signs of pavement failure. The pavement failures appear primarily to be a result of degradation due to the age of the existing asphalt concrete and a lack of routine maintenance. There also appears to be isolated areas of distress associated with poor subgrade conditions. As such, we are providing pavement section recommendations for reconstruction of the roadway areas that require reconstruction based upon the findings of the civil engineering assessment.

SITE EXPLORATION

Our scope of services performed for this project included a site reconnaissance by a staff engineer, a subsurface exploration program, laboratory testing and engineering analyses.

Field Exploration:

Subsurface conditions at the site were explored on August 18, 2020, by drilling eight (8) exploratory borings at the approximate locations shown on the Site Plan in Appendix A. Borings were identified and numbered in a general north to south direction from the most northwest corner of the development at Unit #1. Borings B-1 and B-3 were advanced to depths of 16 ¹/₂ feet below ground surface (bgs) at locations representing conditions at existing units exhibiting distress. Borings B-5 and B-7 were advanced to 16 ¹/₂ feet bgs as well in the approximated centers of demolished Units #118 and #113, respectively. The remaining borings, designated B-2, B-4, B-6 and B-8, were drilled to depths of approximately 5 feet bgs through existing pavements.

All borings were advanced using a CME-55 truck-mounted drill rig with continuous-flight, 7.25inch O.D. hollow-stem auger. The borings were continuously monitored by a field engineer 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. ring-lined, split-barrel 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 NHA NM 15-32 subdivision is located on the west side of Navajo Route 3005 (N3005), immediately west of the intersection of N3005 and N4080. The ground surface appeared to be relatively level across the subdivision, and was essentially unvegetated at the time of our exploration. Several of the units throughout the development and adjacent to drilling were vacant at the time. Units 113 and 118 (B-5 and B-7) have been demolished and debris removed; the foundations and floor slabs were absent with only the vacant, leveled property remaining. Both vacant sites were fenced. Access to other boring sites and the roadway was unrestricted. The following photographs depict typical conditions the sites at the time of our exploration.



Drill Rig at Boring B-3, front of Unit 126 View to the Northeast



Drill Rig at Boring B-8, between Units 87 and 110 View to the North

SUBSURFACE CONDITIONS

Soil Conditions:

Existing Structures

Subsurface conditions are presented on the Boring Logs in Appendix A. Borings B-1 and B-3 were drilled as determined by the project structural engineer at the locations of Units #2 and #126 respectively.

In boring B-1, we encountered silty sand from the ground surface to the total depths explored in the boring ($16\frac{1}{2}$ feet). The silty sand was generally tan, loose to dense, and contained a few lenses of clay rich soils.

In boring B-3, we encountered clayey sand from the ground surface to a depth of approximately 2 feet bgs. Below the clayey sand, we encountered very stiff, sandy lean clay to a depth of approximately $8\frac{1}{2}$ feet bgs. The clay soils were underlain by loose to medium dense, silty sand which extended to the total depth of the boring (16 $\frac{1}{2}$ feet).

Demolished and Rebuild Structures

In boring B-5, we encountered clayey sand from the ground surface to a depth of approximately $8\frac{1}{2}$ feet bgs. The clayey sand was generally tan and medium dense to very dense. Below the clayey sand, we encountered loose, silty sand to a depth of approximately 14 feet bgs. The silty sand was underlain by clayey sand which extended to the total depths explored in the boring ($16\frac{1}{2}$ feet).

In boring B-7, we encountered clayey sand from the ground surface to a depth of approximately 8 feet bgs. The clayey sand was generally tan and loose to dense. Below the clayey sand, we encountered very stiff, sandy lean clay to a depth of approximately $14\frac{1}{2}$ feet bgs. The clay soil was underlain by silty sand which extended to the total depth of the boring ($16\frac{1}{2}$ feet).

<u>Roadways</u>

Borings advanced in the roadways (B-2, B-4, B-6 and B-8) initially encountered asphalt concrete ranging from 2½ to 3½ inches thick underlain by 7 to 9 inches of aggregate base coarse (abc). Boring B-2, encountered sandy lean clay beneath the abc, extending from 1 to 4 feet bgs. The clay was underlain by silty sands extending to the total depths explored in the boring (5 feet). In borings B-4 and B-8, the abc was underlain by clayey sands which extended to the total depth of borings (5 feet). Lastly, in boring B-6, we encountered clayey sand below the abc to a depth of approximately 2 feet bgs. Below the clayey sand the soil transitioned into silty sand which extended to the total depth explored in the boring (5 feet).

In general, the clayey sand soils encountered in the borings were all tan to orange in color, fineto coarse-grained in size, loose to medium dense and slightly damp. The silty sands were tan to orange, fine to coarse-grained in size, loose to medium dense and slightly damp.

Groundwater Conditions:

Groundwater was not encountered in any of 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:

A representative sample of the sandy soils had a fines content (silt- and/or clay-sized particles passing the U.S. No. 200 sieve) of approximately 16 percent, and was non-plastic. Representative samples of the clay soils had fines contents ranging from 60 to 66 percent and plasticity indices from 32 to 34.

The sandy soils had in-place dry densities ranging from approximately 88 to 108 pcf and moisture contents ranging from approximately 2 to 7 percent. The clay soils had in-place dry densities ranging from approximately 105 to 111 pcf and moisture contents ranging from approximately 9 to 12 percent.

Laboratory consolidation/expansion testing was performed on undisturbed ring samples of the sand and clay soils. Results of these tests indicate that the sandy 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 compression/consolidation. When subjected to increased loading in the increased moisture condition, they undergo moderate additional compression. The clay 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 consolidation to slight expansion. When subjected to increased loading in the increased moisture condition, they undergo moderate additional compression.

Results of all laboratory tests are presented in Appendix B.

OPINIONS AND RECOMMENDATIONS

Geotechnical Considerations:

Our opinions and recommendations for the replacement of units 113/118 and a discussion of potential repairs for existing distressed units based on the geotechnical conditions encountered and tested for this report are included herein.

Foundations for New Construction of Units 113/118:

The existing soils encountered at Units 113 and 118 were compressible under the anticipated loads for newly constructed residences. To reduce the potential for settlement and provide more uniform and higher allowable bearing pressures, the buildings should be supported on structural (mat or post-tensioned) slabs on engineered fill.

Due to the moisture sensitive nature of the soils underlying the house sites, any infiltration of moisture below the structures could result in movements that may cause damage to the overlying structures. 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. The area surrounding the buildings on all sides should be paved or surfaced with concrete sidewalks to prevent water infiltration adjacent to the buildings. Raisings site grades, including the floor level of the houses could also help improve drainage and reduce the potential for the supporting soils to become wet.

If there are any significant deviations from the assumed floor elevations, structure locations and/or loads noted at the beginning of this report, the opinions and recommendations of this report should be reviewed and confirmed/modified as necessary to reflect the final planned design conditions.

Structural Mat or Post-Tensioned Slabs

Based on our understanding of the type of structures to be built and the results of our field subsurface exploration and laboratory testing, we recommend the buildings be supported on structural, reinforced (mat or post-tensioned) slab foundations.

Structural (mat or post-tensioned) slab foundations are intended to be sufficiently rigid to function as a single structural unit if the underlying soils were to become wet and compress or expand. The results of our laboratory testing indicate that movements on the order of 1 inches could result as result of increased moisture conditions in the supporting soils. Therefore, the structures and the utilities entering the structure 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 building 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 two (2.0) feet of engineered fill, including the thickness of the base course. The engineered fill should be uniformly and thoroughly moisture conditioned to near optimum moisture (approximately ±3 percent), placed in thin layers and compacted to a minimum of 95 percent relative compaction. Relative compaction everywhere in this report and its appendices refers to the in-place dry density of a soil expressed as a percentage of the maximum dry density of the same material as determined in the laboratory according to ASTM D698 (Standard Proctor) test procedures. Any soft or weak areas that become evident in the subgrade should be over excavated and replaced with properly compacted fill. The finished subgrade surface should be smooth and non-yielding. In addition, to help reduce the potential for moisture infiltration below the slab and potential frost heave, the structural slab foundation should have "turn-down edges" that are embedded at a minimum of 30 inches below lowest adjacent grade. The engineered fill should be constructed below the general slab areas, but is not required under the "turn-down edges." However, the exposed soils in the "turn-down" excavations should be compacted to at least 95 percent, as noted above. We recommend the compressible model be used for design as presented in the PTI Manual 3rd Edition due to the compressibility of the on-site soils encountered.

A maximum allowable bearing value of 1,000 psf may be used for the 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 for the general site soil conditions. A coefficient of subgrade reaction (KV1) 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:

 $K = K_{V1} ((b+1)/(2b))^2$
The structural reinforced slab resting on properly prepared engineered fill should be designed to tolerate a total movement of approximately one inch. For compressible soils under normal conditions, an estimated differential soil movement (Y_m) of approximately half the total movement should be used for design. A slab subgrade friction coefficient of 0.75 is appropriated for a structural reinforced foundation resting on the native soil. 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.

Discussion on Repair of Existing Units Exhibiting Distress:

Compressible, moisture sensitive, soils were encountered on the site and are likely contributing to the distress in some of the units. We offer the following recommendations to aid in the development of specific repair options for the buildings at the site, as coordinated with the structural assessments. We understand that repair options will be developed by others.

Underpinning of the structures at the site may be feasible using helical piers, micropiles, compaction grouting or a combination of those systems. Since these methods are proprietary, the manufacturer should be contacted to recommend the size and quantity of the underpinning based upon loads provided by the structural engineer.

However, foundation repair for structures that have or are experiencing movement is often difficult and costly. It is important to determine whether the structures are currently experiencing movements prior to commencing any repair work. We recommend the following procedures be implemented:

- A floor level survey program should be performed to determine whether the floor slabs are currently moving. We recommend that baseline elevations of the building floors be established. Then evaluation of any further movement could be determined by monitoring the floor slab levels using corresponding periodic floor slab surveys. The monitoring should be performed using the same points and should be performed at quarterly intervals for a minimum of one year or until a pattern of movement or stability is determined. Once a pattern is determined, the monitoring intervals could be adjusted to annually if desired. Additionally, strain gages or crack monitors could be placed on the existing cracks and checked over the same periods.
- The plumbing systems (both supply and drain lines) in the buildings should be tested for leaks and any necessary repairs made.
- All gutter and downspouts should be checked to ensure they are working properly and any water is being discharged at the intended location at least 10 feet from the building.
- The grading around the perimeter of the buildings should be reviewed to ensure that adequate drainage will quickly carry any stormwater away from the building foundations. Areas of reverse drainage or ponding should be re-graded and compacted so that the surface water drains a minimum of 10 feet away from the building perimeter.

If the monitoring program indicates that the building is not (or is no longer) moving or if the owner elects to repair the other items but forego the monitoring, consideration may be given to surficial repairs that would remediate the current distress issues. However, it should be noted that these repairs would not provide a long-term solution to potential future movement if the supporting soils undergo increased moisture conditions.

Corrosion and Cement Type:

A representative sample of soil from the borings was tested to evaluate the potential for the onsite soils to corrode buried metal and/or concrete. The sample was tested for pH, electrical resistivity, and soluble sulfates and chlorides. Results of the tests are summarized in the following table.

Corrosivity Test Results												
Sample	Boring No	Sample	nH	Resistivity	Sulfates	Chlorides						
No.	Doring 100.	Depth (ft)	pn	(ohm-cm)	(%)	(%)						
10043	B-5	5	8.45	2,220	0.006	ND						

¹ND = Not Detected

Corrosion of Concrete:

The soluble sulfate content of the sample tested was 0.006 percent (by weight), which may be characterized as mild potential for corrosion (IBC Table 1904.3). According to the American Concrete Institute Building Code 318, when the sulfate content is less than 0.1 percent by weight in soil, any cement type and a maximum water/cement ratio of 0.45 shall be used. All concrete should be designed, mixed, placed, finished, and cured in accordance with the guidelines presented by the American Concrete Institute (ACI).

Corrosion of Metals:

Corrosion of buried ferrous metals can occur when electrical current flows from the metal into the soil. As the resistivity of the soil decreases, the flow of electrical current increases, increasing the potential for corrosion. A commonly accepted correlation between soil resistivity and corrosion of ferrous metals is shown in the following table.

Resistivity (ohm-cm)	Corrosivity
0 to 1,000	Severely Corrosive
1,000 to 2,000	Corrosive
2,000 to 10,000	Moderately Corrosive
>10,000	Mildly Corrosive

The sample tested had a resistivity value 2,220 ohm-cm. Based on these laboratory results and the table above, the on-site soils would be characterized as moderately corrosive toward ferrous metals. The potential for corrosion should be taken into account during the design process.

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 1613.5.2 of the 2009 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:

• <u>Active</u>:

• <u>Passive</u>:

Shallow foundation walls	250 psf/ft
Shallow column footings	350 psf/ft

• <u>Coefficient of base friction</u>: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 backfill (on-site sand)	50 psf/ft
Undisturbed subsoil	60 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.

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 320 with trucks comprising approximately five percent of the total traffic.

We are presenting options for flexible (asphalt) pavement sections. The pavement design was based on an R-value of 24. This value was based on published values that relate R-values to the

tested values for plasticity index and the percent passing the #200 sieve. 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 and a half (3.5) inches of hot-mix asphalt on a minimum of seven (7.0) inches of aggregate base course.

The design subgrade R-Value for this portion of the project is 24. Although not expected, should import material be necessary to adjust the street grades, the import material should have a minimum R-Value of 24.

Pavement Construction Recommendations:

To identify soft soil zones in subgrade areas to be paved, we recommend those subgrade areas 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.

Although soft, wet soils were not encountered in our borings, they may exist on the site. GEOMAT should be contacted for further recommendations should soft, wet soils be encountered during construction.

Aggregate base course should conform to 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:

- 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 shallow 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. Overexcavation of wet zones and replacement with granular materials may be necessary. Lightweight excavation equipment may be required to reduce subgrade pumping.

Fill Materials:

- 1. Native or imported soils with low expansive potentials could be used as fill material for the following:
 - general site grading

• foundation backfill

. . .

- foundation areas •
- interior floor slab areas

- exterior slab 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:

	Percent finer by weight
Gradation	<u>(ASTM C136)</u>
3"	
No. 4 Sieve	
No. 200 Sieve	50 Max
Maximum expansive potential (%)*	1.5
* Measured on a sample compacted to appro	eximately 95 percent of the ASTM
D698 maximum dry density at about 3 perc	cent below optimum water content.
The sample is confined under a 144-psf sur	charge and submerged.

4. Aggregate base should conform to Section 303 of 2014 NMDOT specifications for Type I Base Course.

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:

	Minimum Percent
<u>Material</u>	(ASTM D698)
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 building or pavements should be sealed or eliminated.
- 2. In areas where sidewalks or paving do not immediately adjoin the structure, 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





Boring B-1

P C S R D S H H	rojec rojec lient: ite Lo ig Ty rilling ampl amm	t Nar t Nur ocatic pe: Met ing N er W er Fa	ne: nber: nc: hod: /eight all:	N 2 10 0 0 0 1 1 3	IHA N 02-35 DS+A Djo Ar CME-5 .25" (20 Ib 40 Ib 0 incl	M15 553 maril 55 0.D. 0.D. s hes	5-32 - lo, Ne Hollc Split s	- 46 Uni ew Mexi ow Stem spoon sa	ico n Auger amples	Date Drilled: 8/18/2020 Latitude: Not Determined Longitude: Not Determined Elevation: Not Determined Boring Location: See Site Plan Groundwater Depth: None Encountered Logged By: SY Remarks: None
Lab	orator	y Res	sults				e	_		
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	Blows per	Sample Type & Length (in)	Symbol	Material Typ	Soil Symbo	Depth (ft)	Soil Description
93.6	16	NP	6.7	5-8 8-12-21 18-26	R SS		SM		1 _ 2 _ 3 _ 4 _ 5 _ 6 _ 7 _ 8 _ 9 _ 10 _ 11 _ 12 _ 13 _	Silty SAND, tan, fine- to coarse-grained, loose to dense, slightly damp higher plasticity layer tan/orange
				8-15-20	SS		Somela		14 _ 15 _ 16 _ 17 _ 18	clay rich layer Total Depth 16½ feet



Boring B-2

	Pi Ci Si Ci Si Hi Hi	rojec lient: ite Lc ig Ty rilling ampl amm	t Nar t Nur ocatio pe: Met ing N er W	me: mber: on: thod: /eight	N 2 1 0 0 7 _7	NHA N 202-3 DS+A Djo Ar Djo Ar Djo Ar 2 DS 2 Sulk S V/A V/A	NM1 553 mari 55 0.D. amp	5-32 - llo, Ne . Hollc ile fro	ew Mexi w Stem m auge	ts ico n Auger r cutting	Date Drilled: 8/18/2020 Latitude: Not Determined Longitude: Not Determined Elevation: Not Determined Boring Location: See Site Plan Groundwater Depth: None Encountered Logged By: SY Remarks: None
Drv Densitv	Labo	% Passing Lot	Plasticity A in the second sec	Moisture Content (%)	Blows per 6"	Sample Type &	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
		60	34			GRAB		AC ABC CL SM		1 _ 2 _ 3 _ 4 _	Asphalt concrete pavement approximately 3½ inches thick Aggregate base course approximately 7 inches thick Sandy Lean CLAY, tan/brown, slightly damp to damp Silty SAND, tan/orange, fine- to medium-grained, slightly damp
02-3553.GPJ GEOMAT.GDT 8/31/20										5 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 -	Total Depth 5 feet
GEOMAT	A =	= Auge	r Cuttii	ngs R	= Ring-l	_ined B	arrel :	 Sampler	SS = Spl	18 _ lit Spoon	RAB = Manual Grab Sample D = Disturbed Bulk Sample PP = Pocket Penetrometer



Boring B-3

P C S R D S H	rojec ilient: ite Lo itg Ty rilling ampl amm	t Nar t Nur ocatio pe: Met ing N er W	me: mber on: _ thod: /ethc	N :2 II C C C C C C C C C C C C C C C C C C	IHA N 02-3 0S+A 0jo Ar 2)jo Ar 2)jo Ar 2)jo Ar 2) 2) 2) 2) 2) 2) 2) 2) 2) 2) 2) 2) 2)	NM1: 553 maril 55 0.D. and \$ s	5-32 lo, No Hollo Split s	- 46 Uni ew Mexi ow Stem	ts ico n Auger amples	Date Drilled: 8/18/2020 Latitude: Not Determined Longitude: Not Determined Elevation: Not Determined Boring Location: See Site Plan Groundwater Depth: None Encountered Logged By: SY Remarks: None
H	amm	er Fa	all: _	3	0 inc	hes				
Dry Density ag (pcf) g	% Passing #200 Sieve	Plasticity A Index	Moisture Content (%)	Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
							sc		1_	Clayey SAND, tan/orange, fine- to coarse-grained, slightly damp
105.4	63	32	9.1	16-29 9-13-15	R		CL		2 _ 3 _ 4 _ 5 _ 6 _ 7 _	Sandy Lean CLAY, brown, very stiff, damp, weak carbonate cementation
99.9			1.8	9-11	R		SM		8 _ 9 _ 10 _ 11 _ 12 _ 13 _ 14 _	Silty SAND, tan/orange, fine- to medium-grained, loose to medium dense, slightly damp
				3-5-10	SS				15 _ 16 _	tan
A =	= Auae	r Cuttii	nas R	= Rina-L	ined B	arrel S	Sample	r SS = Sp	17 _ 18 _ lit Spoon	GRAB = Manual Grab Sample D = Disturbed Bulk Sample PP = Pocket Penetrometer



Boring B-4

	Project Name: NHA NM15-32 - 46 Units Project Number: 202-3553 Client: IDS+A Site Location: Ojo Amarillo, New Mexico Rig Type: CME-55 Drilling Method: 7.25" O.D. Hollow Stem Auger Sampling Method: Bulk sample from auger cuttings Hammer Weight: N/A										Date Drilled: 8/18/2020 Latitude: Not Determined Longitude: Not Determined Elevation: Not Determined Boring Location: See Site Plan Groundwater Depth: None Encountered Logged By: SY Pemarks: None
	H	amm		all: _	<u> </u>	I/A					
	Dry Density []	% Passing % Passing #200 Sieve	Plasticity Index	Moisture Content (%)	Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
ľ								AC	00(}0		Asphalt concrete pavement approximately 2½ inches thick
								ABC	Min	1 _	Aggregate base course approximately 8 inches thick
		66	32			GRAB		CL		2 _ 3 _ 4 _	Sandy Lean CLAY, brown, damp
ł									<i>\////////</i>		Total Depth 5 feet
										6 _	
										7_	
										o _ 9	
										10	
										11 _	
										12 _	
31/20										13 _	
LGDT 8/										14 _	
GEOMA ⁻										15	
553.GPJ										16 _	
T 202-35										17 _	
OMA	•	- ^	· · ····		_ Din ~ '	inod D	0	 Comala:	00 - 0-1	18 _	CRAR = Monual Crab Comple D = Disturbed Dully Comple DD = Desiret Dr terrester
빙	A =	- Auge		igs R	- King-L	-med B	arrei	samplei	39 = Sb	n spoon	אחט – ואומוועמו שרמט סמוזוףופ ע = Uisturded שעוא סמחופ PP = Pocket Penetrometer



Boring B-5

P	rojec	t Nar	ne:	N	IHA N	NM1	5-32 -	- 46 Uni	ts	Date Drilled: 8/18/2020
P	rojec	t Nur	nber	:2	02-3	553				Latitude: <u>Not Determined</u>
C	lient:			I[DS+A	۱				Longitude: <u>Not Determined</u>
S	ite Lo	ocatio	on: _	C)jo Ar	maril	<u>lo, Ne</u>	ew Mexi	ico	Elevation: Not Determined
F	lig Ty	pe:		C	ME-	55				Boring Location: <u>See Site Plan</u>
	rilling	g Met	thod:	7	.25" (0.D.	Hollo	ow Stem	n Auger	Groundwater Depth: <u>None Encountered</u>
S	ampl	ing N	/lethc	od: <u>R</u>	Ring a	and S	Split s	poon sa	amples	Logged By: SY
H	lamm	er W	/eigh	t: <u>1</u>	40 lb	S				Remarks: <u>None</u>
H	lamm	er Fa	all: _	3	0 inc	hes				
Lab	orato	y Re	sults		0.0		be	_		
iťy	و ف ق	>	- %	ber	[yp€ (in)	ō	l ∑	d d	(ft)	
ens cf)	Sie	ticit	sture nt ('	Ns	Je J	Тт Тт	erial	Sy	pth	Soil Description
⊇ @ ∠	200 Pa	las	Mois onte	Bo	amp	S	late	Soil	De	
ā	8,#	1	-ŭ		ഗ ര		2			
									1 _	Clayey SAND, tan, fine- to coarse-grained, medium dense to very dense, slightly damp
									2	
108.1			7.1	22-33	R				3	
							SC		4_	
				5-6-6	SS	7			5_	slightly lower plasticity
						X			6 _	
						\vdash			7	
									8_	
									9_	Silty SAND, tan/orange, fine- to medium-grained, loose,
									10	slightly damp
				6-11	R				10_	
							SM		11 _	
							SIVI		12	
31/20									13 _	
DT 8/									14	
AT.G									45	Clayey SAND, tan, fine- to medium-grained, dense, slightly
GEON				11-16-17	SS	7	SC		15_	damp
GPJ						X			16 _	
-3553						\vdash		<u> </u>	17	Total Depth 161/2 feet
T 202									., _	
A NO	_ <u>^</u>	· · ····		- Dir - '	inc d D		Comert		18 _	CRAB = Manual Crab Sampla D = Disturbed Dull Sample DD = Destud Darret
) A	- Auge		ngs R	- King-L	ined B	arrei	sample	1 33 = Sp	nı əpoon i	- Ivianuai Grab Sample ש = Disturbed Bulk Sample PP = Pocket Penetrometer



Boring B-6

Laboratory Results to do Action Soil Description Applied of the second se		Project Name: NHA NM15-32 - 46 Units Project Number: 202-3553 Client: IDS+A Site Location: Ojo Amarillo, New Mexico Rig Type: CME-55 Drilling Method: 7.25" O.D. Hollow Stem Auger Sampling Method: Bulk sample from auger cuttings Hammer Weight: N/A Hammer Fall: N/A									ts ico n Auger r cutting	Date Drilled: 8/18/2020 Latitude: Not Determined Longitude: Not Determined Elevation: Not Determined Boring Location: See Site Plan Groundwater Depth: None Encountered Logged By: SY Remarks: None
Acc Abc Abc Abc Abc Abc Abc Abc Abc Abc	-	Dry Density (pcf)	% Passing 4200 Sieve	Plasticity A Index	Moisture Content (%)	Blows per 6"	Sample Type & Length (in)	Symbol	Material Type	Soil Symbol	Depth (ft)	Soil Description
Aggregate base course approximately 7 inches thick Sc 1 Aggregate base course approximately 7 inches thick Clayey SAND, red/brown, fine- to coarse-grained, damp Sitty SAND, tan/orange, fine- to coarse-grained, damp Sitty SAND, tan/orange, fine- to coarse-grained, damp Sitty SAND, tan/orange, fine- to coarse-grained, damp Total Depth 5 feet 6 7 8 9 10 11 12 13 14 15 16 17 18 17 18 19 10 11 12 13 14 15 16 17 18	Ī								AC	$\circ \bigcirc \bigcirc \circ$		Asphalt concrete pavement approximately $2\frac{1}{2}$ inches thick
SC 2 Clayey SAND, Ted/Down, Time- to coarse-grained, damp SM 3 SM 4 SM 4 Total Depth 5 feet 7 8 9 10 11 12 13 14 16 17 18 16 17 18									ABC		1 _	Aggregate base course approximately 7 inches thick
Sitty SAND, tan/orange, fine- to coarse-grained, damp Sitty SAND, tan/orange, fine- to coarse-grained, damp Sitty SAND, tan/orange, fine- to coarse-grained, damp Total Depth 5 feet To									sc		2	
SM 4 - 5 5 Total Depth 5 feet 7 6 - 9 - 10 11 - 12 13 - 14 15 - 16 17 - 16 17 - 16 17 - 16 17 - 16 17 - 16 17 - 18							GRAB				З	Silty SAND, tan/orange, fine- to coarse-grained, damp
Image: Second									SM		5_	
organization 5 Total Depth 5 feet 6 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 - 18 -											4 _	
Total Depth 5 feet 0 7 8 9 10 11 12 13 14 15 16 17 18											5	
1000000000000000000000000000000000000											6	Total Depth 5 feet
000000000000000000000000000000000000											0_	
000000000000000000000000000000000000											7 _	
10 10 11 12 11 12 13 14 15 16 17 16 17 18<											8 _	
OUTOGO TOPOGO											9 _	
OPERATOR Image: Cutings R = Ringel ined Barrel Sampler, SS = Split Spoon, GRAB = Manual Grab, Sample, D = Disturbed Bulk Sample, PP = Pocket Penetrometer											10 _	
A = Auger Cuttings R = Bing-lined Barrel Sampler SS = Split Spoon, GRAB = Manual Grab Sample, D = Disturbed Bulk Sample, PP = Pocket Penetrometer											11 _	
A = Auger Cuttings, B = Bing-I ined Barrel Sampler, SS = Split Spoon, GBAB = Manual Grab Sample, D = Disturbed Bulk Sample, PP = Pocket Penetrometer											12 _	
Image: Cuttings B = Bing-L ined Barrel Sampler SS = Split Spoon GBAB = Manual Grab Sample D = Disturbed Bulk Sample PP = Pocket Penetrometer	/20										13 _	
A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample, D = Disturbed Bulk Sample, PP = Pocket Penetrometer	DT 8/31										14 _	
A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sample, D = Disturbed Bulk Sample, PP = Pocket Penetrometer	DMAT.G										15 _	
Y 17 H 18 A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sampler D A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sampler D = Disturbed Bulk Sampler P 18	PJ GEC										16	
A = Auger Cuttings R = Ring-Lined Barrel Sampler SS = Split Spoon GRAB = Manual Grab Sampler D = Disturbed Bulk Sampler PP = Pocket Penetrometer	2-3553.G										17	
$\frac{2}{2}$	AT 202											
	EOM/	A =	= Auge	r Cuttir	ngs R	 = Ring-L	ined B	। arrel ऽ	l Sampler	SS = Spl	it Spoon	GRAB = Manual Grab Sample D = Disturbed Bulk Sample PP = Pocket Penetrometer



Boring B-7

P	rojec	t Nar	ne:	N		M1	5-32 -	46 Uni	ts	Date Drilled: 8/18/2020
P	rojec	t Nur	nber	:2	02-35	553				Latitude: Not Determined
C	lient:			10	DS+A	۱				Longitude: <u>Not Determined</u>
S	ite Lo	ocatio	on: _	C)jo Ar	maril	lo, Ne	ew Mexi	ico	Elevation: Not Determined
R	lig Ty	pe:		C	ME-	55				Boring Location: See Site Plan
	rilling	g Met	thod:	7	.25" (0.D.	Hollo	w Stem	n Auger	Groundwater Depth: <u>None Encountered</u>
S	ampl	ing N	/lethc	od: <u>R</u>	ling a	and S	Split s	poon sa	amples	Logged By:SY
н	lamm	er W	/eigh	t: <u>1</u>	40 lb	s				Remarks: <u>None</u>
H	lamm	er Fa	all: _	3	0 incl	hes				
Lab	Laboratory Results									
sity	ing eve	ty	re (%)	ber	Type h (in)	lodi	al Typ	ymbc	h (ft)	Cail Description
Den pcf)	ass	stici	istu	SWC	angt	Syn	eria	i.	ept	Soli Description
l vic	% P #20(Pla Ir	Sont O	B	San & Le		Mat	So		
								1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1		Clavey SAND tan fine- to coarse-grained loose to dense
									1_	slightly damp
									2	trace gravel
88.3			5.2	8-13					 0	
					R				3_	
							SC		4_	
				12-16-16	99				5 _	no gravel
						X			6_	
									7_	
									8	
									0	Sandy Lean CLAY, brown, very stiff, slightly damp, weak
									9_	
111.2			11.9	16-44	R				10	
							CL		11 _	
									12 _	
									13 _	
									14 _	
				7-10-10					15	Silty SAND, tan/orange, fine- to medium-grained, medium
				7-10-10	SS	\bigvee	SM		16	dense, slightly damp
						$\mid \land \mid$				Tatal Danth 161/ fact
									17 _	
									18 _	
A	= Auge	r Cuttir	ngs R	= Ring-L	ined B	arrel S	Sampler	SS = Spl	lit Spoon	GRAB = Manual Grab Sample D = Disturbed Bulk Sample PP = Pocket Penetrometer



Boring B-8

F	Projec	t Nar	me: _	Ν		IM1	5-32 -	46 Uni	ts	Date Drilled: 8/18/2020
F	Projec	t Nur	nber:	2	202-3	553				Latitude: <u>Not Determined</u>
0	Client:			I	DS+A	۱				Longitude: Not Determined
5	Site Lo	ocatio	on: _	(Djo Ar	nari	llo, Ne	ew Mexi	со	Elevation: Not Determined
F	Rig Ty	pe:		C	CME-	55				Boring Location: See Site Plan
	Drilling	g Met	thod:	7	.25" (D.D.	Hollo	w Stem	Auger	Groundwater Depth: <u>None Encountered</u>
5	Sampl	ing N	/letho	d: _E	<u>Bulk s</u>	amp	le fro	m auge	r cutting	gs Logged By: SY
F	lamm	er W	/eight	:: <u> </u>	J/A					Remarks: <u>None</u>
F	lamm	er Fa	all: _	N	J/A					
Lab	orato	y Re	sults	0			e			
fy	g /e		(%)	Jer	ype (in)	<u></u>	T	bdm	(ft)	
ensi cf)	ssin Sie/	ex licity	nt (9	vs p	le T ngth	Тщр	rial	Syı	pth	Soil Description
م ا	500 Ba	las	Mois onte	Зlo	Ler	Ś	late	Soil	De	
ā	8,#		20	_	ഗ്യ		≥	0,		
							AC ABC		1 _	Asphalt concrete pavement approximately 3 inches thick (significant alligator cracking/degradation)
									~	Aggregate base course approximately 9 inches thick
					GRAB				2_	Clayey SAND, brown, fine- to coarse-grained, slightly damp to
							SC		3 _	damp
									4 _	
									5	
									6	Total Depth 5 feet
									0_	
									7 _	
									8	
									9	
									10	
									10	
									11 _	
									12 _	
31/20									13 _	
SDT 8/									14 _	
OMAT.0									15	
SPJ GE									16 _	
2-3553.(17	
AT 20									19	
A B	= Auge	r Cutti	ngs R	= Ring-l	_ined B	। arrel ६	ı Sampleı	· SS = Spl	it Spoon	GRAB = Manual Grab Sample D = Disturbed Bulk Sample PP = Pocket Penetrometer
<u>ں</u>	0		-	0			•	'	•	

	UNIFIE	TEM	CONS	ISTENCY OR	RFI ATIVF		
	Major Divisions		Group Symbols	Typical Names		DENSITY CRIT	ERIA
		Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	<u>s</u>	tandard Penetratio Density of Granula	on Test r Soils
	Gravels 50% or more of	Clean Clavels	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	Penetration Resistance, N (blows/ft.)	Relative Density	,
	retained on No. 4 sieve	Gravels with	GM	Silty gravels, gravel-sand-silt mixtures	0-4	Very Loose	
Grained Soils		Fines	GC	Clayey gravels, gravel-sand-clay mixtures	5-10	Loose	
More than 50% retained on No. 200 sieve		Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	11-30	Medium De	nse
	Sands More than 50% of		SP	Poorly graded sands and gravelly sands, little or no fines	31-50	Dense	
	coarse fraction passes No. 4 sieve	Sands with	SM	Silty sands, sand-silt mixtures	>50	Very Dense	!
		Fines	SC	Clayey sands, sand-clay mixtures	<u>S</u> De	Standard Penetration Test Density of Fine-Grained Soils	
			ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	Penetration Resistance, N (blows/ft.)	Consistency	Unconfined Compressive Strength (Tons/ft2)
	Silts an Liquid Limi	d Clays t 50 or less	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	<2	Very Soft	<0.25
Fine-Grained Soils			OL	Organic silts and organic silty clays of low plasticity	2-4	Soft	0.25-0.50
50% or more passes No. 200 sieve			MH	Inorganic silts, micaceous or diatomaceous free sands or silts, elastic silts	4-8	Firm	0.50-1.00
	Silts an Liquid Limit g	d Clays reater than 50	СН	Inorganic clays of high plasticity, fat clays	8-15	Stiff	1.00-2.00
			ОН	Organic clays of medium to high plasticity	15-30	Very Stiff	2.00-4.00
н	ighly Organic So	ils	PT	Peat, mucic & other highly organic soils	>30	Hard	>4.0
U.S. Standar	d Sieve Sizes						
>12"	12" 3"	3/4" #4	#10	#40	#200	•	
Boulders	Cobbles	Gravel coarse fine	coarse	Sand medium	fine	Silt	or Clay
	MOISTURF CO	NDITIONS		MATERIAL OL			MBOLS
Dry	Absence of moist, dus	ty, dry to the touch	trace		ace 0-5% R Ring Sample		
Slightly Damp	Below optimum moistu	ire content for compaction	action few			ew 5-10% S SPT Sample	
Moist	Near optimum moistur	e content, will moisten th	ne hand	little	10-25%	B Bulk Sample	

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.

some 25-45%

mostly 50-100%

▼ Ground Water

EXAMPLE:

Very Moist

Wet

SILTY SAND w/trace silt (SM-SP), Brown, loose to med. Dense, fine to medium grained, damp

Above optimum moisture content

Visible free water, below water table

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.

Coring Equipment – Portable electric core drills are used when recovery of asphalt or concrete cores is necessary. The core drill is equipped with either a 4" or 6" diameter diamond core barrel. Water is generally used as a drilling fluid to facilitate cooling and removal of cuttings from the annulus.

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

	BORING	DEPTH	ASTM	1 D698	MOISTURE	DEN	SITY	ATTER	RBERG	LIMITS	SWELL	CONSOL	% PASS		
LAB NO.	NO.	FT.	Density	Moisture	CONT. (%)	WET (pcf)	DRY (pcf)	LL	PL	PI	(%)	TEST	#200 SIEVE	CLASSIFICATION	
10034	B-1	21⁄2	-	-	6.7	99.9	93.6	-	-	-	-	Attached	-	Silty SAND (SM)	
10035	B-1	5	-	-	-	-	-	NLL	NPL	NP	-	-	16	Silty SAND (SM)	
10036	B-1	10	-	-	3.6	104.1	100.5	-	-	-	-	-	-	Silty SAND (SM)	
10038	В-3	21⁄2	-	-	9.1	115.0	105.4	48	16	32	-	Attached	63	Sandy Lean CLAY (CL)	
10040	В-3	10	-	-	1.8	101.8	99.9	-	-	-	-	-	-	Silty SAND (SM)	
10042	B-5	21⁄2	-	-	7.1	115.8	108.1	-	-	-	-	Attached	-	Clayey SAND (SC)	
10043	B-5	5	-	-	-	-	-	-	-	-	-	-	-	Clayey SAND (SC)	
10044	B-7	21⁄2	-	-	5.2	92.9	88.3	-	-	-	-	Attached	-	Clayey SAND (SC)	
10045	B-7	10	-	-	11.9	124.5	111.2	-	-	-	-	-	-	Sandy Lean CLAY (CL)	
														NLL = No Liquid Limit NPL = No Plastic Limit NP = Non-Plastic	
												Project		NHA NM15-32 - 46 Units	
)G	EC	\mathcal{N}	A		SUN	MARY O	F SOIL	_ TEST	S		Job No.		202-3553	
											Location		Ojo Amarillo, New Mexico		
												Date Drille	ed	8/18/2020	

	LAB NO. BORING / SAMPLE MOISTURE SIEVE ANALYSIS, CUMU					MULATIV	E PERCE	NT PASS	SING				ATTERBERG LIMITS							
LAD NO.	TEST PIT	(ft)	%	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 10	No. 16	No. 30	No. 40	No. 50	No. 100	No. 200	LL	PL	PI	CLASSIFICATION
10037	B-2	1 - 4	-	100	100	100	100	100	100	100	100	99	98	95	79	60	48	14	34	Sandy Lean CLAY (CL)
10041	B-4	1 - 4	-	100	100	100	100	100	100	100	100	99	98	96	83	66	45	13	32	Sandy Lean CLAY (CL)
																		Project		NHA NM15-32 - 46 Units
											SUMN	IARY O	F SOIL .	TESTS			Job No.		202-3553	
	\mathbf{T}														Location		1	Ojo Amarillo, New Mexico		
																Dat	e of Explo	ration	8/18/2020	

PROJECT:	NHA NM15-32 46 Units	JOB NO:	202-3553
CLIENT:	IDS+A	WORK ORDER NO:	NA
SAMPLE SOURCE:	B-1 @ 2½'	DATE SAMPLED:	8/18/2020
SAMPLE PREP.:	In Situ	SAMPLED BY:	SY



0.01 0.1 1 10 Surcharge Pressure (tsf) □ 0.1 1 10

PROJECT: CLIENT: MATERIAL:	NHA NM15-32 46 Units IDS+A	JOB NO: WORK ORDER NO: LAB NO:	202-3553 NA 10038
SAMPLE SOURCE:	B-3 @ 2½'	DATE SAMPLED:	8/18/2020
SAMPLE PREP.:	In Situ	SAMPLED BY:	SY





PROJECT:	NHA NM15-32 46 Units	JOB NO:	202-3553
CLIENT:	IDS+A	WORK ORDER NO:	NA
MATERIAL:	Clayey SAND (SC)	LAB NO:	10042
SAMPLE SOURCE:	B-5 @ 2½'	DATE SAMPLED:	8/18/2020
SAMPLE PREP.:	In Situ	SAMPLED BY:	SY



PROJECT: CLIENT:	NHA NM15-32 46 Units IDS+A	JOB NO: WORK ORDER NO:	202-3553 NA
MATERIAL:		LAB NO:	10044
SAMPLE SOURCE:	B-7 @ 2½	DATE SAMPLED:	8/18/2020
SAMPLE PREP.:	In Situ	SAMPLED BY:	SY







Analytical Report

Report Summary

Client: Geomat Engineering Samples Received: 8/19/2020 Job Number: 04001-0002 Work Order: P008062 Project Name/Location: 202-3553 NHA Ojo Armarillo

Walter Hinking

Date: 8/26/20

Report Reviewed By:

Walter Hinchman, Laboratory Director



Envirotech Inc. certifies the test results meet all requirements of TNI unless footnoted otherwise. Statement of Data Authenticity: Envirotech, Inc, attests the data reported has not been altered in any way. Partial or incomplete reproduction of this report is prohibited, unless approved by Envirotech, Inc. Envirotech, Inc, holds the Utah TNI certification NM009792018-1 for the data reported. Envirotech, Inc, holds the Texas TNI certification T104704557-19-2 for the data reported.





Geomat Engineering	Project Name:	202-3553 NHA Ojo Armarillo	
915 Malta Avenue	Project Number:	04001-0002	Reported:
Farmington NM, 87401	Project Manager:	Seth Yokel	08/26/20 15:23

Sample Summary

Client Sample ID	Lab Sample ID	Matrix	Sampled	Received	Container
10043; B5 @ 5	P008062-01A	Solid	08/18/20	08/19/20	Glass Jar, 4 oz.



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Geomat Engineering	Project Name:	202-3553 N	202-3553 NHA Ojo Armarillo					
915 Malta Avenue	Project Number:	04001-0002	2			Repor	ted:	
Farmington NM, 87401	Project Manager:	Seth Yokel				08/26/20 15:23		
P008062-01 (Solid)								
		Reporting						
Analyte	Result	Limit	Dilution	Prepared	Analyzed	Notes		
Wet Chemistry by 9050A/2510B	Ohm cm	Ohm cm				Batch:	2035006	
Specific Resistance (@ 25 C)	2220		1	08/24/20	08/24/20			
Wet Chemistry by EPA 9045D	pH Units	pH Units				Batch:	2035005	
pH @25°C	8.45		1	08/24/20	08/24/20			
Anions by EPA 300.0/9056A	mg/kg	mg/kg				Batch:	2035013	
Chloride	ND	20.0	1	08/25/20	08/25/20			
Chloride	ND	0.002	1	08/25/20	08/25/20			
Sulfate	59.3	20.0	1	08/25/20	08/25/20			
Sulfate	0.006	0.002	1	08/25/20	08/25/20			

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Page 3 of 8



Geomat Engineering		Project Name:	-	202-3553 NHA Ojo Armarillo						
915 Malta Avenue		Project Number: 04001-000		04001-0002					Reported:	
Farmington NM, 87401		Project Manager: Seth Yokel						08/26/20 15:23		
	Wet	Chemistry by	y 9050A/2	2510B - Qu	ality Con	trol				
		Reporting	Spike	Source		REC		RPD		
Analyte	Result	Limit	Level	Result	REC	Limits	RPD	Limit	Notes	
	Ohm cm	Ohm cm	Ohm cm	Ohm cm	%	%	%	%		
Blank (2035006-BLK1)						Prepared & Analyzed: 08/24/20 1				
Specific Resistance (@ 25 C)	>100,000									
LCS (2035006-BS1)							Prepared	l & Analyze	d: 08/24/20 1	
Specific Resistance (@ 25 C)	701		709		98.9	98-102				
Duplicate (2035006-DUP1)				Source: P008054-01 Prepared & Analyzed:			d: 08/24/20 1			
Specific Resistance (@ 25 C)	356			347			2.46	20		

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Geomat Engineering		Project Name:		202-3553 NHA Ojo Armarillo						
915 Malta Avenue		Project Numbe	er:	04001-0002				Reported		
Farmington NM, 87401		Project Manag	er:	Seth Yokel				08/26/20 15:23		
	We	t Chemistry b	y EPA 9	045D - Qua	lity Con	trol				
		Reporting	Spike	Source		REC		RPD		
Analyte	Result	Limit	Level	Result	REC	Limits	RPD	Limit	Notes	
	pH Units	pH Units	pH Units	pH Units	%	%	%	%		
LCS (2035005-BS1)			Prepared & Ana					l & Analyze	d: 08/24/20 1	
pH	7.99		8.00		99.9	98.75-101.25				
Duplicate (2035005-DUP1)				Source: P008054-01 Prepared &				l & Analyze	d: 08/24/20 1	
pH	8.36			8.77			4.79	20		

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Geomat Engineering		Project Name:	-	202-3553 NHA Ojo Armarillo					
915 Malta Avenue	Project Number:		04001-0002			Reported:		Reported:	
Farmington NM, 87401		Project Manage	roject Manager: Seth Yokel					08/26/20 15:23	
	A	nions by EPA	300.0/90	56A - Qual	ity Contr	ol			
		Reporting	Spike	Source		REC		RPD	
Analyte	Result	Limit	Level	Result	REC	Limits	RPD	Limit	Notes
	mg/kg	mg/kg	mg/kg	mg/kg	%	%	%	%	
Blank (2035013-BLK1)							Prepared	1: 08/25/20	0 Analyzed: 08/25/20 1
Chloride	ND	20.0							
Chloride	ND	0.002							
Sulfate	ND	20.0							
Sulfate	ND	0.002							
LCS (2035013-BS1)							Prepared	1: 08/25/20	0 Analyzed: 08/25/20 1
Chloride	247	20.0	250		98.7	90-110			
Sulfate	249	20.0	250		99.4	90-110			
Matrix Spike (2035013-MS1)	atrix Spike (2035013-MS1) Source: P008061-21			008061-21	Prepared: 08/25/20 0 Analyzed: 08/25/20 1				
Chloride	308	20.0	250	55.3	101	80-120			
Sulfate	278	20.0	250	50.4	91.2	80-120			
Matrix Spike Dup (2035013-MSD1)				Source: P008061-21			Prepared	0 Analyzed: 08/25/20 1	
Chloride	311	20.0	250	55.3	102	80-120	1.11	20	
Sulfate	273	20.0	250	50.4	89.2	80-120	1.75	20	

QC Summary Report Comment:

Calculations are based off of the raw (non-rounded) data. However, for reporting purposes all QC data is rounded to three significant figures. Therefore, hand calculated values my differ slightly.

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Page 6 of 8


Geomat Engineering	Project Name:	202-3553 NHA Ojo Armarillo	
915 Malta Avenue	Project Number:	04001-0002	Reported:
Farmington NM, 87401	Project Manager:	Seth Yokel	08/26/20 15:23

Notes and Definitions

T18	>100,000
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
RPD	Relative Percent Difference

** Methods marked with ** are non-accredited methods.

Soil data is reported on an "as received" weight basis, unless reported otherwise.



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LABORATORY TESTING PROCEDURES

Laboratory testing is performed by trained personnel in our accredited laboratory or may be subcontracted by GEOMAT through a qualified outside laboratory if necessary. Actual types and quantities of tests performed for any project will be dependent upon subsurface conditions encountered and specific design requirements.

The following is an abbreviated table of laboratory testing that may be performed by GEOMAT with the applicable standards listed. Testing for a specific project may include all or a selected subset of the laboratory work listed. Laboratory testing beyond those listed may be available and could be incorporated into the project scope at the discretion of GEOMAT.

PROCEDURE	ASTM	AASHTO
Moisture Content	ASTM D2216	AASHTO T 265
Sieve Analysis	ASTM C136	AASHTO T 27
Fines Content	ASTM D1140	T 11
Hydrometer	ASTM D422	T 88
Atterberg Limits	ASTM D4318	AASHTO T 89/T 90
Soil Compression/Expansion	ASTM D2435	T 216
Soil Classification	ASTM D2487	M 145
Direct Shear	ASTM D3080	T 236
Unconfined Compressive Strength of Soils	ASTM D2166	T 208
Unconfined Compressive Strength of Rock Cores	ASTM D4543	-

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, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them 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 herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will <u>not</u> 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.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will <u>not</u> be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- 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, the reliability of a geotechnical-engineering report can be 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 you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnicalengineering report did not read the report in its entirety. Do <u>not</u> rely on an executive summary. Do <u>not</u> read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site 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.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about 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 through project completion to obtain 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 <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed 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 geotechnicalengineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing 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 available 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 constructionphase observations.

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 information 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. 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. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. 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 provide 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 obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

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, the engineer's services were not designed, conducted, or intended to prevent 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 <u>not</u> 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 <u>not</u> building-envelope or mold specialists.*



Telephone: 301/565-2733 e-mail: info@geoprofessional.org www.geoprofessional.org

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HAZARDOUS MATERIALS TESTING REPORT OJO AMARILLO (PHASE 4) MODERNIZATION OJO AMARILLO, SAN JUAN COUNTY, NEW MEXICO

September 4, 2020





Prepared for:



Navajo Housing Authority P. O. Box 4980 Window Rock, AZ 86515 Phone: (928) 871-2600 www.navajohousingauthority.org Prepared by



1812 Schofield Lane Farmington, NM 87401 Phone: (505) 327-1072 Fax: (505) 327-1517 <u>www.iinábá.com</u>

iiná bá, Inc. Project No. 20-042-03 NHA RFP No.: 474



TABLE OF CONTENTS

EXE	CUTIV	E SUN	IMARY1	1
1.0	INTRO 1.1 1.2 1.3	DDUCT ASBES LEAD- MOLD	TON STOS REGULATORY OVERVIEW BASED PAINT REGULATORY OVERVIEW	2 2 3 4
2.0	DESC	RIPTIC	ON OF BUILDINGS INSPECTED	5
3.0	SURV 3.1 3.2 3.3 3.4	EY PR GENE ASBES LEAD- MOLD	OCEDURES RAL STOS-CONTAINING MATERIALS BASED PAINT	3 6 6 7
4.0	FINDI	NGS		8
5.0	ACM	DESCF	RIPTIONS	9
Ар	pendiz	x 1:	Figures and Functional Space Maps Figure 1: Site Location Map Figure 2: Site Testing Location Map Functional Space Maps (5)	
Ар	pendix	x 2:	Positive Bulk/Screening Sample Results, Photographs, and Detailed Cost Estimates	
Ар	pendix	x 3:	Certified Laboratory Analytical Results (with Chain-of- Custody Records	
Ар	pendix	x 4:	Certifications and Field Sampling and Screening Forms	



EXECUTIVE SUMMARY

As requested by the Navajo Housing Authority (NHA), under a subcontract agreement with Indigenous Design Studio & Architecture LLC. (IDSA), the performance of hazardous materials testing was conducted at the Ojo Amarillo NHA Housing Subdivision #15-32 located in Ojo Amarillo, San Juan County, New Mexico on the Navajo Indian Reservation. Field efforts were performed between Monday, August 17 and Tuesday, August 18, 2020. Bulk samples of suspect asbestos-containing materials (ACM), painted surfaces for suspect lead-based paint (LBP), and surface mold spore analysis were collected from the interior and exterior of five (5) representative housing units within the 46-unit modernization effort. Standard United States Environmental Protection Agency (USEPA) sampling (USEPA 40 Code of Federal Regulations Part 763, Subpart E) and Housing and Urban Development (HUD) practices were utilized during the inspections and screenings. The inspections were performed to identify and quantify accessible materials that are confirmed to contain, or are suspected of containing asbestos fibers, lead-based paint, and mold spores.

The following summarizes the findings from this Hazardous Materials Testing:

Asbestos-Containing Materials

- Total Amount of ACM Tile:
- Total Amount of ACM Mastic:
- > Total Amount of ACM Roofing Mastic:
- Total Amount of Transite:

<u>1,400 SF</u> (only units tested)* <u>66,646 SF</u> (all units throughout) <u>460 LF (all units estimated)</u> <u>2,316 SF (all units)</u>

*Due to all mastic testing positive for asbestos, all floor tiles, regardless of testing positive for asbestos or not must be disposed of as ACM due to contact with the mastic.

Lead-Based Painted Materials

> No LBP detected in or on the subject structures.

Mold Spores

Only a trace of the mold spore Alternaria was reported in NHA-120. It is not a health risk at the concentration reported.



1.0 INTRODUCTION

As requested by the Navajo Housing Authority (NHA), under a subcontract agreement with Indigenous Design Studio & Architecture LLC. (IDSA), the performance of hazardous materials testing was conducted at the Ojo Amarillo NHA Housing Subdivision #15-32 located in Ojo Amarillo, San Juan County, New Mexico on the Navajo Indian Reservation. Field efforts were performed between Monday, August 17 and Tuesday, August 18, 2020. Bulk samples of suspect asbestos-containing materials (ACM), painted surfaces for suspect lead-based paint (LBP), and surface mold spore analysis were collected from the interior and exterior of five (5) representative housing units within the 46-unit modernization effort. Standard United States Environmental Protection Agency (USEPA) sampling (USEPA 40 Code of Federal Regulations Part 763, Subpart E) and Housing and Urban Development (HUD) practices were utilized during the inspections and screenings. The inspections were performed to identify and quantify accessible materials that are confirmed to contain, or are suspected of containing asbestos fibers, lead-based paint, and mold spores.

liná, bá, Inc (*iiná bá*) representatives Mr. Matthew Bennalley (inspector) and Mr. Teddy Charles (technician) performed the asbestos inspections, bulk sampling, and building screenings. A copy of applicable certifications can be found in **Appendix 4** along with field sampling and screening forms.

1.1 Asbestos Regulatory Overview

Generally, buildings constructed in 1981 or later are not expected to contain asbestos. For buildings with a date of construction prior to 1981, there is a potential that ACM was used in construction materials. Asbestos was extensively used in building materials during the 1950's to 1970's, and was still used to some extent until being banned in late 1999. *iiná bá* recognizes that there are still some building products available from general retailers that contain a percentage of asbestos, although the general use and manufacture of building materials containing ACM has been discontinued for many years.

The asbestos NESHAP (40 CFR, Part 61, Subpart M) regulates asbestos fiber emissions and asbestos waste disposal practices. The asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) regulation also requires the identification and classification of existing ACM according to friability prior to demolition or renovation activity. Friable ACM is a material containing more than 1% asbestos that, when dry, can be crumbled, pulverized or reduced to power by hand pressure. All friable ACM is considered as Regulated Asbestos-Containing Material (RCAM).

The asbestos NESHAP regulation classifies ACM as either RACM, Category I non-friable ACM or Category II non-friable ACM. RACM includes all friable ACM, along with Category I and Category II non-friable ACM that has become friable, will be or has been subjected to sanding, grinding, cutting or abrading, or ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder in the course of renovation or demolition activity. Category I non-friable ACM are exclusively asbestos-containing packings, gaskets, resilient floor coverings, resilient floor covering mastics and asphalt roofing products that contain more than 1% asbestos. Category II non-friable ACM are all other non-friable materials other than Category I non-friable



ACM that contain more than 1% asbestos. Category II non-friable ACM generally includes but is not limited to cementitious material such as: cement pipes, cement siding, cement panels, glazing, mortar and grouts.

The Occupational Safety and Health Administration (OSHA) asbestos standard for construction (29 CFR 1926.1101) regulates workplace exposure to asbestos. The OSHA standard requires that employee exposure to airborne asbestos must not exceed 0.1 fibers per cubic centimeter of air (0.1/cc) as an eight hour time weighted average (TWA) and not exceed 1.0 fibers per cubic centimeter of air (1.0/cc) over a 30 minute time period known as an excursion limit (EL). The TWA and EL are known as OSHA's asbestos permissible exposure limits (PELs). The OSHA standard classifies construction and maintenance activities which could disturb ACM, and specifies work practices and precautions which employers must follow when engaging in each class of regulated work.

1.2 Lead-Based Paint Regulatory Overview

The lead paint sampling activities were conducted in general accordance with the EPA's work practice standards for conducting lead activities (40 CFR 745.227). Lead is regulated by the EPA and OSHA.

The Resource Conservation and Recovery Act (RCRA) gave the USEPA authority to regulate the waste status of demolition or renovation debris, including lead-containing materials. Specific notification and testing requirements must be addressed prior to transporting, treating, storing, or disposing of hazardous wastes. Lead containing wastes are considered hazardous waste under RCRA if Toxicity Characteristics Leaching Procedure (TCLP) results exceed five milligrams per liter (mg/L). EPA exempts from most RCRA requirements those generators whose combined hazardous waste generation is less than 100 kilograms (kg) per month.

The EPA has established an action level for lead-based paint (LBP) of 1.0 milligram per square centimeter (mg/cm²), 0.5% by weight or 5,000 parts per million (ppm). If a sample analytical result is equal to or greater than 1.0 mg/cm², 0.5% by weight, or 5,000 ppm, the prepared surface is considered to be LBP.

Detectable lead quantities may constitute a lead dust hazard during renovation and demolition activities. Personnel performing renovation and demolition activities that may disturb painted components and building surfaces with concentrations of lead above the designated analytical detection limit should comply with all current OSHA regulations in order to minimize employee exposure. OSHA defines lead paint as a paint, which contains lead, regardless of the concentration. Currently, any proposed renovation or demolition is subject to the OSHA regulations (29 CFR 1926.62 — Lead Exposure in Construction). The OSHA regulation defines specific training requirements, engineering controls and working practices for construction personnel subject to this standard. Occupational exposure to lead occurring in the course of construction work, including maintenance activities, painting, alteration and repairs is subject to the OSHA "Interim" Lead Exposure in Construction standard.



Construction work covered by 29 CFR 1926.62 includes any repair or renovation activities or other activities that disturb in-place lead-containing materials, but does not include routine cleaning and repainting where there is insignificant damage, wear, or corrosion of existing lead-containing coatings or substrates. Employers must assure that no employee will be exposed to lead at concentrations greater than 50 micrograms per cubic meter (μ g/m³) averaged over an eight-hour period without adequate protection. The OSHA Standard also establishes an action level of 30 μ g/m³ which, if exceeded, triggers the requirement for medical monitoring.

1.3 <u>Mold</u>

Currently, there are no EPA regulations or standards regarding airborne mold contaminants. However, there are industry standards and practices for how indoor air is evaluated for the presence of mold species. The standard practice for assessing the quality of indoor air calls for the collection of a "background" sample from outside the structure or space being tested at the same time an indoor sample is obtained, utilizing the same sampling protocols. Any spore types counted in the outdoor sample are subtracted or "backed out" of the indoor air samples obtained. The remaining spore types with identifiable concentrations or spore "counts" are considered to represent the quality of the indoor air sample. In some cases, spore counts are eliminated in the final sample while in others, the remaining spore types are considered to have possibly originated from a source located indoors.



2.0 DESCRIPTION OF BUILDINGS INSPECTED

Three-Bedroom Units (#62 and #125): Single-story (1,068 and1,085 square feet) structures built slab-on-grade with an attached carport. The units are stucco-clad exterior walls with wooden stud interior walls sheet rocked, textured and taped. Flooring is 12-inch square vinyl composition tile (VCT) glued with mastic to a concrete subfloor. Some sheet linoleum was documented in Unit #125. Ceilings were textured. Roofing materials consisted of architectural asphalt shingles over roofing material (felt) with penetrations covered with a mastic.

Four-Bedroom Units (#118 and #120): Single-story (1,320 and 1,804 square feet) structures built slab-on-grade with an attached carport with storage (320 square feet and 47.5 square feet). The units are stucco-clad exterior walls with wooden stud interior walls sheet rocked, textured and taped. Flooring is 12-inch square vinyl composition tile (VCT) glued with mastic to a concrete subfloor. Ceilings were textured. Roofing materials consisted of architectural asphalt shingles over roofing material (felt) with penetrations covered with a mastic.

Five-Bedroom Units: Single-story (1,501 square feet) structures built slab-on-grade with an attached carport with storage (320 square feet and 47.4 square feet). The units are stucco-clad exterior walls with wooden stud interior walls sheet rocked, textured and taped. Flooring is 12-inch square vinyl composition tile (VCT) glued with mastic to a concrete subfloor. Some sheet linoleum was documented in Unit #125. Roofing materials consisted of architectural asphalt shingles over roofing material (felt) with penetrations covered with a mastic.



3.0 SURVEY PROCEDURES

3.1 <u>General</u>

Each room of the subject building was assigned a unique functional space number. Each functional space was visually inspected for suspect ACM. Materials were mapped and quantified on maps hand-drawn in the field. Sample locations were further coded by the use of a "Wall Code" (A, B, C, and D). The side of the building with the main entrance is consistently coded "A", with each wall of a functional space coded in a counterclockwise fashion. Ceiling samples are always coded "E" and samples from a floor are coded "F".

3.2 Asbestos-Containing Materials

Each suspect ACM building material was designated as a distinct homogeneous area, which is a single material, uniform in texture and appearance, installed at one time, and unlikely to consist of more than one type or formulation of material. The inspector touched each suspect material in order to determine friability. A sample of the suspect material was collected (using appropriate personal protective equipment) by removing a small area of the material (generally about 1-inch square), making sure to include any underlying mastic or layers that might also be suspect. The samples were transferred to 3-inch by 5-inch plastic baggies and labeled with appropriate sample location information. Photographs of suspect materials samples are included in **Appendix 2**.

A sufficient number of samples were collected of each material to satisfy the Occupational Safety and Health Administration (OSHA) and the National Emission Standard for Hazardous Air Pollutants (NESHAP) regulations for the determination of asbestos content. ACM Bulk sample *Inspection Forms* and *Sampling Forms* are located in **Appendix 2**.

Each sample was assigned a unique sample identification number and assessed for damage and friability classifications. The samples, with Chain-of-Custody (COC) Record, were shipped via Federal Express_® to ALS Environmental in Cincinnati, Ohio. ALS Environmental is fully accredited by the EPA-required National Voluntary Laboratory Accreditation Program (NVLAP) for analysis of asbestos bulk samples using polarized light microscopy (USEPA Methodology 600/R-93/116), and is also an American Industrial Hygiene Association (AIHA) accredited laboratory. Laboratory analysis reports are located in **Appendix 3**. Standard Operating Procedures (SOPs) utilized during the collection of samples are included in **Appendix 4**.

3.3 Lead-Based Paint

The analysis for lead-based paint was performed by obtaining a representative sample of a suspect paint from the substrate painted. An area of approximately one (1) inch square is required for analysis or a minimum of 200 grams by weight. The samples, with Chain-of-Custody (COC) Record, were shipped via Federal Express_® to ALS Environmental in Fort Collins, Colorado for lead analysis by Trace ICP followed by EPA Method 6010D analysis. Copies of the *Lead Inspection* and *Lead Sampling Forms* are included in **Appendix 2**. Standard Operating Procedures (SOPs) utilized during the collection of samples are included in **Appendix 4**.



3.4 <u>Mold</u>

A representative sample from a surface with visible suspect mold growth (usually dark colored or black in appearance) was obtained using the tape-lift sampling method. Standard Operating Procedures (SOP) for this method are included in **Appendix 4**. Premade tape cassettes (manufactured by SKC) were provided by ALS Environmental of Cincinnati, Ohio. There were very limited visual occurrence within the subject structures that appeared to be suspect. The most obvious occurrence was used as the representative sample location. The cassettes with the sample tape, with Chain-of-Custody (COC) Record, were shipped via Federal Express_® to ALS Environmental in Cincinnati, Ohio for plain light microscopy under 630x magnification by ALS Method MC-AN-005. A total of 23 possible mold spore species were evaluated.

Based on the results of the limited testing, there was only one (1) occurrence (very low concentration) of a detectable mold spore in all five (5) housing units. This occurrence was in Unit #NHA-120 on the ceiling of the Kitchen. The spore detected was Alternaria. A brief description of this mold spore type is provided below.

<u>Alternaria</u>: A fungal spore that is a part of fungal flora everywhere and is a normal agent of decay and decomposition. Indoors they can cause hay fever reactions and are also known as a major plant pathogen. It can result in damp situations and in stored foods, and on cardboard.



4.0 FINDINGS

The table below summarizes the buildings inspected and provides a quick overview of the inspection and testing results from the performance of this Hazardous Materials Testing Report.

Location	Bldg. No.	Unit Type	Asbestos Present	LBP Present	Mold Present
		(Appendix 1)	(Yes or No)	(Yes or No)	(Yes or No)
#15-32	NHA-62	3-Bedroom Unit	No	No	No
#15-32	NHA-118	4-Bedroom Unit	Yes	No	No
#15-32	NHA-120	4-Bedroom Unit	Yes	No	Yes
#15-32	NHA-125	3-Bedroom Unit	Yes	No	No
#15-32	NHA-131	5-Bedroom Unit	Yes	No	No

Table 1 entitled *Summary of Asbestos-Containing Material Bulk Samples Locations* (**Appendix 2**) provides detailed information on materials tested for asbestos content. A summary of samples testing positive are summarized in **Table 4** entitled *Summary of Positive Asbestos-Containing Material Bulk Sample Results*.

Table 2 entitled *Summary of Lead Paint Chip Bulk Sample Locations* (Appendix 2) provides detailed information on surfaces that were tested for lead-based paint. **Table 5** in Appendix 2 entitled *Summary of Lead Paint Chip Buk Sample Results* shows the concentrations of lead in all bulk samples tested.

Table 3 entitled *Summary of Mold Surface Tape Bulk Sample Locations* (**Appendix 2**) provides detailed information of surfaces that were tested for the presence of mold spores. **Table 6** in **Appendix 2** entitled *Summary of Mold Surface Tape Bulk Sample Results* shows the concentration and type of mold spores detected.



5.0 ACM DESCRIPTIONS

Asbestos is the name given to a number of naturally-occurring fibrous silicate minerals (*i.e.,* Chrysotile, Crocidolite, Amosite, fibrous Anthophyllite, fibrous Actinolite or fibrous Tremolite) that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. Asbestos is made up of microscopic bundles of fibers that may become airborne when disturbed. These fibers get into the air and may become inhaled into the lungs, where they may cause significant health problems.













Chrysotile

Crocidolite

Amosite

Anthophyllite

e Actonolite

Tremolite

In the asbestos industry, the term "friable" is used to describe asbestos that can be reduced to dust by hand pressure. "Non-friable" means asbestos that is too hard to be reduced to dust by hand. Non-friable materials, such as transite siding and floor tiles are not regulated, provided it does not become friable. Machine grinding, sanding and dry-buffing are ways of causing non-friable materials to become friable.

Descriptions of materials inspected that were found to contain asbestos are as follows:

Vinyl Composition Floor Tile is classified as a non-friable NESHAP Category I material. This material is currently in fair to poor condition and intact floor tile poses little to no health threat. Removal or disturbance to this material should be performed by appropriately-trained and certified personnel. Removed flooring material should be disposed at a landfill that accepts non-friable asbestos waste. Landfills should be checked for acceptance of this material prior to disposal.

Floor Tile Mastic is classified as a non-friable NESHAP Category I material. This material is currently in fair to poor condition. Floor tile mastic that is beneath floor tile (*i.e.*, inaccessible) poses little to no health threat. Removal or disturbance to this material should be performed by appropriately-trained and certified personnel. Removed flooring material should be disposed at a landfill that accepts non-friable asbestos waste. Landfills should be checked for acceptance of this material prior to disposal.

Roofing Penetration Compound is classified as non-friable NESHAP Category II material. The material is currently in fair to poor condition and undamaged compound poses little to no health threat. In addition, the flashing compound is an exterior material; therefore, building occupants will not be affected. Removal or disturbance to this material should be performed by appropriately-trained and certified personnel. Removed caulking material should be disposed at a landfill that accepts non-friable asbestos waste. Landfills should be checked for acceptance of this material prior to disposal.



Transite is classified as Category II non-friable NESHAP Regulated Asbestos-Containing Material (RACM). Intact panels poses little to no health threat. Removal or disturbance to this material is considered an OSHA Class I action, and should be performed by appropriately trained and certified personnel. Removed panels should be disposed at a landfill that is approved by the Environmental Protection Agency (EPA) for acceptance of non-friable asbestos waste. Landfills should be checked for acceptance of this material prior to disposal.



6.0 ESTIMATED COSTS

The cost to abate (remove) detected hazardous materials the subject structures has been estimated in order to provide NHA with a budgetary value to address the removal of all hazards from the buildings prior to renovation. The only hazard requirement abatement in the 46 Units for Modernization is asbestos. The estimate contains appropriate labor, materials, equipment, and disposal costs, as well as applicable taxes based on current (2020) pricing. A detailed breakdown of the costs are included in **Appendix 2**.

ACM Abatement:

Three-Bedroom Units:	\$18,321.79 per unit
Four-Bedroom Units:	\$18,904.25 per unit
Five-Bedroom Units:	\$21,064.11 per unit

All costs exclude third-party air clearance testing by others.

Based on the Cost Estimates above, the following summarizes the estimated duration of activity by number of days onsite.

ACM Abatement:

Three-Bedroom Units:	5 to 6 days per unit
Four-Bedroom Units:	5 to 7 days per unit
Five-Bedroom Units:	6 to 8 days per unit



7.0 PROJECT LIMITATIONS

This report is for the exclusive use of NHA for the project being discussed. Reliance by any other party on this report is prohibited without written authorization of *iiná bá'* or NHA. Reliance on this report by the BIA and all authorized parties will be subject to the terms, conditions, and limitations stated in the proposal, this report and *iiná bá's* Agreement for Services. The limitations of liability defined in *iiná bá's* proposal is the aggregate limit of *iiná bá's* liability to NHA.

This Project was performed using, as a minimum, practices consistent with standards acceptable within the industry at this time, and a level of diligence typically exercised by industrial hygiene and environmental consultants performing similar services.

The procedures used in this investigation attempt to establish a balance between the competing goals of limiting investigative and reporting costs and time, and reducing the uncertainty about unknown conditions. Therefore, because the findings of this report were derived from the scope, costs, time, and other limitations, the conclusions should not be construed as a guarantee that all environmental or occupational hazards have been identified and fully evaluated. Where sample collection and testing have been performed, *iiná bá's* professional opinions are based in part on the interpretation of data from discrete sampling locations that may not represent conditions at non-sampled locations. Areas inaccessible to *iiná bá'* are to be assumed as asbestos containing until such time access is achieved and the appropriate testing of suspect materials is performed. *liná bá* assumes no responsibility for omissions or errors resulting from inaccurate information, or data, provided by sources outside of *iiná bá* or from omissions or errors in public records.

Furthermore, it is emphasized that the final decision on how much risk to accept always remains with the client since *liná bá* is not in a position to fully understand all of the client's needs. Clients with a greater aversion to risk may want to take additional actions while others, with less aversion to risk, may want to take no further action.

The only data gap identified for this effort was the inability to test/screen all units identified under this Modernization effort. However, due to the significant amount of data obtained from the five (5) units tested during this effort, this data gap is not significant and can be closed using the other data from like structures to apply conditions found to the remaining untested units.

Water & Wastewater & Solid Waste & Roads & Stormwater & Subdivisions & Surveying & GIS



APPENDIX 1 — FIGURES AND FUNCTIONAL SPACE MAPS Hazardous Materials Testing Report Ojo Amarillo (Phase 4) Modernization Ojo Amarillo, San Juan County, New Mexico Iina ba, Inc. Project No.: 20-042-03







PREPARED FOR: NAVAJO HOUSING AUTHORITY P.O. BOX 4980 WINDOW ROCK, ARIZONA 86515

> PREPARED BY: *IINÁ BÁ*, INC. 1812 SCHOFIELD LANE FARMINGTON, NM 87401 www.iinábá.com PHONE: (505) 327-1072 FAX: (505) 327-1517 SEPTEMBER 2020

Hydrology Air Quality ESA Soil Investigations SPCC Water Rights LUST















Water & Wastewater & Solid Waste & Roads & Stormwater & Subdivisions & Surveying & GIS



APPENDIX 2 — POSITIVE BULK/SCREENING SAMPLE RESULTS, PHOTOGRAPHS, AND DETAILED COST ESTIMATES HAZARDOUS MATERIALS TESTING REPORT OJO AMARILLO (PHASE 4) MODERNIZATION OJO AMARILLO, SAN JUAN COUNTY, NEW MEXICO INA BA, INC. PROJECT NO.: 20-042-03







PREPARED FOR: NAVAJO HOUSING AUTHORITY P.O. BOX 4980 WINDOW ROCK, ARIZONA 86515

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Hydrology Air Quality ESA Soil Investigations SPCC Water Rights LUST





Comments	Yellow Mastic	Yellow Mastic	Yellow Mastic														Black Mastic											
<mark>Substrate</mark>	Concrete	Concrete	Concrete	Sheetrock	Sheetrock	Sheetrock	Wood	Wood	Wood	Wood	Wood	Wood	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock
Color	Beige	Beige	Beige	White	White	White	Black	Black	Black	Black/Red	Black/Tan/Red	Black/Tan/Red	Gray	Gray	Tan	Tan	Beige/Brown/Gray	Beige/Brown/Gray	Beige/Brown/Gray	Beige	Beige	Beige	White	White	White	White	White	White
Condition ²	Good	Good	Good	Poor	Poor	Poor	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Functional Space	Living Room (1)	Laundry Room (8)	Master Bath (4)	Living Room (1)	Master Bath (4)	Hallway (2)	Roof	Roof	Roof	Roof	Roof	Roof	Foundation	Foundation	Siding	Siding	Living Room (1)	Bathroom #1 (5)	Bathroom #2 (6)	Living Room (1)	Bedroom #1 (7)	Bedroom #4 (10)	Dining Room (2)	Hallway (4)	Bedroom #3 (9)	Living Room (1)	Bedroom #2 (8)	Bedroom #4 (10)
Interior/Exterior	Interior	Interior	Interior	Interior	Interior	Interior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior
Bulk Sample Material	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Tape/Texture	Tape/Texture	Tape/Texture	Penetration Mastic	Penetration Mastic	Penetration Mastic	Roof Material	Roof Material	Roof Material	Footing	Footing	Stucco	Stucco	Vinyl Composition Tile #2	Vinyl Composition Tile #2	Vinyl Composition Tile #2	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Tape/Texture	Tape/Texture	Tape/Texture	Ceiling Texture	Ceiling Texture	Ceiling Texture
Wall Code	Ч	J	4	С	A	С	R	Я	Я	R	R	R	A	B/C	B/C	A	Ŧ	£	£	£	£	£	С	В	Е	Э	Э	Э
Building/Sample No. ¹	NHA-62-01	NHA-62-02	NHA-62-03	NHA-62-04	NHA-62-05	NHA-62-06	NHA-62-07	NHA-62-08	NHA-62-09	NHA-62-10	NHA-62-11	NHA-62-12	NHA-62-13	NHA-62-14	NHA-62-15	NHA-62-16	NHA-118-01	NHA-118-02	NHA-118-03	NHA-118-04	NHA-118-05	NHA-118-06	NHA-118-07	NHA-118-08	NHA-118-09	NHA-118-10	NHA-118-11	NHA-118-12





Comments												Black Mastic	Black Mastic	Black Mastic	Black/Yellow	Black/Yellow	Black/Yellow											
<mark>Substrate</mark>	Sheetrock	Wood	Wood	Wood	Wood	Wood	Wood	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Metal	Metal	Metal	Mood
Color	Gray	Black/Tan/Red	Black/Tan/Red	Black/Tan/Red	Black/Gray	Black/Gray	Black/Gray	Tan	Tan	Gray	Gray	Beige	Beige	Beige	Peach/Tan	Peach/Tan	Peach/Tan	White	White	White	White	White	White	Gray	Black	Black	Black	White
<mark>Condition²</mark>	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Fair	Fair	Fair	Fair
Functional Space	Laundry Room (3)	Roof	Roof	Roof	Roof	Roof	Roof	Siding	Siding	Foundation	Foundation	Living Room (1)	Bedroom #3 (8)	Bedroom #2 (7)	Laundry Room (10)	Living Room (1)	Bathroom #2 (5)	Bedroom #2 (7)	Bedroom #3 (8)	Living Room (1)	Hallway (3)	Living Room (1)	Bedroom #4 (9)	Laundry Room (10)	Roof	Roof	Roof	Roof
Interior/Exterior	Interior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Exterior	Exterior	Exterior	Exterior
Bulk Sample Material	Transite Panel	Roof Material	Roof Material	Roof Material	Roof Penetration	Roof Penetration	Roof Penetration	Stucco	Stucco	Footing	Footing	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Vinyl Composition Tile #3	Vinyl Composition Tile #3	Vinyl Composition Tile #3	Tape/Texture	Tape/Texture	Tape/Texture	Ceiling Texture	Ceiling Texture	Ceiling Texture	Transite Panel	Roof Penetration	Roof Penetration	Roof Penetration	Roof Material
Wall Code	С	R	R	R	R	R	R	A	D	A	D	Ч	Ъ	Ъ	Ч	н	Ъ	D	A	A	Е	Е	Э	D	R	R	R	ж
Building/Sample No. ¹	NHA-118-13	NHA-118-14	NHA-118-15	NHA-118-16	NHA-118-17	NHA-118-18	NHA-118-19	NHA-118-20	NHA-118-21	NHA-118-22	NHA-118-23	NHA-120-01	NHA-120-02	NHA-120-03	NHA-120-04	NHA-120-05	NHA-120-06	NHA-120-07	NHA-120-08	NHA-120-09	NHA-120-10	NHA-120-11	NHA-120-12	NHA-120-13	NHA-120-14	NHA-120-15	NHA-120-16	NHA-120-17





Comments									Black Mastic	Yellow Mastic	Yellow Mastic	Yellow Mastic	Black Mastic	Black Mastic	Black Mastic													
<mark>Substrate</mark>	Mood	Mood	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Sheetrock	Wood	Mood						
Color	White	White	Lt. Brown	Lt. Brown	Lt. Brown	Gray	Gray	Gray	Beige	Beige	Beige	White/Gray/Blue	White/Gray/Blue	Brown	Brown	Brown	Gray	Gray	Gray	White	White	White	White	White	White	Gray	Black/Beige	Black/Beige
<mark>Condition²</mark>	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Fair	Fair
Functional Space	Roof	Roof	Siding	Siding	Siding	Foundation	Foundation	Foundation	Living Room (1)	Bedroom #3 (6)	Master Bedroom (5)	Kitchen (9)	Bedroom #3 (6)	Utility Room (8)	Bathroom (7)	Master Bath (4)	Bathroom (7)	Utility Room (8)	Master Bath (4)	Living Room (10	Bedroom #2 (3)	Bedroom #3 (6)	Living Room (1)	Bedroom #2 (3)	Bedroom #3 (6)	Utility Room (8)	Roof	Roof
Interior/Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Exterior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Interior	Exterior	Exterior
Bulk Sample Material	Roof Material	Roof Material	Stucco	Stucco	Stucco	Footing	Footing	Footing	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Vinyl Composition Tile #1	Vinyl Composition Tile #4	Vinyl Composition Tile #4	Linoleum	Linoleum	Linoleum	Covebase	Covebase	Covebase	Tape/Texture	Tape/Texture	Tape/Texture	Ceiling Texture	Ceiling Texture	Ceiling Texture	Transite Panel	Roof Penetration	Roof Penetration
Wall Code	R	R	A	c/D	D	A	С	D	ц	F	Ч	F	F	F	Ŧ	Ŧ	D	D	D	С	A	D	С	Е	E	D	R	2
Building/Sample No. ¹	NHA-120-18	NHA-120-19	NHA-120-20	NHA-120-21	NHA-120-22	NHA-120-23	NHA-120-24	NHA-120-25	NHA-125-01	NHA-125-02	NHA-125-03	NHA-125-04	NHA-125-05	NHA-125-06	NHA-125-07	NHA-125-08	NHA-125-09	NHA-125-10	NHA-125-11	NHA-125-12	NHA-125-13	NHA-125-14	NHA-125-15	NHA-125-16	NHA-125-17	NHA-125-18	NHA-125-19	NHA-125-20





Building/Sample No. ¹	Wall Code	Bulk Sample Material	Interior/Exterior	Functional Space	Condition ²	Color	Substrate	Comments
NHA-125-21	R	Roof Penetration	Exterior	Roof	Fair	Black	Wood	
NHA-125-22	R	Roof Material	Exterior	Roof	Fair	Black/Brown	Wood	
NHA-125-23	R	Roof Material	Exterior	Roof	Fair	Black/Beige	Wood	
NHA-125-24	R	Roof Material	Exterior	Roof	Fair	Black/Beige	Wood	
NHA-125-25	A	Stucco	Exterior	Siding	Good	Peach/Gray	Concrete	
NHA-125-26	С	Stucco	Exterior	Siding	Good	Peach/Gray	Concrete	
NHA-125-27	D	Stucco	Exterior	Siding	Good	Peach/Gray	Concrete	
NHA-131-01	ц	Vinyl Composition Tile #2	Interior	Bathroom (4)	Good	Beige/Brown/Gray	Concrete	Black Mastic
NHA-131-02	ц	Vinyl Composition Tile #2	Interior	Carport (12)	Good	Beige/Brown/Gray	Concrete	Black Mastic
NHA-131-03	ч	Vinyl Composition Tile #2	Interior	Living Room (1)	Good	Beige/Brown/Gray	Concrete	Black Mastic
NHA-131-04	A	Tape/Texture	Interior	Bathroom (4)	Good	White	Sheetrock	
NHA-131-05	С	Tape/Texture	Interior	Bedroom #1 (7)	Good	White	Sheetrock	
NHA-131-06	С	Tape/Texture	Interior	Carport (12)	Good	White	Sheetrock	
NHA-131-07	В	Tape/Texture	Interior	Living Room (1)	Good	White	Sheetrock	
NHA-131-08	С	Tape/Texture	Interior	Bathroom (4)	Good	White	Sheetrock	
NHA-131-09	Е	Ceiling Texture	Interior	Living Room (1)	Good	White	Sheetrock	
NHA-131-10	Е	Ceiling Texture	Interior	Bedroom (3)	Good	White	Sheetrock	
NHA-131-11	Е	Ceiling Texture	Interior	Dining Room (11)	Good	White	Sheetrock	
NHA-131-12	A	Transite Panel	Interior	Dining Room (11)	Good	Gray	Sheetrock	
NHA-131-13	D	Covebase	Interior	Bathroom (4)	Fair	Black	Sheetrock	Yellow Mastic
NHA-131-14	В	Covebase	Interior	Kitchen/Dining (11)	Fair	Black	Sheetrock	Yellow Mastic
NHA-131-15	J	Covebase	Interior	Carport (12)	Fair	Black	Sheetrock	Yellow Mastic
NHA-131-16	R	Roof Material	Exterior	Roof	Poor	Tan/Black	Wood	
NHA-131-17	R	Roof Material	Exterior	Roof	Poor	Tan/Black	Wood	
NHA-131-18	R	Room Material	Exterior	Roof	Poor	Tan/Black	Wood	
NHA-131-19	R	Roof Penetration	Exterior	Roof	Poor	Black	Wood	
NHA-131-20	R	Roof Penetration	Exterior	Roof	Poor	Black	Wood	
NHA-131-21	R	Roof Penetration	Exterior	Roof	Poor	Black	Wood	





a <mark>te Comments</mark>	ite	ite	ite
Substre	Concre	Concre	Concre
Color	Peach/Gray	Peach/Gray	Peach/Gray
Condition ²	Fair	Fair	Fair
Functional Space	Siding	Siding	Siding
Interior/Exterior	Exterior	Exterior	Exterior
Bulk Sample Material	Stucco	Stucco	Stucco
<mark>Wall Code</mark>	A	В	J
3uilding/Sample No. ¹	NHA-131-22	NHA-131-23	NHA-131-24

Footnotes:

1 - Denotes building number and function as represented on the Functional Space Maps included in Appendix 1.

2 - Condition represents either the condition of the "parent" bulk material sample (e.g., floor tile) or the associated material such as a mastic, glue, or adhesive if

sampled independent from the parent material.

Functional Space room numbers are shown in parentheses () that correspond to the maps included in Appendix 1.





Building/Sample No. ¹	Wall Code	Bulk Sample Material	Interior/Exterior	Functional Space	Condition ²	Color	Substrate	Comments
NHA-62-LP-1	D	Paint Chip	Exterior	Wall	Fair	Tan	Concrete	
NHA-62-LP-2	D	Paint Chip	Exterior	Rafter	Fair	White	Wood	
NHA-62-LP-3	С	Paint Chip	Interior	Kitchen (9)	Poor	White	Sheetrock	
NHA-118-LP-1	A	Paint Chip	Exterior	Rafter	Fair	White	Wood	
NHA-118-LP-2		Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	
NHA-118-LP-3	A	Paint Chip	Exterior	Wall	Fair	Tan	Concrete	
NHA-120-LP-1	A	Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	
NHA-120-LP-2	A	Paint Chip	Exterior	Rafter	Fair	White	Wood	
NHA-125-LP-1	A	Paint Chip	Exterior	Rafter	Fair	White	Mood	
NHA-125-LP-2	A	Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	
NHA-125-LP-3	A	Paint Chip	Interior	Master Bath Wall (4)	Fair	White	Sheetrock	
NHA-131-LP-1	D	Paint Chip	Exterior	Rafter	Poor	White	Wood	
NHA-131-LP-2	D	Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	
NHA-131-LP-3	С	Paint Chip	Interior	Hallway	Fair	White	Sheetrock	
NHA-131-LP-4	С	Paint Chip	Interior	Living Rm. Window (1)	Good	White	Wood	

Footnotes:

1 - Denotes building number and function as represented on the Functional Space Maps included in Appendix 1.

2 - Condition represents either the condition of the "parent" bulk material sample (e.g., floor tile) or the associated material such as a mastic, glue, or adhesive if sampled independent from the parent material.

Functional Space room numbers are shown in parentheses () that correspond to the maps included in Appendix 1.


TABLE 3: SUMMARY OF MOLD SURFACE TAPE BULK SAMPLE LOCATIONSNAVAJO HOUSING AUTHORITY - OJO AMARILLO NHA #15-32Ojo Amarillo, San Juan County, New Mexicoiina ba, Inc. Project No.: 20-042-03



Interior/ExteriorFunctional Space Condition ² ColorSubstrateCommenInteriorLiving Room (1)GoodWhiteSheetrockInteriorBathroom (5)GoodWhiteSheetrockInteriorKitchen (2)GoodWhiteSheetrockInteriorLiving Room (1)GoodWhiteSheetrockExteriorBedroom (7)GoodWhiteSheetrock	
Interior Living Room (1) Good White Sheetrock Model Interior Bathroom (5) Good White Sheetrock Model Interior Kitchen (2) Good White Sheetrock Model Interior Kitchen (2) Good White Sheetrock Model Interior Living Room (1) Good White Sheetrock Model Exterior Bedroom (7) Good White Sheetrock Model	Bulk Sample Material
InteriorBathroom (5)GoodWhiteSheetrockInteriorKitchen (2)GoodWhiteSheetrockInteriorLiving Room (1)GoodWhiteSheetrockExteriorBedroom (7)GoodWhiteSheetrock	Surface Tape
InteriorKitchen (2)GoodWhiteSheetrockInteriorLiving Room (1)GoodWhiteSheetrockExteriorBedroom (7)GoodWhiteSheetrock	Surface Tape
Interior Living Room (1) Good White Sheetrock Exterior Bedroom (7) Good White Sheetrock	Surface Tape
Exterior Bedroom (7) Good White Sheetrock	Surface Tape
	Surface Tape

Footnotes:

1 - Denotes building number and function as represented on the Functional Space Maps included in Appendix 1.

2 - Condition represents either the condition of the "parent" bulk material sample (e.g., floor tile) or the associated material such as a mastic, glue, or adhesive if sampled independent from the parent material.

Functional Space room numbers are shown in parentheses () that correspond to the maps included in Appendix 1.

Building Function ¹	Bulk Sample Material	% ACM Present ²	Functional Space	Condition ³	Color	Photograph Available	Quantity Presen
Bedroom Unit	VCT Mastic	5-10% Chrysotile	Living Room (1)	Good	Black	Yes	
-Bedroom Unit	VCT Mastic	1-3% Chrysotile	Living Room (1)	Good	Black	Yes	
-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Bedroom #1 (7)	Good	Black	Yes	138 SF
l-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Bedroom #4 (10)	Good	Black	Yes	100 SF
-Bedroom Unit	Transite	10-20% Chrysotile	Laundry Room (3)	Good	Gray	Yes	65 SF
l-Bedroom Unit	Roof Penetration Mastic	5.8% Chrysotile	Roof	Good	Black/Gray	Yes	L
-Bedroom Unit	Roof Penetration Mastic	3.43% Chrysotile	Roof	Good	Black/Gray	Yes	8-10 SF
-Bedroom Unit	VCT	1-3% Chrysotile	Living Room (1)	Good	Beige/Tan	Yes	13 606
-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Living Room (1)	Good	Black	Yes	292 JF
-Bedroom Unit	VCT	1-3% Chrysotile	Bedroom #3 (8)	Good	Beige/Tan	Yes	
-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Bedroom #3 (8)	Good	Black	Yes	T18.3 SF
-Bedroom Unit	VCT	1-3% Chrysotile	Bedroom #2 (7)	Good	Beige/Tan	Yes	17 0 0 7 1
-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Bedroom #2 (7)	good	Black	Yes	JC C.011
-Bedroom Unit	VCT	5-10% Chrysotile	Living Room (1)	Good	Peach/Tan	Yes	288 SF
-Bedroom Unit	Transite	10-20% Chrysotile	Laundry Room (10)	good	Gray	Yes	44 SF
Bedroom Unit	Roof Penetration Mastic	5.07% Chrysotile	Roof	Fair	Black	Yes	
-Bedroom Unit	Roof Penetration Mastic	8.07% Chrysotile	Roof	Fair	Black	Yes	8-10 SF
-Bedroom Unit	Roof Penetration Mastic	3.59% Chrysotile	Roof	Fair	Black	Yes	
-Bedroom Unit	VCT	1-3% Chrysotile	Living Room (1)	Good	Beige/Tan	Yes	13 700
-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Living Room (1)	Good	Black	Yes	280 JF
3-Bedroom Unit	VCT	1-3% Chrysotile	Bedroom #3 (6)	good	Beige/Tan	Yes	133 E C F
3-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Bedroom #3 (6)	Good	Black	Yes	
3-Bedroom Unit	VCT	1-3% Chrysotile	Master Bedroom (5)	Fair	Beige/Tan	Yes	1 <i>6</i> 6 CE
3-Bedroom Unit	VCT Mastic	5-10% Chrysotile	Master Bedroom (5)	Fair	Black	Yes	
3-Bedroom Unit	VCT Mastic	3-5% Chrysotile	Kitchen (9)	Fair	Black	Yes	76.5 SF
3-Bedroom Unit	VCT Mastic	3-5% Chrysotile	Bedroom #3 (6)	Fair	Black	Yes	132.5 SF
3-Bedroom Unit	Linoleum	10-20% Chrysotile	Utility Room (8)	Fair	Brown	Yes	72.3 SF
-Bedroom Unit	Linoleum	5-10% Chrysotile	Bathroom (7)	Fair	Brown	Yes	37.4 SF
3-Bedroom Unit	Linoleum	5-10% Chrysotile	Master Bathroom (4)	Fair	Brown	Yes	40 SF
-Redroom Unit	Transite	10-20% Chrysotile	11tility Room (8)	PUUS		M	40 CE

 TABLE 4: SUMMARY OF POSITIVE ASBESTOS-CONTAINING MATERIAL BULK SAMPLES RESULTS

 NAVAJO HOUSING AUTHORITY – OJO AMARILLO NHA #15-32

 Ojo Amarillo, San Juan County, New Mexico







TABLE 4 continued: SUMMARY OF POSITIVE ASBESTOS-CONTAINING MATERIAL BULK SAMPLES RESULTS NAVAJO HOUSING AUTHORITY – OJO AMARILLO NHA #15-32 Ojo Amarillo, San Juan County, New Mexico

iiná bá, Inc. Project No. – 20-042-03

Building/Sample No. ¹	Building Function ¹	Bulk Sample Material	% ACM Present ²	Functional Space	Condition ³	Color	Photograph Available	Quantity Present
NHA-125-19	3-Bedroom Unit	Roof Penetration Mastic	11.51% Chrysotile	Roof	Fair	Black/Beige	Yes	
NHA-125-20	3-Bedroom Unit	Roof Penetration Mastic	10.94% Chrysotile	Roof	Fair	Black/Beige	Yes	8-10 SF
NHA-125-21	3-Bedroom Unit	Roof Penetration Mastic	7.59% Chrysotile	Roof	Fair	Black/Beige	Yes	
NHA-131-01	5-Bedroom Unit	VCT Mastic	1-3% Chrysotile	Bathroom (9)	Good	Black	Yes	52.3 SF
NHA-131-02	5-Bedroom Unit	VCT Mastic	3-5% Chrysotile	Dining Room/Kitchen (11)	Good	Black	Yes	218.5 SF
NHA-131-03	5-Bedroom Unit	VCT Mastic	1-3% Chrysotile	Living Room (1)	Good	Black	Yes	270 SF
NHA-131-12	5-Bedroom Unit	Transite	5-10% Chrysotile	Utility Room (10)	Good	Gray	Yes	8 SF
NHA-131-19	5-Bedroom Unit	Roof Penetration	7.34% Chrysotile	Roof	Poor	Black	Yes	
NHA-131-20	5-Bedroom Unit	Roof Penetration	9.07% Chrysotile	Roof	Poor	Black	Yes	8-10 SF
NHA-131-21	5-Bedroom Unit	Roof Penetration	5.39% Chrysotile	Roof	Poor	Black	Yes	

¹ – Denotes building number and function as represented on the Functional Space Maps included in Appendix 1.
 ² – Denotes percentage of ACM as Chrysotile asbestos. Concentrations at or above 1% are regulated.
 ³ – Condition" represents either the condition of the "parent" bulk material samples (*e.g.*, floor tile) or the associated material such as a mastic, glue, or adhesive if sampled independent from the parent material. Functional Space room numbers are shown in parentheses () that correspond to the maps included in Appendix 1.



Footnotes:



TABLE 5: SUMMARY OF LEAD PAINT CHIP BULK SAMPLE RESULTSNAVAJO HOUSING AUTHORITY - OJO AMARILL NHA #15-32Ojo Amarillo, San Juan County, New Mexicoiina ba, Inc. Project No.: 20-042-03



Building/Sample No. ¹	Wall Code	Bulk Sample Material	Interior/Exterior	Functional Space	Condition ²	Color	Substrate	Concentration
NHA-62-LP-1	D	Paint Chip	Exterior	Wall	Fair	Tan	Concrete	8.9
NHA-62-LP-2	D	Paint Chip	Exterior	Rafter	Fair	White	Wood	<7.9
NHA-62-LP-3	С	Paint Chip	Interior	Kitchen (9)	Poor	White	Sheetrock	<1.9
NHA-118-LP-1	А	Paint Chip	Exterior	Rafter	Fair	White	Wood	3.4
NHA-118-LP-2	А	Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	13.0
NHA-118-LP-3	А	Paint Chip	Exterior	Wall	Fair	Tan	Concrete	5.5
NHA-120-LP-1	A	Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	11.0
NHA-120-LP-2	А	Paint Chip	Exterior	Rafter	Fair	White	Wood	5.1
NHA-125-LP-1	А	Paint Chip	Exterior	Rafter	Fair	White	Wood	15.0
NHA-125-LP-2	A	Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	24.0
NHA-125-LP-3	А	Paint Chip	Interior	Master Bath Wall (4)	Fair	White	Sheetrock	2.3
NHA-131-LP-1	D	Paint Chip	Exterior	Rafter	Poor	White	Wood	5.2
NHA-131-LP-2	D	Paint Chip	Exterior	Roof Trim	Fair	Brown	Wood	8.1
NHA-131-LP-3	С	Paint Chip	Interior	Hallway (2)	Fair	White	Sheetrock	2.8
NHA-131-LP-4	С	Paint Chip	Interior	Living Rm. Window (1)	Good	White	Wood	<2.2

Footnotes:

1 - Denotes building number and function as represented on the Functional Space Maps included in Appendix 1.

2 - Condition represents either the condition of the "parent" bulk material sample (e.g., sheetrock) or the painted surface itself.

3 - Concentrations are in milligrams per kilogram (mg/Kg). Lead paint is designated as containing 5,000 mg/Kg lead.

Less than symbol (<) indicates a concentration less than the listed reporting limit (RL).

Functional Space room numbers are shown in parentheses () that correspond to the maps included in Appendix 1.



TABLE 6: SUMMARY OF MOLD SURFACE TAPE BULK SAMPLE RESULTSNAVAJO HOUSING AUTHORITY - OJO AMARILLO NHA #15-32Ojo Amarillo, San Juan County, New Mexicoiina ba, Inc. Project No.: 20-042-03



Building/Sample No. ¹	Wall Code	Bulk Sample Material	Interior/Exterior	Functional Space	Condition ²	Color	Substrate	Results
NHA-62	C	Surface Tape	Interior	Living Room (1)	Good	White	Sheetrock	No Spores Detected
NHA-118	A	Surface Tape	Interior	Bathroom (5)	Good	White	Sheetrock	No Spores Detected
NHA-120	Е	Surface Tape	Interior	Kitchen (2)	Good	White	Sheetrock	Alternaria Detected
NHA-125	Е	Surface Tape	Interior	Living Room (1)	Good	White	Sheetrock	No Spores Detected
NHA-131	Е	Surface Tape	Interior	Bedroom (7)	Good	White	Sheetrock	No Spores Detected

Footnotes:

1 - Denotes building number and function as represented on the Functional Space Maps included in Appendix 1.

2 - Condition represents either the condition of the "parent" bulk material sample (e.g., floor tile) or the associated material such as a mastic, glue, or adhesive if sampled independent from the parent material.

Functional Space room numbers are shown in parentheses () that correspond to the maps included in Appendix 1.





PHOTOGRAPHIC DOCUMENTATION OF HAZARDOUS BUILDING MATERIALS Navajo Housing Authority – Ojo Amarillo (Phase 4) Modernization Ojo Amarillo, San Juan County, New Mexico



Photographed by:	Matthew Bennalley (iiná bá, Inc.)
Photograph Period:	Monday, August 17 and Tuesday, August 18, 2020
NHA RFP No.:	474
Contract Owner:	Navajo Housing Authority



Photograph 1: View of typical tan/beige floor tile with black mastic testing positive for asbestos.



Photograph 2: View of typical gray transite panel testing positive for asbestos.



Photograph 3: View of typical gray/black roof penetration mastic testing positive for asbestos.



Photograph 4: View of typical VCT with white and gray-brown streaks testing positive for asbestos.

Bid Summary: Ojo Amarillo 3-Bedroom Unit ACM Abatement 2020

	LABOR		
	OPERATION	# OF UNITS	TOTAL
1	Project Management/Administration	1	\$825.60
2	Close-Out Documentation	1	\$2,288.40
3	Mobilization/Travel	1	\$1,216.80
4	Site Remediation Activities	1	\$6,516.00
	TOTAL LABOR		\$10,846.80

MATERIALS

	MATERIAL	# OF UNITS	TOTAL
1	Air Hog Usage (week)	1	\$900.00
2	Mastic Remover (ea.)	4	\$682.00
3	Plastic Sheeting (roll)	4	\$480.00
4	PPE Supplies (ea.)	1	\$600.00
5	17" Floor Maintainer (week)	1	\$450.00
6	Asbestos Bags (ea.)	100	\$120.00
7	Asbestos Tape (box)	1	\$123.00
8	Generator (unit/week)	2	\$900.00
9	Hauling of Asbestos Waste (load)	2	\$960.00
10	Mileage (mi.)	200	\$138.00
	TOTAL MATERIALS		\$5,353.00

SUBCONTRACTORS

	SUBCONTRACTOR NAME	TOTAL
1	Contract Environmental Services	\$1,000.00
	TOTAL SUBCONTRACTORS	\$1,000.00

TOTAL BEFORE TAXES	\$17,199.80	
NN BUSINESS TAX (6.0%)	\$1,031.99	
GRAND TOTAL	\$18,231.79	per unit

Bid Summary: Ojo Amarillo 4-Bedroom Unit ACM Abatement 2020

	LABOR		
	OPERATION	# OF UNITS	TOTAL
1	Project Management/Administration	1	\$825.60
2	Close-Out Documentation	1	\$2,288.40
3	Mobilization/Travel	1	\$1,216.80
4	Site Remediation Activities	1	\$6,950.40
	TOTAL LABOR		\$11,281.20

MATERIALS

	MATERIAL	# OF UNITS	TOTAL
1	Air Hog Usage (week)	1	\$900.00
2	Mastic Remover (ea.)	4	\$682.00
3	Plastic Sheeting (roll)	4	\$480.00
4	PPE Supplies (ea.)	1	\$600.00
5	17" Floor Maintainer (week)	1	\$450.00
6	Asbestos Bags (ea.)	100	\$120.00
7	Asbestos Tape (box)	1	\$123.00
8	Generator (unit/week)	2	\$900.00
9	Hauling of Asbestos Waste (load)	2	\$960.00
10	Mileage (mi.)	200	\$138.00
	TOTAL MATERIALS		\$5,353.00

SUBCONTRACTORS

	SUBCONTRACTOR NAME	TOTAL
1	Contract Environmental Services	\$1,200.00
	TOTAL SUBCONTRACTORS	\$1,200.00

TOTAL BEFORE TAXES	\$17,834.20	
NN BUSINESS TAX (6.0%)	\$1,070.05	
GRAND TOTAL	\$18,904.25	per unit

Bid Summary: Ojo Amarillo 5-Bedroom Unit ACM Abatement 2020

	LABOR		
	OPERATION	# OF UNITS	TOTAL
1	Project Management/Administration	1	\$825.60
2	Close-Out Documentation	1	\$2,288.40
3	Mobilization/Travel	1	\$1,216.80
4	Site Remediation Activities	1	\$8,688.00
	TOTAL LABOR		\$13,018.80

MATERIALS

	MATERIAL	# OF UNITS	TOTAL
1	Air Hog Usage (week)	1	\$900.00
2	Mastic Remover (ea.)	4	\$682.00
3	Plastic Sheeting (roll)	4	\$480.00
4	PPE Supplies (ea.)	1	\$600.00
5	17" Floor Maintainer (week)	1	\$450.00
6	Asbestos Bags (ea.)	100	\$120.00
7	Asbestos Tape (box)	1	\$123.00
8	Generator (unit/week)	2	\$900.00
9	Hauling of Asbestos Waste (load)	2	\$960.00
10	Mileage (mi.)	200	\$138.00
	TOTAL MATERIALS		\$5,353.00

SUBCONTRACTORS

	SUBCONTRACTOR NAME	TOTAL
1	Contract Environmental Services	\$1,500.00
	TOTAL SUBCONTRACTORS	\$1,500.00

TOTAL BEFORE TAXES	\$19,871.80	
NN BUSINESS TAX (6.0%)	\$1,192.31	
GRAND TOTAL	\$21,064.11	per unit

Water & Wastewater & Solid Waste & Roads & Stormwater & Subdivisions & Surveying & GIS



APPENDIX 3 — CERTIFIED LABORATORY ANALYTICAL RESULTS (WITH CHAIN-OF -CUSTODY RECORDS) Hazardous Materials Testing Report Ojo Amarillo (Phase 4) Modernization Ojo Amarillo, San Juan County, New Mexico Iina ba, Inc. Project No.: 20-042-03







PREPARED FOR: NAVAJO HOUSING AUTHORITY P.O. BOX 4980 WINDOW ROCK, ARIZONA 86515

> PREPARED BY: *IINÁ BÁ*, INC. 1812 SCHOFIELD LANE FARMINGTON, NM 87401 www.iinábá.com PHONE: (505) 327-1072 FAX: (505) 327-1517 SEPTEMBER 2020

Hydrology Air Quality ESA Soil Investigations SPCC Water Rights LUST



27-Aug-2020

John Isham iina ba, inc. 1812 Schofield Lane Farmington, NM 87401

Re: NHA #15-32 OJO AMARILLO

Work Order: 20080692

Dear John,

ALS Environmental received 16 samples on 20-Aug-2020 11:19 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is ZZ.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Joe Ribar Shawn Smythe Project Manager

Report of Laboratory Analysis

ANY DREAD BAY CORE Part of the ACAY dependence Laturp. A Complete Beathers Found of Company-

Environm Intel

www.alsglobal.com

RIGHT SOLUTIONS AIGHT PARTNER

Client:iina ba, inc.Project:NHA #15-32 OJO AMARILLOWork Order:20080692

3

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
20080692-01	NHA-62-01	Bulk		8/18/2020	8/20/2020 11:19	
20080692-02	NHA-62-02	Bulk		8/18/2020	8/20/2020 11:19	
20080692-03	NHA-62-03	Bulk		8/18/2020	8/20/2020 11:19	
20080692-04	NHA-62-04	Bulk		8/18/2020	8/20/2020 11:19	
20080692-05	NHA-62-05	Bulk		8/18/2020	8/20/2020 11:19	
20080692-06	NHA-62-06	Bulk		8/18/2020	8/20/2020 11:19	
20080692-07	NHA-62-07	Bulk		8/18/2020	8/20/2020 11:19	
20080692-08	NHA-62-08	Bulk		8/18/2020	8/20/2020 11:19	
20080692-09	NHA-62-09	Bulk		8/18/2020	8/20/2020 11:19	
20080692-10	NHA-62-10	Bulk		8/18/2020	8/20/2020 11:19	
20080692-11	NHA-62-11	Bulk		8/18/2020	8/20/2020 11:19	
20080692-12	NHA-62-12	Bulk		8/18/2020	8/20/2020 11:19	
20080692-13	NHA-62-13	Bulk		8/18/2020	8/20/2020 11:19	
20080692-14	NHA-62-14	Bulk		8/18/2020	8/20/2020 11:19	
20080692-15	NHA-62-15	Bulk		8/18/2020	8/20/2020 11:19	
20080692-16	NHA-62-16	Bulk		8/18/2020	8/20/2020 11:19	

Date: 27-Aug-20

ALS Environmental

Client:	iina ba, inc.
Project:	NHA #15-32 OJO AMARILLO
Work Order:	20080692

Case Narrative

It is the responsibility of the client to notify the lab of any certification requirements in writing via the chain of custody as this may determine the preparation and analytical procedures employed.

Laboratory accreditation does not in any way constitute approval or endorsement by any accrediting body or agency of the federal government. Please contact ALS Cincinnati QA/QC Manager for accreditation identifications and certifications.

All sample collection is performed outside of ALS and is the sole responsibility of the client. Sample condition acceptable upon receipt except where noted. Estimates of concentration are semi-quantitative and are made on an area basis. Results apply only to portions of samples analyzed. Samples disposed after 60 days.

All analytical data (results) and technical content (comments) related to the preparation and analysis of the samples stated herein is the responsibility of the analyst. Raw data is reviewed and validated by a qualified peer analyst and imported into the Laboratory Information Management System (LIMS) where it is formatted by the cover letter signatory charged with compiling and sending the final LIMS generated report to the client.

The reporting limit (RL) for asbestos in bulk materials is 1% and is a function of the quantity of sample analyzed, the nature of any matrix interferences, sample preparation, and fiber size and distribution. Results reported as ND indicate that no asbestos was detected. Results reported as Trace indicate that asbestos was detected at some level confidently determined to be <1% which is considered inconclusive according to New York ELAP.

ALS performs variety of PLM methods for asbestos in bulk building materials including EPA 600/R-93/116, NIOSH 9002, ELAP 198.1, and ELAP 198.6. In addition, we perform a modified uncertified version of EPA 600/R-04/004 for asbestos in vermiculite which reports asbestos as present or absent only, an in-house developed uncertified method ALS SOP ENV 004 for asbestos in soil, and asbestos in soil by ASTM D7521.

Regardless of the method requested, all samples are examined according to mandatory method protocol. Any optional method protocol are eliminated from the initial analysis but may be performed upon client request. These may include; insufficient sample volume rejection*, phase separation of layered or heterogeneous samples, ashing to remove organic interferences, acid dissolution to remove mineral carbonate interferences, point counting**, and analysis by transmission electron microscopy (TEM) is recommended to verify all ND PLM results.

All samples are examined by stereomicroscope for the determination of homogeneity, texture, friability, color, and extent of fibrous components. Non-asbestos materials such as foil, paper, metal, plastic, pebbles, or organic debris are ignored and a subsample of the remaining material homogenized by some means for examination by polarized light microscope (PLM). Information obtained via both stereomicroscope and PLM are used in the final qualitative and quantitative analysis of fibrous components.

NOTE: Any visible building debris in soil samples such as pieces of drywall, roofing material,

Client:iina ba, inc.Project:NHA #15-32 OJO AMARILLOWork Order:20080692

insulation, concrete, etc., are not included in the soil analysis. If present, these are considered possible asbestos containing materials (ACM) and may be analyzed as separate samples upon client request.

*Sufficient sample volume is material dependent. For samples such as floor tiles, roofing felts, sheet insulation, etc., three to four square inches of the layered material is preferred. For materials such as ceiling tiles, loose fill insulation, pipe insulation, etc., one cubic inch (~15cc) is preferred. For samples of thin coating materials such as paints, mastics, spray plasters, etc., a smaller sample size may be suitable. For vermiculite analysis, a one gallon ziploc bag full of dry, loose material is acceptable. For ENV 004 soil samples, a 4oz jar is recommended. The ASTM D7521 Soil method requires a minimum of 8oz and a maximum of 16oz of homogeneous soil.

**PLM samples at or near the 1% detection limit may be analyzed by the 400 point count analysis which refers to method EPA 600/M4/82/020, or AHERA method EPA 40 CFR Part 763, Sub. E, App. E as these are synonymous

Client:

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080692
Lab ID:	20080692-01A			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-62-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		Tan			
Description		Tile			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

ALS Environmental

Date: 27-Aug-20

Work Order: 20080692

Client: iin Project: NI	a ba, inc. HA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-02A			Colle	action Date: 8/18/2020
Client Sample ID:	NHA-62-02				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM					Date Analyzed 8/26/2020
Macroscopic Exami	nation	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Minera	als			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: iina ba, inc. Project: NHA #15-32 (DJO AMARILLO			Work Order: 20080692
Lab ID: 20080692-0	2B		Collec	etion Date: 8/18/2020
Client Sample ID: NHA-62-02				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 8/	26/2020	E600/R-93/116	Analyst: MRS
Color	Yellow			
Description	Mastic			
Homogeneity	Layered			
Texture	Resinous			
Other Materials			E600/R-93/116	
Cellulose	>1<=3	%		
Fiberglass	ND	%		
Non-fibrous	>10<=20	%		
Other fibers	ND	%		
Resin/binder	>70<=80	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: ii Project: N	na ba, inc. IHA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-03A			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-62-03				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	1				Date Analyzed 8/26/2020
Macroscopic Exam	ination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		Tan			-
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-03B			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-62-03				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		Yellow			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>70<=80	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	B	ND	%		
Total asbestos		ND	%		

Client: iir Project: NI	na ba, inc. HA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-04A			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-62-04				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM					Date Analyzed 8/26/2020
Macroscopic Exami	nation	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		White			-
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>3<=5	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Miner	als			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Note:

AR Page 7 of 18

ALS Environmental

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Client: i Project: N	ina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-04B			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-62-04				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM	Λ				Date Analyzed 8/26/2020
Macroscopic Exan	nination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-05A			Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-62-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-05B			Colleg	ction Date: 8/18/2020
Client Sample ID	: NHA-62-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials	a			E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	Ð	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-06A			Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-62-06				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>3<=5	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080692
Lab ID:	20080692-06B			Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-62-06				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		Beige			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Client: ii Project: N	ina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080692
Lab ID:	20080692-07A			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-62-07				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	I with Ashing				Date Analyzed 8/26/2020
Macroscopic Exam	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			-
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		
Lab ID:	20080692-08A			Collec	ction Date: 8/18/2020
Client Sample ID:	NHA-62-08				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM	with Ashing				Date Analyzed 8/26/2020
Macroscopic Exam	ination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
		ND	%		
Anthophyllite					
Anthophyllite Chrysotile		ND	%		
Anthophyllite Chrysotile Crocidolite		ND ND	%		
Anthophyllite Chrysotile Crocidolite Tremolite - actinolite		ND ND ND	% % %		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080692
Lab ID:	20080692-09A			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-62-09				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		
Lab ID:	20080692-10A			Collec	ction Date: 8/18/2020
Client Sample ID	NHA-62-10				Matrix: BULK
Analyses		Result	Units		Analytical Results
Ashastas hy Pl	M with Ashina				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		

Project: N	ina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080692
Lab ID:	20080692-11A			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-62-11				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	/ with Ashing				Date Analyzed 8/26/2020
Macroscopic Exan	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			•
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		
Lab ID:	20080692-12A			Collec	ction Date: 8/18/2020
Client Sample ID:	NHA-62-12				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	I with Ashing				Date Analyzed 8/26/2020
Macroscopic Exam	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	rals			E600/R-93/116	
		ND	%		
Amosite		ND	%		
Amosite Anthophyllite					
Amosite Anthophyllite Chrysotile		ND	%		
Amosite Anthophyllite Chrysotile Crocidolite		ND ND	% %		
Amosite Anthophyllite Chrysotile Crocidolite Tremolite - actinolite		ND ND ND	% % %		

Client:iina ba, inc.Project:NHA #15-32 (DJO AMARILLO			Work Order: 20080692
Lab ID: 20080692-1	3A		Collec	tion Date: 8/18/2020
Client Sample ID: NHA-62-13				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 3	B/26/2020	E600/R-93/116	Analyst: MRS
Color	Grey			
Description	Material			
Homogeneity	Homogeneous			
Texture	Compact			
Other Materials			E600/R-93/116	
Cellulose	ND	%		
Fiberglass	ND	%		
Non-fibrous	>70<=80	%		
Other fibers	ND	%		
Resin/binder	>10<=20	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080692
Lab ID:	20080692-14A			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-62-14				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		Grey			-
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: ii Project: N	na ba, inc. IHA #15-32 OJO	AMARILLO			Work Order: 20080692	
Lab ID:	ID: 20080692-15A			Collection Date: 8/18/2020		
Client Sample ID:	NHA-62-15		Matrix: BULK		Matrix: BULK	
Analyses		Result	Units		Analytical Results	
Asbestos by PLM					Date Analyzed 8/26/2020	
Macroscopic Exam	ination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS	
Color		Grey			-	
Description		Material				
Homogeneity		Homogeneous				
Texture		Compact				
Other Materials				E600/R-93/116		
Cellulose		ND	%			
Fiberglass		ND	%			
Non-fibrous		>70<=80	%			
Other fibers		ND	%			
Resin/binder		>10<=20	%			
Asbestiform Mine	rals			E600/R-93/116		
Amosite		ND	%			
Anthophyllite		ND	%			
Chrysotile		ND	%			
Crocidolite		ND	%			
Tremolite - actinolite		ND	%			
Total asbestos		ND	%			

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080692
Lab ID: 20080692-16A			Collection Date: 8/18/2020		
Client Sample ID:	NHA-62-16				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM					Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: MRS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mine	erais			E600/R-93/116	
Amosite		ND	%		
Anthophyllite	Anthophyllite		%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

MS

MSD

PDS

PQL

SDL

SW

Units Reported

%

Matrix Spike

Matrix Spike Duplicate

Practical Quantitaion Limit

Description

Sample Detection Limit

SW-846 Method

Post Digestion Spike

Client: Project:	iina ba, inc.	QUALIFIERS, ACRONYMS, UNITS					
WorkOrder:	20080692						
Qualifier	Description						
*	Value exceeds Regulatory Limit						
а	Not accredited						
В	Analyte detected in the associated Method Blank above the Reporting Limit						
Е	Value above quantitation range	Value above quantitation range					
Н	Analyzed outside of Holding Time						
J	Analyte detected below quantitation limit						
n	Not offered for accreditation						
ND	Not Detected at the Reporting Limit						
0	Sample amount is > 4 times amount spiked						
Р	Dual Column results percent difference > 40%						
R	RPD above laboratory control limit						
S	Spike Recovery outside laboratory control limits						
U	Analyzed but not detected above the MDL						
Acronym	Description						
DUP	Method Duplicate						
Е	EPA Method						
LCS	Laboratory Control Sample						
LCSD	Laboratory Control Sample Duplicate						
MBLK	Method Blank						
MDL	Method Detection Limit						
MQL	Method Quantitation Limit						

Sample Receipt Checklist

Client Name: IINABA-FARMINGTON		Date/Time Received: 20-Aug-20 11:19				
Work Order: 20080692		Received by	y: <u>C</u>	<u>DNS</u>		
Checklist completed by Jan Wilcox	20-Aug-20 Date	Reviewed by:	Shawn Sr eSignature	mythe		21-Aug-20 Date
Matrices: <u>bulk</u> Carrier name: <u>FedEx</u>					ų.	
Shipping container/cooler in good condition?	Yes 🗸	No	Not Presen	t 🗔		
Custody seals intact on shipping container/cooler?	Yes	No 🗌	Not Presen	t 🗹		
Custody seals intact on sample bottles?	Yes	No	Not Presen	t 🗹		
Chain of custody present?	Yes 🗸	No				
Chain of custody signed when relinquished and received?	Yes 🗸	No				
Chain of custody agrees with sample labels?	Yes 🗸	No				
Samples in proper container/bottle?	Yes 🗸	No				
Sample containers intact?	Yes 🗹	No				
Sufficient sample volume for indicated test?	Yes 🗸	No				
All samples received within holding time?	Yes 🖌	No 🗌				
Container/Temp Blank temperature in compliance?	Yes 🗸	No 🗌				
Sample(s) received on ice? Temperature(s)/Thermometer(s):	Yes	No 🖌				
Cooler(s)/Kit(s):						
Date/Time sample(s) sent to storage:						
Water - VOA vials have zero headspace?	Yes	No 🛄	No VOA vials s	ubmitted	~	
Water - pH acceptable upon receipt?	Yes	No	N/A			
рН adjusted? pH adjusted by:	Yes 🗌	No	N/A 🗹			

Login Notes:

Client Contacted:	Date Contacted:	Person Contacted:
Contacted By:	Regarding:	
Comments:		
CorrectiveAction:		
		S

SRC Page 1 of 1
ANALYTICAL REQUEST FORM

	ALS LADOFATORY GENELOS	
7	0080692	(A

1. X REGULAR Status

RUSH Status Requested - ADDITIONAL CHARGE
RESULTS REQUIRED BY
DATE

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

2.	Date 8/19/2020	Purchase Order No.	20-042-03	4.
) .	Company Name	INA BA INC		
	Address 1812 \$	SCHOFIELD LANE		5.
	FARMINGTON	I, NM 87401		
	Person to Contact	JOHN R ISHAM, CP	G	
	Telephone	505-327-1072		
Fax Telephone		505-327-1517		
	E-mail Address jis	sham@iinaba.com		
	Billing Address			
	SAME AS ABC	VE		

ager Chris Amidon
on
NHA #15-32 OJO AMARILLO
\$
n AUGUST 18, 2020
t AUGUST 19, 2020
No 062-01

6. REQUEST FOR ANALYSES

(

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-62- 0	BULK		ACM	4
	02	BULK		ACM	4
	03	BULK -		ACM	4
	04	BULK		ACM	4
	05	BULK		ACM	4
	06	BULK		ACM	4
	50	BULK		ACM	4
	07	BULK		ACM	4
	09	BULK		ACM	4
	10	BULK		ACM	4
	18	BULK		ACM	4

Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other
 ** 1. mg/sample
 2. mg/m³
 3. ppm
 4. %
 5. _____ (other)
 Please indicate one or more units in the column entitled Units**
 Comments

Possible Contamination and/or Chemical Hazards	hour
Relinquished by	Date/Time AUGUT 19, 2023 /6:3
Received by	Date/Time
Relinquished by	Date/Time
Received by	Date/Time
Relinquished by	Date/Time
Received by	Date/Time

4388 Glendale Milford Rd, Cincinnati, OH 45242

242 513-733-5336 / FAX: 513-733-5347 ALS Laboratory Group

ANALYTICAL REQUEST FORM



1. 🕅 REGULAR Status

RUSH Status Requested - ADDITIONAL CHARGE
 RESULTS REQUIRED BY
 DATE

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

2. Date 8/19/2020 Purchase Order No. 20-042-03	4. Quote No.
3. Company Name IINA BA INC	ALS Project Manager Chris Amidon
Address 1812 SCHOFIELD LANE	5. Sample Collection
FARMINGTON, NM 87401	Sampling Site NHA #15-32 OJO AMARILLO
Person to Contact JOHN R ISHAM, CPG	Industrial Process
Telephone 505-327-1072	Date of Collection AUGUST 18, 2020
Fax Telephone 505-327-1517	Time Collected
E-mail Address jisham@linaba.com	Date of Shipment AUGUST 19, 2020
Billing Address	Chain of Custody No 062-02
SAME AS ABOVE	

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Metrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-62- 12	BULK		ACM	4
	-13	BULK		ACM	4
	-14	BULK		ACM	4
	-15	BULK		ACM	4
	-16	BULK		ACM	4
91. 					

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other ** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. ____ (other) Please indicate one or more units in the column entitled Units** Comments

Possible Contamination and/or Chemical Hazards	NONE	
Relinquished by	Date/Time	AUGVIT 19,2020 16:30
Received by	Date/Time	8/20/20 11:19
Relinquished by	Date/Time	• • • • • • • • • • • • • • • • • • • •
Received by	Date/Time	
Relinquished by	Date/Time	
Received by	Date/Time	

4388 Glendale Milford Rd, Cincinnati, OH 45242 513-733-5336 / FAX: 513-733-5347 ALS Laboratory Group



27-Aug-2020

John Isham iina ba, inc. 1812 Schofield Lane Farmington, NM 87401

Re: NHA #15-32 OJO Amarillo

Work Order: 20080693

Dear John,

ALS Environmental received 23 samples on 20-Aug-2020 07:17 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 38.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Joe Ribar

Shawn Smythe Project Manager

Report of Laboratory Analysis

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Environmental

www.alsglobal.com

RIGHT SOLUTIONS BIGHT PARTNER

Client:iina ba, inc.Project:NHA #15-32 OJO AmarilloWork Order:20080693

Work Order Sample Summary

Lab Samp IL	Client Sample ID	<u>Matrix</u>	Tag Number	Collection Date	Date Received	Hold
20080693-01	NHA-118-01	Bulk		8/18/2020	8/20/2020	
20080693-02	NHA-118-02	Bulk		8/18/2020	8/20/2020	
20080693-03	NHA-118-03	Bulk		8/18/2020	8/20/2020	
20080693-04	NHA-118-04	Bulk		8/18/2020	8/20/2020	
20080693-05	NHA-118-05	Bulk		8/18/2020	8/20/2020	
20080693-06	NHA-118-06	Bulk		8/18/2020	8/20/2020	
20080693-07	NHA-118-07	Bulk		8/18/2020	8/20/2020	
20080693-08	NHA-118-08	Bulk		8/18/2020	8/20/2020	
20080693-09	NHA-118-09	Bulk		8/18/2020	8/20/2020	
20080693-10	NHA-118-10	Bulk		8/18/2020	8/20/2020	
20080693-11	NHA-118-11	Bulk		8/18/2020	8/20/2020	
20080693-12	NHA-118-12	Bulk		8/18/2020	8/20/2020	
20080693-13	NHA-118-13	Bulk		8/18/2020	8/20/2020	
20080693-14	NHA-118-14	Bulk		8/18/2020	8/20/2020	
20080693-15	NHA-118-15	Bulk		8/18/2020	8/20/2020	
20080693-16	NHA-118-16	Bulk		8/18/2020	8/20/2020	
20080693-17	NHA-118-17	Bulk		8/18/2020	8/20/2020	
20080693-18	NHA-118-18	Bulk		8/18/2020	8/20/2020	
20080693-19	NHA-118-19	Bulk		8/18/2020	8/20/2020	
20080693-20	NHA-118-20	Bulk		8/18/2020	8/20/2020	
20080693-21	NHA-118-21	Bulk		8/18/2020	8/20/2020	
20080693-22	NHA-118-22	Bulk		8/18/2020	8/20/2020	
20080693-23	NHA-118-23	Bulk		8/18/2020	8/20/2020	

Client:	iina ba, inc.	
Project:	NHA #15-32 OJO Amarillo	Case Narrative
Work Order:	20080693	

It is the responsibility of the client to notify the lab of any certification requirements in writing via the chain of custody as this may determine the preparation and analytical procedures employed.

Laboratory accreditation does not in any way constitute approval or endorsement by any accrediting body or agency of the federal government. Please contact ALS Cincinnati QA/QC Manager for accreditation identifications and certifications.

All sample collection is performed outside of ALS and is the sole responsibility of the client. Sample condition acceptable upon receipt except where noted. Estimates of concentration are semi-quantitative and are made on an area basis. Results apply only to portions of samples analyzed. Samples disposed after 60 days.

All analytical data (results) and technical content (comments) related to the preparation and analysis of the samples stated herein is the responsibility of the analyst. Raw data is reviewed and validated by a qualified peer analyst and imported into the Laboratory Information Management System (LIMS) where it is formatted by the cover letter signatory charged with compiling and sending the final LIMS generated report to the client.

The reporting limit (RL) for asbestos in bulk materials is 1% and is a function of the quantity of sample analyzed, the nature of any matrix interferences, sample preparation, and fiber size and distribution. Results reported as ND indicate that no asbestos was detected. Results reported as Trace indicate that asbestos was detected at some level confidently determined to be <1% which is considered inconclusive according to New York ELAP.

ALS performs variety of PLM methods for asbestos in bulk building materials including EPA 600/R-93/116, NIOSH 9002, ELAP 198.1, and ELAP 198.6. In addition, we perform a modified uncertified version of EPA 600/R-04/004 for asbestos in vermiculite which reports asbestos as present or absent only, an in-house developed uncertified method ALS SOP ENV 004 for asbestos in soil, and asbestos in soil by ASTM D7521.

Regardless of the method requested, all samples are examined according to mandatory method protocol. Any optional method protocol are eliminated from the initial analysis but may be performed upon client request. These may include; insufficient sample volume rejection*. phase separation of layered or heterogeneous samples, ashing to remove organic interferences, acid dissolution to remove mineral carbonate interferences, point counting**. and analysis by transmission electron microscopy (TEM) is recommended to verify all ND PLM results.

All samples are examined by stereomicroscope for the determination of homogeneity, texture. friability, color, and extent of fibrous components. Non-asbestos materials such as foil, paper, metal, plastic, pebbles, or organic debris are ignored and a subsample of the remaining material homogenized by some means for examination by polarized light microscope (PLM). Information obtained via both stereomicroscope and PLM are used in the final qualitative and quantitative analysis of fibrous components.

NOTE: Any visible building debris in soil samples such as pieces of drywall, roofing material,

Case Narrative Page 1 of 2

Client:	iina ba, inc.
Project:	NHA #15-32 OJO Amarillo
Work Order:	20080693

insulation, concrete, etc., are not included in the soil analysis. If present, these are considered possible asbestos containing materials (ACM) and may be analyzed as separate samples upon client request.

*Sufficient sample volume is material dependent. For samples such as floor tiles, roofing felts, sheet insulation, etc., three to four square inches of the layered material is preferred. For materials such as ceiling tiles, loose fill insulation, pipe insulation, etc., one cubic inch (~15cc) is preferred. For samples of thin coating materials such as paints, mastics, spray plasters, etc., a smaller sample size may be suitable. For vermiculite analysis, a one gallon ziploc bag full of dry, loose material is acceptable. For ENV 004 soil samples, a 4oz jar is recommended. The ASTM D7521 Soil method requires a minimum of 8oz and a maximum of 16oz of homogeneous soil.

**PLM samples at or near the 1% detection limit may be analyzed by the 400 point count analysis which refers to method EPA 600/M4/82/020, or AHERA method EPA 40 CFR Part 763, Sub. E, App. E as these are synonymous

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID:	20080693-01A			Collec	ction Date: 8/18/2020
Client Sample ID:	NHA-118-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693	
Lab ID: 20080693-01B				Collection Date: 8/18/2020		
Client Sample ID	: NHA-118-01				Matrix: BULK	
Analyses		Result	Units		Analytical Results	
Asbestos by PL	M				Date Analyzed 8/26/2020	
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS	
Color		Black				
Description		Mastic				
Homogeneity		Layered				
Texture		Resinous				
Other Materials				E600/R-93/116		
Cellulose		ND	%			
Fiberglass		ND	%			
Non-fibrous		>10<=20	%			
Other fibers		ND	%			
Resin/binder		>60<=70	%			
Asbestiform Min	erals			E600/R-93/116		
Amosite		ND	%			
Anthophyllite		ND	%			
Chrysotile		>5<=10	%			
Crocidolite		ND	%			
Tremolite - actinolite	e	ND	%			
Total asbestos		>5<=10	%			

ALS Environmental

Client: iina ba, inc. Project: NHA #15-32 OJ() Amarillo			Work Order: 20080693
Lab ID: 20080693-02A		Collection Date: 8/18/2020		ction Date: 8/18/2020
Client Sample ID: NHA-118-02				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color	Grey			
Description	Tile			
Homogeneity	Layered			
Texture	Compact			
Other Materials			E600/R-93/116	
Cellulose	ND	%		
Fiberglass	ND	%		
Non-fibrous	>70<=80	%		
Other fibers	ND	%		
Resin/binder	>10<=20	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID:	20080693-02B			Collec	ction Date: 8/18/2020
Client Sample ID:	NHA-118-02				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLI	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: iina ba, inc Project: NHA #15-	32 OJO Amarillo	Work Order: 20080693
Lab ID: 2008069	93-03A	Collection Date: 8/18/2020
Client Sample ID: NHA-11	8-03	Matrix: BULK
Analyses	Result Un	its Analytical Results
Asbestos by PLM		Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 8/26/20	D20 E600/R-93/116 Analyst: AFS
Color	Grey	
Description	Tile	
Homogeneity	Layered	
Texture	Compact	
Other Materials		E600/R-93/116
Cellulose	ND %	6
Fiberglass	ND %	6
Non-fibrous	>70<=80 %	6
Other fibers	ND %	6
Resin/binder	>10<=20 %	6
Asbestiform Minerals		E600/R-93/116
Amosite	ND %	6
Anthophyllite	ND %	6
Chrysotile	ND %	6
Crocidolite	ND %	6
Tremolite - actinolite	ND %	6
Total asbestos	ND %	6

Date: 27-Aug-20

Client: iina ba, inc. Project: NHA #15-3	2 OJO Amarillo	Work Order: 20080693
Lab ID: 20080693	3-03B	Collection Date: 8/18/2020
Client Sample ID: NHA-118	8-03	Matrix: BULK
Analyses	Result Uni	its Analytical Results
Asbestos by PLM		Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 8/26/20	20 E600/R-93/116 Analyst: AFS
Color	Black	
Description	Mastic	
Homogeneity	Layered	
Texture	Resinous	
Other Materials		E600/R-93/116
Cellulose	>5<=10 %	6
Fiberglass	ND %	6
Non-fibrous	>10<=20 %	6
Other fibers	ND %	6
Resin/binder	>60<=70 %	6
Asbestiform Minerals		E600/R-93/116
Amosite	ND %	6
Anthophyllite	ND %	6
Chrysotile	ND %	6
Crocidolite	ND %	6
Tremolite - actinolite	ND %	6
Total asbestos	ND %	6

55

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID:	20080693-04A			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-118-04				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grev			-
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: iina Project: NHA	ba, inc. A #15-32 OJO Amarillo				Work Order: 20080693
Lab ID: 20	0080693-04B			Coll	lection Date: 8/18/2020
Client Sample ID: N	HA-118-04				Matrix: BULK
Analyses	Res	ult	Units		Analytical Results
Asbestos by PLM					Date Analyzed 8/26/2020
Macroscopic Examina	ition Prep Da	ate:	8/26/2020	E600/R-93/116	Analyst: AFS
Color	BI	ack			
Description	Ма	stic			
Homogeneity	Laye	red			
Texture	Resin	ous			
Other Materials				E600/R-93/116	
Cellulose	>5<=	=10	%		
Fiberglass		ND	%		
Non-fibrous	>10<=	=20	%		
Other fibers		ND	%		
Resin/binder	>60<=	=70	%		
Asbestiform Minerals	8			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile	>1<	<=3	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos	>1<	:=3	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID: 20080693-05A				Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-118-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: i Project: N	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID: 20080693-05B				Collec	tion Date: 8/18/2020
Client Sample ID:	NHA-118-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	N				Date Analyzed 8/26/2020
Macroscopic Exan	nination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Black		1	
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID:	20080693-06A			Colle	ction Date: 8/18/2020
Client Sample ID	NHA-118-06				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Client: iina ba, inc. Project: NHA #15-32 OJO /	Amarillo			Work Order: 20080693
Lab ID: 20080693-06B			Collec	tion Date: 8/18/2020
Client Sample ID: NHA-118-06				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color	Black			
Description	Mastic			
Homogeneity	Layered			
Texture	Resinous			
Other Materials			E600/R-93/116	
Cellulose	ND	%		
Fiberglass	ND	%		
Non-fibrous	>10<=20	%		
Other fibers	ND	%		
Resin/binder	>60<=70	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	>5<=10	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID:	20080693-07A			Collec	tion Date: 8/18/2020
Client Sample ID:	NHA-118-07				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Client: iina ba, inc. Project: NHA #15-32 OJO A	Amarillo			Work Order: 20080693
Lab ID: 20080693-07B			Collec	tion Date: 8/18/2020
Client Sample ID: NHA-118-07				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color	White			
Description	Skim Coat			
Homogeneity	Layered			
Texture	Crumbly			
Other Materials			E600/R-93/116	
Cellulose	>1<=3	%		
Fiberglass	ND	%		
Non-fibrous	>90<=100	%		
Other fibers	ND	%		
Resin/binder	ND	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%	6	
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: iina ba, inc. Project: NHA #15-32 OJO 4	Amarillo			Work Order: 20080693
Lab ID: 20080693-08A		_	Collect	ion Date: 8/18/2020
Client Sample ID: NHA-118-08				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 8	/26/2020	E600/R-93/116	Analyst: AFS
Color	White			
Description	Drywall			
Homogeneity	Layered			
Texture	Crumbly			
Other Materials			E600/R-93/116	
Cellulose	>3<=5	%		
Fiberglass	ND	%		
Non-fibrous	>90<=100	%		
Other fibers	ND	%		
Resin/binder	ND	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client:iina ba, inc.Project:NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID: 20080693-08B			Collect	ion Date: 8/18/2020
Client Sample ID: NHA-118-08				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 8	/26/2020	E600/R-93/116	Analyst: AFS
Color	White			
Description	Skim Coat			
Homogeneity	Layered			
Texture	Crumbly			
Other Materials			E600/R-93/116	
Cellulose	>1<=3	%		
Fiberglass	ND	%		
Non-fibrous	>90<=100	%		
Other fibers	ND	%		
Resin/binder	ND	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: iina Project: NHA	ba, inc. A #15-32 OJO An	narillo			Work Order: 20080693
Lab ID: 2	0080693-09A			Colle	ction Date: 8/18/2020
Client Sample ID: N	HA-118-09				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM					Date Analyzed 8/26/2020
Macroscopic Examina	ation	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mineral	S			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: ii Project: N	ina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080693
Lab ID:	20080693-09B			Collec	tion Date: 8/18/2020
Client Sample ID:	NHA-118-09				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	1				Date Analyzed 8/26/2020
Macroscopic Exam	nination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture	*	Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>3<=5	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-10A			Collec	ction Date: 8/18/2020
Client Sample ID:	NHA-118-10				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLI	м				Date Analyzed 8/26/2020
Macroscopic Exar	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Client: ii Project: N	na ba, inc. IHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-11A			Collec	ction Date: 8/18/2020
Client Sample ID:	NHA-118-11				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	1				Date Analyzed 8/26/2020
Macroscopic Exam	ination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Date: 27-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-12A			Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-118-12				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Note:

 $\widetilde{\mathcal{M}}$

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-13A			Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-118-13				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Transite			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>50<=60	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>10<=20	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		>10<=20	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-14A			Collection D	ate: 8/18/2020
Client Sample ID	NHA-118-14			Mat	rix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		
Lab ID:	20080693-15A			Collection Da	ate: 8/18/2020
Client Sample ID:	NHA-118-15			Mat	rix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLI	N with Ashing				Date Analyzed 8/26/2020
Macroscopic Exar	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Choractilo		ND	%		
Chrysolae			0/		
Crocidolite		ND	70		
Crocidolite Tremolite - actinolite	•	ND ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-16A			Collection I	Date: 8/18/2020
Client Sample ID	NHA-118-16			Ma	trix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		
Lab ID:	20080693-17A			Collection D	Date: 8/18/2020
Client Sample ID:	NHA-118-17			Ma	trix: BULK
Analyses		Result	Units		Analytical Results
Asbestos bv PLI	M with Ashina				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			•
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		

Client: i Project: I	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-18A			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-118-18				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	W with Ashing				Date Analyzed 8/26/2020
Macroscopic Exar	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		5.8	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		5.8	%		
Lab ID:	20080693-19A			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-118-19				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos bv PLN	/l with Ashina				Date Analyzed 8/26/2020
Macroscopic Exam	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		3.43	%		
Crocidolite		ND	%		
			0/		
Tremolite - actinolite			70		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-20A			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-118-20			Matrix: BULK	
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: iina ba, inc. Project: NHA #15-32 OJ	O Amarillo			Work Order: 20080693
Lab ID: 20080693-21A	ab ID: 20080693-21A		Collection Date: 8/18/2020	
Client Sample ID: NHA-118-21			Matrix: BULK	
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 8	3/26/2020	E600/R-93/116	Analyst: AFS
Color	Grey			
Description	Material			
Homogeneity	Homogeneous			
Texture	Crumbly			
Other Materials			E600/R-93/116	
Cellulose	Trace	%		
Fiberglass	ND	%		
Non-fibrous	>90<=100	%		
Other fibers	ND	%		
Resin/binder	ND	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080693
Lab ID:	20080693-22A			Collection Date: 8/18/2020	
Client Sample ID:	NHA-118-22				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLI	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	•	ND	%		
Total asbestos		ND	%		

Client: iina ba, inc. Project: NHA #15-32	OJO Amarillo		Work Order: 20080693
Lab ID: 20080693 Client Sample ID: NHA-118	-23A -23	Collec	tion Date: 8/18/2020 Matrix: BULK
Analyses	Result Units		Analytical Results
Asbestos by PLM			Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date: 8/26/2020	E600/R-93/116	Analyst: AFS
Color	Grev		
Description	Material		
Homogeneity	Homogeneous		
Texture	Crumbly		
Other Materials		E600/R-93/116	
Cellulose	Trace %		
Fiberglass	ND %		
Non-fibrous	>90<=100 %		
Other fibers	ND %		
Resin/binder	ND %		
Asbestiform Minerals		E600/R-93/116	
Amosite	ND %		
Anthophyllite	ND %		
Chrysotile	ND %		
Crocidolite	ND %		
Tremolite - actinolite	ND %		
Total asbestos	ND %		

Client:	iina ba, inc.	QUALIFIERS,				
Project:	NHA #15-32 OJO Amarillo					
WorkOrder:	20080693	ACRONYMS, UNITS				
Qualifier	Description					
*	Value exceeds Regulatory Limit					
a	Not accredited					
В	Analyte detected in the associated Method Blank above the Reporting Limit					
Е	Value above quantitation range					
Н	Analyzed outside of Holding Time					
J	Analyte detected below quantitation limit					
n	Not offered for accreditation					
ND	Not Detected at the Reporting Limit					
0	Sample amount is > 4 times amount spiked					
Р	Dual Column results percent difference > 40%					
R	RPD above laboratory control limit					
S	Spike Recovery outside laboratory control limits					
U	Analyzed but not detected above the MDL					
Acronym	Description					
DUP	Method Duplicate					
Е	EPA Method					
LCS	Laboratory Control Sample					
LCSD	Laboratory Control Sample Duplicate					
MBLK	Method Blank					
MDL	Method Detection Limit					
MQL	Method Quantitation Limit					
MS	Matrix Spike					
MSD	Matrix Spike Duplicate					
PDS	Post Digestion Spike					
PQL	Practical Quantitaion Limit					
SDL	Sample Detection Limit					
SW	SW-846 Method					
Units Reported	Description					

%
Sample Receipt Checklist

Client Name: IINABA-FARMINGTON		Date/Time I	Received:	20-Aug-20	<u>19:17</u>
Work Order: 20080693		Received by	y :	<u>DNS</u>	
Checklist completed by Shawn Smythe	21-Aug-20 Date	Reviewed by:	Shawn S	mythe	21-Aug-20 Date
Matrices: Carrier name: <u>FedEx</u>					1
Shipping container/cooler in good condition?	Yes 🗹	No	Not Preser	nt 🗌	
Custody seals intact on shipping container/cooler?	Yes 🗌	No	Not Preser	nt 🗹	
Custody seals intact on sample bottles?	Yes	No	Not Preser	nt 🗹	
Chain of custody present?	Yes 🗹	No 🗌			
Chain of custody signed when relinquished and received?	Yes 🗸	No			
Chain of custody agrees with sample labels?	Yes 🗹	No			
Samples in proper container/bottle?	Yes 🗹	No			
Sample containers intact?	Yes 🗸	No			
Sufficient sample volume for indicated test?	Yes 🔽	No			
All samples received within holding time?	Yes 🔽	No 🗌			
Container/Temp Blank temperature in compliance?	Yes 🗹	No 🗌			
Sample(s) received on ice? Temperature(s)/Thermometer(s):	Yes	No 🗹			
Cooler(s)/Kit(s):					
Date/Time sample(s) sent to storage:					
Water - VOA vials have zero headspace?	Yes	No	No VOA vials s	submitted	125
Water - pH acceptable upon receipt?	Yes	No 🔛	N/A		
pH adjusted? pH adjusted by:	Yes 🗔	No	N/A		

Login Notes:

Client Contacted:	Da	te Contacted:	Person Contacted:	
Contacted By:	Re	garding:		
Comments:				
CorrectiveAction:				
				SRC P

SRC Page 1 of 1

ANALYTICAL REQUEST FORM

	1. 🔀 REGULAR Status
2000693 ALS	RUSH Status Requested - ADDITIONAL CHARGE RESULTS REQUIRED BY DATE CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES
2. Date $8/19/2020$ Purchase Order No. $23 - 64$ 3. Company Name 1109 by TNC	2 - 0 3 4. Quote No. ALS Project Manager Chris Amidon
Address 1812 SCHOFIELD LANE	5. Sample Collection

Address 1812	2 Schofield LANE
FAR.	MINGTON, NM 87401
Person to Contact	JOHN R. ISHAM, CPG
Telephone	(505) 327-1072
Fax Telephone	(505) 327-1517
E-mail Address	ilshameinaba.com
Billing Address	5
5	AME AS AGOVE

ALS Project Manager Chris Amidon
Sample Collection
Sampling Site NHA # 15-32 OJD AMARILLS
Industrial Process
Date of Collection AUGUST 18,2020
Time Collected
Date of Shipment AUGUST 19,2020
Chain of Custody No // 8 - 0/

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client	Sample Number	Mat	rix"	Sample Volume	ANALYS	ES REQUESTED - Use method number if known	Units**
	NHA	-118-01	Bud	LK		AC	m	4
	1	-02	1					4
		~ 03		_		1		4
		-04			·			4
		-05						U U
		-06						4
		- 07						4
		-08						Ý
		-09						4
		- 10					,	Ϋ́
	1	-11	V					4

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other ** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. _____ (other) Please indicate one or more units in the column entitled Units** Comments ______

Possible Contami	nation and/or Chemical Hazards		
Relinquished by	John R lithon	Date/Time _ AU()UST 19, 2020 16=	30
Received by	U Mail	Date/Time 8/20/20 1120	
Relinquished by	Cur. J	Date/Time	
Received by		Date/Time	
Relinquished by		Date/Time	
Received by		Date/Time	

4388 Glendale Milford Rd, Cincinnati, OH 45242

513-733-5336 / FAX: 513-733-5347

ALS Laboratory Group

ANALYTICAL REQUEST FORM

ALS LADORA ANALYTKAL CHEMISTRY & TES		
200806	,93 🖾	



RUSH Status Requested - ADDITIONAL CHARGE
RESULTS REQUIRED BY
DATE

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

2.	Date 8/19/2020 Purchase Order No. 20-042-03	4.
3.	Company Name ISNA by ENC-	
	Address 1812 Schofield LANE	5.
	FARMINGTON, NM 87401	
	Person to Contact JOHN R. ISHAM, CPG	
	Telephone (505) 327-1072	
	Fax Telephone (505) 327-1517	
	E-mail Address 11shame ing ba. 60 M	
	Billing Address	
	SAME AS ABOVE	

Quote No.	
ALS Project Manager	Chris Amidon
Sample Collection	
Sampling Site	A #15-32 050 AMARILLO
Industrial Process	
Date of Collection	04055 18, 2020
Time Collected	
Date of Shipment	40605T19, 2020
Chain of Custody No	118-02

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-118 -12	BULK		ACM	4
	1 -13	1			1
	-14				
	-15				
	-16				
	-17				
	-18				
	-19				
	-29				
	- 21				
	-22	1		\mathbf{V}	V

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other ** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. _____ (other) Please indicate one or more units in the column entitled Units** Comments

Possible Contami	nation and/or Chemical Hajards		
Relinquished by	Jen R lithen	Date/Time HUGUST 19,2020 16:3	20
Received by	Of the Com	Date/Time 812060 11:20	
Relinquished by		Date/Time	_
Received by		Date/Time	
Relinquished by	1	Date/Time	
Received by		Date/Time	

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ANALYTICAL REQUEST FORM

ALS Laboratori, Group ANALYTICAL CHEMISTRY & TESTING SERVICES 20070693 (ALS)	
2. Date <u>8/19/2020</u> Purchase Order No. <u>20-042</u> 3. Company Name <u>1109 bg tNC</u> . Address <u>1812 Schoffeld CANE</u> <u>Address 1812 Schoffeld CANE</u> <u>Address 1812 Schoffeld CANE</u> <u>Address 1812 Schoffeld CANE</u> <u>Address 327-1072</u> Fax Telephone <u>(505) 327-1072</u> Fax Telephone <u>(505) 327-1072</u> Fax Telephone <u>(505) 327-10572</u> E-mail Address <u>JShame impa.com</u> Billing Address	4. Quote No. ALS Project Manager Chris Amidon Sample Collection Sampling Site NHA A 15-32 QTD AMAN(LLO Industrial Process Date of Collection A (205T 18, 2020 Time Collected Date of Shipment A UGVST 19, 2020 Chain of Custody No / 18 - 03
שיטעקי בוי שאיכ	

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-118-23	BULK		ACM	4

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water, Other ** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. _____ (other) Please indicate one or more units in the column entitled Units** Comments

Possible Contamination and/pr Chemical Hazards	NONE
Relinquished by ASUR L	Date/Time AUDVST 19, 2020 16:30
Received by	Date/Time
Relinquished by	Date/Time
Received by	Date/Time
Relinquished by	Date/Time
Received by	Date/Time

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26-Aug-2020

John Isham iina ba, inc. 1812 Schofield Lane Farmington, NM 87401

Re: NHA #15-32 OJO Amarillo

Work Order: 20080689

Dear John,

ALS Environmental received 25 samples on 20-Aug-2020 11:14 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 37.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Shawn Smythe Shawn Smythe Project Manager

Report of Laboratory Analysis

RECEPTIVE CORP. Fail of the Strength for some Re-impleft finitions runted compar-

Environmental

www.alsglobal.com

RIGHT SOLUTIONS HIGHT PARTNER

Client:	iina ba, inc.
Project:	NHA #15-32 OJO Amarillo
Work Order:	20080689

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
20080689-01	NHA-120-01	Bulk		8/18/2020	8/20/2020 11:20	
20080689-02	NHA-120-02	Bulk		8/18/2020	8/20/2020 11:20	
20080689-03	NHA-120-03	Bulk		8/18/2020	8/20/2020 11:20	
20080689-04	NHA-120-04	Bulk		8/18/2020	8/20/2020 11:20	
20080689-05	NHA-120-05	Bulk		8/18/2020	8/20/2020 11:20	
20080689-06	NHA-120-06	Bulk		8/18/2020	8/20/2020 11:20	
20080689-07	NHA-120-07	Bulk		8/18/2020	8/20/2020 11:20	
20080689-08	NHA-120-08	Bulk		8/18/2020	8/20/2020 11:20	
20080689-09	NHA-120-09	Bulk		8/18/2020	8/20/2020 11:20	
20080689-10	NHA-120-10	Bulk		8/18/2020	8/20/2020 11:20	{
20080689-11	NHA-120-11	Bulk		8/18/2020	8/20/2020 11:20	
20080689-12	NHA-120-12	Bulk		8/18/2020	8/20/2020 11:20	
20080689-13	NHA-120-13	Bulk		8/18/2020	8/20/2020 11:20	
20080689-14	NHA-120-14	Bulk		8/18/2020	8/20/2020 11:20	
20080689-15	NHA-120-15	Bulk		8/18/2020	8/20/2020 11:20	
20080689-16	NHA-120-16	Bulk		8/18/2020	8/20/2020 11:20	
20080689-17	NHA-120-17	Bulk		8/18/2020	8/20/2020 11:20	
20080689-18	NHA-120-18	Bulk		8/18/2020	8/20/2020 11:20	
20080689-19	NHA-120-19	Bulk		8/18/2020	8/20/2020 11:20	
20080689-20	NHA-120-20	Bulk		8/18/2020	8/20/2020 11:20	
20080689-21	NHA-120-21	Bulk		8/18/2020	8/20/2020 11:20	
20080689-22	NHA-120-22	Bulk		8/18/2020	8/20/2020 11:20	
20080689-23	NHA-120-23	Bulk		8/18/2020	8/20/2020 11:20	
20080689-24	NHA-120-24	Bulk		8/18/2020	8/20/2020 11:20	
20080689-25	NHA-120-25	Bulk		8/18/2020	8/20/2020 11:20	

Date: 26-Aug-20

ALS Environmental

Client:	iina ba, inc.	
Project:	NHA #15-32 OJO Amarillo	Case Narrative
Work Order:	20080689	

It is the responsibility of the client to notify the lab of any certification requirements in writing via the chain of custody as this may determine the preparation and analytical procedures employed.

Laboratory accreditation does not in any way constitute approval or endorsement by any accrediting body or agency of the federal government. Please contact ALS Cincinnati QA/QC Manager for accreditation identifications and certifications.

All sample collection is performed outside of ALS and is the sole responsibility of the client. Sample condition acceptable upon receipt except where noted. Estimates of concentration are semi-quantitative and are made on an area basis. Results apply only to portions of samples analyzed. Samples disposed after 60 days.

All analytical data (results) and technical content (comments) related to the preparation and analysis of the samples stated herein is the responsibility of the analyst. Raw data is reviewed and validated by a qualified peer analyst and imported into the Laboratory Information Management System (LIMS) where it is formatted by the cover letter signatory charged with compiling and sending the final LIMS generated report to the client.

The reporting limit (RL) for asbestos in bulk materials is 1% and is a function of the quantity of sample analyzed, the nature of any matrix interferences, sample preparation, and fiber size and distribution. Results reported as ND indicate that no asbestos was detected. Results reported as Trace indicate that asbestos was detected at some level confidently determined to be <1% which is considered inconclusive according to New York ELAP.

ALS performs variety of PLM methods for asbestos in bulk building materials including EPA 600/R-93/116, NIOSH 9002, ELAP 198.1, and ELAP 198.6. In addition, we perform a modified uncertified version of EPA 600/R-04/004 for asbestos in vermiculite which reports asbestos as present or absent only, an in-house developed uncertified method ALS SOP ENV 004 for asbestos in soil, and asbestos in soil by ASTM D7521.

Regardless of the method requested, all samples are examined according to mandatory method protocol. Any optional method protocol are eliminated from the initial analysis but may be performed upon client request. These may include; insufficient sample volume rejection*, phase separation of layered or heterogeneous samples, ashing to remove organic interferences, acid dissolution to remove mineral carbonate interferences, point counting**, and analysis by transmission electron microscopy (TEM) is recommended to verify all ND PLM results.

All samples are examined by stereomicroscope for the determination of homogeneity, texture, friability, color, and extent of fibrous components. Non-asbestos materials such as foil, paper, metal, plastic, pebbles, or organic debris are ignored and a subsample of the remaining material homogenized by some means for examination by polarized light microscope (PLM). Information obtained via both stereomicroscope and PLM are used in the final qualitative and quantitative analysis of fibrous components.

NOTE: Any visible building debris in soil samples such as pieces of drywall, roofing material,

Client:	iina ba, inc.
Project:	NHA #15-32 OJO Amarillo
Work Order:	20080689

insulation, concrete, etc., are not included in the soil analysis. If present, these are considered possible asbestos containing materials (ACM) and may be analyzed as separate samples upon client request.

*Sufficient sample volume is material dependent. For samples such as floor tiles, roofing felts, sheet insulation, etc., three to four square inches of the layered material is preferred. For materials such as ceiling tiles, loose fill insulation, pipe insulation, etc., one cubic inch (~15cc) is preferred. For samples of thin coating materials such as paints, mastics, spray plasters, etc., a smaller sample size may be suitable. For vermiculite analysis, a one gallon ziploc bag full of dry, loose material is acceptable. For ENV 004 soil samples, a 4oz jar is recommended. The ASTM D7521 Soil method requires a minimum of 8oz and a maximum of 16oz of homogeneous soil.

**PLM samples at or near the 1% detection limit may be analyzed by the 400 point count analysis which refers to method EPA 600/M4/82/020, or AHERA method EPA 40 CFR Part 763, Sub. E, App. E as these are synonymous

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-01A			Colle	ection Date: 8/18/2020
Client Sample ID	: NHA-120-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>1<=3	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		>1<=3	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-01B			Colle	ection Date: 8/18/2020
Client Sample ID	: NHA-120-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-02A			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-120-02				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>1<=3	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		>1<=3	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-02B			Colle	ction Date: 8/18/2020
Client Sample ID	NHA-120-02				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-03A			Colle	ction Date: 8/18/2020
Client Sample ID	NHA-120-03				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>1<=3	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		>1<=3	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-03B			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-120-03				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		>5<=10	%		

Date: 26-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-04A			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-120-04				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

4

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-04B			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-120-04				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Yellow			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>70<=80	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-05A			Collec	ction Date: 8/18/2020
Client Sample II): NHA-120-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by Pl	LM				Date Analyzed 8/25/2020
Macroscopic Ex	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mi	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinoli	ite	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-05B			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-120-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Min	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-06A			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-120-06				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mir	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-06B			Colle	ection Date: 8/18/2020
Client Sample ID	: NHA-120-06				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Yellow			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Min	ierals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-07A			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-120-07				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client:iina ba, inc.Project:NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID: 20080689-07B			Collect	tion Date: 8/18/2020
Client Sample ID: NHA-120-07				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/25/2020
Macroscopic Examination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color	White			
Description	Skim Coat			
Homogeneity	Layered			
Texture	Crumbly			
Other Materials			E600/R-93/116	
Cellulose	ND	%		
Fiberglass	ND	%		
Non-fibrous	>90<=100	%		
Other fibers	ND	%		
Resin/binder	ND	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: iina ba, in Project: NHA #15	c. -32 OJO Amarillo			Work Order: 20080689
Lab ID: 200806	89-08A		Collec	tion Date: 8/18/2020
Client Sample ID: NHA-1	20-08			Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/25/2020
Macroscopic Examination	Prep Date: 1	8/25/2020	E600/R-93/116	Analyst: AFS
Color	White			
Description	Drywall			
Homogeneity	Layered			
Texture	Crumbly			
Other Materials			E600/R-93/116	
Cellulose	>5<=10	%		
Fiberglass	ND	%		
Non-fibrous	>80<=90	%		
Other fibers	ND	%	3	
Resin/binder	ND	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-08B			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-120-08				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Date: 26-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-09A			Colle	ction Date: 8/18/2020
Client Sample ID	NHA-120-09				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

7. 16

Client: Project:	iina ba, inc. NHA #15-32 OJO A	marillo			Work Order: 20080689
Lab ID:	20080689-09B			Colle	ection Date: 8/18/2020
Client Sample ID	: NHA-120-09				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-10A			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-120-10				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO .	Amarillo			Work Order: 20080689
Lab ID:	20080689-11A			Collec	ction Date: 8/18/2020
Client Sample ID:	: NHA-120-11				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-12A			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-120-12				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-13A			Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-120-13				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Transite			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		2
Fiberglass		ND	%		
Non-fibrous		>50<=60	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>10<=20	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		>10<=20	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-14A			Coll	ection Date: 8/18/2020
Client Sample ID	: NHA-120-14				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mir	ierals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		5.07	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		5.07	%		
Lab ID:	20080689-15A			Colle	ection Date: 8/18/2020
Client Sample ID:	NHA-120-15				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		8.07	%		
Crocidolite		ND	%		
Tramolita actinolit	9	ND	%		
riemonte - actinonte					

Project: N	ina ba, inc. IHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab IDi	20080680 164			Caller	tion Deter 9/19/2020
	20080089-10A			Collect	tion Date: 8/18/2020
Client Sample ID:	NHA-120-16				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	l with Ashing				Date Analyzed 8/25/2020
Macroscopic Exan	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		3.59	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		3.59	%		
Lab ID:	20080689-17A			Collect	tion Date: 8/18/2020
Client Sample ID:	NHA-120-17				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM	with Ashing				Date Analyzed 8/25/2020
Macroscopic Exam	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
				E600/R-93/116	
Asbestiform Mine	rais				
Asbestiform Mine	rais	ND	%		
Asbestiform Mine Amosite Anthophyllite	rais	ND ND	% %		
Asbestiform Mine Amosite Anthophyllite Chrysotile	rais	ND ND ND	% % %		
Asbestiform Mine Amosite Anthophyllite Chrysotile Crocidolite	rals	ND ND ND ND	% % %		
Asbestiform Mine Amosite Anthophyllite Chrysotile Crocidolite Tremolite - actinolite	rals	ND ND ND ND	% % %		

Client: ii Project: N	na ba, inc. IHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-18A			Colle	ction Date: 8/18/2020
Client Sample ID:	NHA-120-18				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	with Ashing				Date Analyzed 8/25/2020
Macroscopic Exan	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			-
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		
Lab ID:	20080689-19A			Collec	ction Date: 8/18/2020
Client Sample ID:	NHA-120-19				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM	with Ashing				Date Analyzed 8/25/2020
Macroscopic Exam	ination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	rais			E600/R-93/116	
Amosite		ND	%		
Amoste		ND	%		
Anthophyllite		ND	%		
Anthophyllite Chrysotile					
Anthophyllite Chrysotile Crocidolite		ND	%		
Anthophyllite Chrysotile Crocidolite Tremolite - actinolite		ND ND	% %		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-20A			Colle	ection Date: 8/18/2020
Client Sample ID	: NHA-120-20				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		Trace	%	2	
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mir	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc NHA #15-3	32 OJO Amarillo			Work Order: 20080689
Lab ID:	2008068	39-21A		Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-12	20-21			Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Light Grey/ Dark Grey			
Description		Material			
Homogeneity		Layered/Inseparable			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mir	ierais			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-22A			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-120-22				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		
Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
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Lab ID:	20080689-23A			Collec	tion Date: 8/18/2020
Client Sample ID	: NHA-120-23				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mir	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	Amarillo			Work Order: 20080689
Lab ID:	20080689-24A			Collec	ction Date: 8/18/2020
Client Sample ID	: NHA-120-24				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO .	Amarillo			Work Order: 20080689
Lab ID:	20080689-25A			Colle	ction Date: 8/18/2020
Client Sample ID	: NHA-120-25				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project: WorkOrder:	iina ba, inc. NHA #15-32 OJO Amarillo 20080689	QUALIFIERS, ACRONYMS, UNITS
Qualifier	Description	
*	Value exceeds Regulatory Limit	
а	Not accredited	
В	Analyte detected in the associated Method Blank above the Reporting Limit	
Е	Value above quantitation range	
Н	Analyzed outside of Holding Time	
J	Analyte detected below quantitation limit	
n	Not offered for accreditation	
ND	Not Detected at the Reporting Limit	
D	Sample amount is > 4 times amount spiked	
R	RPD above laboratory control limit	
S	Snike Recovery outside laboratory control limits	
U	Analyzed but not detected above the MDL	
Acronym	Description	
DUP	Method Duplicate	
Е	EPA Method	
LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicate	
MBLK	Method Blank	
MDL	Method Detection Limit	
MQL	Method Quantitation Limit	
MS	Matrix Spike	
MSD	Matrix Spike Duplicate	
PDS	Post Digestion Spike	
PQL	Practical Quantitaion Limit	
SDL	Sample Detection Limit	
SW	SW-846 Method	
Units Reported	Description	

%

Sample Receipt Checklist

Client Name: IINABA-FARMINGTON		Date/Time I	Received: 20-A	ug-20 11:14
Work Order: 20080689		Received by	y: <u>DNS</u>	
Checklist completed by Jan Wilcox	20-Aug-20 Date	Reviewed by:	Shawn Smythe eSignature	21-Aug-20 Date
Matrices: <u>bulk</u> Carrier name: <u>FedEx</u>				1
Shipping container/cooler in good condition?	Yes 🗹	No	Not Present	
Custody seals intact on shipping container/cooler?	Yes 🗌	No	Not Present	
Custody seals intact on sample bottles?	Yes 🗌	No	Not Present	
Chain of custody present?	Yes 🔽	No		
Chain of custody signed when relinquished and received?	Yes 🔽	No		
Chain of custody agrees with sample labels?	Yes 🖌	No		
Samples in proper container/bottle?	Yes 🗸	No		
Sample containers intact?	Yes 🖌	No		
Sufficient sample volume for indicated test?	Yes 🖌	No		
All samples received within holding time?	Yes 🗹	No 🗌		
Container/Temp Blank temperature in compliance?	Yes 🗹	No		
Sample(s) received on ice? Temperature(s)/Thermometer(s):	Yes	No 🖌		
Cooler(s)/Kit(s):				
Date/Time sample(s) sent to storage:				
Water - VOA vials have zero headspace?	Yes	No	No VOA vials subm	itted 🔽
Water - pH acceptable upon receipt?	Yes	No 🗌	N/A	
pH adjusted? pH adjusted by:	Yes	No	N/A 🗹	

Login Notes:

Client Contacted:	Date Contacted:	Person Contacted:
Contacted By:	Regarding:	
Comments:		
CorrectiveAction:		
		S



27-Aug-2020

John Isham iina ba, inc. 1812 Schofield Lane Farmington, NM 87401

Re: NHA #15-32 OJO AMARILLO

Work Order: 20080690

Dear John,

ALS Environmental received 27 samples on 20-Aug-2020 11:15 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 43.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Joe Ribar

Shawn Smythe Project Manager

Environmental

Report of Laboratory Analysis

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RIGHT SOLUTIONS BIGHT PABIDER

Client:	iina ba, inc.
Project:	NHA #15-32 OJO AMARILLO
Work Order:	20080690

Work Order Sample Summary

Lab Samp ID	Client Sample ID	<u>Matrix</u>	Tag Number	Collection Date	Date Received	<u>Hold</u>
20080690-01	NHA-125-01	Bulk		8/17/2020	8/20/2020 11:15	
20080690-02	NHA-125-02	Bulk		8/17/2020	8/20/2020 11:15	
20080690-03	NHA-125-03	Bulk		8/17/2020	8/20/2020 11:15	
20080690-04	NHA-125-04	Bulk		8/17/2020	8/20/2020 11:15	
20080690-05	NHA-125-05	Bulk		8/17/2020	8/20/2020 11:15	
20080690-06	NHA-125-06	Bulk		8/17/2020	8/20/2020 11:15	
20080690-07	NHA-125-07	Bulk		8/17/2020	8/20/2020 11:15	
20080690-08	NHA-125-08	Bulk		8/17/2020	8/20/2020 11:15	
20080690-09	NHA-125-09	Bulk		8/17/2020	8/20/2020 11:15	
20080690-10	NHA-125-10	Bulk		8/17/2020	8/20/2020 11:15	
20080690-11	NHA-125-11	Bulk		8/17/2020	8/20/2020 11:15	
20080690-12	NHA-125-12	Bulk		8/17/2020	8/20/2020 11:15	
20080690-13	NHA-125-13	Bulk		8/17/2020	8/20/2020 11:15	
20080690-14	NHA-125-14	Bulk		8/17/2020	8/20/2020 11:15	
20080690-15	NHA-125-15	Bulk		8/17/2020	8/20/2020 11:15	
20080690-16	NHA-125-16	Bulk		8/17/2020	8/20/2020 11:15	
20080690-17	NHA-125-17	Bulk		8/17/2020	8/20/2020 11:15	
20080690-18	NHA-125-18	Bulk		8/17/2020	8/20/2020 11:15	
20080690-19	NHA-125-19	Bulk		8/17/2020	8/20/2020 11:15	
20080690-20	NHA-125-20	Bulk		8/17/2020	8/20/2020 11:15	
20080690-21	NHA-125-21	Bulk		8/17/2020	8/20/2020 11:15	
20080690-22	NHA-125-22	Bulk		8/17/2020	8/20/2020 11:15	
20080690-23	NHA-125-23	Bulk		8/17/2020	8/20/2020 11:15	
20080690-24	NHA-125-24	Bulk		8/17/2020	8/20/2020 11:15	
20080690-25	NHA-125-25	Bulk		8/17/2020	8/20/2020 11:15	
20080690-26	NHA-125-26	Bulk		8/17/2020	8/20/2020 11:15	
20080690-27	NHA-125-27	Bulk		8/17/2020	8/20/2020 11:15	

Date: 27-Aug-20

ALS Environmental

Client:	iina ba, inc.	
Project:	NHA #15-32 OJO AMARILLO	Case Narrative
Work Order:	20080690	

It is the responsibility of the client to notify the lab of any certification requirements in writing via the chain of custody as this may determine the preparation and analytical procedures employed.

Laboratory accreditation does not in any way constitute approval or endorsement by any accrediting body or agency of the federal government. Please contact ALS Cincinnati QA/QC Manager for accreditation identifications and certifications.

All sample collection is performed outside of ALS and is the sole responsibility of the client. Sample condition acceptable upon receipt except where noted. Estimates of concentration are semi-quantitative and are made on an area basis. Results apply only to portions of samples analyzed. Samples disposed after 60 days.

All analytical data (results) and technical content (comments) related to the preparation and analysis of the samples stated herein is the responsibility of the analyst. Raw data is reviewed and validated by a qualified peer analyst and imported into the Laboratory Information Management System (LIMS) where it is formatted by the cover letter signatory charged with compiling and sending the final LIMS generated report to the client.

The reporting limit (RL) for asbestos in bulk materials is 1% and is a function of the quantity of sample analyzed, the nature of any matrix interferences, sample preparation, and fiber size and distribution. Results reported as ND indicate that no asbestos was detected. Results reported as Trace indicate that asbestos was detected at some level confidently determined to be <1% which is considered inconclusive according to New York ELAP.

ALS performs variety of PLM methods for asbestos in bulk building materials including EPA 600/R-93/116, NIOSH 9002, ELAP 198.1, and ELAP 198.6. In addition, we perform a modified uncertified version of EPA 600/R-04/004 for asbestos in vermiculite which reports asbestos as present or absent only, an in-house developed uncertified method ALS SOP ENV 004 for asbestos in soil, and asbestos in soil by ASTM D7521.

Regardless of the method requested, all samples are examined according to mandatory method protocol. Any optional method protocol are eliminated from the initial analysis but may be performed upon client request. These may include; insufficient sample volume rejection*, phase separation of layered or heterogeneous samples, ashing to remove organic interferences, acid dissolution to remove mineral carbonate interferences, point counting**, and analysis by transmission electron microscopy (TEM) is recommended to verify all ND PLM results.

All samples are examined by stereomicroscope for the determination of homogeneity, texture, friability, color, and extent of fibrous components. Non-asbestos materials such as foil, paper, metal, plastic, pebbles, or organic debris are ignored and a subsample of the remaining material homogenized by some means for examination by polarized light microscope (PLM). Information obtained via both stereomicroscope and PLM are used in the final qualitative and quantitative analysis of fibrous components.

NOTE: Any visible building debris in soil samples such as pieces of drywall, roofing material,

Client:iina ba, inc.Project:NHA #15-32 OJO AMARILLOWork Order:20080690

insulation, concrete, etc., are not included in the soil analysis. If present, these are considered possible asbestos containing materials (ACM) and may be analyzed as separate samples upon client request.

*Sufficient sample volume is material dependent. For samples such as floor tiles, roofing felts, sheet insulation, etc., three to four square inches of the layered material is preferred. For materials such as ceiling tiles, loose fill insulation, pipe insulation, etc., one cubic inch (~15cc) is preferred. For samples of thin coating materials such as paints, mastics, spray plasters, etc., a smaller sample size may be suitable. For vermiculite analysis, a one gallon ziploc bag full of dry, loose material is acceptable. For ENV 004 soil samples, a 4oz jar is recommended. The ASTM D7521 Soil method requires a minimum of 8oz and a maximum of 16oz of homogeneous soil.

**PLM samples at or near the 1% detection limit may be analyzed by the 400 point count analysis which refers to method EPA 600/M4/82/020, or AHERA method EPA 40 CFR Part 763, Sub. E, App. E as these are synonymous

Date: 27-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-01A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-125-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>1<=3	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		>1<=3	%		

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Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-01B			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-125-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		>5<=10	%		

Client: iina ba Project: NHA #	, inc. #15-32 OJO AMARILLO		Work Order: 20080690
Lab ID: 200	80690-02A		Collection Date: 8/17/2020
Client Sample ID: NH.	A-125-02		Matrix: BULK
Analyses	Result	Units	Analytical Results
Asbestos by PLM			Date Analyzed 8/25/2020
Macroscopic Examination	n Prep Date: 8/2	5/2020	E600/R-93/116 Analyst: AFS
Color	Tan		
Description	Tile		
Homogeneity	Layered		
Texture	Compact		
Other Materials			E600/R-93/116
Cellulose	ND	%	
Fiberglass	ND	%	
Non-fibrous	>70<=80	%	
Other fibers	ND	%	
Resin/binder	>10<=20	%	
Asbestiform Minerals			E600/R-93/116
Amosite	ND	%	
Anthophyllite	ND	%	
Chrysotile	>1<=3	%	
Crocidolite	ND	%	
Tremolite - actinolite	ND	%	
Total asbestos	>1<=3	%	

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-02B			Collection Da	te: 8/17/2020
Client Sample ID	: NHA-125-02			Matr	ix: BULK
Analyses		Result	Units	P	Analytical Results
Asbestos by PL	м			C	Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116 A	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%	2	
Resin/binder		>60<=70	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-03A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-125-03				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>1<=3	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		>1<=3	%		

Client: iina ba, Project: NHA #	inc. 15-32 OJO AMARILLO		Work Order: 20080690
Lab ID: 2008	0690-03B		Collection Date: 8/17/2020
Client Sample ID: NHA	-125-03		Matrix: BULK
Analyses	Result [nits	Analytical Results
Asbestos by PLM			Date Analyzed 8/25/2020
Macroscopic Examination	n Prep Date: 8/25/	2020 E600/R	R-93/116 Analyst: AFS
Color	Black		
Description	Mastic		
Homogeneity	Layered		
Texture	Resinous		
Other Materials		E600/R	R-93/116
Cellulose	ND	%	
Fiberglass	ND	%	
Non-fibrous	>10<=20	%	
Other fibers	ND	%	
Resin/binder	>60<=70	%	
Asbestiform Minerals		E600/R	R-93/116
Amosite	ND	%	
Anthophyllite	ND	%	
Chrysotile	>5<=10	%	
Crocidolite	ND	%	
Tremolite - actinolite	ND	%	
Total asbestos	>5<=10	%	

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-04A			Collec	tion Date: 8/17/2020
Client Sample ID	: NHA-125-04				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: iina ba, inc. Project: NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID: 20080690-04B			Collection Da	te: 8/17/2020
Client Sample ID: NHA-125-04			Matr	ix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/25/2020
Macroscopic Examination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color	Black			
Description	Mastic			
Homogeneity	Layered			
Texture	Resinous			
Other Materials			E600/R-93/116	
Cellulose	ND	%		
Fiberglass	ND	%		
Non-fibrous	>10<=20	%		
Other fibers	ND	%		
Resin/binder	>70<=80	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	>3<=5	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	>3<=5	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-05A			Colle	ction Date: 8/17/2020
Client Sample ID	NHA-125-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: i Project: 1	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690	
Lab ID:	20080690-05B			Collection Date: 8/17/2020		
Client Sample ID:	NHA-125-05				Matrix: BULK	
Analyses		Result	Units		Analytical Results	
Asbestos by PL	N				Date Analyzed 8/25/2020	
Macroscopic Exar	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS	
Color		Black				
Description		Mastic				
Homogeneity		Layered				
Texture		Resinous				
Other Materials				E600/R-93/116		
Cellulose		ND	%			
Fiberglass		ND	%			
Non-fibrous		>10<=20	%			
Other fibers		ND	%			
Resin/binder		>70<=80	%			
Asbestiform Mine	erals			E600/R-93/116		
Amosite		ND	%			
Anthophyllite		ND	%			
Chrysotile		>3<=5	%			
Crocidolite		ND	%			
Tremolite - actinolite		ND	%			
Total asbestos		>3<=5	%			

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-06A			Colle	ction Date: 8/17/2020
Client Sample ID	NHA-125-06				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Homogeneous			
Texture		Flexible			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>10<=20	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		>10<=20	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-07A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-125-07				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Tile			
Homogeneity		Homogeneous			
Texture		Flexible			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolite	Ð	ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-08A			Collec	tion Date: 8/17/2020
Client Sample II	D: NHA-125-08				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by P	LM				Date Analyzed 8/25/2020
Macroscopic Ex	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan/ Yellow			
Description		Tile/ Mastic			
Homogeneity	La	yered/Inseparable			
Texture	F	Flexible/ Resinous			
Other Materials	3			E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Mi	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinol	ite	ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-09A			Collec	tion Date: 8/17/2020
Client Sample ID:	NHA-125-09				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Material			
Homogeneity		Layered			
Texture		Flexible			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>30<=40	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	3	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-09B			Collect	tion Date: 8/17/2020
Client Sample ID:	NHA-125-09				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>70<=80	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-10A			Collec	tion Date: 8/17/2020
Client Sample 1	ID: NHA-125-10				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by F	PLM				Date Analyzed 8/25/2020
Macroscopic E	xamination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Material			
Homogeneity		Layered			
Texture		Flexible			
Other Material	s			E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>30<=40	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform N	linerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actine	olite	ND	%		
Total asbesto	S	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-10B			Collec	tion Date: 8/17/2020
Client Sample ID:	NHA-125-10				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>70<=80	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690	
Lab ID:	20080690-11A			Collection Date: 8/17/2020		
Client Sample ID	: NHA-125-11				Matrix: BULK	
Analyses		Result	Units		Analytical Results	
Asbestos by PL	м				Date Analyzed 8/25/2020	
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS	
Color		Tan				
Description		Material				
Homogeneity		Layered				
Texture		Flexible				
Other Materials				E600/R-93/116		
Cellulose		ND	%			
Fiberglass		ND	%			
Non-fibrous		>30<=40	%			
Other fibers		ND	%			
Resin/binder		>50<=60	%			
Asbestiform Min	erals			E600/R-93/116		
Amosite		ND	%			
Anthophyllite		NÐ	%			
Chrysotile		ND	%			
Crocidolite		ND	%			
Tremolite - actinolite	9	ND	%			
Total asbestos		ND	%			

Client: iina ba, inc. Project: NHA #15-32	OJO AMARILLO			Work Order: 20080690
Lab ID: 20080690-	-11B		Collec	tion Date: 8/17/2020
Client Sample ID: NHA-125-	-11			Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/25/2020
Macroscopic Examination	Prep Date: 8/2	5/2020	E600/R-93/116	Analyst: AFS
Color	Black			
Description	Mastic			
Homogeneity	Layered			
Texture	Resinous			
Other Materials			E600/R-93/116	
Cellulose	>1<=3	%		
Fiberglass	ND	%		
Non-fibrous	>10<=20	%		
Other fibers	ND	%		
Resin/binder	>70<=80	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-12A			Colle	ection Date: 8/17/2020
Client Sample ID:	NHA-125-12				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			-
Description		Drywall			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Client: iina ba, inc. Project: NHA #15-32 OJ	O AMARILLO	Work Order: 20080690
Lab ID: 20080690-13A	A	Collection Date: 8/17/2020
Client Sample ID: NHA-125-13		Matrix: BULK
Analyses	Result Uni	its Analytical Results
Asbestos by PLM		Date Analyzed 8/25/2020
Macroscopic Examination	Prep Date: 8/25/20	020 E600/R-93/116 Analyst: AFS
Color	White	
Description	Drywall	
Homogeneity	Layered	
Texture	Crumbly	
Other Materials		E600/R-93/116
Cellulose	>5<=10 %	6
Fiberglass	ND %	6
Non-fibrous	>80<=90 %	6
Other fibers	ND %	6
Resin/binder	ND %	/o
Asbestiform Minerals		E600/R-93/116
Amosite	ND %	6
Anthophyllite	ND %	6
Chrysotile	ND %	6
Crocidolite	ND %	6
Tremolite - actinolite	ND %	/o
Total asbestos	ND %	6

Client: i Project: N	ina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-13B			Collec	tion Date: 8/17/2020
Client Sample ID:	NHA-125-13				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	Λ				Date Analyzed 8/25/2020
Macroscopic Exan	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Date: 27-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-14A	c		Collec	tion Date: 8/17/2020
Client Sample ID	: NHA-125-14				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywali			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite	2	ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Note:

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Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080690
Lab ID:	20080690-14B			Collec	tion Date: 8/17/2020
Client Sample I	D: NHA-125-14				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by P	rL M				Date Analyzed 8/25/2020
Macroscopic Ex	kamination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials	S			E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform M	inerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actino	lite	ND	%		
Total asbestos	;	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-15A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-125-15				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>30<=40	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Date: 27-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-16A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-125-16				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>30<=40	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

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Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-17A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-125-17				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>30<=40	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		
Client: i Project: N	ina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
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Lab ID:	20080690-18A			Colle	ection Date: 8/17/2020
Client Sample ID:	NHA-125-18				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	Л				Date Analyzed 8/25/2020
Macroscopic Exan	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Transite			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>50<=60	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>10<=20	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		>10<=20	%		

Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-19A			Collectio	n Date: 8/17/2020
Client Sample ID	: NHA-125-19			r	Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		11.51	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		11.51	%		
Total asbestos Lab ID:	20080690-20A	11.51	%	Collection	n Date: 8/17/2020
Total asbestos Lab ID: Client Sample ID:	20080690-20A : NHA-125-20	11.51	%	Collection	n Date: 8/17/2020 Matrix: BULK
Total asbestos Lab ID: Client Sample ID: Analyses	20080690-20A : NHA-125-20	11.51 Result	% Units	Collection	n Date: 8/17/2020 Matrix: BULK Analytical Results
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PL	20080690-20A NHA-125-20	11.51 Result	% Units	Collection N	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PLI Macroscopic Exa	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date:	% Units 8/25/2020	Collection N E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PLI Macroscopic Exal Color	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date: Black	% Units 8/25/2020	Collection N E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PL Macroscopic Exal Color Description	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date: Black Material	% Units 8/25/2020	Collection M E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PLI Macroscopic Exat Color Description Homogeneity	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date: Black Material Homogeneous	% Units 8/25/2020	Collection N E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PLI Macroscopic Exal Color Description Homogeneity Texture	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date: Black Material Homogeneous Resinous	% Units 8/25/2020	Collection N E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PL Macroscopic Exal Color Description Homogeneity Texture Asbestiform Min	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date: Black Material Homogeneous Resinous	% Units 8/25/2020	Collection N E600/R-93/116 E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PLI Macroscopic Exal Color Description Homogeneity Texture Asbestiform Mine Amosite	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date: Black Material Homogeneous Resinous	% Units 8/25/2020 %	Collection N E600/R-93/116 E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PL Macroscopic Exa Color Description Homogeneity Texture Asbestiform Min Amosite Anthophyllite	20080690-20A NHA-125-20 With Ashing mination	11.51 Result Prep Date: Black Material Homogeneous Resinous ND	% Units 8/25/2020 % %	Collection N E600/R-93/116 E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PL Macroscopic Exa Color Description Homogeneity Texture Asbestiform Min Amosite Anthophyllite Chrysotile	20080690-20A : NHA-125-20 M with Ashing mination	11.51 Result Prep Date: Black Material Homogeneous Resinous ND ND ND 10.94	% Units 8/25/2020 % %	Collection M E600/R-93/116 E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PLI Macroscopic Exal Color Description Homogeneity Texture Asbestiform Min Amosite Anthophyllite Chrysotile Crocidolite	20080690-20A NHA-125-20	11.51 Result Prep Date: Black Material Homogeneous Resinous ND ND ND ND ND	% Units 8/25/2020 % % %	Collection M E600/R-93/116 E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS
Total asbestos Lab ID: Client Sample ID: Analyses Asbestos by PL Macroscopic Exa Color Description Homogeneity Texture Asbestiform Min Amosite Anthophyllite Chrysotile Crocidolite Tremolite - actinolite	20080690-20A NHA-125-20 With Ashing mination	11.51 Result Prep Date: Black Material Homogeneous Resinous ND ND 10.94 ND ND	% Units 8/25/2020 % % % %	Collection N E600/R-93/116	n Date: 8/17/2020 Matrix: BULK Analytical Results Date Analyzed 8/26/2020 Analyst: MRS

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-21A			Coll	ection Date: 8/17/2020
Client Sample ID	: NHA-125-21				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		7.59	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		7.59	%		
Lab ID:	20080690-22A			Coll	ection Date: 8/17/2020
Client Sample ID	NHA-125-22				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Amosite Anthophyllite		ND ND	% %		
Amosite Anthophyllite Chrysotile		ND ND ND	% % %		
Amosite Anthophyllite Chrysotile Crocidolite		ND ND ND ND	% % %		
Amosite Anthophyllite Chrysotile Crocidolite Tremolite - actinolite	9	ND ND ND ND	% % % %		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-23A			Col	lection Date: 8/17/2020
Client Sample ID	: NHA-125-23				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	.M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	amination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mir	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	te	ND	%		
Total asbestos		ND	%		
Lab ID:	20080690-24A			Col	lection Date: 8/17/2020
Client Sample ID	: NHA-125-24				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos bv PL	M with Ashina				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Asbestiform Min Amosite	erals	ND	%	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite	ierals	ND ND	% %	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite Chrysotile	ierals	ND ND ND	% %	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite Chrysotile Crocidolite	ierals	ND ND ND	% % %	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite Chrysotile Crocidolite Tremolite - actinolite	e	ND ND ND ND	% % %	E600/R-93/116	

Date: 27-Aug-20

Client: i Project: N	ina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-25A			Collec	tion Date: 8/17/2020
Client Sample ID:	NHA-125-25				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	Λ				Date Analyzed 8/25/2020
Macroscopic Exan	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

10

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-26A			Collec	ction Date: 8/17/2020
Client Sample ID:	NHA-125-26				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLI	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080690
Lab ID:	20080690-27A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-125-27				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/25/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Compact		G	
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	•	ND	%		
Total asbestos		ND	%		

Client: Project: WorkOrder:	iina ba, inc. NHA #15-32 OJO AMARILLO 20080690	QUALIFIERS, ACRONYMS, UNITS
Qualifier	Description	
*	Value exceeds Regulatory Limit	183
а	Not accredited	
В	Analyte detected in the associated Method Blank above the Reporting Limit	
Е	Value above quantitation range	
Н	Analyzed outside of Holding Time	
J	Analyte detected below quantitation limit	
n	Not offered for accreditation	
ND	Not Detected at the Reporting Limit	
P	Sample amount is > 4 times amount spiked	
R	RPD above laboratory control limit	
s	Spike Recovery outside laboratory control limits	
U	Analyzed but not detected above the MDL	
Acronym	Description	
DUP	Method Duplicate	
Е	EPA Method	
LCS	Laboratory Control Sample	
LCSD	Laboratory Control Sample Duplicate	
MBLK	Method Blank	
MDL	Method Detection Limit	
MQL	Method Quantitation Limit	
MS	Matrix Spike	
MSD	Matrix Spike Duplicate	
PDS	Post Digestion Spike	
PQL	Practical Quantitaion Limit	
SDL	Sample Detection Limit	
SW	SW-846 Method	
Units Reported	Description	

%

Sample Receipt Checklist

Client Name: IINABA-FARMINGTON		Date/Time f	Received: 2	0-Aug-20	11:15
Work Order: 20080690		Received by	y: <u>E</u>	<u>NS</u>	
Checklist completed by Shawn Smythe	21-Aug-20 Date	Reviewed by:	Shawn Sr eSignature	nythe	21-Aug-20 Date
Matrices: Carrier name: <u>FedEx</u>					
Shipping container/cooler in good condition?	Yes 🗹	No	Not Presen	t 🗌	
Custody seals intact on shipping container/cooler?	Yes	No	Not Presen	t 🔽	
Custody seals intact on sample bottles?	Yes	No	Not Presen	t 🗸	
Chain of custody present?	Yes 🗹	No			
Chain of custody signed when relinquished and received?	Yes 🗹	No			
Chain of custody agrees with sample labels?	Yes 🗸	No			
Samples in proper container/bottle?	Yes 🗹	No			
Sample containers intact?	Yes 🖌	No			
Sufficient sample volume for indicated test?	Yes 🔽	No			
All samples received within holding time?	Yes 🗸	No			
Container/Temp Blank temperature in compliance?	Yes 🔽	No 🗌			
Sample(s) received on ice? Temperature(s)/Thermometer(s):	Yes	No 🗹			
Cooler(s)/Kit(s):					
Date/Time sample(s) sent to storage:					
Water - VOA vials have zero headspace?	Yes	No	No VOA vials s	ubmitted	
Water - pH acceptable upon receipt?	Yes	No 🔤	N/A		
pH adjusted? pH adjusted by:	Yes 🗔	No	N/A		

Login Notes:

Regarding:	
	SE

SRC Page 1 of 1

ANALYTICAL REQUEST FORM





RUSH Status Requested - ADDITIONAL CHARGE RESULTS REQUIRED BY

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

2	Date	8/19/202	20 Purchase Order No.	20-042-03
3.	Comp	any Name	IINA BA INC	
	Addres	_{ss} 1812	SCHOFIELD LANE	
	FAR	MINGTO	N, NM 87401	
	Persor	n to Contac	JOHN R ISHAM, CP	G
	Telept	ione	505-327-1072	
	Fax Te	ephone	505-327-1517	
	E-mail	Address	jisham@iinaba.com	
	Billing	Address		
	SAM	IE AS AB	OVE	

ALS Project Manage	r Chris Amidon
Sample Collection	
Sampling Site NHA	A #15-32 OJO AMARILLO
Industrial Process	
Date of Collection	AUGUST 17, 2020
Time Collected	
Date of Shipment	UGUST 19, 2020
Obele of Ounted Alls	125-01

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-125-01	BULK		ACM	4
	-02	BULK		ACM	4
	-03	BULK		ACM	4
	-04	BULK		ACM	4
	- 05	BULK		ACM	4
	-06	BULK		ACM	4
	-07	BULK		ACM	4
	-08	BULK		ACM	4
	-09	BULK		ACM	4
	-10	BULK		ACM	4
	~ 11	BULK		ACM	4

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other
 ** 1 mg/sample 2. mg/m³ 3. ppm 4. % 5. _____ (other) Please indicate one or more units in the column entitled Units** Comments

Possible Contami	ination and/or Chemical Hazards	NONE		
Relinquished by	Alma	Ah	Date/Time	August 19,2022 16:30
Received by	Dall 9		Date/Time	8120120 7115
Relinquished by	1001		Date/Time	0,
Received by			Date/Time	
Relinquished by			Date/Time	
Received by			Date/Time	

4388 Glendale Milford Rd, Cincinnati, OH 45242

513-733-5336 / FAX: 513-733-5347

ALS Laboratory Group

ANALYTICAL REQUEST FORM



1. 🖾 REGULAR Status

RUSH Status Requested - ADDITIONAL CHARGE RESULTS REQUIRED BY

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

4. Quote No.
ALS Project Manager Chris Amidon
5. Sample Collection
Sampling Site NHA #15-32 OJO AMARILLO
Industrial Process
Date of Collection AUGUST 17, 2020
Time Collected
Date of Shipment AUGUST 19, 2020
Chain of Custody No 125-02

6. REQUESTFOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-125-12	BULK		ACM	4
	-13	BULK		ACM	4
	-14	BULK		ACM	4
	-15	BULK		ACM	4
	-16	BULK		ACM	4
	-17	BULK	· · · · · · · · · · · · · · · · · · ·	ACM	4
	- 18	BULK		ACM	4
	-19	BULK		ACM	4
	-20	BULK		ACM	4
	-71	BULK		ACM	4
	-22	BULK		ACM	4

Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water, Other
 ** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. ____ (other) Please indicate one or more units in the column entitled Units**
 Comments

Possible Contamination and/or Chemical Hazards	NONE
Relinquished by	bla Date/Time AUGUST 19, 2020
Received by	Date/Time 8/20/20 11:15
lelinquished by	Date/Time
eceived by	Date/Time
elinquished by	Date/Time
Received by	Date/Time

4388 Glendale Milford Rd, Cincinnati, OH 45242 513-733-5336 / FAX: 513-733-5347 ALS Laboratory Group

ALS Laboratory Group MENTERAL CREMERY & HESTING SCREETER 20070690 (ALS)

ANALYTICAL REQUEST FORM

1. REGULAR Status

RUSH Status Requested - ADDITIONAL CHARGE RESULTS REQUIRED BY

DATE CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

2. Date 8/19/2020 Purchase Order No. 20-042-03	4. Quote No
Company Name IINA BA INC	Al S Project Manager Chris Amidon
Address 1812 SCHOFIELD LANE	5. Sample Collection
Person to Contact JOHN R ISHAM, CPG	Sampling Site NHA #15-32 OJO AMARILLO
Telephone 505-327-1072	Industrial Process
Fax Telephone 505-327-1517	Date of Collection AUGUST 17, 2020
E-mail Address jisham@iinaba.com	Time Collected
Billing Address	Date of Shipment AUGUST 19, 2020
SAME AS ABOVE	Chain of Custody No 125-03

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED Line method and have	T
	NHA-125-23	BULK		A ON I	Units**
	-24	BULK		ACM	4
	-25	BULK		ACM	4
	-26	BULK		ACM	4
	-27	BULK		ACM	4
				ACM	4

Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other
 ** 1. mg/sample 2. mg/m³ 3. pprn 4. % 5. _____ (other) Please indicate one or more units in the column entitled Units**
 Comments

Possible Contamination and/or Chemical Hazards	NONE	
Relinquished by	life Determine A.	C. 19-1-1
Received by		2051 69 2020 16:30
Relinquished by	Date/Time	720/20/11/5
D	Date/Time	
Received by	Date/Time	
Relinguished by		
Remind by	Date/Time	
	Date/Time	
4388 Glendale Milford Rd, Cincinnati, O	H 45242 512 722 5556 (

ALS Laboratory Group



27-Aug-2020

John Isham iina ba, inc. 1812 Schofield Lane Farmington, NM 87401

Re: NHA #15-32 OJO AMARILLO

Work Order: 20080691

Dear John,

ALS Environmental received 26 samples on 20-Aug-2020 11:17 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 42.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Joe Ribar Shawn Smythe Project Manager

Environmental

Report of Laboratory Analysis

A School OW CORP Parcel the School of Graph Action Republication Frances

www.alsglobal.com

RIGHT SOLUTIONS MORT PARTNER

Client:iina ba, inc.Project:NHA #15-32 OJO AMARILLOWork Order:20080691

Work Order Sample Summary

Lab Samp ID	Client Sample ID	<u>Matrix</u>	Tag Number	Collection Date	Date Received	Hold
20080691-01	NHA-131-01	Bulk		8/17/2020	8/20/2020 11:17	
20080691-02	NHA-131-02	Bulk		8/17/2020	8/20/2020 11:17	
20080691-03	NHA-131-03	Bulk		8/17/2020	8/20/2020 11:17	
20080691-04	NHA-131-04	Bulk		8/17/2020	8/20/2020 11:17	
20080691-05	NHA-131-05	Bulk		8/17/2020	8/20/2020 11:17	
20080691-06	NHA-131-06	Bulk		8/17/2020	8/20/2020 11:17	
20080691-07	NHA-131-07	Bulk		8/17/2020	8/20/2020 11:17	
20080691-08	NHA-131-08	Bulk		8/17/2020	8/20/2020 11:17	
20080691-09	NHA-131-09	Bulk		8/17/2020	8/20/2020 11:17	
20080691-10	NHA-131-10	Bulk		8/17/2020	8/20/2020 11:17	
20080691-11	NHA-131-11	Bulk		8/17/2020	8/20/2020 11:17	
20080691-12	NHA-131-12	Bulk		8/17/2020	8/20/2020 11:17	
20080691-13	NHA-131-13	Bulk		8/17/2020	8/20/2020 11:17	
20080691-14	NHA-131-14	Bulk		8/17/2020	8/20/2020 11:17	
20080691-15	NHA-131-15	Bulk		8/17/2020	8/20/2020 11:17	
20080691-16	NHA-131-16	Bulk		8/17/2020	8/20/2020 11:17	
20080691-17	NHA-131-17	Bulk		8/17/2020	8/20/2020 11:17	
20080691-18	NHA-131-18	Bulk		8/17/2020	8/20/2020 11:17	
20080691-19	NHA-131-19	Bulk		8/17/2020	8/20/2020 11:17	
20080691-20	NHA-131-20	Bulk		8/17/2020	8/20/2020 11:17	
20080691-21	NHA-131-21	Bulk		8/17/2020	8/20/2020 11:17	
20080691-22	NHA-131-22	Bulk		8/17/2020	8/20/2020 11:17	
20080691-23	NHA-131-23	Bulk		8/17/2020	8/20/2020 11:17	
20080691-24	NHA-131-24	Bulk		8/17/2020	8/20/2020 11:17	
20080691-25	NHA-131-25	Bulk		8/17/2020	8/20/2020 11:17	
20080691-26	NHA-131-26	Bulk		8/17/2020	8/20/2020 11:17	

Date: 27-Aug-20

ALS Environmental

Client:	iina ba, inc.	
Project:	NHA #15-32 OJO AMARILLO	Case Narrative
Work Order:	20080691	

It is the responsibility of the client to notify the lab of any certification requirements in writing via the chain of custody as this may determine the preparation and analytical procedures employed.

Laboratory accreditation does not in any way constitute approval or endorsement by any accrediting body or agency of the federal government. Please contact ALS Cincinnati QA/QC Manager for accreditation identifications and certifications.

All sample collection is performed outside of ALS and is the sole responsibility of the client. Sample condition acceptable upon receipt except where noted. Estimates of concentration are semi-quantitative and are made on an area basis. Results apply only to portions of samples analyzed. Samples disposed after 60 days.

All analytical data (results) and technical content (comments) related to the preparation and analysis of the samples stated herein is the responsibility of the analyst. Raw data is reviewed and validated by a qualified peer analyst and imported into the Laboratory Information Management System (LIMS) where it is formatted by the cover letter signatory charged with compiling and sending the final LIMS generated report to the client.

The reporting limit (RL) for asbestos in bulk materials is 1% and is a function of the quantity of sample analyzed, the nature of any matrix interferences, sample preparation, and fiber size and distribution. Results reported as ND indicate that no asbestos was detected. Results reported as Trace indicate that asbestos was detected at some level confidently determined to be <1% which is considered inconclusive according to New York ELAP.

ALS performs variety of PLM methods for asbestos in bulk building materials including EPA 600/R-93/116, NIOSH 9002, ELAP 198.1, and ELAP 198.6. In addition, we perform a modified uncertified version of EPA 600/R-04/004 for asbestos in vermiculite which reports asbestos as present or absent only, an in-house developed uncertified method ALS SOP ENV 004 for asbestos in soil, and asbestos in soil by ASTM D7521.

Regardless of the method requested, all samples are examined according to mandatory method protocol. Any optional method protocol are eliminated from the initial analysis but may be performed upon client request. These may include; insufficient sample volume rejection*, phase separation of layered or heterogeneous samples, ashing to remove organic interferences, acid dissolution to remove mineral carbonate interferences, point counting**, and analysis by transmission electron microscopy (TEM) is recommended to verify all ND PLM results.

All samples are examined by stereomicroscope for the determination of homogeneity, texture, friability, color, and extent of fibrous components. Non-asbestos materials such as foil, paper, metal, plastic, pebbles, or organic debris are ignored and a subsample of the remaining material homogenized by some means for examination by polarized light microscope (PLM). Information obtained via both stereomicroscope and PLM are used in the final qualitative and quantitative analysis of fibrous components.

NOTE: Any visible building debris in soil samples such as pieces of drywall, roofing material,

Client:iina ba, inc.Project:NHA #15-32 OJO AMARILLOWork Order:20080691

insulation, concrete, etc., are not included in the soil analysis. If present, these are considered possible asbestos containing materials (ACM) and may be analyzed as separate samples upon client request.

*Sufficient sample volume is material dependent. For samples such as floor tiles, roofing felts, sheet insulation, etc., three to four square inches of the layered material is preferred. For materials such as ceiling tiles, loose fill insulation, pipe insulation, etc., one cubic inch (~15cc) is preferred. For samples of thin coating materials such as paints, mastics, spray plasters, etc., a smaller sample size may be suitable. For vermiculite analysis, a one gallon ziploc bag full of dry, loose material is acceptable. For ENV 004 soil samples, a 4oz jar is recommended. The ASTM D7521 Soil method requires a minimum of 8oz and a maximum of 16oz of homogeneous soil.

**PLM samples at or near the 1% detection limit may be analyzed by the 400 point count analysis which refers to method EPA 600/M4/82/020, or AHERA method EPA 40 CFR Part 763, Sub. E, App. E as these are synonymous

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-01A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-131-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Beige			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: iii Project: N	na ba, inc. HA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-01B			Colle	ction Date: 8/17/2020
Client Sample ID:	NHA-131-01				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLM					Date Analyzed 8/26/2020
Macroscopic Exam	ination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>70<=80	%		
Asbestiform Miner	als			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>1<=3	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		>1<=3	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-02A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-131-02				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Beige			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Date: 27-Aug-20

Client: i Project: I	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-02B			Collec	ction Date: 8/17/2020
Client Sample ID:	NHA-131-02				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exar	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>70<=80	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>3<=5	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		>3<=5	%		

193

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-03A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-131-03				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	М				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Beige			
Description		Tile			
Homogeneity		Layered			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>70<=80	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client:iina ba, inc.Project:NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID: 20080691-03B			Collec	tion Date: 8/17/2020
Client Sample ID: NHA-131-03				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color	Black			-
Description	Mastic			
Homogeneity	Layered			
Texture	Resinous			
Other Materials			E600/R-93/116	
Cellulose	ND	%		
Fiberglass	ND	%		
Non-fibrous	>10<=20	%		
Other fibers	ND	%		
Resin/binder	>70<=80	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	>1<=3	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	>1<=3	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-04A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-04				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>1<=3	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Date: 27-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-05A			Collec	tion Date: 8/17/2020
Client Sample ID	: NHA-131-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

5

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-05B			Collec	tion Date: 8/17/2020
Client Sample ID	: NHA-131-05				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 _. OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-06A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-131-06				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client:iina ba, inc.Project:NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID: 20080691-06B			Collec	tion Date: 8/17/2020
Client Sample ID: NHA-131-06				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color	White			
Description	Skim Coat			
Homogeneity	Layered			
Texture	Crumbly			
Other Materials			E600/R-93/116	
Cellulose	ND	%		
Fiberglass	ND	%		
Non-fibrous	>90<=100	%		
Other fibers	ND	%		
Resin/binder	ND	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%		
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID: 20080691-07A				Collec	tion Date: 8/17/2020
Client Sample ID	: NHA-131-07				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	.M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: i Project: N	ina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-07B			Collec	tion Date: 8/17/2020
Client Sample ID:	NHA-131-07				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	Ν				Date Analyzed 8/26/2020
Macroscopic Exan	nination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Skim Coat			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%	15	
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: i Project: 1	lina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID: 20080691-08A				Collec	ction Date: 8/17/2020
Client Sample ID:	NHA-131-08				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	Ŵ				Date Analyzed 8/26/2020
Macroscopic Exar	nination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Drywall			
Homogeneity		Layered			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691	
Lab ID:	20080691-08B			Collection Date: 8/17/2020		
Client Sample ID	NHA-131-08			Matrix: BULK		
Analyses		Result	Units		Analytical Results	
Asbestos by PL	М				Date Analyzed 8/26/2020	
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS	
Color		White				
Description		Skim Coat		9-		
Homogeneity		Layered				
Texture		Crumbly				
Other Materials				E600/R-93/116		
Cellulose		ND	%			
Fiberglass		ND	%			
Non-fibrous		>90<=100	%			
Other fibers		ND	%			
Resin/binder		ND	%			
Asbestiform Min	erals			E600/R-93/116		
Amosite		ND	%			
Anthophyllite		ND	%			
Chrysotile		ND	%			
Crocidolite		ND	%			
Tremolite - actinolite	9	ND	%			
Total asbestos		ND	%			

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID: 20080691-09A				Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-09			Matrix: BULK	
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID: 20080691-10A				Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-131-10			Matrix: BULK	
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	8	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID: 20080691-11A			Collection Date: 8/17/2020		tion Date: 8/17/2020
Client Sample ID	NHA-131-11			Matrix: BULK	
Analyses		Result	Units		Analytical Results
Asbestos by PL	.м				Date Analyzed 8/26/2020
Macroscopic Exa	amination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		White			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>80<=90	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mir	nerals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID: 20080691-12A				Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-12				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Transite			
Homogeneity		Homogeneous			
Texture		Compact			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>60<=70	%		
Other fibers		ND	%		
Resin/binder		>10<=20	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		>5<=10	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		>5<=10	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691	
Lab ID: 20080691-13A				Colle	ction Date: 8/17/2020	
Client Sample ID	: NHA-131-13			Matrix: BULK		
Analyses		Result	Units		Analytical Results	
Asbestos by PL	м				Date Analyzed 8/26/2020	
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS	
Color		Black				
Description		Material				
Homogeneity		Layered				
Texture		Flexible				
Other Materials				E600/R-93/116		
Cellulose		Trace	%			
Fiberglass		ND	%			
Non-fibrous		>30<=40	%			
Other fibers		ND	%			
Resin/binder		>50<=60	%			
Asbestiform Min	erals			E600/R-93/116		
Amosite		ND	%			
Anthophyllite		ND	%			
Chrysotile		ND	%			
Crocidolite		ND	%			
Tremolite - actinolite	•	ND	%			
Total asbestos		ND	%			
Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691	
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Lab ID:	20080691-13B			Collection Date: 8/17/2020		
Client Sample ID	: NHA-131-13				Matrix: BULK	
Analyses		Result	Units		Analytical Results	
Asbestos by PL	M				Date Analyzed 8/26/2020	
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS	
Color		Tan				
Description		Mastic				
Homogeneity		Layered				
Texture		Resinous				
Other Materials				E600/R-93/116		
Cellulose		Trace	%			
Fiberglass		ND	%			
Non-fibrous		>10<=20	%			
Other fibers		ND	%			
Resin/binder		>70<=80	%			
Asbestiform Min	erals			E600/R-93/116		
Arnosite		ND	%			
Anthophyllite		ND	%			
Chrysotile		ND	%			
Crocidolite		ND	%			
Tremolite - actinolite	9	ND	%			
Total asbestos		ND	%			

Date: 27-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-14A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-14				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Material			
Homogeneity		Layered			
Texture		Flexible			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>30<=40	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	B	ND	%		
Total asbestos		ND	%		

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Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-14B			Collec	tion Date: 8/17/2020
Client Sample ID	• NHA-131-14				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	.M				Date Analyzed 8/26/2020
Macroscopic Exa	imination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Yellow			
Description		Mastic			
Homogeneity		Layered			
Texture		Resinous			
Other Materials				E600/R-93/116	
Cellulose		>5<=10	%		
Fiberglass		ND	%		
Non-fibrous		>10<=20	%		
Other fibers		ND	%		
Resin/binder		>60<=70	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolit	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO A	MARILLO			Work Order: 20080691
Lab ID:	20080691-15A			Collec	tion Date: 8/17/2020
Client Sample ID:	NHA-131-15				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Black			
Description		Material			
Homogeneity		Layered			
⊤exture		Flexible			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>30<=40	%		
Other fibers		ND	%		
Resin/binder		>50<=60	%		
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite)	ND	%		
Total asbestos		ND	%		

Date: 27-Aug-20

Client:iina ba, inc.Project:NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID: 20080691-15B			Collec	tion Date: 8/17/2020
Client Sample ID: NHA-131-15				Matrix: BULK
Analyses	Result	Units		Analytical Results
Asbestos by PLM				Date Analyzed 8/26/2020
Macroscopic Examination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color	Tan			-
Description	Mastic			
Homogeneity	Layered			
Texture	Resinous			
Other Materials			E600/R-93/116	
Cellulose	>5<=10	%		
Fiberglass	ND	%		
Non-fibrous	>10<=20	%		
Other fibers	ND	%		
Resin/binder	>60<=70	%		
Asbestiform Minerals			E600/R-93/116	
Amosite	ND	%		
Anthophyllite	ND	%	¥.	
Chrysotile	ND	%		
Crocidolite	ND	%		
Tremolite - actinolite	ND	%		
Total asbestos	ND	%		

Note:

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-16A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-16				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black		2	
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		
Lab ID:	20080691-17A			Colle	ction Date: 8/17/2020
Client Sample ID:	NHA-131-17				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Desinaus			
Texture		Resinous			
Asbestiform Min	erals	Resinous		E600/R-93/116	
Asbestiform Min Amosite	erals	Resinous	%	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite	erals	ND	% %	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite Chrysotile	erals	Resinous ND ND ND	% %	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite Chrysotile Crocidolite	erals	ND ND ND ND ND	% % %	E600/R-93/116	
Asbestiform Min Amosite Anthophyllite Chrysotile Crocidolite Tremolite - actinolite	erals e	ND ND ND ND ND	% % %	E600/R-93/116	

Lab ID: 20080691-18A Collection Date: 8/17/2020 Client Sample ID: NHA-131-18 Matrix: BULK Analyses Result Units Analytical Result Asbestos by PLM with Ashing Date Analyzed 8/26 Back Date Analyzed 8/26 Macroscopic Examination Prep Date: 8/25/2020 E600/R-93/116 Analyst: MRS Color Black Date Analyzed 8/26 Analyst: MRS Analyst: MRS Color Black Date Analyzed 8/26 E600/R-93/116 Analyst: MRS Color Black E600/R-93/116 Analyst: MRS Asbestiform Minerals E600/R-93/116 Analyst: MRS Astostife ND<%	esults 3/2020
Client Sample ID: NHA-131-18 Matrix: BULK Analyses Result Units Analytical Result Asbestos by PLM with Ashing Macroscopic Examination Prep Date: 8/25/2020 E600/R-93/116 Date Analyzed 8/25/2020 Color Black Description Material Homogeneous Texture ND % Asbestiform Minerals E600/R-93/116 Analyst: MRS Amosite Anthophyllite Crocidolite ND % Antiophyllite Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Collection Date: 8/17/2020	esults 3/2020
Analyses Result Units Analytical Result Asbestos by PLM with Ashing Macroscopic Examination Prep Date: 8/25/2020 E600/R-93/116 Date Analyzed 8/26 Color Black Black Material Analyst: MRS Analyst: MRS Color Black Material Homogeneous E600/R-93/116 Analyst: MRS MRS Asbestiform Minerals E600/R-93/116 Material Mariat MRS Material Amosite ND % Matriat MD % Matriat Mariat Mariat MRS Material Mariat MRS Matriat MRS Matriat MRS Matriat MRS Matriat Matriat MRS MRS Matriat MRS Matriat MRS MRS MRS MRS	esults 3/2020
Asbestos by PLM with Ashing Macroscopic Examination Date Analyzed 8/26 Macroscopic Examination Prep Date: 8/25/2020 E600/R-93/116 Analyst: MRS Color Black Material Homogeneity Homogeneous Resinous Texture Resinous E600/R-93/116 Ansite ND % Anthophyllite ND % Crocidolite ND % Tremolite - actinolite ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Matrix: BULK	5/2020
Macroscopic Examination Prep Date: 8/25/2020 E600/R-93/116 Analyst: MRS Color Black Material Material Homogeneous Homo	
ColorBlack Material Homogeneous ResinousAsbestiform MineralsE600/R-93/116AmositeNDAmositeNDAnthophylliteNDChrysotileNDCrocidoliteNDTremolite - actinoliteNDTotal asbestosNDKeineralsCollection Date:Bilack Matrix:Bulkk	
Description Material Homogeneity Homogeneous Texture Resinous Asbestiform Minerals E600/R-93/116 Amosite ND Amosite ND Anthophyllite ND Chrysotile ND Crocidolite ND Tremolite - actinolite ND Total asbestos ND Lab ID: 20080691-19A Collection Date: 8/17/2020 Material MI Material MI Material MI Moderal MI <td></td>	
Homogeneity Texture Homogeneous Resinous Asbestiform Minerals E600/R-93/116 Amosite ND % Anthophyllite ND % Chrysotile ND % Crocidolite ND % Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Texture Resinous Asbestiform Minerals E600/R-93/116 Amosite ND Amosite ND Anthophyllite ND Chrysotile ND Crocidolite ND Tremolite - actinolite ND Total asbestos ND Lab ID: 20080691-19A Collection Date: 8/17/2020 Matrix: BULK	
Asbestiform Minerals E600/R-93/116 Amosite ND % Anthophyllite ND % Chrysotile ND % Crocidolite ND % Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Amosite ND % Anthophyllite ND % Chrysotile ND % Crocidolite ND % Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Anthophyllite ND % Chrysotile ND % Crocidolite ND % Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Chrysotile ND % Crocidolite ND % Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Crocidolite ND % Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Tremolite - actinolite ND % Total asbestos ND % Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Total asbestosND%Lab ID:20080691-19ACollection Date: 8/17/2020Client Sample ID:NHA-131-19Matrix: BULK	
Lab ID: 20080691-19A Collection Date: 8/17/2020 Client Sample ID: NHA-131-19 Matrix: BULK	
Client Sample ID: NHA-131-19 Matrix: BULK	
Analyses Result Units Analytical Re	esults
Asbestos by PLM with Ashing Date Analyzed 8/26	6/2020
Macroscopic Examination Prep Date: 8/25/2020 E600/R-93/116 Analyst: MRS	
Color Black	
Description Material	
Homogeneity Homogeneous	
Texture Resinous	
Asbestiform Minerals E600/R-93/116	
Amosite ND %	
Anthophyllite ND %	
Chrysotile 7.34 %	
Crocidolite ND %	
Tremolite - actinolite ND %	

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-20A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-20				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			·
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		9.07	%		
Crocidolite		ND	%		
Tremolite - actinolite	3	ND	%		
Total asbestos		9.07	%		
Lab ID:	20080691-21A			Collec	ction Date: 8/17/2020
Client Sample ID:	NHA-131-21				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLI	M with Ashing				Date Analyzed 8/26/2020
Macroscopic Exar	nination	Prep Date:	8/25/2020	E600/R-93/116	Analyst: MRS
Color		Black			
Description		Material			
Homogeneity		Homogeneous			
Texture		Resinous			
Asbestiform Mine	erals			E600/R-93/116	
Amosite		ND	%		
Aniosite		ND	%		
Anthophyllite					
Anthophyllite Chrysotile		4.39	%		
Anthophyllite Chrysotile Crocidolite		4.39 ND	% %		
Anthophyllite Chrysotile Crocidolite Tremolite - actinolite	,	4.39 ND ND	% % %		

Client: i Project: P	ina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-22A			Collec	tion Date: 8/17/2020
Client Sample ID:	NHA-131-22				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PLN	Λ				Date Analyzed 8/26/2020
Macroscopic Exan	nination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		Тгасе	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Mine	rals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite		ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-23A			Collec	ction Date: 8/17/2020
Client Sample ID	: NHA-131-23				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-24A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-24				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Tan			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		ND	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	e	ND	%		
Total asbestos		ND	%		

Date: 27-Aug-20

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-25A			Collect	ion Date: 8/17/2020
Client Sample ID	: NHA-131-25				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	м				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		
Crocidolite		ND	%		
Tremolite - actinolite	9	ND	%		
Total asbestos		ND	%		

Client: Project:	iina ba, inc. NHA #15-32 OJO	AMARILLO			Work Order: 20080691
Lab ID:	20080691-26A			Colle	ction Date: 8/17/2020
Client Sample ID	: NHA-131-26				Matrix: BULK
Analyses		Result	Units		Analytical Results
Asbestos by PL	M				Date Analyzed 8/26/2020
Macroscopic Exa	mination	Prep Date:	8/26/2020	E600/R-93/116	Analyst: AFS
Color		Grey			·
Description		Material			
Homogeneity		Homogeneous			
Texture		Crumbly			
Other Materials				E600/R-93/116	
Cellulose		Trace	%		
Fiberglass		ND	%		
Non-fibrous		>90<=100	%		
Other fibers		ND	%		
Resin/binder		ND	%		
Asbestiform Min	erals			E600/R-93/116	
Amosite		ND	%		
Anthophyllite		ND	%		
Chrysotile		ND	%		

ND

ND

ND

%

%

%

Note:

Crocidolite

Tremolite - actinolite

Total asbestos

Client: Project: WorkOrder:	iina ba, inc. NHA #15-32 OJO AMARILLO 20080691	QUALIFIERS, ACRONYMS, UNITS
Qualifier	Description	
*	Value exceeds Regulatory Limit	
а	Not accredited	

В	Analyte detected in the associated Method Blank above th
Е	Value above quantitation range
Н	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
0	Sample amount is > 4 times amount spiked
Р	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported Description

%

Sample Receipt Checklist

Client Name: IINABA-FARMINGTON		Date/Time I	Received: 20	-Aug-20 1	<u>1:17</u>
Work Order: 20080691		Received by	y: <u>DI</u>	<u>NS</u>	
Checklist completed by Jan Wilcox	20-Aug-20 Date	Reviewed by:	Shawn Sm	ythe	21-Aug-20 Date
Matrices: <u>bulk</u> Carrier name: <u>FedEx</u>					
Shipping container/cooler in good condition?	Yes 🗸	No	Not Present		
Custody seals intact on shipping container/cooler?	Yes	No	Not Present	\checkmark	
Custody seals intact on sample bottles?	Yes 🗌	No	Not Present	✓	
Chain of custody present?	Yes 🗹	No			
Chain of custody signed when relinquished and received?	Yes 🔽	No			
Chain of custody agrees with sample labels?	Yes 🖌	No 🗌			
Samples in proper container/bottle?	Yes 🗹	No			
Sample containers intact?	Yes 🖌	No			
Sufficient sample volume for indicated test?	Yes 🗹	No			
All samples received within holding time?	Yes 🗹	No			
Container/Temp Blank temperature in compliance?	Yes 🖌	No 🗌			
Sample(s) received on ice? Temperature(s)/Thermometer(s):	Yes	No 🗹			
Cooler(s)/Kit(s):					
Date/Time sample(s) sent to storage:	Vas	No		h milita d	
Water - VOA viais nave zero neadspace?	res		NO VUA viais sui	omittea	
vvater - pH acceptable upon receipt?	Yes	No	N/A		
pH adjusted? pH adjusted by:	Yes	No	N/A		

Login Notes:

Client Contacted:	Date Contacted	Person Contacted:
Contacted By:	Regarding:	
-		
Comments:		
CorrectiveAction:		

SRC Page 1 of 1

ANALYTICAL REQUEST FORM

	ALS Laboratory Group
\mathcal{H}	080691



1. X REGULAR Status

RUSH Status Requested - ADDITIONAL CHARGE
RESULTS REQUIRED BY
DATE

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

. Date 8/19/2020 Purchase Order No. 20-042-03	4. Quote No.	
Company Name IINA BA INC	ALS Project Manager Chris Amidon	
Address 1812 SCHOFIELD LANE	5. Sample Collection	
FARMINGTON, NM 87401	Sampling Site NHA #15-32 OJO AMARILLO	
Person to Contact JOHN R ISHAM, CPG	Industrial Process	
Telephone 505-327-1072	Date of Collection AUGUST 17, 2020	
Fax Telephone 505-327-1517	Time Collected	
E-mall Address jisham@iinaba.com	Date of Shipment AUGUST 19, 2020	
Billing Address	Chain of Custody No 131-01	
SAME AS ABOVE		

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-131-01	BULK		ACM	4
	- ºZ	BULK		ACM	4
	-03	BULK		ACM	4
	-04	BÜLK		ACM	4
	-05	BULK		ACM	4
	-06	BULK		ACM	4
	-07	BULK		ACM	4
	-08	BULK		ACM	4
	_09	BULK		ACM	4
	-10	BULK		АСМ	4
	-11	BULK		ACM	4

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other
** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. _____ (other) Please Indicate one or more units in the column entitled Units**

Comm	ents

Possible Contamination and/or Chemical Hazards	ONE
Relinquished by	Date/Time AUGVST 19, 2020 16:30
Received by	Date/Time 2/20/20 1/17
Relinquished by	Date/Time
Received by	Date/Time
Relinquished by	Date/Time
Received by	Date/Time

4388 Glendale Milford Rd, Cincinnati, OH 45242

513-733-5336 / FAX: 513-733-5347

ALS Laboratory Group

ANALYTICAL REQUEST FORM

ALS Laboratory Group ANALYTICAL CHEMISTRY & TESTING SERVICES	A.
20080691	(ALS)

1/X REGULAR Status

RUSH Status Requested - ADDITIONAL CHARGE RESULTS REQUIRED BY

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

2. Date 8/19/2020 Purchase Order No.	20-042-03	4. Quote No.
. Company Name IINA BA INC		ALS Project Manager Chris Amidon
Address 1812 SCHOFIELD LANE		5. Sample Collection
FARMINGTON, NM 87401		Sampling Site NHA #15-32 OJO AMARILLO
Person to Contact JOHN R ISHAM, CP	G	Industrial Process
Telephone 505-327-1072		Date of Collection AUGUST 17, 2020
Fax Telephone 505-327-1517		Time Collected
E-mail Address jisham@iinaba.com		Date of Shipment AUGUST 19, 2020
Billing Address		Chain of Custody No 131-02
SAME AS ABOVE		

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-131-12	BULK		ACM	4
	~13	BULK		ACM	4
	-14	BULK	1754	ACM	4
	-15	BULK		ACM	4
	-16	BULK		ACM	4
	-17	BULK		ACM	4
	-18	BULK		ACM	4
	-19	BULK		ACM	4
	- 20	BULK		ACM	4
	- 21	BULK		ACM	4
	55~	BULK		ACM	4

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other
** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. _____ (other) Please Indicate one or more units in the column entitled Units**

Comments	
----------	--

Possible Contamination and/or Chemical Hazards	IE
Relinquished by	Date/Time AUGUST 19, 2020 16:30
Received by	Date/Time 8/20/30 /11:17
Relinquished by	Date/Time
Received by	Date/Time
Relinquished by	Date/Time
Received by	Date/Time

4388 Glendale Milford Rd, Cincinnati, OH 45242

513-733-5336 / FAX: 513-733-5347

ALS Laboratory Group

ANALYTICAL REQUEST FORM

ALS Laboratory Group ANALYTIKAL CHEMISTRY & TESTING SERVICES	
20080691	AL

1. K REGULAR Status

CONTACT ALS DATACHEM PRIOR TO SENDING SAMPLES

2. Date 8/19/2020	Purchase Order No.	20-042-03	4.	Quote No.	
3. Company Name	IINA BA INC			ALS Project Manag	ger Chris Amidon
Address 1812	SCHOFIELD LANE		5.	Sample Collection	1
FARMINGTON	N, NM 87401		(i	Sampling Site NI	A #15-32 OJO AMARILLO
Person to Contact	JOHN R ISHAM, CP	G		Industrial Process	
Telephone	505-327-1072			Date of Collection	AUGUST 17, 2020
Fax Telephone	505-327-1517			Time Collected	
E-mail Address ji	sham@iinaba.com			Date of Shipment	AUGUST 19, 2020
Billing Address				Chain of Custody N	lo 131-03
SAME AS ABO	DVE				

6. REQUEST FOR ANALYSES

Laboratory Use Only	Client Sample Number	Metrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**
	NHA-131-23	BULK		ACM	4
	-24	BULK		ACM	4
	- 25	BULK		ACM	4
See 14 in	-76	BULK		ACM	4
		BULK		ACM	4
		BULK		ACM	4
		BULK		ACM	4
		BULK		ACM	4
		BULK		ACM	4
		BULK		ACM	4
		BULK		ACM	4

* Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soil; Water; Other ** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. ____ (other) Please indicate one or more units in the column entitled Units** Comments

Relignished by the Children	- Detertime AUGUST 19.2020 16:3
Received by	
Relinquished by	Date/Time
Received by	Date/Time
Relinquished by	Date/Time
Received by	Date/Time

4388 Glendale Milford Rd, Cincinnati, OH 45242 513-733-5336 / FAX: 513-733-5347 ALS Laboratory Group



LIMS Version: 7.010

Monday, August 31, 2020

John Isham iina ba, Inc. 1812 Schofield Lane Farmington, NM 87401

Re: ALS Workorder: 2008461 Project Name: NHA Housing Ojo Amarillo Testing Project Number: 20-042-03

Dear Mr. Isham:

Fifteen solid samples were received from iina ba, Inc., on 8/20/2020. The samples were scheduled for the following analysis:

Metals

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

nhi Ellija

ALS Environmental For Katie M. OBrien **Project Manager**

ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP., Part of the ALS Laboratory Group An ALS Limited Company



www.alsglobal.com RIGHT SOLUTIONS BIGHT PARTNER



ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environme	ental – Fort Collins
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280



2008461

Metals:

The samples were analyzed following SW-846, 3rd Edition procedures. Analysis by Trace ICP followed method 6010D and the current revision of SOP 834.

¥.

All acceptance criteria were met.

Sample Number(s) Cross-Reference Table

OrderNum: 2008461 Client Name: iina ba, Inc. Client Project Name: NHA Housing Ojo Amarillo Testing Client Project Number: 20-042-03 Client PO Number: 20-042-03

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
NHA-62-LP1	2008461-1		SOLID	18-Aug-20	
NHA-62-LP2	2008461-2		SOLID	18-Aug-20	
NHA-62-LP3	2008461-3		SOLID	18-Aug-20	
NHA-118-LP-1	2008461-4		SOLID	18-Aug-20	
NHA-118-LP-2	2008461-5		SOLID	18-Aug-20	
NHA-118-LP-3	2008461-6		SOLID	18-Aug-20	
NHA-120-LP-1	2008461-7		SOLID	18-Aug-20	
NHA-120-LP-2	2008461-8		SOLID	18-Aug-20	
NHA-125-LP-1	2008461-9		SOLID	17-Aug-20	
NHA-125-LP-2	2008461-10		SOLID	17-Aug-20	
NHA-131-LP1	2008461-11		SOLID	17-Aug-20	
NHA-131-LP2	2008461-12		SOLID	17-Aug-20	
NHA-131-LP3	2008461-13		SOLID	17-Aug-20	
NHA-131-LP4	2008461-14		SOLID	17-Aug-20	
NHA-125-LP-3	2008461-15		SOLID	17-Aug-20	

ALS Enviro	225 Commerce Drive, Fo TF: (800) 443-1511 PH: (8
<	

<	ALS Environmental				Chain	-of-C	usto	dy								
	225 Commerce Drive, Fort Colkins, Colorado 80524 TF: (800) 443-1511 PH: (870) 490-1511 FX: (970) 490-1	1522									Form 20248	WORKORDER	Ч	0 Q	r P	9
(ALS)		SAN	APLER Matthe	w Bennalley					DATE	8	9/2020	PAGE	F		5	~
PROJECT NAME	NHA Housing Olo Amarillo Testing		SITE ID NM#15	73				TURNA	anno		omat	DISPOSAL	By Lab	5	Return	o Client
PROJECT No.	20 042 03	EDD FO	DRMAT				Ī			-				L		\vdash
		PURCHASE O	RDER 20-042	63												
COMPANY NAME	iina ba, Inc.	BILL TO CON	APANY Same				Γ									
SEND REPORT TO	John R. Isham, CPG	INVOICE AT	TN TO Terry Y	(ezzie			Γ			_			_			
ADDRESS	1812 Schofield Lane	QQV	RESS 1612 S	chofield Lane			Γ									
CITY / STATE / ZP	Farmington, NM 87401	CITY / STAT	E/ZP Farmin	gton, NM 87401												
PHONE	(505) 327-1072	•	HONE (506) 3:	27-1072												
FAX	(505) 327-1517		FAX (505) 3:	27-1517			Γ		_							
E-MAIL	jisham@iinaba.com		E-MAL IVAZZI	e@iinaba.com			Γ	DE9J								_
Lab ID	Field ID	Metrix	Sample Date	Sample Time	Bott #	a de la companya de l	8									
1	NHA-62-LP1	Solid	8/18/2020					×								-
2	NHA-62-LP2	Solid	8/18/2020					×	-							-
2	NHA-62-LP3	Solid	8/18/2020					×								-
Г	NHA-118-LP-1	Solid	8/18/2020					×								,
5	NHA-118-LP-2	Solid	8/18/2020													
و	NHA-118-LP-3	Solid	8/18/2020					×								
t	NHA-120-LP-1	Solid	8/18/2020				~	×								
r	NHA-120-LP-2	Solid	8/18/2020				7	×								
4	NHA-125-LP-1	Solid	8/17/2020					×								
с <u>о</u>	NHA-125-LP-2	Solid	8/17/2020				n									
"Time Zone (Circle):	EST CST MST PST Mathix: O = oil S = soil	NS = non-soil soli	id W = water L	= liquid E = extn	act F=filte											
For metals or ani	ons, please detail analytes below.							2	IGNATURI	1	PREN	ITED NAME		DATE		BME
Comments:		OC PACK	AGE (check below		Ψ.	INQUISHI	₩	z	le l	M-	TO HN	R. ISHAN	18/	19/2	72	5.50
		_	LEVEL II (Slandard	90)		RECEM			Y		1-1-65	-N-0550	12	1201	0	53
			i						Y							

RELINQUISHED BY RECEIVED BY RELINQUISHED BY RECIEIVED BY RECEIVED BY LEVEL III (Std QC + forms) LEVEL IV (Std QC + forms + raw data) 1-HCI 2-HN03 3-H2SO4 4-NaOH 5-NaHSO4 7-Other 8-4 degrees C 9-5035 EL II (SUINGIN

5 of 25

ALS Environm	225 Commerce Drive, Fort Colline

Return to Client 2000566 2 5 By Labor N WORKORDER PAGE DISPOSAL . Form 202rb 8/19/2020 Normal DATE TURNAROUND Chain-of-Custody ス pead × × × × 8 Sample Time Bottles Pres. Trine Zone (Circle): EST CST MST PST Matrix: 0 = oil S = soil NS = non-soil solid W = water L = liquid E = extract F = filter E-MAL Nazzie@iinaba.com CITY / STATE / ZP Farmington, NM 87401 ADDRESS 1812 Schofield Lane SAMPLER Matthew Bennelley PHONE (505) 327-1072 FAX (505) 327-1517 INVOICE ATTN TO Terry Yazzie SITE ID NMH16-32 PURCHASE ORDER 20-042-03 BILL TO COMPANY Same Sample Date 8/17/2020 8/17/2020 8/17/2020 8/17/2020 1 EDD FORMAT Matrix Solid Solid Solid Solid 3 ive, Fort Collina, Colorado 80524 PH: (970) 480-1511 FX: (970) 480-1522 PROJECT NAME NHA HOUSING OIO AMARIIIO Testing For metals or anions, please detail analytes below. Comments: ental Field ID Farmington, NM 87401 John R. Isham, CPG 1812 Schofield Lane NHA - 125- LA-3 jisham@iinaba.com (505) 327-1517 PHONE (505) 327-1072 iina ba, Inc. NHA-131-LP4 NHA-131-LP2 NHA-131-LP3 NHA-131-LP1 PROJECT No. 20-042-03 TF: (800) 443-SEND REPORT TO ADDRESS E-WIL COMPANY NAME CITY / STATE / ZP FAX 3 2 J 5

Comments:						8	: PACKAGE (check	(mojec	
	é						LEVEL II (Sta	inderd OC)	
6							LEVEL III (St	d QC + forms)	
of							LEVEL IV (St + raw deta)	d QC + forms	
25									æ
Preservative Key:	Ę	2-HNO3	3-H2SO4	4-NaOH	5-NaHSO4	7-Other	8-4 degrees C	9-5035	

	A A SIGNATURE	PRINTED NAME	DATE	JNIE
RELINQUISHED BY	Aur Cukar	JOHN R. ISHAM	8/19/2 J	0/6:30
RECEIVED BY	146	1-Jer Masser	2/2-1/2	0550
RELINQUISHED BY				
RECEIVED BY				
RELINQUISHED BY				
RECEIVED BY				



ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID:	iina ba		Workorder No:	200	8461
Project Manager:	KMO	Initials:	TM	Date:	8/20/20
1. Are airbills / shipping	documents present and/or i	removable?		Drop Off	YES NO
2. Are custody seals on s	hipping containers intact?				
3. Are custody seals on s	ample containers intact?				YES NO•
4. Is there a COC (chain-	of-custody) present?			2	YES NO.
5. Is the COC in agreeme	nt with samples received?	(IDs, dates, times, # of sample	es, # of containers, matrix, requested a	nalyses, etc. 1.00	YES NO.
6. Are short-hold sample	s present?			Um.	YES 🗸 NO
7. Are all samples within	holding times for the reque	sted analyses?		2	
8. Were all sample conta	iners received intact? (not bro	oken or leaking)		2	
9. Is there sufficient sam	ple for the requested analys	ses?		2	YES NO.
10. Are samples in prope	r containers for requested a	nalyses? (form 250, 50	Imple Handling Guidelines)		YES NO+
11. Are all aqueous samp	les preserved correctly, if re	equired?		✓ N/A	YES NO•
12. Were unpreserved sa	mples pH checked, if requir	ed?		✓ N/A	YES NO
13. Are all samples requirin	g no headspace (voc, gro, rsk/mee,	radon) free of bubble	es > 6 mm in diameter?	✓ N/A	YES NO
14. Were the samples shi	pped on ice?				YES 🗸 NO
15. Were cooler tempera	tures measured at 0.1 - 6.0 ^c	C? IR gun used":	#3 #5	Red Only	YES V NO
# of custody seals on cooler: External mR/hr reading: Background mR/hr reading: * Please provide d	0 10 11 Were external mR/hr i accepta etails below for 'NO' responses in j	readings ≤ two times i Ince criteria? (if no, se gray boxes above - foi	background and within DOT the Form 008) r 2 thru 5 & 7 thru 12, notify F	□ N/A ✓	YES NO
ferring	sumple not a	sted on	COC . NHA	F-125-L	P-3
	Add per John.				
			All client bottle ID's vs ALS lab	ID's double-checke	ed by: TM
If applicable, was the clie Project Manager Signa	ature / Date:	N/A Contact	Name John — 8 4 1	۵ م	ate: 3[1] 2=

Form 201r30.xls (06/04/2020) +IR Gun #3, VWR SN 170647571 +IR Gun #5, VWR SN 192272629



fedex.com 1800.6ofedEx 1800.463.3339

8 of 25

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA H	ousing Ojo Amarill	o Testing			Work Order:	2008461
Sample ID:	NHA-62-LP1					Lab ID:	2008461-1
Legal Location:						Matrix:	SOLID
Collection Date:	8/18/2020				Perc	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals			SWe	6010	Pre	p Date: 8/27/20 2	20 PrepBy: JML
LEAD		8.9		1.7	MG/KG	1	8/28/2020 16:27

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Hou	sing Ojo Amarill	lo Testing			Work Order:	2008461
Sample ID:	NHA-62-LP2					Lab ID:	2008461-2
Legal Location:						Matrix:	SOLID
Collection Date:	8/18/2020				Per	cent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		ND	SW6	010 7.9	Pre MG/KG	ep Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:28

Client:	iina ba, Inc.					Date: 3	31-Aug-20
Project:	20-042-03 NHA Ho	ousing Ojo Amaril	lo Testing			Work Order: 2	2008461
Sample ID:	NHA-62-LP3					Lab ID: 2	2008461-3
Legal Location:						Matrix: S	SOLID
Collection Date:	8/18/2020				Perc	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals		ND	SWE	5010	Pre MG/KG	p Date: 8/27/202	0 PrepBy: JML 8/28/2020 16:31

ICP Metais		24	SW6	010	Pre	o Date: 8/27/20	20 PrepBy: JML
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Collection Date:	8/18/2020				Perc	ent Moisture:	
Legal Location:						Matrix:	SOLID
Sample ID:	NHA-118-LP-1					Lab ID:	2008461-4
Project:	20-042-03 NHA Ho	using Ojo Amarill	lo Testing			Work Order:	2008461
Client:	iina ba, Inc.					Date:	31-Aug-20

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Hous	ing Ojo Amaril	lo Testing			Work Order:	2008461
Sample ID:	NHA-118-LP-2					Lab ID:	2008461-5
Legal Location:						Matrix:	SOLID
Collection Date:	8/18/2020				Per	cent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		13	SW6	010 2	Pre MG/KG	p Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:33

Client:	iina ba, Inc.	uning Oin Amerill	- T			Date:	31-Aug-20
Project:	20-042-03 NHA HO	using Ojo Amarili	oresting			Work Order:	2008461
Sample ID:	NHA-118-LP-3					Lab ID:	2008461-6
Legal Location:	0/10/2020					Matrix:	SOLID
Collection Date:	8/18/2020				Perc	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals			SWE	5010	Pre	p Date: 8/27/20	20 PrepBy: JML
LEAD		5.5		1.9	MG/KG	1	8/28/2020 16:34

Client:	iina ba, Inc.					Date: 3	31-Aug-20
Project:	20-042-03 NHA Ho	using Ojo Amaril	lo Testing			Work Order: 2	2008461
Sample ID:	NHA-120-LP-1					Lab ID: 2	2008461-7
Legal Location:						Matrix: S	SOLID
Collection Date:	8/18/2020				Perc	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals			SWE	6010	Pre	o Date: 8/27/202	0 PrepBy: JML
LEAD		11		3.4	MG/KG	1	8/28/2020 16:35

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Hou	sing Ojo Amarill	o Testing			Work Order:	2008461
Sample ID:	NHA-120-LP-2					Lab ID:	2008461-8
Legal Location:						Matrix:	SOLID
Collection Date:	8/18/2020				Perc	cent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		5.1	SW6	i010 2.5	Pre MG/KG	p Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:36

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Hou	ising Ojo Amaril	lo Testing			Work Order:	2008461
Sample ID:	NHA-125-LP-1					Lab ID:	2008461-9
Legal Location:						Matrix:	SOLID
Collection Date:	8/17/2020				Per	cent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		15	SW6	010 2.2	Pre MG/KG	ep Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:37

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Housing Ojo Amarillo Testing			Work Order: 2008461			
Sample ID:	NHA-125-LP-2					Lab ID:	2008461-10
Legal Location:						Matrix:	SOLID
Collection Date:	8/17/2020	20 Percent Moisture:					
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		24	SW6	010 2	Pre MG/KG	p Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:38
Client:	iina ba, Inc.					Date:	31-Aug-20
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Project:	20-042-03 NHA Hou	sing Ojo Amarill	o Testing			Work Order:	2008461
Sample ID:	NHA-131-LP1					Lab ID:	2008461-11
Legal Location:						Matrix:	SOLID
Collection Date:	8/17/2020				Perc	cent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		5.2	SW6	010 1.9	Pre MG/KG	p Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:39

(4)

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Hor	using Ojo Amarill	o Testing			Work Order:	2008461
Sample ID:	NHA-131-LP2					Lab ID:	2008461-12
Legal Location:						Matrix:	SOLID
Collection Date:	8/17/2020				Perc	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		8.1	SW6	010 1.9	Pre MG/KG	p Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:40

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Ho	using Ojo Amarill	o Testing			Work Order:	2008461
Sample ID:	NHA-131-LP3					Lab ID:	2008461-13
Legal Location:						Matrix:	SOLID
Collection Date:	8/17/2020				Perc	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals		2.8	SW6	010	Pre	p Date: 8/27/20	20 PrepBy: JML

Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Hous	sing Ojo Amaril	lo Testing			Work Order:	2008461
Sample ID:	NHA-131-LP4					Lab ID:	2008461-14
Legal Location:						Matrix:	SOLID
Collection Date:	8/17/2020				Per	cent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		ND	SW6	010 2.2	Pre MG/KG	ep Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:47

SAMPLE SUMMARY REPORT

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Client:	iina ba, Inc.					Date:	31-Aug-20
Project:	20-042-03 NHA Hou	sing Ojo Amaril	lo Testing			Work Order:	2008461
Sample ID:	NHA-125-LP-3					Lab ID:	2008461-15
Legal Location:						Matrix:	SOLID
Collection Date:	8/17/2020				Per	cent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ICP Metals LEAD		2.3	SW6	i010 1.9	Pre MG/KG	ep Date: 8/27/20 1	20 PrepBy: JML 8/28/2020 16:48

Client:						
D	iina ba, Inc.				Date:	31-Aug-20
Project:	20-042-03 NHA Housing	Oio Amarillo Testi	no		Work Order	2008461
Sample ID:	NUA 125 LD 2		11 6			2000+01
Sample ID:	NHA-123-LF-3				Lab ID:	2008461-15
Legal Location:					Matrix:	SOLID
Collection Date:	8/17/2020			Perc	ent Moisture:	
A . T		D K -	Repo	t	Dilution	
Analyses		Result Q	ual Limi	t Units	Factor	Date Analyze
Explanation of Q	ualifiers					
Radiochemistry:						
- "Report Limit" is the I	MDC		M3 - The requ	sted MDC was n	ot met, but the rend	inted
U or ND - Result is les	s than the sample specific MDC.		activity is	greater than the	reported MDC.	
Y1 - Chemical Yield is	in control at 100-110%. Quantital	ive vield is assumed.	L - LCS Recov	ery below lower o	ontrol limit	
Y2 - Chemical Yield ou	itside default limits		H - LCS Recov	ery above upper	control limit.	
W - DER is greater that	n Warning Limit of 1.42		P - LCS, Matri	Spike Recovery	within control limits	•
* - Aliquot Basis is 'As	Received' while the Report Basis	is 'Drv Weight'.	N - Matrix Spik	e Recovery outsid	le control limits	
# - Aliquot Basis is 'Dr	Weight' while the Report Basis is	As Received'	NC - Not Calci	lated for duplicat	e results less than	5 times MDC
G - Sample density diff	ers by more than 15% of LCS den	sity.	B - Analyte cor	centration greate	r than MDC.	
D - DER is greater than	n Control Limit		B3 - Analyte co	ncentration great	er than MDC but le	ss than Requested
M - Requested MDC no	ot met.		MDC,			
Inorganics:						
B - Result is less than	the requested reporting limit but g	reater than the instrument	method detection li	nit (MDL).		
U or ND - Indicates that	t the compound was analyzed for	but not detected.				
E - The reported value	is estimated because of the prese	nce of interference. An ex	planatory note may	be included in the	e narrative.	
M - Duplicate injection	n precision was not met					
N - Spiked sample reco duplicate fail and the na	overy not within control limits. A plative sample concentration is less	ost spike is analyzed for all than four times the spike a	I ICP analyses when added concentration	the matrix spike	and or spik e	
Z - Spiked recovery not	within control limits. An explanato	ory note may be included in	the narrative.			
* - Duplicate analysis (i	relative percent difference) not with	hin control limite				
		in control imits.				
S - SAR value is estimation	ated as one or more analytes used	in the calculation were no	ot detected above the	e detection limit.		
S - SAR value is estima Organics:	ated as one or more analytes used	I in the calculation were no	ot detected above th	e detection limit		
S - SAR value is estima <u>Organics:</u> U or ND - Indicates tha	ated as one or more analytes used	I in the calculation were no but not detected.	ot detected above th	e detection limit.		
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected	ated as one or more analytes used t the compound was analyzed for i in the associated method blank as	I in the calculation were no but not detected. well as in the sample. It i	ot detected above the	e detection limit. Iank contaminatio	on and warns the da	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentratio	ated as one or more analytes used t the compound was analyzed for l in the associated method blank as on exceeds the upper level of the o	I in the calculation were no but not detected, s well as in the sample. It i calibration range.	ot detected above the	e detection limit. Iank contaminatio	on and warns the da	ita user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentratio J - Estimated value. TI	ated as one or more analytes used t the compound was analyzed for i in the associated method blank as on exceeds the upper level of the o ne result is less than the reporting	I in the calculation were no but not detected. s well as in the sample. It i calibration range.	ot detected above th indicates probable t nstrument method d	e detection limit. lank contaminatio	on and warns the da DL).	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentratio J - Estimated value. TI A - A tentatively identifie	ated as one or more analytes used t the compound was analyzed for i in the associated method blank as on exceeds the upper level of the o ne result is less than the reporting ed compound is a suspected aldol	I in the calculation were no but not detected. I well as in the sample. It i calibration range. I imit but greater than the in -condensation product.	ot detected above th indicates probable t nstrument method o	e detection limit. lank contaminatio	on and warns the da)L).	ata user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentratio J - Estimated value. TI A - A tentatively identifio X - The analyte was dill	ated as one or more analytes used t the compound was analyzed for i in the associated method blank as on exceeds the upper level of the ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation	I in the calculation were no but not detected. s well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level.	ot detected above th indicates probable t nstrument method o	e detection limit. lank contaminatio	on and warns the da DL).	ita user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentration J - Estimated value. TI A - A tentatively identified X - The analyte was dill * - The spike recovery i	ated as one or more analytes used t the compound was analyzed for i in the associated method blank as on exceeds the upper level of the ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation s equal to or outside the control or	I in the calculation were no but not detected. a well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used.	ot detected above th indicates probable t nstrument method d	e detection limit. lank contaminatio	on and warns the da DL).	ita user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentration J - Estimated value. TI A - A tentatively identifiant X - The analyte was dillat * - The spike recovery in + - The relative percent	ated as one or more analytes used t the compound was analyzed for in in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or indifference (RPD) equals or exceed	I in the calculation were no but not detected. s well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used. ds the control criteria.	ot detected above th indicates probable t	e detection limit. lank contaminatio	on and warns the da DL).	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentration J - Estimated value. TI A - A tentatively identifiend X - The analyte was dillet * - The spike recovery in + - The relative percent G - A pattern resembling	ated as one or more analytes used t the compound was analyzed for in in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or excee- ing gasoline was detected in this sa	I in the calculation were no but not detected. a well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used. eds the control criteria. ample.	ot detected above th indicates probable t	e detection limit. lank contaminatio	on and warns the da	ita user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentration J - Estimated value. TH A - A tentatively identifiend X - The analyte was dillet * - The spike recovery in + - The relative percent G - A pattern resemblin D - A pattern resemblin	ated as one or more analytes used t the compound was analyzed for in in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or excee- ing gasoline was detected in this sam	I in the calculation were no but not detected. a well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used. ample. ple.	ot detected above th indicates probable t	e detection limit. lank contaminatio	on and warns the da	ita user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentration J - Estimated value. TH A - A tentatively identifiend X - The analyte was dilled * - The spike recovery in + - The relative percent G - A pattern resemblin D - A pattern resemblin M - A pattern resemblin	ated as one or more analytes used t the compound was analyzed for in in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or excee- ing gasoline was detected in this sam ig motor oil was detected in this sam ig motor oil was detected in this sam	In the calculation were no but not detected. a well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. riteria used. eds the control criteria. ample. ple.	ot detected above th indicates probable t	e detection limit. lank contaminatio	on and warns the da	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte concentration J - Estimated value. TH A - A tentatively identifiend X - The analyte was dilled * - The spike recovery in + - The relative percent G - A pattern resemblin D - A pattern resemblin C - A pattern resemblin	ated as one or more analytes used t the compound was analyzed for l in the associated method blank as on exceeds the upper level of the ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or exceed in g gasoline was detected in this sam ing motor oil was detected in this sam ig orude oil was detected in this sam	I in the calculation were no but not detected. well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used. eds the control criteria. ample. ple. ample.	ot detected above th indicates probable t	e detection limit. lank contaminatio	on and warns the da	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte is detected J - Estimated value. TI A - A tentatively identifia X - The analyte was dill * - The spike recovery i + - The relative percent G - A pattern resemblin D - A pattern resemblin C - A pattern resemblin 4 - A pattern resemblin	ated as one or more analytes used to the compound was analyzed for it in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or excee- ing gasoline was detected in this sam ing motor oil was detected in this sam g orude oil was detected in this sam g JP-4 was detected in this sample	I in the calculation were no but not detected. well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used. eds the control criteria. ample. ple. ample. e.	ot detected above th indicates probable t	e detection limit. lank contaminatio	on and warns the da	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte is detected J - Estimated value. TI A - A tentatively identifia X - The analyte was dill * - The spike recovery i + - The relative percent G - A pattern resemblin D - A pattern resemblin M - A pattern resemblin 5 - A pattern resemblin 9 - A pattern resemblin	ated as one or more analytes used to the compound was analyzed for it in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or exceet g gasoline was detected in this sam g diesel was detected in this sam g motor oil was detected in this sam g DP-4 was detected in this sampling JP-5 was detected in this sampling d JP-5 was detected in this sampling d JP-5 was detected in this sampling d JP-5 was detected in this sampling d JP-5 was detected in this sam	I in the calculation were no but not detected. well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used. eds the control criteria. ample. ple. ample. e.	ot detected above th indicates probable t nstrument method d	e detection limit. lank contaminatio	on and warns the da	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte is detected J - Estimated value. TI A - A tentatively identifia X - The analyte was dill * - The spike recovery i + - The relative percent G - A pattern resemblin D - A pattern resemblin M - A pattern resemblin 5 - A pattern resemblin H - Indicates that the fu	ated as one or more analytes used to the compound was analyzed for it in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or exceed g gasoline was detected in this sam g diesel was detected in this sam g motor oil was detected in this sam g orude oil was detected in this sam g JP-5 was detected in this sample g JP-5 was detected in this sample el pattern was in the heavier end of	I in the calculation were no but not detected s well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used eds the control criteria. ample, ple. ample, e. e. of the retention time window	ot detected above th indicates probable t instrument method d w for the analyte of i	e detection limit, lank contaminatio etection limit (ME	on and warns the da	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte is detected J - Estimated value. TI A - A tentatively identifia X - The analyte was dill * - The spike recovery i + - The relative percent G - A pattern resemblin D - A pattern resemblin M - A pattern resemblin 5 - A pattern resemblin 5 - A pattern resemblin H - Indicates that the fue	ated as one or more analytes used t the compound was analyzed for i in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitation is equal to or outside the control or difference (RPD) equals or exceed in gasoline was detected in this sam ig mortor oil was detected in this sam g ortor oil was detected in this sam g JP-4 was detected in this sampling JP-5 twas detected in the sample el pattern was in the heavier end of	I in the calculation were no but not detected. well as in the sample. It i calibration range. limit but greater than the in -condensation product. on level. iteria used. eds the control criteria. ample, ple. ample, e. e. of the retention time window	of detected above the indicates probable to instrument method of method in the analyte of in	e detection limit, lank contaminatio etection limit (ME etects, erest,	on and warns the da	ta user.
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte is detected J - Estimated value. TI A - A tentatively identifia X - The analyte was dill * - The spike recovery i + - The relative percent G - A pattern resemblin D - A pattern resemblin M - A pattern resemblin 4 - A pattern resemblin 5 - A pattern resemblin 4 - Indicates that the fundicates that the fundicates that the fundicates that H - Indicates that the fundicates th	ated as one or more analytes used to the compound was analyzed for h in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitatic s equal to or outside the control or difference (RPD) equals or exceed g gasoline was detected in this sam g diesel was detected in this sam g motor oil was detected in this sam g grude oil was detected in this sam g JP-4 was detected in this sampling g JP-5 was detected in this sampling g JP-5 was detected in this sampling a pattern was in the heavier end of the ta significant fraction of the rep	I in the calculation were no but not detected. swell as in the sample. It i calibration range. limit but greater than the in -condensation product. in level. iteria used. adds the control criteria. ample. ample. e. e. of the retention time window orted result did not resemt	ot detected above the indicates probable to instrument method of most the analyte of in for the analyte of in ble the patterns of a	e detection limit, lank contamination etection limit (MC etection limit (MC)))	on and warns the da NL).	arbon products:
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte is detected J - Estimated value. TI A - A tentatively identifia X - The analyte was dill * - The spike recovery i + - The relative percent G - A pattern resemblin D - A pattern resemblin M - A pattern resemblin 4 - A pattern resemblin 5 - A pattern resemblin 4 - Indicates that the function H - Indicates that the function C - This flag indicates the gasoline - JP-8 - diesel	ated as one or more analytes used to the compound was analyzed for h in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitatic s equal to or outside the control or difference (RPD) equals or excee to gasoline was detected in this sam g diesel was detected in this sam g motor oil was detected in this sam g prude oil was detected in this sam g p2-4 was detected in this sampl g JP-5 was detected in this sampl el pattern was in the heavier end of hat a significant fraction of the rep	I in the calculation were no but not detected. s well as in the sample. It i calibration range. limit but greater than the in -condensation product. in level. iteria used. adds the control criteria. ample. ample. e. e. of the retention time window orted result did not resemt	ot detected above the indicates probable to nstrument method of more the analyte of in for the analyte of in ble the patterns of a	e detection limit, lank contamination etection limit (ME etection limit (ME etection limit (ME etection limit (ME etection limit (ME etection limit (ME	on and warns the da NL).	arbon products:
S - SAR value is estima Organics: U or ND - Indicates tha B - Analyte is detected E - Analyte is detected J - Estimated value. TI A - A tentatively identifia X - The analyte was dill * - The spike recovery i + - The relative percent G - A pattern resemblin D - A pattern resemblin M - A pattern resemblin 4 - A pattern resemblin 5 - A pattern resemblin 4 - Indicates that the function H - Indicates that the function C - This flag indicates the - JP-8 - diesel - mineral spirits	ated as one or more analytes used to the compound was analyzed for h in the associated method blank as on exceeds the upper level of the of ne result is less than the reporting ed compound is a suspected aldol uted below an accurate quantitatic s equal to or outside the control or difference (RPD) equals or exceed g gasoline was detected in this sam g motor oil was detected in this sam g motor oil was detected in this sam g prude oil was detected in this sam g JP-4 was detected in this sampling g JP-5 was detected in this sampling a pattern was in the heavier end of that a significant fraction of the rep	I in the calculation were no but not detected. s well as in the sample. It i calibration range. limit but greater than the in -condensation product. in level. iteria used. adds the control criteria. ample. ample. e. e. of the retention time window orted result did not resemt	ot detected above the indicates probable to nstrument method of w for the analyte of in for the analyte of in ble the patterns of a	e detection limit, lank contamination etection limit (ME etection limit (ME etection limit (ME etection limit (ME etection limit (ME	on and warns the da NL).	arbon products:
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Client: iina ba, Inc. Work Order: 2008461

Date: 8/31/2020 12:10

QC BATCH REPORT

Project:

20-042-03 NHA Housing Ojo Amarillo Testing

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Sample ID: IP200827-5					Units: MG/K	G	Analys	is Date:	8/28/202	20 16:25		
	Run II	D: IT200828-1	A7			F	Prep Date: 8/27	/2020	DF	1		
	Result	ReportLimit	SPK Val	SPK Rel Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual	
	49	2	50		98	80-120				20		
Sample ID: IP200827-5					Units: MG/K	G	Analys	is Date:	8/28/202	0 16:26		
	Run II	D: IT200828-1	A7			F	Prep Date: 8/27	/2020	DF:	1		
	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref	RPD	RPD Limit	Qual	
	48.9	2	50		98	80-120		4	19 0	20		
Sample ID: IP200827-5					Units: MG/K	G	Analys	is Date:	8/28/202	0 16:24		
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John Isham

iiná bá, Inc.

1812 Schlofield Lane

Farmington, NM 87401

ANALYTICAL REPORT

Report Date: August 27, 2020

Phone: (505) 327-1072

E-mail: jisham@iinaba.com

Workorder: **34-2023524** Project ID: NHA #15-32 OJO AMARILLO Purchase Order: 20-042-03 Project Manager: Paul E. Pope

Client Sample IDLab IDReceive DateAnalysis DateSampling Site62 NHA2023524001August 21, 2020August 27, 2020NHA #15-32 OJO AMARI

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 ! FAX +1 801 268 9992 ALS GROUP USA, CORP. An ALS Limited Company



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Thu, 08/27/20 10:45 AM



Bulk Screen

Workorder: 34-2023524

Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method: MC-AN-005 Matrix: Bulk

Lab Sample ID	2023524001
Client Sample ID	62 NHA

Fungal Spore Type	Density Rating
Alternaria	-
Arthrinium	•
Ascospores	
Aspergillus/Penicillium Types	<u>49</u> 0
Basidiospores	
Bipolaris/Dreschlera	22°
Chaetomium	
Cladosporium	11171
Curvularia	
Epicoccum	
Fusarium	5.444);
Meruliporia	
Nigrospora	
Oidium/Peronospora	(**)
Pithomyces	-
Polythrincium	3 44 0
Smuts/Myxomycetes/ Periconia/Rusts	17 <u>11</u> 17
Spegazzinia	
Stachybotrys	322
Stemphylium	
Torula	144
Ulocladium	
Unidentified Mitospores	



Bulk Screen

Workorder: 34-2023524

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method Summary

ALS Method MC-AN-005 is used to identify the various types of fungal spores that may be present in bulk matrices and to describe their relative density within a given sample. Samples are analyzed using plain light microscopy under 630x magnification.

Sample Preparation

For tape lift sample submissions, the tape lift is removed from its associated sample container and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

For bulk sample submissions, the sample material is first evaluated to identify the location of heaviest fungal growth. A tape lift sample is then taken from the identified location and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

Density Rating

A density rating is assigned to each sample by the analyst based on the relative extent of fungal growth observed on the tape lift. The following scale is used to assist in the interpretation of the reported results:

Density Rating	Interpretation
	No fungal growth observed
1+	Trace of fungal growth
2+	Small or limited fungal growth
3+	Moderate fungal growth
4+	Heavy fungal growth



Bulk Screen

Workorder: 34-2023524

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Potential Indoor Air Quality Molds and Fungi

Certain mold and fungi types found in high concentrations in indoor environments may indicate the presence of an indoor air quality concern. Some of these groups include but are not limited to:

Alternaria Aspergillus/Penicillium Chaetomium Fusarium Pithomyces Stachybotrys/Memnoniella Ulocladium

Common Outdoor Molds and Fungi

Certain molds commonly found outdoors can be found indoors in moderate amounts and may or may not necessarily indicate a potential indoor air quality concern. Some of these groups include but are not limited to:

Ascospores Basidiospores Bipolaris/Dreschlera Cladosporium Epicoccum Nigrospora Oidium/Peronospora Smuts/Myxomycetes/Periconia/Rusts

Health Effects

Fungal spores are part of the natural environment and can be found both outdoors and indoors. Given the proper moisture level and nutrient source, indoor mold growth can occur on building materials and furnishings. Exposure to certain molds and fungi can cause health problems, such as allergic reactions and asthma attacks, in certain individuals. Susceptibility to the effects of mold and fungi may vary with age, genetic predisposition, impaired immune systems, and exposure level.

The results contained in this report are not intended to provide medical advice, and should not be used to determine the overall safety of an indoor living space. For more information, consult a health professional or your state or local health department.



Bulk Screen

Workorder: 34-2023524

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
MC-4N-005	/S/ Peter P. Steen	/S/ Shaina Wiest
	08/27/2020 09:07	08/27/2020 10:29

Laboratory Contact Information

ALS Environmental	Phone: (801) 266-7700
960 W Levoy Drive	Email: alslt.lab@ALSGlobal.com
Salt Lake City, Utah 84123	Web: www.alsslc.com

General Lab Comments

The results provided in this report relate only to the items tested. Samples were received in acceptable condition unless otherwise noted. The following information was provided by the client: Sample ID and Air Volume. Air Volume can potentially affect the validity of the results. This test report shall not be reproduced, except in full, without written approval of ALS.



John Isham

iiná bá, Inc.

1812 Schlofield Lane

Farmington, NM 87401

ANALYTICAL REPORT

Report Date: August 27, 2020

Phone: (505) 327-1072

E-mail: jisham@iinaba.com

Workorder: **34-2023521** Project ID: NHA #15-32 OJO AMARILLO Purchase Order: 20-042-03 Project Manager: Paul E. Pope

Client Sample IDLab IDReceive DateAnalysis DateSampling Site118 NHA2023521001August 21, 2020August 27, 2020NHA #15-32 OJO AMARI

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www.alsglobal.com

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Thu, 08/27/20 10:41 AM



Bulk Screen

Workorder: 34-2023521

Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method: MC-AN-005 Matrix: Bulk

Lab Sample ID	2023521001	
Client Sample ID	118 NHA	
Fungal Spore Type	Density Rating	
Alternaria		
Arthrinium		-
Ascospores		
Aspergillus/Penicillium Types		
Basidiospores		
Bipolaris/Dreschlera	÷=;	
Chaetomium		
Cladosporium	200	
Curvularia		
Epicoccum	7220	
Fusarium	1.000	
Meruliporia		
Nigrospora	.(==).	
Oidium/Peronospora		
Pithomyces	-	
Polythrincium		
Smuts/Myxomycetes/ Periconia/Rusts	144 	
Spegazzinia	-	
Stachybotrys		
Stemphylium		
Torula	311	
Ulocladium		
Unidentified Mitospores	-	



Bulk Screen

Workorder: 34-2023521

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method Summary

ALS Method MC-AN-005 is used to identify the various types of fungal spores that may be present in bulk matrices and to describe their relative density within a given sample. Samples are analyzed using plain light microscopy under 630x magnification.

Sample Preparation

For tape lift sample submissions, the tape lift is removed from its associated sample container and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

For bulk sample submissions, the sample material is first evaluated to identify the location of heaviest fungal growth. A tape lift sample is then taken from the identified location and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

Density Rating

A density rating is assigned to each sample by the analyst based on the relative extent of fungal growth observed on the tape lift. The following scale is used to assist in the interpretation of the reported results:

Density Rating	Interpretation
	No fungal growth observed
1+	Trace of fungal growth
2+	Small or limited fungal growth
3+	Moderate fungal growth
4+	Heavy fungal growth



Bulk Screen

Workorder: 34-2023521

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Potential Indoor Air Quality Molds and Fungi

Certain mold and fungi types found in high concentrations in indoor environments may indicate the presence of an indoor air quality concern. Some of these groups include but are not limited to:

Alternaria Aspergillus/Penicillium Chaetomium Fusarium Pithomyces Stachybotrys/Memnoniella Ulocladium

Common Outdoor Molds and Fungi

Certain molds commonly found outdoors can be found indoors in moderate amounts and may or may not necessarily indicate a potential indoor air quality concern. Some of these groups include but are not limited to:

Ascospores Basidiospores Bipolaris/Dreschlera Cladosporium Epicoccum Nigrospora Oidium/Peronospora Smuts/Myxomycetes/Periconia/Rusts

Health Effects

Fungal spores are part of the natural environment and can be found both outdoors and indoors. Given the proper moisture level and nutrient source, indoor mold growth can occur on building materials and furnishings. Exposure to certain molds and fungi can cause health problems, such as allergic reactions and asthma attacks, in certain individuals. Susceptibility to the effects of mold and fungi may vary with age, genetic predisposition, impaired immune systems, and exposure level.

The results contained in this report are not intended to provide medical advice, and should not be used to determine the overall safety of an indoor living space. For more information, consult a health professional or your state or local health department.



Bulk Screen

Workorder: 34-2023521

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
MC-AN-005	/S/ Peter P. Steen	/S/ Shaina Wiest
	08/27/2020 09:07	08/27/2020 10:29

Laboratory Contact Information

ALS Environmental	Phone: (801) 266-7700
960 W Levoy Drive	Email: alslt.lab@ALSGlobal.com
Salt Lake City, Utah 84123	Web: www.alsslc.com

General Lab Comments

The results provided in this report relate only to the items tested. Samples were received in acceptable condition unless otherwise noted. The following information was provided by the client: Sample ID and Air Volume. Air Volume can potentially affect the validity of the results. This test report shall not be reproduced, except in full, without written approval of ALS.



John Isham

iiná bá, Inc.

1812 Schlofield Lane

Farmington, NM 87401

ANALYTICAL REPORT

Report Date: August 27, 2020

Phone: (505) 327-1072

E-mail: jisham@iinaba.com

Workorder: **34-2023517** Project ID: NHA #15-32 OJO AMARILLO Purchase Order: 20-042-03 Project Manager: Paul E. Pope

Client Sample IDLab IDReceive DateAnalysis DateSampling Site120 NHA2023517001August 21, 2020August 27, 2020NHA #15-32 OJO AMARI

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Thu, 08/27/20 10:40 AM



Bulk Screen

Workorder: 34-2023517

Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method: MC-AN-005 Matrix: Bulk

Lab Sample ID	2023517001	
Client Sample ID	120 NHA	
Fungal Spore Type	Density Rating	
Alternaria	4+	
Arthrinium		
Ascospores		
Aspergillus/Penicillium Types	##C	
Basidiospores		
Bipolaris/Dreschlera	***	
Chaetomium		
Cladosporium		
Curvularia		
Epicoccum	120	
Fusarium	2 ** 2	
Meruliporia		
Nigrospora	2 -0	
Oidium/Peronospora	0.000	
Pithomyces	1 22 1	
Polythrincium	:**	
Smuts/Myxomycetes/ Periconia/Rusts	(141) (141)	
Spegazzinia		
Stachybotrys	1984	
Stemphylium		_
Torula	544	
Ulocladium		
Unidentified Mitospores	14	



Bulk Screen

Workorder: 34-2023517

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method Summary

ALS Method MC-AN-005 is used to identify the various types of fungal spores that may be present in bulk matrices and to describe their relative density within a given sample. Samples are analyzed using plain light microscopy under 630x magnification.

Sample Preparation

For tape lift sample submissions, the tape lift is removed from its associated sample container and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

For bulk sample submissions, the sample material is first evaluated to identify the location of heaviest fungal growth. A tape lift sample is then taken from the identified location and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

Density Rating

A density rating is assigned to each sample by the analyst based on the relative extent of fungal growth observed on the tape lift. The following scale is used to assist in the interpretation of the reported results:

Density Rating	Interpretation
100	No fungal growth observed
1+	Trace of fungal growth
2+	Small or limited fungal growth
3+	Moderate fungal growth
4+	Heavy fungal growth



Bulk Screen

Workorder: 34-2023517

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Potential Indoor Air Quality Molds and Fungi

Certain mold and fungi types found in high concentrations in indoor environments may indicate the presence of an indoor air quality concern. Some of these groups include but are not limited to:

Alternaria Aspergillus/Penicillium Chaetomium Fusarium Pithomyces Stachybotrys/Memnoniella Ulocladium

Common Outdoor Molds and Fungi

Certain molds commonly found outdoors can be found indoors in moderate amounts and may or may not necessarily indicate a potential indoor air quality concern. Some of these groups include but are not limited to:

Ascospores Basidiospores Bipolaris/Dreschlera Cladosporium Epicoccum Nigrospora Oidium/Peronospora Smuts/Myxomycetes/Periconia/Rusts

Health Effects

Fungal spores are part of the natural environment and can be found both outdoors and indoors. Given the proper moisture level and nutrient source, indoor mold growth can occur on building materials and furnishings. Exposure to certain molds and fungi can cause health problems, such as allergic reactions and asthma attacks, in certain individuals. Susceptibility to the effects of mold and fungi may vary with age, genetic predisposition, impaired immune systems, and exposure level.

The results contained in this report are not intended to provide medical advice, and should not be used to determine the overall safety of an indoor living space. For more information, consult a health professional or your state or local health department.



Bulk Screen

Workorder: 34-2023517

Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method: MC-AN-005 Matrix: Bulk

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
MC-AN-005	/S/ Peter P. Steen	/S/ Shaina Wiest
	08/27/2020 09:07	08/27/2020 10:29

Laboratory Contact Information

ALS Environmental	Phone: (801) 266-7700
960 W Levoy Drive	Email: alslt.lab@ALSGlobal.com
Salt Lake City, Utah 84123	Web: www.alssic.com

General Lab Comments

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John Isham

iiná bá, Inc.

1812 Schlofield Lane

Farmington, NM 87401

ANALYTICAL REPORT

Report Date: August 27, 2020

Phone: (505) 327-1072

E-mail: jisham@iinaba.com

Workorder: **34-2023523** Project ID: NHA #15-32 OJO AMARILLO Purchase Order: 20-042-03 Project Manager: Paul E. Pope

Client Sample IDLab IDReceive DateAnalysis DateSampling Site125 NHA2023523001August 21, 2020August 27, 2020NHA #15-32 OJO AMARI

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Thu, 08/27/20 10:44 AM



Bulk Screen

Workorder: 34-2023523

Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method: MC-AN-005 Matrix: Bulk

Lab Sample ID	2023523001	
Client Sample ID	125 NHA	
Fungal Spore Type	Density Rating	
Alternaria	S 🕶 S	
Arthrinium	(1 1 1 1	
Ascospores		
Aspergillus/Penicillium Types		
Basidiospores	2	
Bipolaris/Dreschlera	3+	
Chaetomium		
Cladosporium		
Curvularia		
Epicoccum		
Fusarium		
Meruliporia		
Nigrospora		
Oidium/Peronospora	1.77	
Pithomyces		
Polythrincium		
Smuts/Myxomycetes/ Periconia/Rusts		
Spegazzinia		
Stachybotrys		
Stemphylium	175	
Torula		
Ulocladium		
Unidentified Mitospores		



Bulk Screen

Workorder: 34-2023523

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method Summary

ALS Method MC-AN-005 is used to identify the various types of fungal spores that may be present in bulk matrices and to describe their relative density within a given sample. Samples are analyzed using plain light microscopy under 630x magnification.

Sample Preparation

For tape lift sample submissions, the tape lift is removed from its associated sample container and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

For bulk sample submissions, the sample material is first evaluated to identify the location of heaviest fungal growth. A tape lift sample is then taken from the identified location and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

Density Rating

A density rating is assigned to each sample by the analyst based on the relative extent of fungal growth observed on the tape lift. The following scale is used to assist in the interpretation of the reported results:

Interpretation
No fungal growth observed
Trace of fungal growth
Small or limited fungal growth
Moderate fungal growth
Heavy fungal growth



Bulk Screen

Workorder: 34-2023523

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Potential Indoor Air Quality Molds and Fungi

Certain mold and fungi types found in high concentrations in indoor environments may indicate the presence of an indoor air quality concern. Some of these groups include but are not limited to:

Alternaria Aspergillus/Penicillium Chaetomium Fusarium Pithomyces Stachybotrys/Memnoniella Ulocladium

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Health Effects

Fungal spores are part of the natural environment and can be found both outdoors and indoors. Given the proper moisture level and nutrient source, indoor mold growth can occur on building materials and furnishings. Exposure to certain molds and fungi can cause health problems, such as allergic reactions and asthma attacks, in certain individuals. Susceptibility to the effects of mold and fungi may vary with age, genetic predisposition, impaired immune systems, and exposure level.

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Bulk Screen

Workorder: 34-2023523

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
MC-AN-005	/S/ Peter P. Steen	/S/ Shaina Wiest
	08/27/2020 09:07	08/27/2020 10:29

Laboratory Contact Information

ALS Environmental	Phone: (801) 266-7700
960 W Levoy Drive	Email: alslt.lab@ALSGlobal.com
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General Lab Comments

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John Isham

iiná bá, Inc.

1812 Schlofield Lane

Farmington, NM 87401

ANALYTICAL REPORT

Report Date: August 27, 2020

Phone: (505) 327-1072

E-mail: jisham@iinaba.com

Workorder: 34-2023522 Project ID: NHA #15-32 OJO AMARILLO Purchase Order: 20-042-03 Project Manager: Paul E. Pope

Client Sample IDLab IDReceive DateAnalysis DateSampling Site131 NHA2023522001August 21, 2020August 27, 2020NHA #15-32 OJO AMARI

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Thu, 08/27/20 10:42 AM



Bulk Screen

Workorder: 34-2023522

Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method:	MC-AN-005
Matrix:	Bulk

Lab Sample ID	2023522001
Client Sample ID	131 NHA
Fungal Spore Type	Density Rating
Alternaria	
Arthrinium	150
Ascospores	: ##37
Aspergillus/Penicillium Types	-
Basidiospores	2. 2
Bipolaris/Dreschlera	(1999).
Chaetomium	3
Cladosporium	-
Curvularia	(14)
Epicoccum	
Fusarium	5 23
Meruliporia	
Nigrospora	0.000
Oidium/Peronospora	
Pithomyces	
Polythrincium	
Smuts/Myxomycetes/ Periconia/Rusts	1
Spegazzinia	877
Stachybotrys	2
Stemphylium	-
Torula	
Ulocladium	:**
Unidentified Mitospores	1



Bulk Screen

Workorder: 34-2023522

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Method Summary

ALS Method MC-AN-005 is used to identify the various types of fungal spores that may be present in bulk matrices and to describe their relative density within a given sample. Samples are analyzed using plain light microscopy under 630x magnification.

Sample Preparation

For tape lift sample submissions, the tape lift is removed from its associated sample container and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

For bulk sample submissions, the sample material is first evaluated to identify the location of heaviest fungal growth. A tape lift sample is then taken from the identified location and affixed to a microscope slide for subsequent microscopic examination to determine the type and relative density of fungal spores present.

Density Rating

A density rating is assigned to each sample by the analyst based on the relative extent of fungal growth observed on the tape lift. The following scale is used to assist in the interpretation of the reported results:

Interpretation
No fungal growth observed
Trace of fungal growth
Small or limited fungal growth
Moderate fungal growth
Heavy fungal growth



Bulk Screen

Workorder: 34-2023522

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Potential Indoor Air Quality Molds and Fungi

Certain mold and fungi types found in high concentrations in indoor environments may indicate the presence of an indoor air quality concern. Some of these groups include but are not limited to:

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Bulk Screen

Workorder: 34-2023522

Method: MC-AN-005 Matrix: Bulk Client: iiná bá, Inc. Project Manager: Paul E. Pope

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
MC-AN-005	/S/ Peter P. Steen	/S/ Shaina Wiest
	08/27/2020 09:07	08/27/2020 10:29

Laboratory Contact Information

ALS Environmental	Phone: (801) 266-7700
960 W Levoy Drive	Email: alslt.lab@ALSGlobal.com
Salt Lake City, Utah 84123	Web: www.alsslc.com

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APPENDIX 4 — CERTIFICATIONS AND FIELD SAMPLING AND SCREENING FORMS HAZARDOUS MATERIALS TESTING REPORT OJO AMARILLO (PHASE 4) MODERNIZATION OJO AMARILLO, SAN JUAN COUNTY, NEW MEXICO IINA BA, INC. PROJECT NO.: 20-042-03







PREPARED FOR: NAVAJO HOUSING AUTHORITY P.O. BOX 4980 WINDOW ROCK, ARIZONA 86515

> PREPARED BY: *IINÁ BÁ*, INC. 1812 SCHOFIELD LANE FARMINGTON, NM 87401 www.iinábá.com PHONE: (505) 327-1072 FAX: (505) 327-1517 SEPTEMBER 2020

Hydrology Air Quality ESA Soil Investigations SPCC Water Rights LUST

FIELD SCIENCES INSTITUTE

CERTIFIES THAT

MATTHEW BENNALLEY

HAS SUCCESSFULLY COMPLETED THE REQUIRED TRAINING FOR ACCREDITATION UNDER TSCA TITLE II

4 HOUR ASBESTOS INSPECTOR REFRESHER

Date of Course: 02/19/2020

June Kon.

Instructor

Expiration Date: 02/19/2021

CERTIFICATE NUMBER: IR200219003

FSI FIELD SCIENCES INSTITUTE

A Division of CERL, Inc. 2301 Yale Blvd SE, Suite D-2 Albuquerque, NM 87106 Telephone 505-764-9251 Fax 505-764-0117 1812 Schofield Lane Farmington, NM 87401



ASBESTOS SAMPLING FORM	
	te liñannedan
SAMPLE # NHA-62-1	LOCATION:
UNIT# 62 ROOM# (WALL CODE: A B C D Florer
STRUCTURE:	CONDITION:
Flower t. Ze TT	🗌 Poor 🗌 Fair 📈 Good 🗌 Excellent
SURSTRATE	
SOBSTRATE.	COLOR:
🗌 Wood 🗌 Metał 🕅 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 📈 Beige
Other:	Clear A Other: ad white givey brown
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🔀 Yes 🗌 No
If yes, describe:	
General Notes:	

ASBESTO	DS SAMPLING FORM
SAMPLE # NHA-62-2	LOCATION:
UNIT# ROOM#	WALL CODE: A B C D Floor
STRUCTURE:	CONDITION:
Floor Hle#1	Poor Fair Good Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🔄 Metal 🔀 Concrete 🗌 Sheetrock	🗌 White 🔲 Black 🗌 Tan 🗌 Gray 📈 Beige
Other:	Clear Other: W/white grey brown
MASTIC PRESENT? 📈 Yes 🗌 No	PHOTOGRAPH: 📈 Yes 🗌 No
If yes, describe:	
General Notes:	
Version 1	Page(of)

1812 Schofield Lane Farmington, NM 87401



ASBESTC	S SAMPLING FORM
	de Information
SAMPLE # MHA-62-3	
UNIT# #62 ROOM# 4	WALL CODE: A B C D Floor
STRUCTURE: floor the #1	CONDITION:
SUBSTRATE:	COLOR:
Wood Metal Concrete Sheetrock	🗍 White 🗌 Black 🗌 Tan 🗌 Gray 🔣 Beige
Other:	Clear A Other: White grey brown
MASTIC PRESENT? X Yes No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe:	
General Notes:	

ASBESTC	DS SAMPLING FORM
SAMPLE # NHA-62-4	LOCATION:
KNON# /	WALL CODE: 🗌 A 🗌 B 🖾 C 🗌 D
structure: tape & foxture	CONDITION:
SUBSTRATE:	COLOR:
Wood Metal Concrete K Sheetrock	🕅 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
C Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🔀 No If yes, describe:	PHOTOGRAPH: X Yes 🗌 No
General Notes:	
Version 1	Page 2 of 9


ASBESTOS SAMPLING FORM		
	ดต แก้สถาหมาสม	
SAMPLE # NHA-62-5	LOCATION:	
UNIT# 62 ROOM# 4	WALL CODE:	
STRUCTURE:	CONDITION:	
Tapa & texture	Poor 🗌 Fair 🗌 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
Wood Metal Concrete X Sheetrock	White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT?	PHOTOGRAPH: X Yes 🗌 No	
General Notos		

ASBESTOS SAMPLING FORM		
SAMPLE # NHA-62-6	LOCATION:	
UNIT# 62 ROOM# 2	WALL CODE: A B C C D	
STRUCTURE: tape & texture	CONDITION:	
SUBSTRATE:	COLOR:	
Wood Metal Concrete Sheetrock	White Black Tan Gray Beige	
MASTIC PRESENT?		
General Notes:		
/ersion 1	Page 3 of 8	



ASBESTOS SAMPLING FORM		
	de la formettor	
SAMPLE # NHA-62-7	LOCATION:	
UNIT# 62 ROOM# roof	WALLCODE: A B C D Fort	
STRUCTURE:	CONDITION:	
root penetration	Poor 🗍 Fair 🕅 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
Wood 🕅 Metal 🗌 Concrete 🗌 Sheetrock	White CBlack Tan CGray Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: Black		
General Notes:		

ASBESTOS SAMPLING FORM		
Sector Sector	ni e l'initeren evitori):	
SAMPLE # NHA-62-8	LOCATION:	
UNIT# ROOM#	WALL CODE: A B C D roof	
STRUCTURE:	CONDITION:	
roof peretration	🗌 Poor 🗌 Fair 🕅 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🖄 Wood 🕅 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 📈 Black 🗌 Tan 🛛 🏹 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 😡 Yes 🗌 No	
If yes, describe: Black		
General Notes:		

Page<u>4</u>of<u>8</u>.



ASBESTOS SAMPLING FORM						
	Attrix Information					
SAMPLE #	-62-9	LOCATION	J: 🗌 Ini	terior 🔀	Exterior	
62 F	ROOM# roof	WALL COD	DE: 🗌 A	В]C []D	sof
STRUCTURE:		CONDITIO	N:			
root pe	metration	Poor	E Fair	Good	Excelle	nt
SUBSTRATE:						
Wood Metal	Concrete Sheetrock	White	🕅 Black	🗌 Tan	🖌 Gray	🗌 Beige
Other;		🗌 Clear	Other:			
MASTIC PRESENT? Div If yes, describe:	res 🗌 No	PHOTOGR	APH: 🗌 Yes	No No		
General Notes:						

ASBESTOS SAMPLING FORM		
SAMPLE # NHA -62 -10	LOCATION:	
UNIT# 62 ROOM#	WALL CODE: A B C D port	
structure: root - material	CONDITION:	
SUBSTRATE:	COLOR:	
Wood Metal Concrete Sheetrock	White K Black K Tan Gray Beige	
Other:	Clear Other: Red	
MASTIC PRESENT? 🛛 Yes 🗌 No	PHOTOGRAPH: X Yes 🗌 No	
If yes, describe: Rlack		
General Notes:		
/ersion 1	Page 5 of 2	



ASBESTOS SAMPLING FORM		
	ale Infrarmedian	
SAMPLE # NHA-62-11	LOCATION:	
UNIT# 62 ROOM# roof	WALL CODE: A B C D Past	
STRUCTURE:	CONDITION:	
root material	Poor 🗌 Fair 📈 Good 🗌 Excellent	
SUBSTRATE:		
Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	White K Black Tan Gray Beige	
Other:	Clear Cother: Red	
MASTIC PRESENT? X Yes No	PHOTOGRAPH: 🛒 Yes 🗌 No	
If yes, describe: Black		
General Notes:		

ASBESTOS SAMPLING FORM		
SAMPLE # NHA -62-12		
UNIT# 62 ROOM#	WALL CODE: A B C D AEST	
STRUCTURE:	CONDITION:	
1005 material	🗌 Poor 🗌 Fair 🛛 💭 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🕅 Wood 🔲 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🎢 Black 📈 Tan 🗌 Gray 🗌 Beige	
Other:	Clear XOther:	
MASTIC PRESENT? Yes No	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe: Black		
General Notes:	·	



ASBESTOS SAMPLING FORM		
	es Informeration	
SAMPLE # NHA-62-13	LOCATION:	
UNIT# 62 ROOM# tside	WALL CODE: A B C D	
STRUCTURE: - h	CONDITION:	
1- soting	Poor Fair KGood Excellent	
SUBSTRATE:	COLOR:	
Wood Metal X Concrete Sheetrock	White Black Tan Aray Beige	
Other:	Clear Other:	
MASTIC PRESENT?	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe:		
General Notes:		
2.5		

ASBESTOS SAMPLING FORM		
SAMPLE # NHA-62-14	LOCATION:	
UNIT# 62 ROOM# Jside	WALL CODE: 🗆 A 🏹 B 🏹 C 🗆 D	
STRUCTURE: Foothy	CONDITION:	
SUBSTRATE:	COLOR:	
Wood Metal Concrete Sheetrock	🗌 White 🗌 Black 🗌 Tan 🏾 🏹 Gray 🗌 Beige	
	Clear Other:	
MASTIC PRESENT? 🔲 Yes 🕅 No If yes, describe:	PHOTOGRAPH: 🕅 Yes 🗌 No	
General Notes:		



ASBESTOS SAMPLING FORM		
	de Information	
SAMPLE # NHA-62-15	LOCATION:	
UNIT# le 2 ROOM# outside wall	WALL CODE: A A B A C D	
STRUCTURE:	CONDITION:	
Stucco	Poor 🗌 Fair 🕅 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🖾 Concrete 🗍 Sheetrock	🗌 White 🔲 Black 📈 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe:		
General Notes:	•	

ASBESTOS SAMPLING FORM		
vie firit an editor		
LOCATION:		
WALL CODE: XA B C D		
CONDITION:		
Poor Fair X Good Excellent		
COLOR:		
🗌 White 🗌 Black 🕅 Tan 🗌 Gray 🗌 Beige		
Clear Other:		
PHOTOGRAPH: X Yes 🗌 No		

14



ASBESTOS INSPECTION FORM		
	General Information	
PROJECT NAME:	OLO NMBRILLO	
PROJECT NUMBER:	6-042-03	
DATE OF SAMPLE:	Aug 13'20 SITE LOCATION: OLO NHA	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TE	
	Weather Information	
WEATHER AT TIME OF INSPECTION? Clear Cloudy Rain Sleet Fog Snowing High Winds Other: Temperature:		
	Building Information	
UNIT# CZ	ROOM# WKm DIMENSIONS: Length: 9 Width: 3/2	
LOCATION WITHIN UNIT?	Interior 🗌 Exterior	
TYPE OF FLOORING?	Tile Carpet Vinyl Other:	
Describe: BELE W/ WW	ATTE GREY PROWAN SMALL STREAKS	
TYPE OF COVE BASE COLOR?	Vinyl/Rubber 🔀 Wood 🗌 Other:	
Certing	Black Brown Tan Beige Other: WHETE	
TYPE OF WALLS PRESENT?	X Tape/Texture K Sheetrock Wood Panel	
(Eilinto	Other:	
TYPE OF FIXTURES PRESENT &		
Door Window	Building Roof Counter-top Bathtub Sink Toliet	
White Gray] Clear 🔄 Black 🗌 Other:	
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?	
Door Roof]Ріре	
White Gray] Red 🔄 Black 🔲 Other:	
GENERAL NOTES:		
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General Information MATILO 42-03 3'ZO SITE LOCATION: OLO NHA		
AZ-03 3'ZO SITE LOCATION: OLO NHA		
AZ-03 SITE LOCATION: OLO NHA		
SITE LOCATION: OLO NHA		
Weather Information		
WEATHER AT TIME OF INSPECTION? Clear Cloudy Rain Steet Fog Snowing High Winds Other: Temperature:		
Building Information		
With: DIMENSIONS: Length: Z3 Width: 3' Interior Exterior		
Carpet Vinyl Other: 40557 5/2×2		
//Rubber 🔀 Wood 🗌 Other:		
k Brown Tan Beige Other: WHITE		
er:		
G COLOR? NA		
Roof Counter-top Bathtub Sink Toliet		
Black Other:		
OLOR? NA		
Black Other:		

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ASBESTOS INSPECTION FORM		
	General Information	
PROJECT NAME:	OLD AMARILLO NHA	
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	MILLE'ZO SITE LOCATION: OLO NILLO	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TZ	
Arren 1998 - Contraction of the State	Weather Information	
WEATHER AT TIME OF INSPECT	「ION? ☐ Sleet ☐ Fog ☐ Snowing ☐ High Winds Temperature: (3)	
	Building Information	
UNIT# 62	ROOM# PR I DIMENSIONS: Length: 9 Width: 0/2	
LOCATION WITHIN UNIT?		
TYPE OF FLOORING?	Tile Carpet Vinyl Other:	
Describe: BEIGE W / WA	TTE GREY FRONT	
TYPE OF COVE BASE CÓLOR?	Uinyl/Rubber 🛛 Wood 🗌 Other: BMA BOSET Black Brown 🗌 Tan 🗌 Beige 💭 Other: WHITE	
TYPE OF WALLS PRESENT?	Tape/Texture 🕅 Sheetrock 🗌 Wood Panel	
TYPE OF FIXTURES PRESENT &		
3'*4'	Building Roof Counter-top Bathtub Sink Toliet	
White Gray] Clear 🔲 Black 🛄 Other:	
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? NA	
Door Roof	Pipe	
🗌 White 🔲 Gray 🗌	Red 🔲 Black 🗌 Other:	
GENERAL NOTES:		

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ASBESTOS INSPECTION FORM		
	General Information	
PROJECT NAME:	OLO AMARILO	
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	BUL 13'20 SITE LOCATION: OJO NHA	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TZ	
	Weather Information	
WEATHER AT TIME OF INSPEC	FION? Sleet Fog Snowing High Winds Temperature:	
	Building Information	
UNIT# 62	ROOM# BR/REATING DIMENSIONS: Length: 5 Width: 5 1/2'	
LOCATION WITHIN UNIT?	X Interior Exterior	
TYPE OF FLOORING?	Tile Carpet Vinyl Other:	
TYPE OF COVE BASE COLOR? Uvinyl/Rubber X Wood Other: Black Brown Tan Beige Other: WHITE		
TYPE OF WALLS PRESENT?	Dither:	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	
Door X Window	Building Roof Counter-top Bathtub Sink A. Toliet	
🔀 White 🗌 Gray 🗌] Clear 🔄 Black 🗌 Other:	
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?	
Door Roof] Ріре	
🗌 White 🔄 Gray 🗌] Red 🗌 Black 🗌 Other:	
GENERAL NOTES:		

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ASBESTOS INSPECTION FORM			
	General Information		
PROJECT NAME:	OLO AMARILLO NHA		
PROJECT NUMBER:	20-042.03		
DATE OF SAMPLE:	MIC 12 20 SITE LOCATION: OJO NUL		
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	TC		
	Weather Information		
WEATHER AT TIME OF INSPECT	TION? Sleet Fog Snowing High Winds Temperature: Muster FR		
	Building Information		
UNIT# CZ	ROOM# R 2 DIMENSIONS: Length: 15 Width: 10/2		
LOCATION WITHIN UNIT?	Interior Exterior		
TYPE OF FLOORING?	Tile Carpet Vinyl Other:		
Describe: BELGE W/WHITE	GREV BROWN		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber Wood Other: BALL PROSES		
TYPE OF WALLS PRESENT?	TYPE OF WALLS PRESENT?		
TYPE OF FIXTURES PRESENT &			
Door X Window] Building 🗌 Roof 🔲 Counter-top 🔲 Bathtub 🔄 Sink 🗌 Toliet		
🗌 White 🗌 Gray] Clear 🔄 Black 🗌 Other:		
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?		
Door Roof] Pipe		
🗌 White 🗌 Gray 🗌] Red 🔄 Black 🔄 Other:		
GENERAL NOTES:			



ASBESTOS INSPECTION FORM		
	General Information	
PROJECT NAME:	alo Amarillo NHA	
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	ANG 16'20 SITE LOCATION: OLO NHL	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TC	
	Weather Information	
WEATHER AT TIME OF INSP	ECTION? ain Sleet Fog Snowing High Winds Temperature:	
	Building Information	
	ROOM# KK 3 DIMENSIONS: Length: ル Width: ジル	
LOCATION WITHIN UNIT?	Interior Exterior	
TYPE OF FLOORING?	Tile Carpet Vinyl Other:	
Describe: BEALE W / V	UNTE GREY BROWN	
TYPE OF COVE BASE COLOR	? Vinyl/Rubber 🔀 Wood 🗌 Other:	
	Black Brown Tan Beige Other: WHITE	
TYPE OF WALLS PRESENT?	🔀 Tape/Texture 🛛 🔀 Sheetrock 🗌 Wood Panel	
	Other: CELING	
TYPE OF FIXTURES PRESENT	& CAULKING COLOR?	
Door Window	Building Roof Counter-top Bathtub Sink Toliet	
🗋 White 🗌 Gray	Clear Black Other:	
WHERE ON UNIT IS PUTTY P	RESENT & COLOR?	
🗌 Door 🗌 Roof	Pipe	
🗌 White 📋 Gray	Red Black Other:	
GENERAL NOTES:		



	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	OLO AMARILLO NHA
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	ANG VS TO SITE LOCATION: 0.40 NHA
CERTIFIED INSPECTORS:	MB
FIELD TECHNICIANS:	TC
の構成的になる。	Weather Information
WEATHER AT TIME OF INSPECT	ION? Sleet Fog Snowing High Winds Temperature:
17	Building Information
	ROOM# Keel DIMENSIONS: Length: 572 Width: 372
TYPE OF FLOORING?	Tile Carpet Vinyl Other:
TYPE OF COVE BASE COLUK?	Vinyl/Rubber [X] Wood [] Other: Black Brown Tan Beige Other: WHIE
TYPE OF WALLS PRESENT?	Tape/Texture Sheetrock Wood Panel
TYPE OF FIXTURES PRESENT & (CAULKING COLOR?
Door 🕅 Window	Building Roof Counter-top 🔀 Bathtub 🔀 Sink 🛛 Toliet
🕅 White 🗌 Gray 🗌	Clear Black Other:
WHERE ON UNIT IS PUTTY PRES	ENT & COLOR? NA
Door Roof	Pipe
🗌 White 🔛 Gray 🗌	Red 🗌 Black 📄 Other:
GENERAL NOTES:	



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ASBESTOS INSPECTION FORM		
の思想を見ていたという	General Information	
PROJECT NAME:	OLO NMARILLO NIHA	
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	MUL 12'20 SITE LOCATION: 0.10 NHA	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TE	
	Weather Information	
WEATHER AT TIME OF INSPECT	FION? Sleet Fog Snowing High Winds Temperature:	
	Building Information	
	ROOM# MUNDEYRM DIMENSIONS: Length: 3/2 Width: 3/2	
LOCATION WITHIN UNIT?	M Interior Exterior FURNALE /WATER HEATER	
TYPE OF FLOORING? していないてい	Tile Carpet Vinyl Other:	
Describe: Belle W/ WW	TE GREY BROWN	
TYPE OF COVE BASE COLOR?	Uinyl/Rubber 🛛 Wood U Other: BAKE FOLGO	
TYPE OF WALLS PRESENT?		
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? NA	
Door Window] Building 🗌 Roof 🔲 Counter-top 🔲 Bathtub 🗌 Sink 🗍 Toliet	
White Gray] Clear 🗌 Black 🗌 Other:	
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR? NA	
Door Roof] Pipe	
🗌 White 🗌 Gray 🗌] Red 🗌 Black 🔲 Other:	
GENERAL NOTES:		



	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	OLO AMARILLO NUTA
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	ALL 12'20 SITE LOCATION: OLO NUT
CERTIFIED INSPECTORS:	MB
FIELD TECHNICIANS:	TC
	Weather Information
WEATHER AT TIME OF INSPECT	FION? Sleet Fog Snowing High Winds Temperature:
	Building Information
LOCATION WITHIN UNIT?	ROOM# Kicken DIMENSIONS: Length: 7/2 Width: 7'
TYPE OF FLOORING? Describe: BELLE W/W	Image: Carpet Vinyl Other:
TYPE OF COVE BASE COLOR?	Vinyl/Rubber X Wood Other: BALL BOLLS
TYPE OF WALLS PRESENT?	Tape/Texture Sheetrock 🗌 Wood Panel
TYPE OF FIXTURES PRESENT & (CAULKING COLOR?
Door 🗶 Window] Building 🗌 Roof 🔀 Counter-top 🗌 Bathtub 🔀 Sink 🗌 Toliet
🔀 White 🗌 Gray] Clear 🔲 Black 🗌 Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? N.L
Door Roof] Pipe
🗌 White 🔛 Gray 📃] Red 🗌 Black 🗌 Other:
GENERAL NOTES:	



	ASBESTOS INSPECTION FORM		
	General Information		
PROJECT NAME:	ato smirgluo nota		
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	BULLE'ZO SITE LOCATION: OLO NHA		
CERTIFIED INSPECTORS:	MT3		
FIELD TECHNICIANS:	TZ		
	Weather Information		
WEATHER AT TIME OF INSPECT	TION?		
🕅 Clear 🗌 Cloudy 🗌 Rain	Sleet Fog Snowing High Winds		
Other:	Temperature:		
LINIT# 62	ROOM# DIJULIA DIMENSIONS		
LOCATION WITHIN UNIT?			
	Therior		
TYPE OF FLOORING?	Tile Carpet Viny! Other:		
Describe: BEILE W / WW	TE GREAT BROWN		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber X Wood Other:		
	Black Brown Tan Beige Cother: WINTE		
TYPE OF WALLS PRESENT?	X Tape/Texture X Sheetrock Vood Panel		
TYPE OF FIXTURES PRESENT & (
(2) 4'x4' 2'	(10"x4'		
Door Dividow	Building Roof Counter-top Bathtub Sink Toliet		
🗌 White 🔛 Gray	Clear Black Other:		
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?		
Door Roof]Ріре		
🗌 White 🔲 Gray 🗌	Red Black Other:		
GENERAL NOTES:			
Ω.			



ieral Information		
allo NATA		
-03		
SITE LOCATION: OLO NULLS		
ther Information		
WEATHER AT TIME OF INSPECTION? Detter: Cloudy Rain Sleet Fog Snowing High Winds Other: Temperature:		
ding Information		
rior X Exterior		
rpet 🗌 Vinyl 🕅 Other:		
r 🗌 Wood 🔀 Other: Brown 🗌 Tan 🔲 Beige 🔀 Other:		
e Sheetrock Wood Panel Ceving		
DR? NA		
oof Counter-top Bathtub Sink Toliet		
ack 🗌 Other:		
NVS		
ack 🗌 Other:		



ASBESTC	S SAMPLING FORM
	a - Information
SAMPLE # NHA -118 - 1	LOCATION: X Interior C Exterior
UNIT# //8 ROOM# 7 (WALL CODE: A B C D Floor
STRUCTURE: Floor tile #2	CONDITION:
SUBSTRATE:	COLOR:
Wood Metal Concrete Sheetrock	Clear Other: w/white prover grey streaks
MASTIC PRESENT? Yes No	
If yes, describe: Black	
General Notes:	

ASBESTOS SAMPLING FORM	
96 M	nile intércrans actes
SAMPLE # NH4-118-2	LOCATION:
UNIT# 118 ROOM# 5	WALL CODE: A B C D Floor
STRUCTURE:	CONDITION:
Floor tile # 2	Poor Fair Good Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 😾 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 🕅 Beige
Other:	Clear & Other: W/white brown grey straks
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: V Yes No
fyes, describe: Black	
General Notes:	I
10	
ersion 1	Pageof_



ASBESTOS SAMPLING FORM	
ale lintermetation	
LOCATION:	
WALL CODE: A B C D Floor	
CONDITION:	
Poor Fair K Good Excellent	
COLOR:	
White Black Tan Gray X Beige	
Clear Other: I whole brown grey strenks	
PHOTOGRAPH: 🕅 Yes 🗌 No	

ASBESTOS SAMPLING FORM			
14 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Second Mile (1917) come accue		
SAMPLE # NHA-118-4	LOCATION:		
UNIT# //8 ROOM# /	WALL CODE: A R B C D Floor		
STRUCTURE:	CONDITION:		
Floor File # 1	🗌 Poor 🗌 Fair 🕅 Good 🗌 Excellent		
SUBSTRATE:	COLOR:		
🗌 Wood 🗌 Metal 🛛 🛱 Concrete 🗌 Sheetrock	🗌 White 🔄 Black 🗌 Tan 🗌 Gray 🗌 Beige		
Other:	Clear Other: Lt. Prins W/wh. to brown the strack		
MASTIC PRESENT? 📈 Yes 🗌 No	PHOTOGRAPH: 🔀 Yes 🗌 No		
If yes, describe: Pl-cE			
General Notes:			



ASBESTOS SAMPLING FORM	
SAMPLE # NHA-118+5	LOCATION: Interior Exterior
unit# 118 room# 1	WALL CODE: A B C D Floor
STRUCTURE: Floor tile # (CONDITION:
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🕅 Concrete 🗌 Sheetrock	White Black Tan Gray Beige
Other:	Clear Other: (t. Brown w/white brown tain strenk;
MASTIC PRESENT? 🛛 Yes 🗌 No	PHOTOGRAPH: Yes No
If yes, describe: Block	
General Notes:	

ASBESTOS SAMPLING FORM	
มัด Informe สับทุก	
LOCATION:	
WALL CODE: A B C D Floor	
CONDITION:	
🗌 Poor 🗌 Fair 🛛 💭 Good 🗌 Excellent	
COLOR:	
🗌 White 🗌 Black 🗌 Tan 📄 Gray 🗌 Beige	
Clear Other: Lt. Brown W/chits brown tan streal	
PHOTOGRAPH: 🗶 Yes 🗌 No	



ASBESTOS SAMPLING FORM	
S. MERCHANNER CONTENTS IN AN	กระเบ้าสายสะสาย
SAMPLE # NHA-118-7	LOCATION:
UNIT# [18 ROOM# 2	WALL CODE: A B CC D
STRUCTURE:	CONDITION:
lape & lexture	🗌 Poor 🔲 Fair 📈 Good 📋 Excellent
SUBSTRATE:	
🗌 Wood 🗌 Metal 🔲 Concrete 📈 Sheetrock	White Black Tan Gray Beige
Other:	Clear Other:
MASTIC PRESENT? Yes No	PHOTOGRAPH: X Yes 🗌 No
If yes, describe:	,
General Notes:	•

ASBESTOS SAMPLING FORM						
	(d-1)	vie Uniformie	dicia			
SAMPLE # NHA-11	8-8	LOCATION	: 🗹 Ini	terior 🗌 E	Exterior	
UNIT# //8 RC	оом# 4	WALL COD	DE: 🗌 A	т⊋Гв □]C []D	
STRUCTURE:		CONDITIO	N:		1	
Tap	o + Texture	Poor	🗌 Fair	Good	Excellent	
SUBSTRATE:		COLOR:				
🗌 Wood 🗌 Metal 🗍	Concrete X Sheetrock	White	🗌 Black	🗌 Tan	Gray	🗌 Beige
] Other:		🗌 Clear	Other:			
MASTIC PRESENT?	s No	PHOTOGR	APH: Yes	No		
If yes, describe:						
General Notes:						



ASBESTOS SAMPLING FORM	
	ม่า ไป,∮ต∎า¥ร⊉ณ
SAMPLE # NHA-118-9	LOCATION:
UNIT# 115 ROOM# 9	WALL CODE: A B B C R D Colling
STRUCTURE:	CONDITION:
Tape & Texture	🗌 Poor 🔲 Fair 📈 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	💢 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: X Yes No
If yes, describe:	<i>'</i>
General Notes:	

ASBESTOS SAMPLING FORM	
And	ale Information
SAMPLE # КНА- 118 -{Ф	LOCATION:
UNIT# // 8 ROOM# /	WALL CODE: A KB C C D
STRUCTURE:	CONDITION:
Coiling texture	Poor Fair Good Excellent
SUBSTRATE:	COLOR:
Wood Metal Concrete 🕅 Sheetrock	White 🔲 Black 🗍 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 📈 No	PHOTOGRAPH: XYes No
f yes, describe:	
General Notes:	
/ersion 1	Page S of 1



ASBESTOS SAMPLING FORM		
Strangens Hulfdermyszárus		
SAMPLE # NHA-118-10	LOCATION: Interior Exterior	
UNIT# 1/8 ROOM# 6	WALL CODE: DA DB DC XD Ceilty	
STRUCTURE:	CONDITION:	
Ceiling texture	Poor Fair X Good Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🔲 Metal 🗌 Concrete 🕱 Sheetrock	White 🗋 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT?	PHOTOGRAPH: X Yes 🗌 No	
Canaral Natao		
General Notes:		

ASBESTOS SAMPLING FORM	
SAMPLE # NHA-118-12	LOCATION:
UNIT# 118 ROOM# (Û	WALL CODE: A B C D Calling
STRUCTURE: Coiling texture	CONDITION:
SUBSTRATE:	COLOR: White Black Tan Gray Beige Clear Other:
MASTIC PRESENT? Yes No If yes, describe:	PHOTOGRAPH: Yes 🗌 No
General Notes:	



ASBESTOS SAMPLING FORM		
Sectoria Information		
SAMPLE # NHA-118-13	LOCATION: Interior Exterior	
UNIT# 118 ROOM# 3	WALL CODE: A B A C D	
STRUCTURE:	CONDITION:	
Transite provel	Poor 🗌 Fair 📈 Good 🗌 Excellent	
SUBSTRATE:		
Wood Metal Concrete X Sheetrock	White Black Tan Gray Beige	
Other:	Clear Other:	
	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe:	~~	
General Notes:		

ASBESTOS SAMPLING FORM		
and the second	น (ป. โฏซีการพระสุนักษา	
SAMPLE # NHA-118-14		
UNIT# /16 ROOM# roof	WALL CODE: A B C C D	
STRUCTURE:	CONDITION:	
Vod material	Poor Fair Good Excellent	
SUBSTRATE:	COLOR:	
💢 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🕅 Black 🕅 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other: Red	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe: Black		
General Notes: West stile		



ASBESTOS SAMPLING FORM		
4.1	a shiran mairun	
SAMPLE # NHA-118-15	LOCATION:	
UNIT# 118 ROOM#	WALL CODE:	
STRUCTURE:	CONDITION:	
voot material	Poor Fair Good Excellent	
SUBSTRATE:	COLOR:	
🕅 Wood 🗌 Metal 🗌 Concrete 🗍 Sheetrock	🗌 White 🕅 Black 🕅 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other: Red	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe; Black		
General Notes:		

ASBESTOS SAMPLING FORM		
ar in	nie finite anne druke	
SAMPLE # NHA-118-16	LOCATION:	
UNIT# 118 ROOM#	WALL CODE: A B C D	
STRUCTURE:	CONDITION:	
root material	🗌 Poor 📋 Fair 🛛 💭 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🕅 Black 🗶 Tan 🗌 Gray 🗌 Beige	
Other:	Clear X Other:	
MASTIC PRESENT? X Yes No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: Bleck		
General Notes:		
e		



ASBESTOS SAMPLING FORM		
SAMDIF #		
NHA-118-17	IDCATION:	
UNIT# 118 ROOM#		
STRUCTURE:	CONDITION:	
Rost Venetration	Poor Fair Good Excellent	
SUBSTRATE:	COLOR:	
Wood Metal Concrete Sheetrock	🗌 🗌 White 🛛 🖾 Black 🗌 Tan 🕅 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? Yes No	PHOTOGRAPH: 🗌 Yes 🗌 No	
If yes, describe:		
General Notes:		

ASBESTOS SAMPLING FORM		
(F 1)	ale Informers and	
SAMPLE # NHA - 118 - 14	LOCATION:	
UNIT# 1/8 ROOM# poor	WALL CODE: A B C D	
STRUCTURE:	CONDITION:	
Roat penetration	🗋 Poor 🔲 Fair 🕅 Good 🗌 Excellent	
SUBSTRATE:	COLOB:	
Wood Metal Concrete Sheetrock	Uhite K Black Tan K Gray Beige	
Other:	Clear Other:	
MASTIC PRESENT? 📈 Yes 🗌 No	PHOTOGRAPH: 🔀 Yes 🗌 No	
If yes, describe: Plack		
General Notes:		



ASBESTOS SAMPLING FORM		
	e a historing stran	
SAMPLE # NHA-118-19	LOCATION:	
UNIT# 118 ROOM# Aort		
STRUCTURÈ:	CONDITION:	
root penetration	🗌 Poor 🔲 Fair 🛛 🗙 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🕅 Wood 🕅 Metal 🗌 Concrete 🗌 Sheetrock	White 🔀 Black 🗌 Tan 📈 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🛛 Yes 🗌 No	
If yes, describe: Black		
General Notes:		

ASBESTOS SAMPLING FORM			
Sie medie Unifer en el ante			
SAMPLE # NHA-118-20	LOCATION:		
UNIT# 118 ROOM# outside val	WALL CODE: A B C C D		
STRUCTURE	CONDITION:		
Stucco	Poor Fair Good Excellent		
SUBSTRATE:	COLOR:		
Wood Metal X Concrete Sheetrock	🗌 White 🗌 Black 🕅 Tan 🗌 Gray 🗌 Beige		
Other:	Clear Other:		
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: X Yes 🗌 No		
If yes, describe:			
General Notes:			



ASBESTC	IS SAMPLING FORM
	A 4 Information
SAMPLE # NHA-118-21	LOCATION:
UNIT# 118 ROPM# 118 ortside vall	WALL CODE: A B C C D
STRUCTURE:	CONDITION:
Stucco	Poor Fair X Good Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metał 📈 Concrete 🗌 Sheetrock	White Black A Tan Gray Beige
Other:	Clear Other:
MASTIC PRESENT? Yes No	PHOTOGRAPH: 🖾 Yes 🗌 No
If yes, describe:	· ·
General Notes:	

ASBESTOS SAMPLING FORM			
Cample Information			
SAMPLE # WHA-118-22			
UNIT# 118 ROOM#	WALL CODE: A B C D		
STRUCTURE:	CONDITION:		
forting	🗌 Poor 🗌 Fair 🕅 Good 🗌 Excellent		
SUBSTRATE:	COLOR:		
Wood Metal Concrete Sheetrock	🗌 White 🔲 Black 🗌 Tan 📈 Gray 🗌 Beige		
Other:	Clear Other:		
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 💢 Yes 🗌 No		
If yes, describe:			
General Notes:			



ASBESTC	DS SAMPLING FORM
	nis Information
SAMPLE # NHA-118-23	LOCATION:
UNIT# 118 ROOM# outside	WALL CODE: A B C Z D
STRUCTURE:	CONDITION:
fostivy	🗌 Poor 🔲 Fair 🕅 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🎇 Concrete 🗌 Sheetrock	White 🗌 Black 🗌 Tan 🏾 🕅 Gray 🔲 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: XYes 🗌 No
If yes, describe:	
General Notes:	

ASBESTOS SAMPLING FORM						
SAMPLE #		LOCATION:				
UNIT#	ROOM#	WALL COD	DE: 🗌 A	В]C []D	
STRUCTURE:			N:	Good	Excellent	
SUBSTRATE:	Concrete Sheetrock	COLOR:	Black	🗌 Tan	🗌 Gray	Beige
MASTIC PRESENT? If yes, describe:	Yes No	PHOTOGR	APH: 🗌 Yes	i 🗌 No		
General Notes:						

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ASBESTOS INSPECTION FORM			
General Information			
PROJECT NAME:	alo MARILIO		
PROJECT NUMBER:	20-042-07		
DATE OF SAMPLE:	ALL 19 20 SITE LOCATION: OLD NATA		
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	TE		
in the state of the second	Weather Information		
WEATHER AT TIME OF INSPEC	TION? Sleet Fog Snowing High Winds Temperature:		
	Building Information		
LOCATION WITHIN UNIT?	KOOM# LK DIMENSIONS: Length: Z/Z Width: X Interior Exterior 40% T 3' x 2' k SIDENSE 9 x 2 ' f 2'		
TYPE OF FLOORING? IZ" X IZ" Describe: IT FROWM W/ I TYPE OF COVE BASE COLOR?	Image: State of the state		
TYPE OF WALLS PRESENT? CELLING BPCORN TEXTURE	Tape/Texture Sheetrock Wood Panel		
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? NA		
Door 🗴 Window	Building Roof Counter-top Bathtub Sink Toliet		
🗌 White 🗌 Gray 🗌] Clear 🔲 Black 🛄 Other:		
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR? NL		
Door Roof]Ріре		
White Gray] Red 🔄 Black 🗌 Other:		
GENERAL NOTES:	2		



	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	OLO AMARILLO
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	AND 12 120 SITE LOCATION: OLD NILL
CERTIFIED INSPECTORS:	MB
FIELD TECHNICIANS:	TZ
	Weather Information
WEATHER AT TIME OF INSPECT	FION?
🔀 Clear 🗌 Cloudy 🗌 Rain	Sleet Fog Snowing High Winds
Other:	Temperature:
	(2) 31-
	Building Information
UNIT# 112	ROOM# DINING DIMENSIONS: Length: 19' Width: 10%
LOCATION WITHIN UNIT?	KITCHENION Exterior
TYPE OF FLOORING?	
Describe: TBROWN W/W	HTE TIN GREN PROWN LONG NARROW STREAKS
TYPE OF COVE BASE COLOR?	Vinyl/Rubber 🛛 Wood 🗌 Other:
KVIEHEN Black Brown Tan Beige Other:	
TYPE OF WALLS PRESENT?	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? NIL RUL A'X4' 5 34 X4' WINDOW
⋜′ю* x Z′6* ¥ □ Door X Window	Sining KM Building Roof Counter-top Bathtub Sink Toliet
🔀 White 🗌 Gray	Clear Black Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? N.A.
_ Door _ Roof _	Ріре
White Gray	Red Black Other:
SENERAL NOTES:	



	ASBESTOS INSPECTION FORM			
STU ERSTRUCT PROBABILIS	General	Information	The lot of the second	Same States
PROJECT NAME:	Q10 MMKILLO			
PROJECT NUMBER:	20-042-03			
DATE OF SAMPLE:	Ano 10'20	SITE LOCATION:	alo NHA	
CERTIFIED INSPECTORS:	MB			
FIELD TECHNICIANS:	TC			
A Company of the second states	Weather	Information		A State of Streams
WEATHER AT TIME OF INSPEC	TION? Sleet Fog Ter	g 🗌 Snowing 🔲 H mperature:	igh Winds	
	Building	Information	アンドール自己ないと言	
UNIT# WZ	ROOM#LAUNDRY ROC	M DIMENSIONS:	Length: 웅	Width: 10'
LOCATION WITHIN UNIT?	🔀 Interior	Exterior		
TYPE OF FLOORING? VZ X VZ ATTILE Carpet Vinyl Other: HEATER / WATER HEATER VZ X VZ ATTILE Carpet Vinyl Other: HEATER / WATER HEATER Describe: LT BOWN W/ WHITZ BROWN GOES LONG NATOROW STREAKES FLOOR				
I YPE OF COVE BASE COLOR ? X Vinyl/Rubber Vinyl/Rubber Other: X Black Brown Tan Beige Other:				
TYPE OF WALLS PRESENT?	Tape/Texture	Sheetrock 🗌 Wo	od Panel	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	NA N		
Door Window	Building 🗌 Roof	Counter-top	athtub 🗌 Sink	
White Gray	Clear Black	Other:		
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?			
Door Roof] Pipe	-		
🗌 White 🔲 Gray 🗌] Red 🗌 Black	Other:		×;
GENERAL NOTES:				

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ASBESTOS INSPECTION FORM			
A PROPERTY OF A PROPERTY OF	General	Information	
PROJECT NAME:	ato SMARILLE)	
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	Bub 12'20	SITE LOCATION:	alo NH6
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	TC		
	Weather	Information	
WEATHER AT TIME OF INSPECT	FION?	g Snowing H mperature:	High Winds
	Building	Information	
LOCATION WITHIN UNIT?	ROOM# HSL	DIMENSIONS:	Length: 26/2 Width: Z
TYPE OF FLOORING? Describe: T BROWN W/ W	Tile Carpet	Vinyl Other:	409987 5%×2 46 STREAKS
TYPE OF COVE BASE COLOR? Vinyl/Rubber V Wood Other:			
TYPE OF WALLS PRESENT? Tape/Texture Scheetrock Wood Panel			
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	NA	
Door Window	Building 🗌 Roof	Counter-top	Bathtub 🗌 Sink 🗌 Toliet
🗌 White 🔲 Gray 🗌	Clear 🗌 Black	Other:	
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?		
Door Roof] Pipe		
🗌 White 🔛 Gray 📃	Red 🗌 Black	Other:	
GENERAL NOTES:			



	ASBESTOS INSPECTION FORM	
	General Information	
PROJECT NAME:	alo MARILLO	
PROJECT NUMBER:	10-042-022	
DATE OF SAMPLE:	AUL 12'ZO SITE LOCATION: QLO NHA	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	Te	
	Weather Information	
WEATHER AT TIME OF INSPECT	TION?	
	Building Information	
LOCATION WITHIN UNIT?	X Interior Exterior	
TYPE OF FLOORING? Image: Tile Carpet Vinyl Other: Describe: Image: Tile Carpet Vinyl Other: Describe: Image: Tile Image: Tile Carpet Vinyl Other: Describe: Image: Tile Image: Tile Image: Tile Image: Tile Image: Tile Image: Tile Describe: Image: Tile Image: Tile		
TYPE OF WALLS PRESENT?	🔀 Tape/Texture 🔀 Sheetrock 🗌 Wood Panel	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? GERMAN, A"KA" TILE	
Door Window	Building Roof Counter-top X Bathtub X Sink X Toliet	
🔀 White 🗌 Gray	Clear Black Other:	
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?	
Door Roof	Pipe	
🗌 White 🔲 Gray 🗌	Red 🗌 Black 🗋 Other:	
GENERAL NOTES:		



ASBESTOS INSPECTION FORM		
General Information		
ato Amarillo		
20-042-03		
And 12'20 SITE LOCATION: OLO NHA		
MB		
TC		
Weather Information		
TION? Sleet Fog Snowing High Winds Temperature:		
Building Information		
Interior Exterior		
TYPE OF FLOORING? X Tile Carpet Vinyl Other: Describe: Beige W/ White Brown Grey Streekey		
Black Brown Tan Beige Other:		
Tape/Texture X Sheetrock Wood Panel		
CAULKING COLOR?		
Building Roof Counter-top X Bathtub X Sink X Toliet		
] Clear 🔲 Black 🗌 Other:		
SENT & COLOR? N.L.		
] Pipe		
Red 🗌 Black 🗌 Other:		



	ASBESTOS INSPECTION FORM	
A Strategy and the second second second	General Information	
PROJECT NAME:	ato Ambrillo	
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	BUL 15 20 SITE LOCATION: Q10 NHA	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TZ	
	Weather Information	
WEATHER AT TIME OF INSPECT	FION? Sleet Fog Snowing High Winds Temperature:	
140	Building Information	
LOCATION WITHIN UNIT?	ROOM# TOK DIMENSIONS: Length: 12* Width: 10* Interior Exterior	
TYPE OF FLOORING?	Tile Carpet Vinyl Other:	
Describe: TBONN W/W	Hits Brown Ish Gray Norrow Streaks	
TYPE OF COVE BASE COLOR? Vinyl/Rubber 🛛 Wood Other: Base Board Black Brown Tan Beige 🎗 Other: Witte		
TYPE OF WALLS PRESENT?		
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? NA	
Door Window	Building Roof Counter-top Bathtub Sink Toliet	
🗌 White 📄 Gray 🗌	Clear Black Other:	
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR? NA	
Door Roof] Ріре	
🗌 White 🗌 Gray 🗌	Red 🔲 Black 🗌 Other:	
GENERAL NOTES:		


ASBESTOS INSPECTION FORM		
General Information		
PROJECT NAME:	0-10 hamarilo	
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	ANG 13'20 SITE LOCATION: 0-10 NH4	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TZ	
	Weather Information	
WEATHER AT TIME OF INSPEC	TION?	
	6 64	
	Building Information	
LOCATION WITHIN UNIT?	Interior Exterior	
TYPE OF FLOORING? Describe: Lit Browsn W/	X Tile Carpet Vinyl Other: CLOSET 5x21/2' White Prown Grey Long Streskers	
TYPE OF COVE BASE COLOR?	Vinyl/Rubber X Wood Other: Blse Rond Black Brown Tan Beige Other: White	
TYPE OF WALLS PRESENT? Cording Papara TExtu	Tape/Texture 🗹 Sheetrock 🗌 Wood Panel	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? HK	
Door 🕅 Window [Building Roof Counter-top Bathtub Sink Toliet	
🗌 White 🔲 Gray 🛛	Clear Black Other:	
WHERE ON UNIT IS PUTTY PRI	SENT & COLOR?	
Door Roof] Pipe	
🗌 White 🔲 Gray 🗌	Red Black Other:	
GENERAL NOTES:		



	ASBESTOS INSPECTION FORM		
	Genera	Information	
PROJECT NAME:	alo AMARIL	6	
PROJECT NUMBER:	20-002-03		
DATE OF SAMPLE:	ANG 12'20	SITE LOCATION: OLO NHA	
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	TZ		
Service Real Providence	Weathe	r Information	
WEATHER AT TIME OF INSPEC	TION? Sleet Fo Te	ng Snowing High Winds emperature:	
	Building	Information	
	ROOM# BR 3	DIMENSIONS: Length: 7' Width: 10'	
LOCATION WITHIN UNIT?	🔀 Interior	Exterior	
TYPE OF FLOORING?	🕅 Tile 🗌 Carpet	Vinyl Other: CLOSEE 5 × 242	
Describe: LT PROWN W/ W	ute Grey Brown	Long Streaks	
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	N Wood Other: Base Roard n Tan Beige X Other: White	
TYPE OF WALLS PRESENT? Lielung Popcom Text	X Tape/Texture	X Sheetrock 🗌 Wood Panel	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	NA	
Door Window	Building 🗌 Roof	Counter-top 🗌 Bathtub 🗌 Sink 🗌 Toliet	
🗌 White 🔲 Gray 🗌] Clear 🗌 Black	Other:	
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?		
Door Roof] Pipe		
🗌 White 🔲 Gray 🗌] Red 🗌 Black	Other:	
GENERAL NOTES:			



ASBESTOS INSPECTION FORM		
	General	Information
PROJECT NAME:	OLO AMMAI	مل
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	Buc 13'20	SITE LOCATION: OLO NHX
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TE	
	Weather	r Information
WEATHER AT TIME OF INSPECT	FION? Sleet Fo Te	ig 🗌 Snowing 📄 High Winds emperature:
	Building	Information
LOCATION WITHIN UNIT?	ROOM# BC 4	DIMENSIONS: Length: 9' Width: 10
TYPE OF FLOORING? Describe: Thrown /w BR	X Tile Carpet	Vinyl Other: CLOSET 4×21/2.
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	Wood Other: Bue Bornd n _ Tan _ Beige Other: White
TYPE OF WALLS PRESENT?	Tape/Texture	Sheetrock Wood Panel Poplorn Exture
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	NA
Door Window	Building 🗌 Roof	Counter-top Bathtub Sink Toliet
🗌 White 🗌 Gray	Clear Black	Other:
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?	٨
Door Roof] Pipe	
🗌 White 🗌 Gray 🗌	Red 🗌 Black	Other:
GENERAL NOTES:		



ASBESTOS INSPECTION FORM	
	General Information
PROJECT NAME:	alo Amarillo Nith
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	MUG 12 20 SITE LOCATION: OLO NUM
CERTIFIED INSPECTORS:	MB
FIELD TECHNICIANS:	TC
	Weather Information
WEATHER AT TIME OF INSPECT	ION?
	Building Information
LOCATION WITHIN UNIT?	INDENSIONS: Length: 20° Width: 20°
TYPE OF FLOORING? Describe:	Tile Carpet Vinyl X Other: Louc Hook Storige Axzik Conc Floor
TYPE OF COVE BASE COLOR?	Vinyl/Rubber X Wood Other: Black Brown Tan Beige Other: WHITE
TYPE OF WALLS PRESENT?	STORAGE 19 22/2 Tape/Texture Sheetrock Wood Panel UKPORT CEIUNG
TYPE OF FIXTURES PRESENT &	
Door Window	Building 🗌 Roof 🗌 Counter-top 📄 Bathtub 📄 Sink 🔲 Toliet
🗌 White 🔲 Gray 🗌	Clear 🔲 Black 🗌 Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? NA
Door Roof	Pipe
🗌 White 🔲 Gray 🗌	Red 🔲 Black 🗌 Other:
GENERAL NOTES:	
	\backslash



ASBESTOS SAMPLING FORM		
Samp	le Information	
SAMPLE # NHA-120-1	LOCATION:	
UNIT# 120 ROOM# 1	WALL CODE: A B C D Hoor	
STRUCTURE: flow file #1	CONDITION:	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🗶 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 🛛 🕅 Beige	
Other:	Clear Other: white gray brown streak & white	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🗌 Yes 🗌 No	
If yes, describe: Black		
General Notes:		
	·	

ASBESTOS SAMPLING FORM		
Samp	le Information	
SAMPLE # NHA -120 - 2	LOCATION: 🕅 Interior 🗌 Exterior	
UNIT# 120 ROOM# 8	WALL CODE: A B C D Floor	
STRUCTURE:	CONDITION:	
Ploor tile	🗌 Poor 🗌 Fair 📈 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 💢 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 📈 Beige	
Other:	Clear Other: Wwhite groybrown streak & while	
MASTIC PRESENT? 🛛 Yes 🗔 No	PHOTOGRAPH: Yes No	
If yes, describe: Black		
General Notes:		



ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # WHA-120-3	LOCATION: 🕅 Interior 🗌 Exterior	
UNIT# 120 ROOM# 7	WALL CODE: A B C D Floor	
STRUCTURE:	CONDITION:	
Ploor FI6	🗌 Poor 🗌 Fair 🕅 Good 🔲 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🔲 Metal 🛛 🕅 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗍 Tan 🗌 Gray 🕅 Beige	
Other:	Clear Other: White gray brown strenks & white	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: X Yes No	
If yes, describe: Black		
General Notes:		

ASBESTOS SAMPLING FORM		
Samp	ple Information	
SAMPLE # NAA- 120-4	LOCATION:	
UNIT# /20 ROOM# \$ 10	WALL CODE: A B C D Flor	
STRUCTURE: Ploor file #2	CONDITION:	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🕅 Concrete 🗌 Sheetrock	🗌 White 🔲 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other: Reach w/white tan brown	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: Black /vellow		
General Notes:		
Version 1	Page2of	



ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA- 120-5	LOCATION:	
UNIT# 120 ROOM# 1	WALL CODE: A B C D Floor	
STRUCTURE:	CONDITION:	
1-loor till c	Poor Eair Good Excellent	
SUBSTRATE:	COLOR:	
Wood Metal Concrete Sheetrock	White Black Tan Gray Beige	
Other:	Clear Other: Peach w/ white tan brown	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: Black (yellow		
General Notes:		

ASBESTOS SAMPLING FORM		
Samp	ole Information	
SAMPLE # NHA-120-6	LOCATION:	
UNIT# 120 ROOM# 5	WALL CODE: A B C D Floor	
STRUCTURE: For the #2	CONDITION:	
SUBSTRATE:	COLOR:	
🗌 Wood 🛛 🕅 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other: Pendly W/white timbrown	
MASTIC PRESENT?	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: Black Yellow		
General Notes:		

Page 3 of 3



ASBESTOS SAMPLING FORM		
Sam	ole Information	
SAMPLE # NHA-120-7		
UNIT# 120 ROOM# 7		
STRUCTURE:	CONDITION:	
Tapo + Texture	🗌 Poor 🗌 Fair 📈 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	White 🗋 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe:		
General Notes:		

ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA-120-8	LOCATION:	
UNIT# 120 ROOM# 8	WALL CODE: A B C D	
STRUCTURE:	CONDITION:	
Tape + Texture	Poor Fair X Good Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🔲 Metal 🗌 Concrete 🕅 Sheetrock	🕅 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🗶 No	PHOTOGRAPH: 🕂 Yes 🗌 No	
If yes, describe:		
General Notes:		



ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA-120-9		
UNIT# 120 ROOM# 1	WALL CODE:	
STRUCTURE:	CONDITION:	
Tape & Texture	Poor Fair Good Excellent	
V	2). 21	
SUBSTRATE:	COLOR:	
🗌 Wood 📄 Metal 📄 Concrete 📄 Sheetrock	🗌 White 🗌 Black 🗌 Tan 📄 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? Yes No	PHOTOGRAPH: 🗌 Yes 🗌 No	
If yes, describe:		
General Notes:		
	4	

ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA-120-10	LOCATION: 📈 Interior 🗌 Exterior	
UNIT# 120 ROOM# 3	WALL CODE: A B C D Ceiling	
STRUCTURE:	CONDITION:	
celling texture	🗌 Poor 🗌 Fair 🖉 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🗌 Concrete 🎢 Sheetrock	White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe:		
General Notes: Chod of hall way		



ASBESTOS SAMPLING FORM					
Samp	le Informat	tion	N. WHILE	212454	
SAMPLE # NHA-120-11	LOCATION	: 🛱 Ini	terior	Exterior	
UNIT# /20 ROOM# (WALL COD	DE: 🗌 A	🗌 В []c] p	celling
STRUCTURE:	CONDITIO	N:			/
ceiling texture	Poor	🗌 Fair	Good	Excelle	int
SUBSTRATE:	COLOR:				
🗌 Wood 📋 Metal 🗌 Concrete 💢 Sheetrock	Ja White	🗌 Black	🗌 Tan	🗌 Gray	Beige
Other:	Clear	Other:			
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGR/	APH: 🕅 Yes	s 🗌 No		
If yes, describe:					
General Notes: org fire place					

ASBESTOS SAMPLING FORM		
Samp	ale Information	
SAMPLE # NHA-120-12	LOCATION:	
UNIT# 170 ROOM# 9	WALL CODE: DA DB DC DD Geilling	
STRUCTURE:	CONDITION:	
Ceiling testure	🗌 Poor 🗌 Fair 🕅 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🗌 Concrete 🎢 Sheetrock	🕅 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 🖉 Yes 🗌 No	
If yes, describe:		
General Notes:		
	2	



ASBESTOS SAMPLING FORM		
Sam	ple Information	
SAMPLE # NHA-120-13	LOCATION: Interior Exterior	
UNIT# 120 ROOM# (D		
STRUCTURE: Transite panel	CONDITION:	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	🗌 🗌 White 🔲 Black 🗌 Tan 🛛 🗶 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 🗶 Yes 🗌 No	
If yes, describe:		
General Notes:		

ASBESTOS SAMPLING FORM		
Samp	le Information	
SAMPLE # NHA-120-14	LOCATION:	
UNIT# 120 ROOM# root (east)	WALL CODE: A B C D port	
STRUCTURE: 0 / /	CONDITION:	
post -penetintien	🗌 Poor 🎘 Fair 🗍 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🏹 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🛱 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 💢 Yes 🗌 No	
If yes, describe: $\mathcal{J}(\mathcal{A})$		
General Notes:		



ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA-120-15		
UNIT# 120 ROOM# (South)	WALL CODE: A B C D prof	
STRUCTURE:	CONDITION:	
root penetration	Poor Fair Good Excellent	
SUBSTRATE:	COLOR:	
🗆 Wood 🕅 Metal 🖉 Concrete 🗔 Sheetrock	White PBlack Tan Gray Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: Black		
General Notes:	•	

ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA-120-16		
UNIT# 120 ROOM# (west)	WALL CODE: A B C D FOR	
structure: root penetration	CONDITION:	
SUBSTRATE:	COLOR:	
Uwood XMetal Concrete Sheetrock	🗌 White 🗍 🕅 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🛒 Yes 🗌 No	
If yes, describe: Black		
General Notes:		



ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA-120-17	LOCATION:	
UNIT# 120 ROOM# roof least	WALL CODE: A B C D Voof	
STRUCTURE:	CONDITION:	
poot material	Poor Fair Good Excellent	
SUBSTRATE:	COLOR:	
Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: Yes No	
If yes, describe:		
General Notes:		

ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NAA - 120 - 18		
UNIT# 120 ROOM# root(west)	WALLCODE: A B C D por R	
STRUCTURE:	CONDITION:	
voot material	Poor Fair Good Excellent	
SUBSTRATE:	COLOR:	
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🕅 White 🗌 Black 🛄 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 💢 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: black		
General Notes:		
	\sim	

Page of 1?



ASBESTOS SAMPLING FORM		
Sam	ble Information	
SAMPLE # NHA-120-19	LOCATION:	
UNIT# 120 ROOM#	WALL CODE: A B C D Foot	
STRUCTURE:	CONDITION:	
root material	Poor Fair Good Excellent	
CIIDCTDATE,		
SUBSTRATE.		
Wood 🗌 Metal 🗌 Concrete 🗍 Sheetrock	White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? Yes No	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe: black	-	
General Notes:	•	

ASBESTOS SAMPLING FORM		
Samp	ble Information	
SAMPLE # NHA-120-20	LOCATION:	
UNIT# 120 ROOM# wall	WALL CODE: XA IB IC ID	
STRUCTURE:	CONDITION:	
Strcco	Poor Fair Good Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 💢 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other: Lt brown	
MASTIC PRESENT?	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe:		
General Notes:		



ASBESTOS SAMPLING FORM			
Sam	ple Information		
SAMPLE # NHA-120-21			
UNIT# 120 ROOM# ml	WALL CODE: DA DB XC XD		
STRUCTURE:	CONDITION:		
Stuceo	Poor 🗌 Fair 🛛 Good 🗌 Excellent		
SUBSTRATE:	COLOR:		
Wood Metal Concrete Sheetrock	🗌 White 🔲 Black 🗌 Tan 📄 Gray 🗌 Beige		
Other:	Clear Other: It brown		
MASTIC PRESENT? Yes No If yes, describe:	PHOTOGRAPH: Yes No		
General Notes:			

ASBESTOS SAMPLING FORM		
Sam	ple Information	
SAMPLE # WHA-120-22	LOCATION:	
UNIT# 120 ROOM# vall	WALL CODE: A B C D	
STRUCTURE:	CONDITION:	
stacco	🗆 Poor 🔲 Fair 🛛 🖓 Good 🔲 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 📈 Concrete 🗌 Sheetrock	🗌 White 🔲 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other: H. Brown	
MASTIC PRESENT? 🔲 Yes 🛛 No If yes, describe:	PHOTOGRAPH: X Yes 🗌 No	
General Notes:		
/ersion 1		
	Page <u> </u> of].	



ASBESTO	ASBESTOS SAMPLING FORM				
Samp	ole Information				
SAMPLE # NHA - 120 - 23					
UNIT# 120 ROOM# WALL CODE: WALL CODE: WALL CODE:					
STRUCTURE:	CONDITION:				
footing	🗆 Poor 🔲 Fair 🗸 Good 🗌 Excellent				
SUBSTRATE:	COLOR:				
Wood Metal Concrete Sheetrock	White 🔲 Black 🗌 Tan 🛒 Gray 🗌 Beige				
Other:	, Clear 🗌 Other:				
MASTIC PRESENT? Yes No	PHOTOGRAPH: 💢 Yes 🗌 No				
If yes, describe:					
General Notes:	A				

ASBESTOS SAMPLING FORM				
Sample Information				
SAMPLE # NHA- 120-24				
UNIT# 120 ROOM# adside	WALL CODE: A B C C D			
STRUCTURE:	CONDITION:			
facting	🗌 Poor 🗌 Fair 🕅 Good 🗌 Excellent			
SUBSTRATE:	COLOR:			
🗌 Wood 🗌 Metal 💢 Concrete 🗌 Sheetrock	🗌 White 🔲 Black 🗌 Tan 🛛 🕅 Gray 🗌 Beige			
Other:	Clear Other:			
MASTIC PRESENT? 🗌 Yes 🏹 No	PHOTOGRAPH: 🎢 Yes 🗌 No			
If yes, describe:				
General Notes:	~			



ASBESTO	ASBESTOS SAMPLING FORM			
Sam	ble Information			
SAMPLE # WHA- 120 - 25	LOCATION:			
UNIT# 120 ROOM# ovtside				
STRUCTURE:	CONDITION:			
firsting	Poor X Fair Good Excellent			
SUBSTRATE:	COLOR:			
Wood Metal Toncrete Sheetrock	White Black Tan K Gray Beige			
Other:	Clear Other:			
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 💭 Yes 🗌 No			
If yes, describe:				
General Notes:				

ASBESTOS SAMPLING FORM						
	Sam	ole Informa	tion	State 10 - 1		
SAMPLE #		LOCATION:				
UNIT#	ROOM#	WALL COD	DE: 🗌 A	В]C 🗌 D	
STRUCTURE:		CONDITIO	N:			
		Poor	🗌 Fair	Good	Excellent	
SUBSTRATE:		COLOR:				
🗌 Wood 🗌 Metal	Concrete Sheetrock	White	Black	🗌 Tan	🗌 Gray	Beige
Other:		Clear	Other:			
MASTIC PRESENT?] Yes 🗌 No	PHOTOGR	APH: 🗌 Yes	s 🗌 No		
If yes, describe:						
General Notes:						



	ASBESTOS INSPECTION FORM			
	Genera	al Information		
PROJECT NAME:	alo AMAR	40 NHA		
PROJECT NUMBER:	20-042-021			
DATE OF SAMPLE:	Rom 17'20	SITE LOCATION:	OTO NHR	
CERTIFIED INSPECTORS:	MB	36		
FIELD TECHNICIANS:	TE			
	Weath	er Information		
WEATHER AT TIME OF INSPEC	TION?			
🔀 Clear 🗌 Cloudy 🗌 Rain	Sleet F	og 🗌 Snowing 🗌 I	High Winds	
Other:	7	emperature:		
	\square	95-		
	Buildin	g Information		
UNIT# 20	ROOM# LR	DIMENSIONS:	Length: 18 Width: 16	
LOCATION WITHIN UNIT?	X Interior	Exterior		
TYPE OF FLOORING? 12" X12" WHITE W/GREY 12" X12" BROWN TAN PE Describe: B9119 W/MATTER	Tile Carpet	Vinyl Other:	CLOSET Z"XOZ'	
TYPE OF COVE BASE COLOR?	Vinvl/Rubber	Wood Other	WHILE ON THOUSA FRANKS	
	Black Brow	vn 🗌 Tan 🗌 Beige	Other: W. HTE	
TYPE OF WALLS PRESENT?	🔀 Tape/Texture	Sheetrock Wo	ood Panel	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	NA		
Door 🕅 Window	Building Roof	Counter-top	Bathtub 🗌 Sink 🗍 Toliet	
🗌 White 📄 Gray	Clear Black	Other:		
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?	λ		
Door Roof] Pipe	-		
White Gray	Red Black	Other:		
GENERAL NOTES:				
			÷	



	ASBESTOS I	NSPECTION FORM		
	Genera	al Information		
PROJECT NAME:	OLO AMARILLO	NHA		
PROJECT NUMBER:	20-042-02			
DATE OF SAMPLE:	Mg 17 20	SITE LOCATION:	alo NHS	
CERTIFIED INSPECTORS:	MRS			
FIELD TECHNICIANS:	Te			
	Weath	er Information	a start and	Yune Speak Pro-
WEATHER AT TIME OF INSPECT	FION?	Fog Snowing H Femperature: 97 -	ligh Winds	
	Buildin	g Information	「地理の理論」	CONTRACT STATES
UNIT# (20 LOCATION WITHIN UNIT?	ROOM#KIE	DIMENSIONS:	Length:(4)_	Width:2
TYPE OF FLOORING? TELCH W/WHITE 12"XIZ" TAN BROWN STELLYS Describe: PELLE W/ WHITE		Vinyl Other:	WHITE W/CRS	Y BROWN BELLE
TYPE OF COVE BASE COLOR? TYPE OF WALLS PRESENT?	Vinyl/Rubber State Black Brow	Wood Other:	BASS BOART	>
COUNTS FORCORN TEXTUR	Conter:			
TYPE OF FIXTURES PRESENT & (CAULKING COLOR?			
Door Window	Building Roof	🔀 Counter-top 🗌 E	Bathtub 🗌 Sink	Toliet
🔀 White 🗌 Gray 🗌	Clear 🗌 Black	Other:	14	
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? 🖊	\$		
Door Roof	Pipe			
🗌 White 🔛 Gray 🗌	Red 🗌 Black	Other:		
GENERAL NOTES: LITHUST 1 Thepe /	RM (HENTER) TENTURE CONK FLOOR	WOJER HEDJER EILING PopGR	N TEXTUEE	



ASBESTOS INSPECTION FORM			
	Genera	Information	
PROJECT NAME:	ato AMARILL	o NHA	
PROJECT NUMBER:	20-042-02		
DATE OF SAMPLE:	ANG 17'20	SITE LOCATION:	OLO GITE NUTS
CERTIFIED INSPECTORS:	MPS		
FIELD TECHNICIANS:	TC		
	Weathe	er Information	
WEATHER AT TIME OF INSPEC	TION?		
🔀 Clear 🗌 Cloudy 🗌 Rain	Sleet F	og 🗌 Snowing 🗌 H	ligh Winds
Other:	(3)	emperature:	
	Buildin	e Information	Share the sector of a sector
UNIT# 120	ROOM# HALL	DIMENSIONS:	Length: 24' Width: 3/
LOCATION WITHIN UNIT?	X Interior	Exterior	
TYPE OF FLOORING?	🔀 Tile 🗌 Carpet	Vinyl Other:	CLOSET 4/2X 2' TEN W/ WHITE BROWN GRE
Describe: BELLE W/ WHI	TE GREN BROW	IN STREAKS	streaks
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	Wood Other:	RUE RALES
	Black Brov	vn 🗌 Tan 🗌 Beige	DAGE TOUGED
TYPE OF WALLS PRESENT?	X Tape/Texture	X Sheetrock 🗌 Wo	od Panel
	Other: Cerly	NG POPLORN TEX	TURE
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	NA	
Door Window	Building 🗌 Roof	Counter-top	lathtub 🗌 Sink 🗌 Toliet
White Gray	Clear 🗌 Black	Other:	
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? N	٨	
Door Roof] Pipe		
White Gray] Red 🛛 🗌 Black	Other:	
GENERAL NOTES:			



ASBESTOS INSPECTION FORM			
	Genera	Information	
PROJECT NAME:	ab MARILLO	NUHA	
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	ANG 17'20	SITE LOCATION: OLO NUM	
CERTIFIED INSPECTORS:	МВ		
FIELD TECHNICIANS:	TC		
	Weathe	r Information	
WEATHER AT TIME OF INSPEC	CTION?	og Snowing High Winds emperature:	
14.0	Building	Information	
LOCATION WITHIN UNIT?		DIMENSIONS: Length 5/2 Width: 8/2	
TYPE OF FLOORING? 12" X 2 TEACH W/WHITE TAN Describe: TYPE OF COVE BASE COLOR?	Tile Carpet	Vinyl Other:	
TYPE OF WALLS PRESENT?			
CZILING	X Tape/Texture	Sheetrock Wood Panel CZRAMIC TILE 4"X 4" BEIGE	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?		
Door Window	Building Roof	🗌 Counter-top 🕅 Bathtub 🕅 Sink 🕅 Toliet	
🔀 White 🗌 Gray	Clear Black	Other:	
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?	18	
Door Roof] Pipe		
🗌 White 🔛 Gray	Red Black	Other:	
GENERAL NOTES:			



ASBESTOS INSPECTION FORM				
	Genera	I Information	Company and Sol	int his day to series
PROJECT NAME:	OLO AMABILO I	LHR		
PROJECT NUMBER:	20-042-03			
DATE OF SAMPLE:	1200 17 120	SITE LOCATIO	N: OJO NHL	
CERTIFIED INSPECTORS:	MB			
FIELD TECHNICIANS:	TC			
	Weathe	r Information		
WEATHER AT TIME OF INSPEC	TION?	og DSnowing emperature: ク ム	High Winds	
	Building	Information		
LOCATION WITHIN UNIT?			5: Length: 5%	Width: (p *
TYPE OF FLOORING? Describe: 12" X12" FEICH		Vinyl D	Other:	
TYPE OF COVE BASE COLOR?	🗶 Vinyl/Rubber	Wood (Dther: leige 🗌 Other:	
TYPE OF WALLS PRESENT?	Tape/Texture	X Sheetrock	Wood Panel	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? Building Clear Black	Counter-top	Hewer Dethtub Z Sink	Toliet
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?	Ь		
Door Roof] Pipe			
🗌 White 📋 Gray 🗌] Red 🗌 Black	Other:		2 1
GENERAL NOTES:				



ASBESTOS INSPECTION FORM			
	General Information		
PROJECT NAME:	alo AMARILLO		
PROJECT NUMBER:	20-042-04		
DATE OF SAMPLE:	ASIC 17'LO SITE LOCATION: OLO NUTO		
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	TE		
	Weather Information		
WEATHER AT TIME OF INSPEC Clear Cloudy Rain Other:	FION? Sleet Fog Snowing High Winds Temperature:		
	Building Information		
UNIT# 120	ROOM# BR DIMENSIONS: Length: 14' Width: 12'		
LOCATION WITHIN UNIT?	MATTER Interior Exterior		
TYPE OF FLOORING?	K Tile Carpet Vinyl Other: 4055 - 5/2 × 3'		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber X Wood Other: Black Brown Tan Beige X Other: WHITE		
TYPE OF WALLS PRESENT?	Tape/Texture Sheetrock Wood Panel		
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?		
Door 🕅 Window	Sink Doliet		
White Gray] Clear 🔲 Black 🗌 Other:		
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?		
Door Roof] Ріре		
🗌 White 🔲 Gray 🗌] Red 🗌 Black 🔲 Other:		
GENERAL NOTES:	-		



ASBESTOS INSPECTION FORM			
General Information			
PROJECT NAME:	OLO SMARILLO NHL		
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	MUA 17 20 SITE LOCATION: OLO NULA		
CERTIFIED INSPECTORS:	MFD		
FIELD TECHNICIANS:	R		
	Weather Information		
WEATHER AT TIME OF INSPEC	TION? Sleet Fog Snowing High Winds Temperature: Image: State Stat		
10.	Building Information		
LOCATION WITHIN UNIT?	ROOM# PK 2 DIMENSIONS: Length: PK Width: III Interior Exterior		
TYPE OF FLOORING?	Carpet Vinyl Other:		
TYPE OF COVE BASÉ COLOR?	Vinyl/Rubber Wood Other: BLSE BOSED FESCU TA		
TYPE OF WALLS PRESENT?	Tape/Texture X Sheetrock Wood Panel		
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? NA		
Door Window	Building 🗌 Roof 🗌 Counter-top 🗌 Bathtub 🔲 Sink 🗌 Toliet		
White Gray	Clear Black Other:		
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR? NA		
Door Roof] Pipe		
White Gray	Red Black Other:		
GENERAL NOTES:			



ASBESTOS INSPECTION FORM				
General Information				
PROJECT NAME:	ato AMARIA	to NHK		
PROJECT NUMBER:	20-042-021			
DATE OF SAMPLE:	ANG 17'20	SITE LOCATION:	alo NHA	
CERTIFIED INSPECTORS:	MB			
FIELD TECHNICIANS:	TE			
	Wea	ther Information		Hiller H. St.
WEATHER AT TIME OF INSPE	ECTION? ain Sleet [Fog Snowing Temperature:	High Winds	
	Build	ling Information		The second second
UNIT# 120	ROOM# PK	DIMENSIONS:	Length: 9%	Width:
LOCATION WITHIN UNIT?	X Inter	ior Exterior		
TYPE OF FLOORING?		Det Vinyl Other	(L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	TYEXZE'
TYPE OF WALLS PRESENT?		Brown Tan Beige	Conter: WHITE	× < < >
CEILING EPRORN TEXT	WE Other:			
	& CAULKING COLO	R? No		
Door Window	Building Ro	of 🗌 Counter-top 🗌	Bathtub 🗌 Sink	Toliet
🗌 White 📄 Gray	Clear Bla	ck 🗌 Other:	×	
WHERE ON UNIT IS PUTTY P	RESENT & COLOR?	NA		
Door Roof	Pipe			
🗌 White 📋 Gray	Red Bla	ck 🗌 Other:		
GENERAL NOTES:				



ASBESTOS INSPECTION FORM			
	General Inform	ation	he full and the shares of the first of the
PROJECT NAME:	OLO MARGUD NHA		
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	BANG 17'20 SITE	LOCATION: 0.	O NAAL
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	R		
	Weather Inform	lation	
WEATHER AT TIME OF INSPE	CTION? Sleet Fog Temperate	Snowing 🗌 High Wi Jre:	nds
Standing of the state of the st	Building Inform	ation	
LOCATION WITHIN UNIT?	ROOM### 4 DIM	ENSIONS: Len xterior	gth: 1½ Width: 11 '
TYPE OF FLOORING?		NY COther:	CLOSET 52 X 2 1/2 '
TYPE OF COVE BASE COLOR?	🗌 Vinyl/Rubber 🛛 🕅 Wood	Dther:	HE BOSED her: WHITE
TYPE OF WALLS PRESENT? Tape/Texture Sheetrock Wood Panel Other: CELING REFEDEN TEXTURE			
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?		
Door 🔀 Window	Building Roof Cou	nter-top 🗌 Bathtub	Sink 🛄 Toliet
🗌 White 📋 Gray	Clear Black Oth	er:	
WHERE ON UNIT IS PUTTY PR	ESENT & COLOR? NA		
Door Roof	Pipe		
🗌 White 📄 Gray 🛛	Red Black Oth	er:	
GENERAL NOTES:			



ASBESTOS INSPECTION FORM			
General Information			
PROJECT NAME:	ato smorulo nith		
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	SUG 17'ED SITE LOCATION: OLO NAS		
CERTIFIED INSPECTORS:	MA		
FIELD TECHNICIANS:	TC		
	Weather Information		
WEATHER AT TIME OF INSPECT	ION? Sleet Fog Snowing High Winds Temperature: Temperature:		
	Building Information		
	ROOM# WARACE KM DIMENSIONS: Length: 6' Width: 5'		
LOCATION WITHIN UNIT?	X Interior Exterior		
TYPE OF FLOORING?	Tile Carpet Vinyl Other:		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber Wood Other:		
	🔀 Black 🗌 Brown 🗌 Tan 🗌 Beige 🗍 Other:		
TYPE OF WALLS PRESENT?	Tape/Texture X Sheetrock Wood Panel		
TYPE OF FIXTURES PRESENT & (
Door Window	Building Roof Counter-top Bathtub Sink Toliet		
White Gray	Clear Black Other:		
WHERE ON UNIT IS PUTTY PRES	ENT & COLOR? NA		
Door 🗍 Roof	Pipe		
🗌 White 🔲 Gray 📃	Red 🗌 Black 🗍 Other:		
GENERAL NOTES:			

Y



ASBESTOS INSPECTION FORM			
General Information			
PROJECT NAME:	abo Mukrue NHA		
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	ANG 17'20 SITE LOCATION: OLD WATL		
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	TC		
State State Barrier State	Weather Information		
WEATHER AT TIME OF INSPECT	TION? Sleet Fog Snowing High Winds Temperature: 🕉		
	Building Information		
LOCATION WITHIN UNIT?	ROOM#		
TYPE OF FLOORING? Describe:	Tile Carpet Vinyl X Other:		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber Wood Other: NA		
TYPE OF WALLS PRESENT?	Tape/Texture Sheetrock Wood Panel Other: Style		
TYPE OF FIXTURES PRESENT & (CAULKING COLOR? NA		
Door Window] Building 🗌 Roof 🗌 Counter-top 🗌 Bathtub 🗍 Sink 🗌 Toliet		
🗌 White 🔛 Gray 🗌] Clear 🔄 Black 🛄 Other:		
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? NA		
Door Roof] Pipe		
White Gray] Red 🔄 Black 🛄 Other:		
GENERAL NOTES:			



ASBESTOS INSPECTION FORM		
	General Information	
PROJECT NAME:	ato suverilo	
PROJECT NUMBER:	20,42-03	
DATE OF SAMPLE:	ANG 13 'CO SITE LOCATION: QUO MUAS	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TC	
	Weather Information	
WEATHER AT TIME OF INSPECT	10N?	
🕅 Clear 🔄 Cloudy 🗌 Rain	Sleet 🗍 Fog 🗌 Snowing 🗌 High Winds	
Other:	(12) Temperature:	
Market Book and Article And Article And	Building Information	
UNIT# 120	ROOM# Sicker DIMENSIONS: Length: 6 Width: 5	
LOCATION WITHIN UNIT? 0	Kracz Interior 🛛 Exterior	
TYPE OF FLOORING?		
Describe: Conc FLOOR		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber 🔀 Wood 🗌 Other: BALLE BOLLED	
	Black Brown Tan Beige X Other: WHTE	
TYPE OF WALLS PRESENT?	Sheetrock X Wood Panel	
TYPE OF FIXTURES PRESENT & (
Door Window	Building Roof Counter-top Bathtub Sink Toliet	
🗌 White 🔲 Gray 🗌	Clear 🔲 Black 🗌 Other:	
WHERE ON UNIT IS PUTTY PRES	ENT & COLOR?	
Door Roof	Pipe	
🗌 White 🔲 Gray 🗌	Red 🗌 Black 🗍 Other:	
GENERAL NOTES:		



ASBESTOS SAMPLING FORM		
SAMPLE # NHA - 125 - 1	LOCATION:	
UNIT# 125 ROOM# 1	WALL CODE: A B C D Floor	
STRUCTURE: Floor File #1	CONDITION:	
SUBSTRATE:	COLOR:	
Wood Metal X Concrete Sheetrock Other:	🗌 White 🗌 Black 🛄 Tan 🗌 Gray 🛛 Beige	
	Clear Other: White grey brown straks	
MASTIC PRESENT? X Yes No	PHOTOGRAPH: Yes No	
If yes, describe: Black		
General Notes:		

ASBESTOS SAMPLING FORM		
Sette	ole laformation	
SAMPLE # WHA- 125 - Z	LOCATION:	
UNIT# (25) ROOM# 6	WALL CODE: A B C D Floor	
STRUCTURE: Fland ht. #1	CONDITION:	
Floor IVle	🗌 Poor 🗌 Fair 💢 Good 🗌 Excellent	
SUBSTRATE:		
Wood Metal X Concrete Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 🕅 Beige	
Other:	Clear Other: White gray brown streak	
MASTIC PRESENT? Yes No	PHOTOGRAPH: X Yes No	
If yes, describe: Black		
General Notes:	-	



ASBESTOS SAMPLING FORM		
Start :	ate la Remaalon	
SAMPLE # NHA-125-3	LOCATION:	
UNIT# 021 123 ROOM# 5	WALL CODE: A B C D Hoor	
STRUCTURE:	CONDITION:	
Floor the #1	Poor 🕅 Fair 🗌 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🕅 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 🕅 Beige	
Other:	Clear Other: Wwhite gray brown streets	
MASTIC PRESENT? 🔀 Yes 🗌 No	PHOTOGRAPH: 🗶 Yes 🗌 No	
If yes, describe: Black		
General Notes:		

ASBESTOS SAMPLING FORM		
Sam	de Informetion	
SAMPLE # NHA-125-4	LOCATION:	
UNIT# 125 ROOM# 9	WALL CODE: A B C D Floor	
STRUCTURE: Hour tile # 2	CONDITION:	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🗶 Concrete 🗌 Sheetrock	🕅 White 🗌 Black 🗍 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other: Wyhit, gray tyrey blue	
MASTIC PRESENT? X Yes No	PHOTOGRAPH: 🔀 Yes 🗌 No	
If yes, describe: Black		
General Notes:		
/ersion 1	Page2 of \bot	



ASBESTOS SAMPLING FORM		
Sampata in formandor		
SAMPLE # NAA-125-5	LOCATION: X Interior C Exterior	
UNIT# 0304 (25 ROOM# 6	WALL CODE: A B C D Floor	
STRUCTURE: Moor the #2	CONDITION:	
SUBSTRATE:	COLOR:	
Wood Metal Concrete Sheetrock Other:	🕅 White 🗌 Black 🗌 Tan 🗍 Gray 🗌 Beige	
	Clear Other: W/grey, Hgrey, blue	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 💢 Yes 🗌 No	
If yes, describe: Black	~~~X	
General Notes:		

ASBESTOS SAMPLING FORM		
and the second	le Islomation	
SAMPLE # NHA- 125-6	LOCATION:	
UNIT# 125 ROOM# 8	WALL CODE: A B C D Floor	
STRUCTURE: / in / adm	CONDITION:	
<i>L-10</i> /0 / <i>C</i> 0 / <i>U</i>	Poor AFair Good Excellent	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 🖾 Concrete 🗌 Sheetrock	🗌 White 🔄 Black 🗌 Tan 🔄 Gray 🗌 Beige	
Other:	🗆 Clear 🗌 Other: Brown	
MASTIC PRESENT? 🛛 Yes 🗌 No	PHOTOGRAPH: 🛛 Yes 🗌 No	
If yes, describe: Yenow		
General Notes:		



ASBESTOS SAMPLING FORM	
alta lan Companyanon	
LOCATION:	
WALL CODE: A B C D For	
CONDITION:	
Poor Fair Good Excellent	
COLOR:	
🗌 White 🗌 Black 🔲 Tan 📋 Gray 🗌 Beige	
Clear X Other: Brown	
PHOTOGRAPH: K Yes 🗌 No	

ASBESTO	S SAMPLING FORM
Ser 14	la Information
SAMPLE # NHA-125-8	
UNIT# 125 ROOM# 4	WALL CODE: A B C D Hoor
STRUCTURE: 1 in 10	CONDITION:
LINDIEUM	Poor 🛛 Fair 🗌 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🕅 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear A Other: Brown
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 💹 Yes 🗌 No
If yes, describe: Yellow	
General Notes:	



ASBESTOS SAMPLING FORM	
SANADIE #	
SAIVIPLE # NHA-125-9	LOCATION:
UNIT# # 125 ROOM# 7	WALL CODE: A B C C D
STRUCTURE: Intelase	CONDITION:
	Poor Fair Good Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	🗌 White 🔄 Black 🛄 Tan 🚺 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? Yes No	PHOTOGRAPH: 🗌 Yes 🗌 No
If yes, describe: Black	
General Notes:	

ASBESTOS SAMPLING FORM	
Semi	de Information
SAMPLE # NHA-125-10	LOCATION:
UNIT# ET 125 ROOM# 8	WALL CODE: 🗌 A 🗌 B 🗌 C 💢 D
STRUCTURE: (one base	CONDITION:
	🗌 Poor 🔲 Fair 💢 Good 🗌 Excellent
SUBSTRATE:	COLOR:
Wood Metal Concrete Sheetrock	🗌 White 🗌 Black 🔲 Tan 📈 Gray 🗌 Beige
U Other:	Clear Other:
MASTIC PRESENT? X Yes No	PHOTOGRAPH: 🖉 Yes 🗌 No
If yes, describe: Black	-(
General Notes:	



ASBESTO	S SAMPLING FORM
Semi-	ale de l'entre verseen
SAMPLE # NHA - 125-11	LOCATION:
UNIT# 800 125 ROOM# 4-	WALL CODE: A B C C D
STRUCTURE: (NGG SC	CONDITION:
SUBSTRATE:	COLOR:
Wood Metal Concrete Sheetrock Other:	🗌 White 🔲 Black 🗌 Tan 🛛 🗙 Gray 🗌 Beige
	Clear Other:
MASTIC PRESENT? \mathbb{D} Yes \square No If yes, describe: $\mathcal{B}(\mathcal{A})$	PHOTOGRAPH: X Yes 🗌 No
General Notes:	

ASBESTO	IS SAMPLING FORM
Setting	alst Informatika
SAMPLE # NHA-125-12	
UNIT# PER 125 ROOM#	WALL CODE: A B KC C D
STRUCTURE: In the Torth of	CONDITION:
Japa 1-7/ure	🗌 Poor 🗌 Fair 📈 Good 🗌 Excellent
SUBSTRATE:	COLOR:
Wood Metal Concrete X Sheetrock	White Black Tan Gray Beige
	Clear Other:
MASTIC PRESENT? 🗌 Yes 🏹 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe:	
General Notes:	



ASBESTOS SAMPLING FORM	
SAMPLE # WHA-125-13	
UNIT# 125 ROOM# 3	WALL CODE: XA DB C D
STRUCTURE: Tape & Texture	CONDITION:
SUBSTRATE:	COLOR: White Black Tan Gray Beige Clear Other:
MASTIC PRESENT? 🗌 Yes 🕅 No If yes, describe:	PHOTOGRAPH: X Yes No
General Notes:	

ASBESTOS SAMPLING FORM	
SAMPLE # NIAA-125-14	LOCATION:
UNIT# 125 ROOM# 6	WALL CODE: 🗌 A 🗌 B 🗌 C 🕅 D
STRUCTURE: Tape & Texture	CONDITION:
SUBSTRATE:	COLOR: White Black Tan Gray Beige Clear Other:
MASTIC PRESENT? 🗌 Yes 🗶 No If yes, describe:	PHOTOGRAPH: X Yes 🗌 No
General Notes:	


ASBESTO	S SAMPLING FORM
Samp	le Information
SAMPLE # NHA-125-15	
UNIT# 1 3,5 ROOM# (WALL CODE: A B C D Colling
STRUCTURE: Antine	CONDITION:
Paper in int	🗌 Poor 🗌 Fair 🕅 Good 🗌 Excellent
Certing	
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🛱 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe:	
General Notes:	

ASBESTOS SAMPLING FORM	
Samp	le Information
SAMPLE # NHA - 125-16	LOCATION: Interior Exterior
UNIT# 125 ROOM# 3	WALL CODE: A B B C D Cailing
STRUCTURE: ANIL TO TO TO TO	CONDITION:
Lening lexiting	🗌 Poor 🔲 Fair 💭 Good 🗌 Excellent
SUBSTRATE:	COLOR:
Uther:	💢 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
	Clear Other:
MASTIC PRESENT? 🗌 Yes 🏹 No If yes, describe:	PHOTOGRAPH: X Yes 🗌 No
General Notes:	



ASBESTO	S SAMPLING FORM
Samp	ble Information
SAMPLE # NHA - 125-17	
UNIT# 131 ROOM# 6	WALL CODE: A B B C D (eiling
STRUCTURE: att texture	CONDITION:
Certing I exiting	🗆 Poor 🔲 Fair 🛛 🖾 Good 🔲 Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	🖉 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT?	PHOTOGRAPH: 🖾 Yes 🗌 No
If yes, describe:	,
General Notes:	

ASBESTOS SAMPLING FORM	
Sam	ple Information
SAMPLE # NHA-125-18	LOCATION:
UNIT# 131 ROOM# 8	WALL CODE: A B C D
STRUCTURE: SF transition panel	CONDITION:
	🗌 Poor 🔲 Fair 🕅 Good 🗌 Excellent
SUBSTRATE:	COLOR:
Wood Metal Concrete Sheetrock	🗌 White 🗌 Black 🗌 Tan 🕅 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🕅 No If yes, describe:	PHOTOGRAPH: 🕱 Yes 🗋 No
General Notes:	

Version 1



ASBESTOS SAMPLING FORM	
Samp	ble Information
SAMPLE # NHA - 125-19	
UNIT# 125 ROOM# Roof (rast)	WALL CODE: DA DB DC D rort
STRUCTURE: roat anothe Horn	CONDITION:
pene lastion	Poor 🏹 Fair 🗌 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🛱 Black 🗌 Tan 🗌 Gray 🕅 Beige
Other:	Clear Other:
MASTIC PRESENT? 🛛 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe: Black	,
General Notes:	

ASBESTO	S SAMPLING FORM
Samı	ole Information
SAMPLE # WHA-125-20	LOCATION:
UNIT# 125 ROOM# roof (vest)	WALL CODE: A B B C D port
STRUCTURE:	CONDITION:
root penetration	Poor 🗹 Fair 🗌 Good 🗌 Excellent
SUBSTRATE	
	COLOR:
Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🕅 Black 🗌 Tan 🗌 Gray 🕅 Beige
Other:	Clear Other:
MASTIC PRESENT? 🔀 Yes 🗌 No	PHOTOGRAPH: 🖾 Yes 🗌 No
If yes, describe: Black	
General Notes:	



ASBESTO	S SAMPLING FORM
Samp	ole Information
SAMPLE # NHA-125-21	
UNIT# 125 ROOM# roof (sonth	WALL CODE: A B C D roof
STRUCTURE:	CONDITION:
root pendration	🗌 Poor 💢 Fair 🗌 Good 🗌 Excellent
SUBSTRATE:	COLOR:
Wood 🗋 Metal 🗌 Concrete 🗌 Sheetrock	White 🕅 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🔀 Yes 🗌 No
If yes, describe: Black	
General Notes:	

ASBESTO	S SAMPLING FORM
Samp	ple Information
SAMPLE # NHA -125-22	LOCATION:
UNIT# 125 ROOM# roof (east)	WALL CODE: A B C D port
STRUCTURE:	CONDITION:
rooting material	🗌 Poor 🕅 Fair 🗌 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🕅 Black 🗌 Tan 🗌 Gray 🕅 Beige
Other:	🗆 Clear 🗌 Other: Brown
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe: Black	
General Notes:	



ASBESTOS SAMPLING FORM	
Samp	le Information
SAMPLE # NHA-125-23	
UNIT# 125 ROOM# root forth	WALL CODE: A B C D root
STRUCTURE:	CONDITION:
rooting motorial	Poor Fair Good Excellent
SUBSTRATE:	COLOR:
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🗡 Black 🗌 Tan 🗌 Gray 🖉 Beige
Other:	Clear Other: Brown
MASTIC PRESENT? X-Yes No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe:	
General Notes:	

ASBESTOS SAMPLING FORM	
ole Information	
WALL CODE: A B C D Goot	
CONDITION:	
🗌 Poor 🛛 Fair 🗌 Good 🗌 Excellent	
COLOR:	
🗌 White 🕅 Black 🗌 Tan 🗌 Gray 🅅 Beige	
Clear Other: Brown	
PHOTOGRAPH: Ves 🗌 No	



ASBESTOS SAMPLING FORM	
Samp	ble Information
SAMPLE # NHA -125-25	
UNIT# 125 ROOM# ortside nul	
STRUCTURE: Streco vall	CONDITION:
SUBSTRATE:	COLOR:
🗌 Wood 🔲 Metal 🕅 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🎇 Gray 🗌 Beige
Other:	🗆 Clear 🗋 Other: Perch
MASTIC PRESENT? 🗌 Yes 🏹 No	PHOTOGRAPH: 🖄 Yes 🗌 No
If yes, describe:	
General Notes:	

ASBESTOS SAMPLING FORM	
Samp	le Information
SAMPLE # NHA-125-26	
UNIT# 125 ROOM# outside wall	
STRUCTURE:	CONDITION:
strees way	🗌 Poor 🗌 Fair 🛛 🖉 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🕅 Concrete 🗌 Sheetrock	White Black Tan Gray Beige
Other:	Clear Other: Pench
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe:	
General Notes:	
	5 C



ASBESTO	DS SAMPLING FORM
Sam	ple Information
SAMPLE # NHA-125-27	LOCATION:
UNIT# 125 ROOM# proside will	WALL CODE: A B C X D
STRUCTURE:	CONDITION:
STUCCO may	Poor Fair Good Excellent
SUBSTRATE:	
🗌 Wood 🗌 Metal 🕅 Concrete 🗌 Sheetrock	White Black Tan Arguing Beige
Other:	🗆 Clear 🗌 Other: Peach
MASTIC PRESENT? Yes KNo If yes, describe:	PHOTOGRAPH: 🗹 Yes 🗌 No
General Notes:	

The state of the second st	ASBESTOS SAMPLING FORM					
	Sam	ple Informa	tion			S. HERRICH
SAMPLE #	LOCATION	LOCATION:				
UNIT#	ROOM#	WALL COE	DE: 🗌 A	В]C []D	
STRUCTURE:		CONDITIO	N:			
		🗌 Poor	🗌 Fair	Good	Excellent	
SUBSTRATE:		COLOR:				
🗌 Wood 🗌 Metal	White	Black	🗌 Tan	Gray	Beige	
U Other:		🗌 Clear	Other:			
MASTIC PRESENT?	Yes 🗌 No	PHOTOGR	APH: 🗌 Yes	5 🗌 No		
General Notes:						

Page<u>/4</u>of_<u>/4</u>



	ASBESTOS I	NSPECTION FORM	
	Gener	al Information	
PROJECT NAME:	0.10 AMARILO	NHA.	
PROJECT NUMBER:	20-042-07		
DATE OF SAMPLE:	Mug 17 '20	SITE LOCATION:	ato With
CERTIFIED INSPECTORS:	MB		
FIELD TECHNICIANS:	Te		
	Weath	er Information	
WEATHER AT TIME OF INSPECT		Fog Snowing Temperature:	High Winds
UNIT# 125	Buildin	g Information	
LOCATION WITHIN UNIT?	Interior	Exterior	Length: Zer Width: 14
TYPE OF FLOORING?	Tile Carpet	Vinyl Other:	405E 8'x 3'
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	Wood Other:	BME BOSKO
TYPE OF WALLS PRESENT?	CXTape/Texture	Sheetrock Wa	Dod Panel
TYPE OF FIXTURES PRESENT & (CAULKING COLOR?	NA	DOORWAST
Door X Window	Building 🗌 Roof	Counter-top	Gathtub Sink Toliet
🗌 White 🔄 Gray	Clear 🗌 Black	Other:	
WHERE ON UNIT IS PUTTY PRES	ENT & COLOR?	No	
Door Roof	Pipe		
White Gray	Red 🗌 Black	Other:	
GENERAL NOTES: 125 3	3R/	۶.	

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	ASBESTOS INSPECTION FORM	
	General Information	
PROJECT NAME:	OLO MULARILLO NHA	
PROJECT NUMBER:	20-042-03	
DATE OF SAMPLE:	SITE LOCATION: OLO NHA	
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	T2	
	Weather Information	
WEATHER AT TIME OF INSPECT	ION?	
	Building Information	
UNIT# 125	ROOM# HOLLWAY DIMENSIONS: Length: 24 / Width: 3/	
LOCATION WITHIN UNIT?	Interior Exterior	
TYPE OF FLOORING?	Tile Carpet Vinyl Other: WHITE W/CREY, LIZERY,	REAL
TYPE OF COVE PASE COLORS	GEST DEENIN SILEAKS/ LT BLUE, STREAKS (2) 12"	
TTPE OF COVE BASE COLOR?	Black Brown Tan Beige Other: WHIE	
TYPE OF WALLS PRESENT?	Tape/Texture Sheetrock Wood Panel Other: Other: Other:	
TYPE OF FIXTURES PRFSENT & C	CAULKING COLOR?	
Door 💕 Window	H/X Building Roof Counter-top Bathtub Sink Toliet	
🗌 White 🔄 Gray	Clear 🔲 Black 🛄 Other:	
WHERE ON UNIT IS PUTTY PRES	ENT & COLOR? NA	
Door Roof	Pipe	
White Gray	Red 🗌 Black 🗌 Other:	
GENERAL NOTES: NL		

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	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	0.10 AMARILO NHA
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	Ang 17'20 SITE LOCATION: OLO NHA
CERTIFIED INSPECTORS:	MB
FIELD TECHNICIANS:	R
「おいろ」と思いまでは	Weather Information
WEATHER AT TIME OF INSPEC	TION?
UNIT# 125	Building Information
	ROUNI# 10K 2 DIMENSIONS: Length: 9' Width: 10'
	X Interior Exterior
TYPE OF FLOORING? Z * X Z * Describe: BELGE W/WHC	Tile Carpet Vinyl Other: Classer 7'XZ'
TYPE OF COVE BASE COLOR?	Vinyl/Rubber X Wood Other
	Black Brown Tan Beige Other: WATE
TYPE OF WALLS PRESENT?	C Tape/Texture Sheetrock Wood Panel
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? HA
Door X Window	Building 🗌 Roof 🔲 Counter-top 🗌 Bathtub 🗌 Sink 🗌 Toliet
🗌 White 🔲 Gray] Clear 🔲 Black 🗍 Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? NL
Door Roof	Pipe
🗌 White 🗌 Gray 🗌	Red 🗌 Black 🗍 Other:
GENERAL NOTES:	

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	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	OTO PROBADO
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	Aug 17 20 SITE LOCATION: 010 NUM
CERTIFIED INSPECTORS:	MPS
FIELD TECHNICIANS:	TE .
	Weather Information
WEATHER AT TIME OF INSPECT	FION? Sleet Fog Snowing High Winds Temperature:
	Building Information
LOCATION WITHIN UNIT?	With: Sinterior Exterior
TYPE OF FLOORING?	Tile Carpet 🗹 Vinyl 🗌 Other:
Describe: BKONN Sepure	KECTRIONGLE LINDLEUM
TYPE OF COVE BASE COLOR?	Vinyl/Rubber Wood Other:
TYPE OF WALLS PRESENT?	🖌 Tape/Texture 🔀 Sheetrock 🗌 Wood Panel
TYPE OF FIXTURES PRESENT & C	CAULKING COLOR?
Door Window	Building Roof Accontenter Bathtub Sink X Toliet
🔀 White 🗌 Gray 🗌	Clear Black Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? NA
Door Roof	Pipe
White Gray	Red Black Other:
GENERAL NOTES:	



	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	OLO SMARILIO NHA
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	ang 17 'B SITE LOCATION: OSO NHA
CERTIFIED INSPECTORS:	MP
FIELD TECHNICIANS:	TE
	Weather Information
WEATHER AT TIME OF INSPEC	TION?
UNIT# 17-	Building Information
	Milensions: Length: S' Width: 10'
TYPE OF FLOORING?	Tile Carpet Vinyl Other:
Describe: HELLE W/WHL	IE, CREY, FRONN GIREAKS
TYPE OF COVE BASE COLOR?	Black Brown Tan Beige Other:
TYPE OF WALLS PRESENT?	Tape/Texture Sheetrock Wood Panel
TYPE OF FIXTURES PRESENT &	CAULKING COLOR? NA
Door X Window	Z X X Building Roof Counter-top Bathtub Sink Toliet
White Gray] Clear 🔄 Black 🔲 Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?
Door Roof] Ріре
🗌 White 🔲 Gray	Red Black Other:
GENERAL NOTES:	

3



		ASBESTOS	NSPECTION FORM			
		Gener	al Information			
PROJECT NAME:	_	alo suseno	NHA			
PROJECT NUMBE	R:	20-042-03				
DATE OF SAMPLE		Bug 17 20	SITE LOCATION:	OLO NHA		
	LTORS:	MPS				
FIELD TECHNICIAI	NS:	T				
	Felder and	Weath	er Information			
WEATHER AT TIM		FION?				
Clear Clo	udy 🔄 Rain	Sleet	Fog 🗌 Snowing 🗌 H	figh Winds		
Other:		0	Temperature:			
		6	94			
		Buildin	g Information			E.
		ROOM# K 3	DIMENSIONS:	Length: (13/4	Width: Lo	>
	N UNIT?	🔀 Interior	Exterior		4050	
TYPE OF FLOORIN	G?			(G) 12" TIL	K/ WHITE W	1/15
12.	XIZ			IT GREAT F	BIAG	14
Describe: Balle/	WHATE GR	EY BROWN STR	ZEAKG		/~~~G	
TYPE OF COVE BA	SE COLOR?	Uinyl/Rubber	Wood Other:	BALGZAR	2	
				Cotheres	42	
				WHIE		
TYPE OF WALLS PE	RESENT?	X Tape/Texture	Sheetrock 🗌 Wo	od Panel	iter	1
		Other:	- BPCOPN TEXT	24		1
YPE OF FIXTURES	PRESENT & C	AULKING COLOR?	NG NG			-
🗌 Door 🛛 🗶	Window	Building Roof	Counter-top	athtub 🗌 Sink	Toliet	
White	Gray	Clear 🗌 Black	Other:			
VHERE ON UNIT IS	S PUTTY PRES	ENT & COLOR?	LS			
Door	Roof	Ріре				
🗌 White 🔲	Gray	Red 🗌 Black	Other:			
ENERAL NOTES:						
						1



General Information PROJECT NAME: Q to AMAQUO PROJECT NUMBER: 20 - 042 - 03 DATE OF SAMPLE: Amg 17 '20 SITE LOCATION: Q to Nth CERTIFIED INSPECTORS: MP FIELD TECHNICIANS: TC Weather Information WEATHER AT TIME OF INSPECTION? MC Clear Cloudy Rain Sleet Fog Snowing High Winds Other: Temperature: MIDIMENSIONS: Length: Width: 5%/24/2
PROJECT NAME: Q.J.O. AMAQUO PROJECT NUMBER: 20 - 042 - 033 DATE OF SAMPLE: Amg 17 '20 SITE LOCATION: Q.JO. NHA CERTIFIED INSPECTORS: MP3 FIELD TECHNICIANS: TC Weather Information WEATHER AT TIME OF INSPECTION? X Clear Cloudy Rain Sleet Fog Snowing High Winds Other: Temperature: Temperature: Temperature: Temperature: Temperature: UNIT# TC ROOM# Kat Kow DIMENSIONS: Length: G/// Width: 57/4/
PROJECT NUMBER: 10 - 042 - 03 DATE OF SAMPLE: Amg 17 '20 SITE LOCATION: QLO NHA CERTIFIED INSPECTORS: MFr FIELD TECHNICIANS: TC Weather Information WEATHER AT TIME OF INSPECTION? ✓ Clear Cloudy Rain Sleet Fog Snowing High Winds Other: Temperature: Temperature: Temperature: Temperature: WINIT# No. DIMENSIONS: Length: 4/2 Width: 5*/4
DATE OF SAMPLE: Aug 17'20 SITE LOCATION: QLO NHA CERTIFIED INSPECTORS: MP FIELD TECHNICIANS: TC Weather Information Weather Information WEATHER AT TIME OF INSPECTION? ME Clear Cloudy Rain Sleet Fog Snowing High Winds Other: Temperature: Building Information UNIT# 125
CERTIFIED INSPECTORS: MF FIELD TECHNICIANS: TC Weather Information WEATHER AT TIME OF INSPECTION? X Clear Cloudy Rain Sleet Fog Snowing High Winds Temperature: Image: Strength of the stre
FIELD TECHNICIANS: Weather Information WEATHER AT TIME OF INSPECTION? Image: Clear Clear Cloudy Rain Steet Fog Snowing High Winds Temperature: Image: Cloudy Building Information UNIT# 135, ROOM# fractions: Length: 41/2 Width: 53/41/2
Weather Information WEATHER AT TIME OF INSPECTION? Image: Cloudy image: C
WEATHER AT TIME OF INSPECTION? Image: Cloudy Rain Sleet Fog Snowing High Winds Image: Other: Temperature: Image: Other:
Clear Cloudy Rain Sleet Fog Snowing High Winds Other: Temperature: Other: Temperature: Building Information UNIT# ROOM# fraction DIMENSIONS: Length: 61/2 Width: 53/44
Other: Temperature: Image: Second system Building Information UNIT# Image: Second system DIMENSIONS: Length: G/G/M
Organization Building Information UNIT# IZC, ROOM# frail from DIMENSIONS: Length: 6 1/2 Width: S 3/4
Building Information UNIT# 135, ROOM# frat from DIMENSIONS: Length: 61/2 Width: 53/41
ROOM# ROOM# ROOM DIMENSIONS: Length: 61/2 Width: 57/4
Interior Exterior
Described Line Levie Berry
🗌 Black 🗌 Brown 🔀 Tan 🗌 Beige 🗌 Other:
TYPE OF WALLS PRESENT?
CERMINE 11/E 4"x4" PELLZ BEDWAther:
TYPE OF FIXTURES PRESENT & CAULKING COLOR?
🗌 Door 🗌 Window 🗌 Building 📋 Roof 🗌 Counter-top 🔀 Bathtub 🔀 Sink 🔀 Toliet
🕅 White 🗌 Gray 🗌 Clear 🗌 Black 🗌 Other:
WHERE ON UNIT IS PUTTY PRESENT & COLOR?
Door Roof Pipe
White Gray Red Black Other:
GENERAL NOTES:



	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	OLO AMORILIO
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	Ang 17 '20 SITE LOCATION: QLO NATA
CERTIFIED INSPECTORS:	MB
FIELD TECHNICIANS:	TE
	Weather Information
WEATHER AT TIME OF INSPEC	TION? Sleet Fog Snowing High Winds Temperature: 94-
111174 105	Building Information
LOCATION WITHIN UNIT?	ROOM#UIUTY KWI DIMENSIONS: Length: 2/2 Width: 3/2
	HESTER BOOM 21/2 X 5 N
TYPE OF FLOORING?	Tile Carpet Vinyl Other:
Describe: WHITE, W/ BEM	42 BRAWAN BELLAN STREAKES
TYPE OF COVE BASE COLOR?	Vinyl/Rubber Wood Other:
	🗌 Black 🔄 Brown 🔀 Tan 📄 Beige 📄 Other:
TYPE OF WALLS PRESENT?	🔀 Tape/Texture 🕅 Sheetrock 🗌 Wood Panel
TYPE OF FIXTURES PRESENT &	
Door Window] Building 🗌 Roof 🗌 Counter-top 🗌 Bathtub 📄 Sink 🗌 Toliet
White Gray	Clear Black Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? NA
Door Roof] Pipe
🗌 White 🔄 Gray	Red Black Other:
GENERAL NOTES:	20

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		A	SBESTOS I	NSPECTION FO	RM	
"fatter but stille		Waller Sulli	Gener	al Information	NOT THE WAY AND	
PROJECT NAM	ME:	0.10 1	MARLIO	NHA		SALKAGA LANKESK
PROJECT NU	MBER:	20-04	2-03			
DATE OF SAM	APLE:	king 18	120	SITE LOCATI	ON: OLO NHA	
CERTIFIED IN:	SPECTORS:	MB				
FIELD TECHNI	ICIANS:	TC				
		Street and the	Weath	er Information	A LE CARLES AND A STREET	
WEATHER AT	TIME OF INS	PECTION?				
🛛 🗶 Clear 🗌	Cloudy	Rain 🗌 S	leet 🗌 F	og 🗌 Snowing	🔄 High Winds	
Other:			I	emperature:		
			T	94		
	45 H. Ch		Buildin	g Information		
UNIT# 25		ROOM#	KITCHEN	DIMENSION	IS: Length: 🤊 /	Width: 81/2'
	THIN UNIT?		K Interior	Exterior	2.5	
TYPE OF FLOC	DRING?		Carpet		Othern	
					ouner:	
Describe: UN	VOLEUM -	BRANKL S	QUARE 1	N/ RECTRIS	NELE	
TYPE OF COVE	E BASE COLOF	? 🕅 Vin	yl/Rubber	🗋 Wood 🛛 🗌	Other:	
		🔄 Bla	ck 🗌 Brow	ın 🔀 Tan 🗌	Beige 🗌 Other:	
TYPE OF WALL	S PRESENT?		a/Toxturo	C Chaotrack		
C	EILIN-		Je/ rexture	N Sneetrock		
			ier:			
IYPE OF FIXTU	JRES PRESENT てんいて	[& CAULKIN	G COLOR?			
Door	Window	Building	Roof	🔀 Counter-top	🗌 Bathtub 🗌 Sink	Toliet
X White	🗌 Gray	Clear	Black	Other:		
WHERE ON UN	NIT IS PUTTY F	PRESENT & C	OLOR? N	LL		
Door	Roof	Pipe				
U White	Gray	Red	🗌 Black	Other:		
SENERAL NOT	FS.					
	LJ.					



	ASBESTOS	INSPECTION FORM	
	Gener		
PROJECT NAME	66 MU 4110	ALL ALLA	
PROJECT NUMBER:	20 042-02	TYPIN	
DATE OF SAMPLE:	Aug 17'20	SITE LOCATION:	a la NIH
CERTIFIED INSPECTORS:			CUC INAN
	MB		
FIELD TECHNICIANS:	_		
	K		
	Weath	er Information	
	FION?		
Clear Cloudy Rain	Sleet	Fog 🗌 Snowing 🗌 H	ligh Winds
Other:	6	Temperature:	
	(6)	94	
	Buildir	ng Information	
	ROOM# VINING	DIMENSIONS:	Length: 🤊 🍋 Width: 🍰 🄏
LOCATION WITHIN UNIT?	🔀 Interior	Exterior	
			12"x12"
124 121	🔀 Tile 🛛 🗌 Carpet	Vinyl 🗌 Other:	GRX G GRIP IILES
Describe: BELS W/ WHT	(PSN BANN	TAN STREAML	Reil & Reilly Struck
TYPE OF COVE BASE COLOR?	Vinvl/Rubber	Wood Other	PLACE ROLES
			Parse Burkin
	🔄 Black 🔄 Bro	wn 🔄 Tan 🔄 Beige	Other: WHIE
TYPE OF WALLS PRESENT?			
	X Tape/Texture	Sheetrock Wo	ood Panel
	Other:	ilmb	
TYPE OF FIXTURES PRESENT & (CAULKING COLOR	, NA	
Door Xi Window			
White Gray	Clear 🗌 Black	Other:	
WHERE ON UNIT IS PUTTY PRES	ENT & COLOR?	NA	
Door Roof	Pipe		
White Gray	Red 🗌 Black	Other:	
GENERAL NOTES:			
			7
			N



	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	alo Amarillo MHA
PROJECT NUMBER:	20-042-03
DATE OF SAMPLE:	Sug 12'20 SITE LOCATION: OLO NHA
CERTIFIED INSPECTORS:	MP
FIELD TECHNICIANS:	E
	Weather Information
WEATHER AT TIME OF INSPECT	TION?
UNIT# 17	
	STOPPALE Interior Exterior STORME GNL FLOOR 19' X 2/2'
TYPE OF FLOORING? Describe:	Tile Carpet Vinyl 🕅 Other: CONC FLOOR
TYPE OF COVE BASE COLOR?	Vinyl/Rubber Wood Other:
NA.	Black Brown Tan Beige Other:
TYPE OF WALLS PRESENT?	TORSLE Tape/Texture Sheetrock X Wood Panel Calune Carport Other: STULLO CARPORT
TYPE OF FIXTURES PRESENT &	
Door Window	Building Roof Counter-top Bathtub Sink Toliet
🗌 White 🗌 Gray 🗌	Clear Black Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR? NA
Door Roof	Pipe
🗌 White 🔲 Gray 🗌	Red 🔲 Black 🗌 Other:
GENERAL NOTES:	

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	ASBESTOS INSPECTION FORM						
	General	Information					
PROJECT NAME:	CLO AMORILIO	NUA					
PROJECT NUMBER:	20-042-03						
DATE OF SAMPLE:	Dava To	SITE LOCATION:	# 131				
CERTIFIED INSPECTORS:	1 67						
	MB						
HELD TECHNICIANS:	TU	Luarue R	м́				
ARRENT AND A STATE OF A	Weather	Information					
WEATHER AT TIME OF INSPEC	ΓΙΟΝ?						
Clear Cloudy Rain	Sleet Sleet Fo	g 🗌 Snowing 🗌 H	ligh Winds				
Other:	Te	mperature:					
		10					
	Building	DIMENSION	Longth La Charles				
			Length: 13 Width: 15				
	🔀 Interior	Exterior	GLOSET GYZ'				
TYPE OF FLOORING?							
12×12	Tile 🗌 Carpet	Vinyl Other:					
Describe: Brile W/W	AFR. IPSY BRA	WN STREAKE					
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	Wood Other:	RILL RUD				
	🗍 Black 🗌 Brown	n 🗍 Tan 🗌 Beige	Other: WHITE				
TYPE OF WALLS PRESENT?		X Sheetrock Wo	od Panel				
	X Other 1 1	L Para Tas					
TYPE OF FIXTURES DRESENT &		G IFTERN IEX	NUKE				
		4/2 4/2 Counter-top					
White Grav	Clear Black	Other:	ne - Exterior				
,	Black						
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?						
Door Roof	Pipe						
🔀 White 🗌 Gray	Red 🗌 Black	Other:					
Coultene							
GENERAL NOTES:	.)						
ENTRANCE A'XGI	'z' / Concr	ETE FLOOR /					
	•						
1 , -*							
ъ. т. с							



	ASBESTOS INSPECTION FORM
	General Information
PROJECT NAME:	0.10 MARILO HHA
PROJECT NUMBER:	20-042-04
DATE OF SAMPLE:	Mrg & Zo SITE LOCATION: 4131 0-20 DMARILES
CERTIFIED INSPECTORS:	MB
FIELD TECHNICIANS:	72
	Weather Information
WEATHER AT TIME OF INSPECT	TION? Sleet Fog Snowing High Winds Temperature: TS Folder RM
	Building Information
UNIT# 131	ROOM# HOLL DIMENSIONS: Length: 2014 Width: 3'
3/2 x5 3 FORALE	ERM CEILING SHEET ROCK / TAPE TEXTURE.
TYPE OF FLOORING? 12'X 12' Describe: BELGE W/WH	Tile Carpet Vinyl Other: CLOSET ?* XZ' COSET SUTELES HTZ CREY BROWN STREAKS Z'X 5'
TYPE OF COVE BASE COLOR?	Vinyl/Rubber 🔀 Wood 🗌 Other:
	Black Brown Tan Beige Other:
TYPE OF WALLS PRESENT?	Tape/Texture 🔀 Sheetrock 🗌 Wood Panel
TYPE OF FIXTURES PRESENT & (CAULKING COLOR? 31/2 × 41/2
🗌 Door 🛛 🔀 Window 🗌	Building Roof Counter-top Bathtub Sink Toliet
🗌 White 🗌 Gray 🔛	Clear 🔀 Black 🗌 Other:
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?
Door Roof	Pipe
White Gray	Red 🔲 Black 🗌 Other:
GENERAL NOTES: HALL W	MY STORMERM
Ron	2 Rm 3
ADDITIONAL RIGHT	7/4 x 3



	ASBESTOS II	VSPECTION FORM		
	Genera	I Information	ANT REPORT	
PROJECT NAME:	ato AMARILLO) NHA		
PROJECT NUMBER:	20-042-03		AME	140 NUA
DATE OF SAMPLE:	Dug \$ 20	SITE LOCATION:	alo here	4131
CERTIFIED INSPECTORS:	MB 17			
FIELD TECHNICIANS:	T2			
	Weathe	er Information		
WEATHER AT TIME OF INSPEC	TION?			
Clear Cloudy Rain	Sleet F	og 🗌 Snowing 🔲	High Winds	
Other:	3	emperature:		
	Buildin	g Information		
UNIT# 131	ROOM#4 BR	DIMENSIONS:	Length: 12	Width: 12
LOCATION WITHIN UNIT?	🔀 Interior	Exterior	05ET 2'	x L/z
TYPE OF FLOORING?	Tile 🗌 Carpet	Vinyl Other:	5. 17. 17.	
Describe: PELLE W/WI	ATTE GREY P	CONNI STRUKG		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	Wood Other:		
	🗌 Black 🗌 Brow	vn 🗌 Tan 🗌 Beige	Other:	
TYPE OF WALLS PRESENT?	X Tape/Texture	Sheetrock 🗌 W	lood Panel	
	Other:	MPLORN TEXTIR	4	
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	DIWING CALINA	£~	
Door Window	Building 🗌 Roof	Counter-top	Bathtub 🗌 Sinł	c 🗌 Toliet
White Gray	Clear 🗌 Black	Other:		
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?	A.		
Door Roof	Pipe			
White Gray	Red 🗌 Black	Other:		
GENERAL NOTES:				
			2	

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	ASBESTOS INSPECTION FORM						
The second statistics of the second	General	Information		(FOR ALL AND			
PROJECT NAME:	010 GUARDUO	NHA		AND STATISTICS OF			
PROJECT NUMBER:	ZU-0AZ-02						
DATE OF SAMPLE:	Que 120	SITE LOCATIO	N: NHA OLO BMI	Fillo			
CERTIFIED INSPECTORS:	17						
	MP						
FIELD TECHNICIANS:	TZ						
	Weather	Information					
	TION?						
Clear Cloudy Rain	Sleet Fo	g Snowing	High Winds				
Other:	(\mathbf{A})	emperature:					
	Ruilding	Lefermetice.		No. and stores the same			
UNIT# 131	BOOM# Rith Pont	DIMENSIONS	Longth: Cl/c Wie	th: a!			
LOCATION WITHIN UNIT?				1111. J			
	1 Interior	Exterior					
TYPE OF FLOORING?							
	Carpet		Other:				
Describe: BELLE W/ WHT	E, LREY, FRAM	1 TREAKS					
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	Wood 0	Other:				
	🔀 Black 🗌 Brown	n 🗌 Tan 🗌 B	eige 🗌 Other:				
TYPE OF WALLS PRESENT? ራይሀብሪታ	Tape/Texture	Sheetrock	Wood Panei				
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?		GUAL KR				
Door Window] Building 🗌 Roof	Counter-top	Bathtub X Sink X	Toliet			
🔀 White 🗌 Gray	Clear 🔄 Black	Other:					
WHERE ON UNIT IS PUTTY PRES	SENT & COLOR?		5				
Door Roof] Pipe	HA					
🗌 White 🔄 Gray	Red 🗌 Black	Other:					
GENERAL NOTES							
				1			

Page 4 of 12

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		AS	BESTOS IN	SPECTION FC	DRM			
112 - 6 2/1	用的常常的		Genera	I Information				
PROJECT NAM	ME:	010	AMAGUL	D NHA				
PROJECT NUM	MBER:	20-0	242-03					
DATE OF SAM	1PLE:	Brug	120	SITE LOCAT	ION: OJC	> AMAR	NO HI	H
CERTIFIED IN:	SPECTORS:	MB	7					
FIELD TECHN	ICIANS:	Te						
		State State	Weathe	r Information				
WEATHER AT	TIME OF INS	PECTION?						
Clear	Cloudy	Rain 🗌 SI	eet 🗌 Fe	og 👘 🔄 Snowing	រ 🗌 High Wir	nds		
Other:		B	Т	emperature:	4			
LINUTA (2)	Press and	- 100	Building	g Information	Claure Data (inclu	and State	11 1-01-	210534
		ROOM#	BR B	DIMENSIO	NS: Leng	thiz	Width:	12'
			A Interior	Exterior	LOSET 6x2	/		20
TYPE OF FLOC	DRING?	🔀 Tile	Carpet	Vinyl] Other:			
Describe: 🖁	ELE W/1	NHIR, G	or BRD	WAL STREA	XG			
TYPE OF COVE	E BASE COLO	אין	yl/Rubber	Wood	Other:	4 12	2	
		🗌 Blad	ck 🗌 Brow	n 🗌 Tan 🛄	Beige Oth	er:		
TYPE OF WAL	LS PRESENT?	🔀 Тар	e/Texture	Sheetrock	Wood Pane	el		
		🗌 Oth	er:	Parcorn	TEXTUPE	(411)	14	
TYPE OF FIXTU	JRES PRESEN	T & CAULKIN	G COLOR?		1-1 MG	24	A /	
Door	🔀 Window	Building	Roof	Counter-top	Bathtub	Sink	Toliet	
U White	Gray	Clear	Black	Other:				
WHERE ON UN	NIT IS PUTTY	PRESENT & C	OLOR?					
🗌 Door	Roof	Pipe			N/A			
U White	Gray	Red	🗌 Black	Other:	·	*		
GENERAL NOT	ES:							
							7	
				2				

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		AS	BESTOS IN	SPECTION FORM	
	「「大学」」		General	Information	
PROJECT NAM	ЛE:	0.10 0	MARILLO	7	
PROJECT NUN	ABER:	20-05	42-03		
DATE OF SAM	IPLE:	Ang 4	120	SITE LOCATION:	ato smstile with
CERTIFIED INS	SPECTORS:	MP	1		
FIELD TECHNI	CIANS:	R			
a state of the state of the			Weathe	r Information	
WEATHER AT	TIME OF INSP	ECTION?			
Clear	Cloudy R	ain 🗌 Sle	eet 🗌 Fo	g Snowing [High Winds
Other:		6	Τe	emperature:	
			Building	Information	
UNIT# 131		ROOM#	BRZ	DIMENSIONS:	Length: 9 Width: 11/2
LOCATION WI	THIN UNIT?		🔀 Interior	Exterior	LOGAT 5'XZ'
TYPE OF FLOC	DRING?	Tile	Carpet	Vinyl Oth	er:
Describe: 😽	and w/w	MITE, GR	EX, BRO	WN FREAKS	
TYPE OF COVE	BASE COLOR	? 🗌 Viny	/l/Rubber	Wood Oth	er:
		🗌 Blac	k 🗌 Brow	n 🗌 Tan 🛄 Beig	e Other: WHTB
TYPE OF WAL	LS PRESENT?	🔁 Тар	e/Texture	Sheetrock	Wood Panel
		Othe	er: Pop	CORN TEXTLE	25. CEILING
TYPE OF FIXTU	JRES PRESENT	& CAULKIN	G COLOR?	E E	//
Door	Window	Building	Roof	Counter-top	Bathtub Sink Toliet
🗌 White	Gray	Clear	Black	Other:	
WHERE ON UI	NIT IS PUTTY P	PRESENT & C	OLOR?		
Door	Roof	Pipe		N/B	•
🗌 White	Gray	Red	🗌 Black	Other:	
GENERAL NOT	ES:				
					-
					10 10



	AS	SBESTOS IN	SPECTION FORM	N	
	R. A. L. C.	General	Information		
PROJECT NAME:	010	AMARIL	Ø		
PROJECT NUMBER	: 20-0	242-03			
DATE OF SAMPLE:	Aug	120	SITE LOCATION	1: alothar	uo naa
CERTIFIED INSPECT	TORS:	17			
FIELD TECHNICIAN	S: TE				
		Weather	r Information	We we want	
WEATHER AT TIME	OF INSPECTION?				
Clear 🗌 Clou	dy 🗌 Rain 🗌 S	leet 🗌 Fo	og 🗌 Snowing	High Winds	
Other:	$\overline{(\pi)}$	Te	emperature:		
A CONTRACTOR OF THE OWNER		-	EA		
LINIT#		Building	Information		
		DK I		Length: 9	
	ONT:	🔀 Interior	Exterior	(1065 5×7	, 1
TYPE OF FLOORING	;?				•
	🔀 Tile	Carpet	Uinyl C	ther:	_
Describe: Reuse	W/WHEE, LA	ET BRON	NH STREAKS	7	
TYPE OF COVE BAS	E COLOR?	iyl/Rubber	Wood 0	ther: BACH BOL	et.
	🗌 Bla	ick 🗌 Browi	n 🗌 Tan 🗌 Be	ige Other:	
TYPE OF WALLS PR	ESENT? 🔀 Ta	pe/Texture	X Sheetrock	Wood Panel	ö
	Oth	ner: Po	PCORN TEXT	475	
TYPE OF FIXTURES	PRESENT & CAULKIN	IG COLOR?	H/D	. <u>1</u>	8
Door 🔣	Window Building	Roof	Counter-top	🗌 Bathtub 📋 Sink	🗌 Toliet
White	Gray 🗌 Clear	🗌 Black	Other:		
WHERE ON UNIT IS	PUTTY PRESENT & (COLOR? N/	b		
Door	Roof 🗌 Pipe				
White 🗌 🤅	Gray 🗌 Red	Black	Other:	5	
GENERAL NOTES:					

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	ASBESTOS INSPECTION FORM					
	General Information					
PROJECT NAME:	OLO AMORILO					
PROJECT NUMBER:	20-042-021					
DATE OF SAMPLE:	Sug 2 20 SITE LOCATION: QLO AMARILLO NHS					
CERTIFIED INSPECTORS:	MPS					
FIELD TECHNICIANS:	TC					
	Weather Information					
WEATHER AT TIME OF INSPEC	TION?					
Clear Cloudy Rain	Sleet Fog Snowing High Winds					
Other:	Temperature:					
The state of the s	Building Information					
UNIT# \31	ROOM# BR MAGE DIMENSIONS: Length: 3 Width: 11 2					
LOCATION WITHIN UNIT?	Interior Exterior					
TYPE OF FLOORING?	Tile Carpet Vinyl Other:					
Describe: Phales w/ Wh	HTE, GREY, BROWN STREAKS					
TYPE OF COVE BASE COLOR?	Vinyl/Rubber Wood Other: PALE Pole					
	Black Brown Tan Beige Other: WHITE					
TYPE OF WALLS PRESENT?	Tape/Texture Sheetrock 🗌 Wood Panel					
	Other: POPCOFN TENTURE CELLING					
TYPE OF FIXTURES PRESENT &						
Door 🖄 Window	Building Roof Counter-top Bathtub Sink Toliet					
🗌 White 🔲 Gray	Clear Black Other:					
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?					
Door Roof]Ріре					
White Gray	Red Black Other:					
GENERAL NOTES:						

51.78



			AS	BESTOS IN	SPECTION FO	RM	
	A STREET			Genera	I Information		
PR	OJECT NAM	VIE:	010	SMARIL	O NHA		
PR	OJECT NU	MBER:	20-0	42 03			
DA	TE OF SAN	1PLE:	Bugh	1'20	SITE LOCATIO	ON: OJO A	MARILO NWA
CE	RTIFIED IN	SPECTORS:	MB				
FIE	LD TECHN	CIANS:	TE				
	- The Miles	11年,新学校。24年		Weathe	r Information		
	ATHER AT Clear [] Other:	TIME OF INS	PECTION? Rain SI	eet 🗌 Fo	og 🗌 Snowing emperature:	High Winds	
5.	States States	To Stan Stan	A HIS PARANTS	Building	g Information	Single Cittle Sanny	
LO	CATION W	ITHIN UNIT?	ROOM#	Interior	DIMENSION	IS: Length:	5% Width: 91/2
TYI De:	E OF FLOC	DRING?		Carpet	Vinyi	Other:	
TYF	E OF COVI	BASE COLO	R? 🚺 Viny	/l/Rubber	Wood	Other:	
			X Blac	k 🗌 Brow	n 🗍 Tan 📋	Beige 🗌 Other:	
TYP	PE OF WAL	LS PRESENT?	🔀 Тар	e/Texture	Sheetrock	Wood Panel	
			Oth	er: Certe			k.
TYP	E OF FIXTU	JRES PRESEN	T & CAULKIN	G COLOR?	· 4"y	4" WALL TIL	E - WAITE BENNIL
	Door	Window	Building	Roof	Counter-top	Bathtub	🗙 Sink 🕱 Toliet
	🔀 White	Gray	Clear	Black	Other:	TURE	NIDITH A
WH	ERE ON U	NIT IS PUTTY	PRESENT & C	OLOR?			
(4	Door	Roof	Pipe			2	
	U White	Gray	Red	🗌 Black	Other:		
GEN	IERAL NOT	ES:					
		×					

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	ASBESTOS IN	SPECTION FORM
	Genera	l Information
PROJECT NAME:	alo AMARILLO) NUHA
PROJECT NUMBER:	20-012-03	
DATE OF SAMPLE:	Mug 17'20	SITE LOCATION: O-O AMARILO
CERTIFIED INSPECTORS:	MB	
FIELD TECHNICIANS:	TC	
	Weathe	r Information
WEATHER AT TIME OF INSPEC	TION?	pg 🗌 Snowing 🔲 High Winds emperature:
an we have all of the set of the	Building	; Information
UNIT#	ROOM# WILLEY R	DIMENSIONS: Length: 12 Width: 5/2
LOCATION WITHIN UNIT?	🔀 Interior	Exterior HEATER RM 5'X21/2 7
TYPE OF FLOORING?	Tile Carpet	Vinyi X Other: Conc Floor
Describe: CONC FLORE	PHILE W	WHITE GROV FROMIN STREAKLY
TYPE OF COVE BASE COLOR?	Vinyl/Rubber	Wood Other:
	🔀 Black 🗌 Brow	n 🗌 Tan 📄 Beige 📄 Other:
TYPE OF WALLS PRESENT?	Tape/Texture	Sheetrock 🗌 Wood Panel
TYPE OF FIXTURES PRESENT &	CAULKING COLOR?	NA ····································
Door Window	Building 🗌 Roof	Counter-top Bathtub Sink Toliet
🗌 White 📄 Gray] Clear 📃 Black	Other:
WHERE ON UNIT IS PUTTY PRE	SENT & COLOR?	A
Door Roof] Pipe	
🗌 White 🔛 Gray 🗌] Red 🛛 🗌 Black	Other:
GENERAL NOTES:		

5.94



	ASBESTOS INSPECTION FORM						
A AN THE AL		Genera	I Information	1.17			
PROJECT NAME:	al	LUNRILLO I	VHA				
PROJECT NUMBER	: 20	-042-03					
DATE OF SAMPLE:	- Due	17'20	SITE LOCATIO	N: ON	NULL		
CERTIFIED INSPEC	TORS:	AB					
FIELD TECHNICIAN	s: T	2					
TRUE MARTINE		Weathe	r Information				
WEATHER AT TIME	OF INSPECTION dy Rain	?] Sleet Fo Tu	og Snowing emperature:	High Winds			
UNITH 121	1000	Building	Information		An same by CAL		
	UNIT?			: Length:	: 9 Width: 1.72		
TYPE OF FLOORING		e 🗌 Carpet	Vinyl 🔲	Other:			
Describe: Preuse	W/WHITE	CREY PR	own sir	bks			
TYPE OF COVE BAS		Vinyl/Rubber	M Wood C	eige Other:	Board-Dinne Ru		
TYPE OF WALLS PR	ESENT?	Tape/Texture	Sheetrock	Wood Panel			
they are		Other: Kirz	HEN / DININ	6 RM			
TYPE OF FIXTURES	PRESENT & CAUL	KING COLOR?	(2) 31/2 ×	4' +	1/1-		
🗌 Door 🔀	Window Build	ing 🗌 Roof	Counter-top	Bathtub	Sink Doliet		
White	Gray 🗌 Clear	Black	Other:				
WHERE ON UNIT IS	PUTTY PRESENT	& COLOR?	N/s				
Door	Roof Dipe						
🗍 White 📃 🤇	Gray 🗌 Red	🗌 Black	Other:				
GENERAL NOTES:							



	ASBESTOS INSPECTION FORM		
	General Information		
PROJECT NAME:	alo muskilo nita		
PROJECT NUMBER:	20-042-03		
DATE OF SAMPLE:	Aug 17'20 SITE LOCATION: OLO SNAPILO		
CERTIFIED INSPECTORS:	MP		
FIELD TECHNICIANS:	R		
	Weather Information		
WEATHER AT TIME OF INSPEC	CTION?		
🙀 Clear 🗌 Cloudy 🗌 Rain	Sleet Fog Snowing High Winds		
Other:	Temperature:		
	(12) 87-		
A-MARTINE PARTY IN THE PARTY	Building Information		
UNIT# 131	ROOM#CIEPET DIMENSIONS: Length: 20 Width: 16		
LOCATION WITHIN UNIT?	Interior Exterior		
TYPE OF FLOORING?			
Describe: CARPORT - CON	K FLOOR LONG FLOOR		
TYPE OF COVE BASE COLOR?	Vinyl/Rubber 🔀 Wood 🗌 Other:		
STO RAGE BNAC BOARD	🗌 Black 🔄 Brown 🗌 Tan 📄 Beige 🔀 Other: WHITE		
TYPE OF WALLS PRESENT?			
CEILING WOOD	Tape/Texture X Sheetrock X Wood Panel Calunc Carpera		
CARPORT-MILLO	Other: MORALEZ - MALLO		
TYPE OF FIXTURES PRESENT &			
Door 🗍 Window 🗧	Building Roof Counter-top Bathtub Sink Toliet		
🗌 White 🗌 Gray	Clear Black Other:		
WHERE ON UNIT IS PUTTY PRE	ESENT & COLOR?		
Door Roof] Pipe		
🗌 White 🗌 Gray	Red Black Other:		
GENERAL NOTES:			
	- 54		

Page 2 of (2



ASBESTOS SAMPLING FORM		
SAMPLE # NHA 131-1		
UNIT# ROOM# 9	WALL CODE: A B C D D F	
STRUCTURE: Floer NG	CONDITION:	
SUBSTRATE:	COLOR:	
🗌 Wood 🗌 Metal 💢 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🗍 Tan 🗌 Gray 🗌 Beige	
Other:	□ Clear & Other: Beige w/white, grey, brown stre	
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No	
If yes, describe: Black		
General Notes:		
s ^{- 8}		

ASBESTOS SAMPLING FORM	
Setting	ale laformetica
SAMPLE # NHA-131-2	LOCATION: 🛛 Interior 🗌 Exterior
UNIT# 131 ROOM# 458	WALL CODE: A B C D C P
STRUCTURE: Flore til	CONDITION:
	🗋 Poor 🗌 Fair 🔀 Good 🗌 Excellent
	÷
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 📈 Concrete 🗌 Sheetrock	🗶 White 🗌 Black 🗌 Tan 📈 Gray 🗌 Beige
Other:	Clear Other: Brige White gry, and brown ste
MASTIC PRESENT? X Yes No	PHOTOGRAPH: 🗶 Yes 🗌 No
If yes, describe: Black	
General Notes:	
	\$



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ASBESTOS SAMPLING FORM	
54(f)	nie Amilenmention
SAMPLE # 11+4 - 131-3	LOCATION: Interior Exterior
UNIT# 131 ROOM# 1	WALL CODE: A B C D D Floor
structure: Floortile	CONDITION:
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🕅 Concrete 🗌 Sheetrock	🗌 White 🔄 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear X Other: Beigo w/ white, grey, brown strends
MASTIC PRESENT? 💢 Yes 🗌 No	PHOTOGRAPH: 🛛 Yes 🗌 No
If yes, describe: Black	
General Notes:	

ASBESTOS SAMPLING FORM	
	als information
SAMPLE # A/HA-131-4	LOCATION: X Interior C Exterior
UNIT# 131 ROOM# 4	WALL CODE:
STRUCTURE:	CONDITION:
Vry wall	🗌 Poor 🗌 Fair 🕅 Good 🗌 Excellent
lape & lexturp	
SUBSTRATE:	COLOR:
🕅 Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🔯 No	PHOTOGRAPH: Ves 🗌 No
If yes, describe:	$\overline{\nabla}$
General Notes:	



ASBESTOS SAMPLING FORM		
SAMPLE # NHA - 131-5	LOCATION:	
UNIT# 131 ROOM# 27	WALL CODE: A B C C D	
STRUCTURE: Drywall Tape & Texture	CONDITION:	
SUBSTRATE:	COLOR: White Black Tan Gray Beige Clear Other:	
MASTIC PRESENT? Yes No If yes, describe:	PHOTOGRAPH: X Yes 🗌 No	
General Notes:		

ASBESTOS SAMPLING FORM	
58 9/4	ale later matical
SAMPLE # NHA-131-6	LOCATION:
UNIT# 131 ROOM# 12	WALL CODE: A B C C D
STRUCTURE: Drywall tape +	CONDITION:
texture	
SUBSTRATE:	COLOR:
Wood 🗌 Metal 🗌 Concrete 🕅 Sheetrock	White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🗹 No	
If yes, describe:	
General Notes:	
/ersion 1	Page <u>3</u> of 1



ASBESTOS SAMPLING FORM		
SAMPLE # NHA - 131 - 7	LOCATION:	
UNIT# [31 ROOM# [WALL CODE: 🗌 A 🖾 B 🗌 C 🗌 D	
structure: Drywolf tape t texture	CONDITION:	
SUBSTRATE:	COLOR:	
MASTIC PRESENT?	PHOTOGRAPH: 📈 Yes 🗌 No	
General Notes:		

ASBESTOS SAMPLING FORM	
SAMPLE # NHA-131-8	LOCATION:
UNIT# 131 ROOM# 9	WALL CODE: 🗌 A 🗌 B 🕅 C 🗌 D
STRUCTURE: Dry will type t texture	CONDITION:
SUBSTRATE:	COLOR:
🕅 Wood 🗌 Metal 🗌 Concrete 🛱 Sheetrock	White 🔲 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 💭 No If yes, describe:	PHOTOGRAPH: Yes 🗌 No
General Notes:	



ASBESTOS SAMPLING FORM		
Same	olis (in formulation)	
SAMPLE # NHA -131-9	LOCATION:	
UNIT# <i>[3]</i>	WALL CODE: A B C D D Ceiling	
structure: Ceiling texture	CONDITION:	
SUBSTRATE:	COLOR:	
🖄 Wood 🗌 Metal 📄 Concrete 🕅 Sheetrock	White Black Tan Gray Beige	
If yes, describe:		
General Notes:		

ASBESTOS SAMPLING FORM	
Genny	ale Information
SAMPLE # NHA -131-10	LOCATION: 🔀 Interior 🗌 Exterior
UNIT# 131 ROOM#	WALL CODE: A B C D D Colling
STRUCTURE:	CONDITION:
Cerling Texture	Poor Excellent
SUBSTRATE:	COLOR:
Wood 🗌 Metal 🗌 Concrete 🛒 Sheetrock	💢 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 📈 Yes 🗌 No
If yes, describe:	
General Notes:	



ASBESTOS SAMPLING FORM	
SAMPLE # XJHA-131-11	LOCATION:
UNIT# ROOM#	WALL CODE: A B C D D ceiling
STRUCTURE: Coiling texts	CONDITION:
SUBSTRATE: Wood Metal Concrete S Sh Other:	neetrock XWhite Black Tan Gray Beige
MASTIC PRESENT? 🔲 Yes 🕅 No If yes, describe:	PHOTOGRAPH: 📈 Yes 🗌 No
General Notes:	

ASBESTOS SAMPLING FORM	
	ale haformation
SAMPLE # N/44-131-12	LOCATION: 🔀 Interior 🗌 Exterior
^{UNIT#} 131 ^{ROOM#} 11	WALL CODE: A B C D
STRUCTURE: Transite pond	CONDITION:
	🗌 Poor 📋 Fair 💭 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🔲 Metal 🗌 Concrete 🕅 Sheetrock	🗌 White 🔲 Black 🗌 Tan 🚺 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🗌 Yes 📈 No If yes, describe:	PHOTOGRAPH: 🛛 Yes 🗌 No
General Notes:	


ASBESTO	S SAMPLING FORM
5a1	
SAMPLE # NHA - 131 - 13	LOCATION: X Interior C Exterior
UNIT# [3] ROOM# 4	
structure: (ovebage	CONDITION:
SUBSTRATE:	COLOR:
Wood Metal Concrete X Sheetrock Other:	White Mack Tan Gray Beige Gray Other:
A contract of the second se	
MASTIC PRESENT? 🛛 🔀 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe: Yellow	
General Notes:	

ASBESTO	DS SAMPLING FORM
Series	ala bilovmation
SAMPLE # NHA - 131-14	LOCATION:
UNIT# [3/ ROOM# []	WALL CODE: 🗌 A 🕅 B 🗍 C 🗌 D
STRUCTURE:	CONDITION:
Love base	Poor Fair Good Excellent
SUBSTRATE:	COLOR:
Wood Metal Concrete X Sheetrock	🗌 White 🔲 Black 🛄 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🗶 Yes 🗌 No
If yes, describe: Yellow	
General Notes:	



ASBESTOS SAMPLING FORM	
this contract of the second	alite (Ni King pasalicus
SAMPLE # NHA-131-15	LOCATION:
UNIT# 131 ROOM# 12	WALL CODE: A B CC D
STRUCTURE:	CONDITION:
Corebuse	Poor 🕅 Fair 🗌 Good 🗌 Excellent
SUBSTRATE:	COLOR:
🗌 Wood 🗌 Metal 🗌 Concrete 🏹 Sheetrock	🗌 White 🗶 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🛛 Yes 🗌 No	PHOTOGRAPH: 💹 Yes 🗌 No
If yes, describe: Yellow	
General Notes:	

ASBESTOS SAMPLING FORM	
Service Se	de Information
SAMPLE # NHA-131-16	LOCATION:
UNIT# 131 ROOM# Roof	WALL CODE: A B C D ROA
STRUCTURE: Roof material	CONDITION:
1000 1000.121	Poor Erair Good Excellent
SUBSTRATE:	COLOR:
🗶 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🗌 Black 🕅 Tan 🗌 Gray 📈 Beige
Other:	🗌 Clear 🗌 Other: Black
MASTIC PRESENT? 🖉 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe: Black	18 1950
General Notes: Cast side of house	

Page_<u>Fof_13</u>

-(i¥



ASBESTOS SAMPLING FORM	
SAMPLE # NHA - 131 - 17	LOCATION:
UNIT# 131 ROOM#Rood	WALL CODE: A B C D Roof
STRUCTURE: Rooting material	CONDITION:
SUBSTRATE:	COLOR:
MASTIC PRESENT? Pres No If yes, describe:	PHOTOGRAPH: 📈 Yes 🗌 No
General Notes: South side of	house

ASBESTOS SAMPLING FORM	
Serie	de Information
SAMPLE # NAA-131-18	LOCATION:
UNIT# 131 ROOM# Root	WALL CODE: A B C D Rook
STRUCTURE: P () at a /	CONDITION:
Loss Ing Malcial	Poor Erair Good Excellent
SUBSTRATE:	COLOR:
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🛕 Black 🖄 Tan 🗌 Gray 🗶 Beige
Other:	Clear Other:
MASTIC PRESENT? Ves No	PHOTOGRAPH: 🛛 Yes 🗍 No
If yes, describe: Black	
General Notes: Cast Side	strong



ASBESTOS SAMPLING FORM	
	aita (ni Kamharidi an
SAMPLE # NHA-131-19	LOCATION:
UNIT# [3] ROOM# Roof	WALL CODE: A B C D Root
STRUCTURE: O	CONDITION:
Rooting penetration	Poor 🗌 Fair 🗌 Good 🗌 Excellent
SUBSTRATE	
	COLOR.
🕅 Wood 🕅 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🕅 Black 🔲 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other:
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe: Black	
General Notes:	

ASBESTO	S SAMPLING FORM
Califie Contract of Califier	de latormation
SAMPLE # NHA-131-20	LOCATION:
UNIT# 131 ROOM# Loat	WALL CODE: A B B C D foot
STRUCTURE: P.A. Plustantia	CONDITION:
Louing forenting	📈 Poor 🗌 Fair 🗌 Good 🗌 Excellent
SUBSTRATE:	COLOR:
Wood Metal Concrete Sheetrock	🗌 White 🕅 Black 🗌 Tan 🗌 Gray 🗌 Beige
U Other:	Clear Other:
MASTIC PRESENT? 🕅 Yes 🗌 No	PHOTOGRAPH: 🔯 Yes 🗌 No
If yes, describe: Black	
General Notes: Cast	



ASBESTOS SAMPLING FORM	
SAMPLE # NHA-131-21	LOCATION:
UNIT# 131 ROOM# Coot	WALL CODE: A B C D Road
STRUCTURE: Rooting penetration	CONDITION:
SUBSTRATE:	COLOR: White Black Tan Gray Beige Clear Other:
MASTIC PRESENT? Res No If yes, describe:	PHOTOGRAPH: X Yes 🗌 No
General Notes: West	

ASBESTO	S SAMPLING FORM
Same Same	de Information
SAMPLE # NHA-131-22	LOCATION:
UNIT# [3] ROOM#	WALL CODE: 🖾 A 🗌 B 🗌 C 🗌 D
STRUCTURE: Stacco unil	CONDITION:
Struct Court	🗌 Poor 🕅 Fair 🗌 Good 🗌 Excellent
SUBSTRATE:	COLOR:
Wood Metal Ar Concrete Sheetrock	White Black Tan K Gray Beige
Other:	Clear Other: Pendh
MASTIC PRESENT? 🔲 Yes 🕅 No If yes, describe:	PHOTOGRAPH: 🕅 Yes 🗌 No
General Notes: $\mathcal M$	

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ASBESTOS SAMPLING FORM	
SAMPLE # NHA-131-23	LOCATION:
UNIT# 131 ROOM#	WALL CODE: A KB C D
STRUCTURE: Stricco wall	CONDITION:
SUBSTRATE:	COLOR:
🕅 Wood 🥆 🖄 Metal 🛛 📈 Concrete 🗔 Sheetrock	🗌 White 🗌 Black 🗌 Tan 🛛 🕅 Gray 🗌 Beige
Other:	Clear Dther: Peach
MASTIC PRESENT?	PHOTOGRAPH: 🗶 Yes 🗌 No
If yes, describe:	
General Notes:	

ASBESTOS SAMPLING FORM	
Sam	ole Information
SAMPLE # NHA-131-24	LOCATION:
UNIT# [3] ROOM# outsile	WALL CODE: 🗌 A 🗌 B 🖾 C 🗌 D
structure: Stacco vall	CONDITION:
SUBSTRATE:	COLOR:
🖄 Wood 🕅 Metal 🕅 Concrete 🗔 Sheetrock	🗌 White 🗌 Black 🔲 Tan 🛛 🎘 Gray 🗌 Beige
Other:	Clear Other: Peach
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 🕅 Yes 🗌 No
If yes, describe:	
General Notes:	



ASBESTO	S SAMPLING FORM
SAMPLE # NHA - 131 - 25	LOCATION:
UNIT# 131 ROOM# ontside	WALL CODE: 🕅 A 🗌 B 🗌 C 🗌 D
STRUCTURE: Concrete Footmy	CONDITION:
SUBSTRATE:	COLOR: White Black Tan Gray Beige Clear Other:
MASTIC PRESENT?	PHOTOGRAPH: XI Yes 🗌 No
General Notes:	

ASBESTOS SAMPLING FORM		
SAMPLE # NHA-131-26	LOCATION:	
UNIT# 131 ROOM# ontside	WALL CODE: 🗌 A 🗌 B 💢 C 🗌 D	
STRUCTURE: Concrete footing	CONDITION:	
SUBSTRATE:	COLOR:	
Wood Metal Concrete Sheetrock Other:	White Black Tan Gray Beige	
	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🏹 ฟัง lf yes, describe:	PHOTOGRAPH: 🕅 Yes 🗌 No	
General Notes:		



LEAD PAINT SAMPLING FORM		
SAMPLE # NHA-62-LPI	LOCATION:	
UNIT# 62 ROOM# outside	WALL CODE: 🗌 A 🗌 B 🗌 C 🏹 D	
structure: Paint on exterior wall	CONDITION:	
SUBSTRATE:	COLOR: White Black X Tan Gray Beige Clear Other:	
MASTIC PRESENT?	PHOTOGRAPH: 🕅 Yes 🗌 No	
General Notes:		

Lead paint ASDESTOS SAMPLING FORM		
SAMPLE # NHA-62-LP2	LOCATION:	
UNIT# 62 ROOM# outside	WALL CODE: 🗌 A 🗌 B 🗌 C 🕅 D	
STRUCTURE:	CONDITION:	
Paint on rafter	🗌 Poor 💭 Fair 🗌 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
K Wood 🗌 Metal 🗌 Concrete 🗍 Sheetrock	🕅 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: X Yes No	
If yes, describe:		
General Notes:		



LEAD PAINT SAMPLING FORM			
SAMPLE # NHA-62-LP3	LOCATION:		
UNIT# 62 ROOM# 9	WALL CODE: 🗌 A 🗌 B 💢 C 🗌 D		
structure: faint on wall	CONDITION:		
SUBSTRATE:	COLOR: White Black Tan Gray Beige Clear Other:		
MASTIC PRESENT?	PHOTOGRAPH: X Yes No		
General Notes:			

ASBESTOS SAMPLING FORM						
SAMPLE #	617 - 617	LOCATION:	ion	terior		N 172.3
UNIT#	ROOM#	WALL CODE				
STRUCTURE:		CONDITION	1:			
		Poor	🗌 Fair	Good	Excellent	
SUBSTRATE:		COLOR:				
Wood Metal Concrete Sheetrock Other:		White	Black	🔄 Tan	🗌 Gray	🗌 Beige
		Clear	Other:			
MASTIC PRESENT?		PHOTOGRA	VPH: 🗌 Yes	s 🗌 No		
General Notes:						



LEAD PAINT SAMPLING FORM			
SAMPLE # NHA-118-LP1	LOCATION:		
UNIT# 118 ROOM# outside	WALL CODE: XA DB C D		
STRUCTURE: L'on rafter	CONDITION:		
SUBSTRATE:	COLOR: X White Black Tan Gray Beige Clear Other:		
MASTIC PRESENT?	PHOTOGRAPH: 🗶 Yes 🗌 No		
General Notes:			

Lead Kaput ASBESTO	S-SAMPLING FORM
SAMPLE # NGA - 118 - 6P2	LOCATION:
UNIT# 118 ROOM# JSide	WALL CODE: A B C D
STRUCTURE:	CONDITION:
Il on root trim	Poor Fair Good Excellent
SUBSTRATE:	COLOR:
Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	🗌 White 🔄 Black 🗌 Tan 🗌 Gray 🗌 Beige
Other:	Clear Other: Brown
MASTIC PRESENT? 🗌 Yes 🗙 No	PHOTOGRAPH: X Yes No
If yes, describe:	
General Notes:	



LEAD PAINT SAMPLING FORM			
SAMPLE # NHA-118-283	LOCATION:		
UNIT# 118 ROOM# July: de			
STRUCTURE: Ll'on Staceo wall	CONDITION:		
SUBSTRATE:	COLOR: White Black X Tan Gray Beige Clear Other:		
MASTIC PRESENT?	PHOTOGRAPH: /X Yes 🗌 No		
General Notes:			

Lead paint ASBESTER SAMPLING FORM						
SAMPLE #		LOCATION	l: 🗌 In	terior 🗌 E	Exterior	
UNIT#	ROOM#	WALL COD	DE: 🗌 A	В]C []D	
STRUCTURE:			N:	Good	Excellent	
SUBSTRATE:		COLOR:				
Wood Metal Other:	Concrete Sheetrock	U White	Black	🗌 Tan	🗌 Gray	🗌 Beige
MASTIC PRESENT? [If yes, describe:] Yes 🗌 No	PHOTOGR	APH: 🗌 Yes	s 🔲 No		
General Notes:						



LEAD PAINT SAMPLING FORM			
SAMPLE # NHA - 120 - LPI			
UNIT# 120 ROOM# intside	WALL CODE: A B C D		
STRUCTURE:	CONDITION:		
LP on root trim	🗌 Poor 🕅 Fair 🗌 Good 🔲 Excellent		
SUBSTRATE:	COLOR:		
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	White Black Tan Gray Beige		
Other:	Clear Other: Brown		
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 😰 Yes 🗌 No		
If yes, describe:			
General Notes:			

ASBESTOS SAMPLING FORM		
SAMPLE # NHA-120-LP2	LOCATION:	
UNIT# 120 ROOM# fortside	WALL CODE: 🗶 A 🗆 B 🗆 C 🗆 D	
STRUCTURE: LP on rafter	CONDITION:	
SUBSTRATE:	COLOR:	
MASTIC PRESENT? 🗌 Yes 🕅 No If yes, describe:	PHOTOGRAPH: 🛛 Yes 🗌 No	
General Notes:		



LEAD PAINT SAMPLING FORM		
and the second second second second	ins in Korana in a	
SAMPLE # NHA-125-LP1	LOCATION:	
UNIT# 125 ROOM#	WALL CODE: XA 🗆 B 🗆 C 🗆 D	
STRUCTURE:	CONDITION:	
LP on rafter	🗌 Poor 🔀 Fair 🗌 Good 🗌 Excellent	
SUBSTRATE:	COLOR:	
🛛 Wood 🗌 Metal 🗌 Concrete 🗍 Sheetrock	🕅 White 🗍 Black 🗌 Tan 🗌 Gray 🗌 Beige	
Other:	Clear Other:	
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: 📈 Yes 🗌 No	
If yes, describe:		
General Notes:	c	

ASBESTO	S SAMPLING FORM		
SAMPLE # NHA-128-LP2	LOCATION:		
UNIT# 125 ROOM# artside	WALL CODE: 📈 A 🗌 B 🗌 C 🗌 D		
structure: frim on roof edge	CONDITION:		
SUBSTRATE:	COLOR:		
🕅 Wood 🗌 Metal 🗌 Concrete 🗌 Sheetrock	White Black Tan Gray Beige Clear Other:		
MASTIC PRESENT? 🗌 Yes 🖉 No If yes, describe:	PHOTOGRAPH: X Yes No		
General Notes:			



LEAD PAINT SAMPLING FORM			
SAMPLE # NAA - 125 - 273	LOCATION:		
UNIT# 125 ROOM# 4	WALL CODE: 🛱 A 🗌 B 🗌 C 🗌 D		
STRUCTURE: L failed on vall	CONDITION:		
SUBSTRATE:	COLOR: Image: Color in the image: Color in the image: Color in the image: Clear in the i		
MASTIC PRESENT?	PHOTOGRAPH: X Yes 🗌 No		
General Notes:			

ASBESTOS SA			g form			
	Ser.	ola (milarena	1406	Salt (Salt	Contraction of the	Starter and
SAMPLE #		LOCATION	1:	Interior	Exterior	
UNIT#	ROOM#	WALL COI	DE:	В]C []D	
STRUCTURE:		CONDITIC	N:			
		Poor	🗌 Fair	Good	Excellent	
SUBSTRATE:		COLOR:				
Wood Metal Concrete Sheetrock		White	🗍 Black	🗌 Tan	Gray	🗌 Beige
		Clear	Other	:		
MASTIC PRESENT?	🔄 Yes 🗌 No	PHOTOGRAPH: 🗌 Yes 🗌 No				
If yes, describe:						
General Notes:						



LEAD PAINT SAMPLING FORM			
Sam	ble Information		
SAMPLE # NHA- 131-LP1			
UNIT# 131 ROOM# outside			
STRUCTURE:	CONDITION:		
LP on ratter	Poor 🗌 Fair 🗌 Good 🗌 Excellent		
SUBSTRATE:	COLOR:		
🕅 Wood 🗌 Metal 🛄 Concrete 🗌 Sheetrock	🗶 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige		
Other:	Clear Other:		
MASTIC PRESENT? 🗌 Yes 🔀 No	PHOTOGRAPH: 📈 Yes 🗌 No		
If yes, describe:			
General Notes:			

LEAD ASBESTOS SAMPLING FORM			
PAINT Samp	ble Information		
SAMPLE # NHA-131-672	LOCATION:		
UNIT# 131 ROOM# Outside	WALL CODE: 🗌 A 🗌 B 🗌 C 📈 D		
STRUCTURE:	CONDITION:		
LP on root trim	Poor Fair Good Excellent		
SUBSTRATE:	COLOR:		
💢 Wood 🗌 Metal 🗌 Concrete 🛄 Sheetrock	🗌 White 🗌 Black 📄 Tan 📄 Gray 📄 Beige		
Other:	Clear Di Other: Tothe Brown		
MASTIC PRESENT? 🗌 Yes 🕅 No	PHOTOGRAPH: ☐ Yes ☐ №		
If yes, describe:	19 ^{19 10} 10		
General Notes:			



	LEAD PAINT SAMPLING FORM			
SAMPLE # NHA-131-2P3	LOCATION:			
UNIT# 131 ROOM# 2	WALL CODE: 🗌 A 📑 B 🛱 C 🗆 D			
STRUCTURE:	CONDITION:			
LP on wall	🗌 Poor 🕅 Fair 🗌 Good 📄 Excellent			
SUBSTRATE:	COLOR:			
🗌 Wood 🔲 Metal 🗌 Concrete 💢 Sheetrock	🕅 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige			
Other:	Clear Dther:			
MASTIC PRESENT? 🗌 Yes 💢 No	PHOTOGRAPH: I Yes 🗌 No			
If yes, describe:				
General Notes:				

LEAP -ASPECTOS SAMPLING FORM				
PAINT and	an information			
SAMPLE # NHA-131-LP4	LOCATION:			
UNIT# 131 ROOM# 1	WALL CODE: 🗌 A 🗌 B 🕅 C 🗌 D			
STRUCTURE:	CONDITION:			
LP on window Sill	🗌 Poor 🔲 Fair 🕅 Good 🗌 Excellent			
SUBSTRATE:	COLOR:			
💢 Wood 🗌 Metal 🗌 Concrete 🗋 Sheetrock	🕅 White 🗌 Black 🗌 Tan 🗌 Gray 🗌 Beige			
Other:	Clear Other:			
MASTIC PRESENT? Yes No	PHOTOGRAPH: 🗌 Yes 📈 No			
If yes, describe:				
General Notes:				

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes formwork for cast-in-place concrete, including water stops, and installation of embedded items.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Reinforcement Section 03 2000
- B. Cast-In-Place Concrete Section 03 3000
- C. Under-Slab Vapor Retarder Section 07 2600

1.3 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM), latest versions:
 - 1. ASTM D266 Specification for Asphalt Saturated Organic Felt used in Roofing and Waterproofing"
 - 2. ASTM D1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

1.4 QUALITY ASSURANCE

A. Comply with the American Concrete Institute Standard, ACI 347-04, Recommended Practice for Concrete Formwork.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood complying with Voluntary Product Standard PS 1-07 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better or metal, metal-framed plywood or other acceptable panel-type materials. Plywood shall be mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Commercial formulation that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- D. Chamfer Strips: ³/₄ inch by ³/₄ inch wood, PVC, or rubber.
- E. Preformed Construction Joint: 24-gage steel, galvanized, shaped to form a continuous tongue and groove key.
- F. Preformed Control Joint: Rigid plastic or metal strip with removable top section.

- G. Expansion Joint Material: Asphalt saturated fiberboard, ¹/₂ inch thick, meeting the requirements of ASTM D 1751.
- H. Felt: Asphalt-saturated organic felt, weighing 30 pounds per 100 square feet, meeting the requirements of ASTM D 226.
- I. Water stops: PVC, meeting the requirements of CRD-C572. Provide 6 inches wide dumbbell shape water stop with 3/16-inch minimum web thickness and 3/8 inch minimum end bulb diameter.
- J. Recycled Content: Minimum 5 percent post-consumer content, or minimum 20 percent preconsumer recycled content at contractor's option.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

3.2 PREPARATION

A. Form Coating: Coat contact surfaces of forms with a form coating compound before reinforcement is placed. Thin form-coating compounds with thinning agent and apply as specified in manufacturer's instructions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.

3.3 INSTALLATION

- A. Formwork: Formwork shall support vertical and lateral loads that are applied until such loads can be supported by concrete structure. Formwork shall be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Construct forms to sizes, shapes, lines and dimensions shown. Perform surveys to obtain accurate alignment. Provide for recesses, chamfers, blocking, anchorages, inserts, and other features required in work. Select materials to obtain required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.
- B. Chamfer Strips: Provide at exposed corners and edges.
- C. Form Ties: Use factory fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.
- D. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. General: Set anchorage devices and other embedded items accurately. Use setting drawings, diagrams, templates and printed instructions provided by supplier. Secure embedded items such that they are not displaced during placement of concrete.

3.5 JOINTS

- A. Construction Joints in Elevated Slabs and Beams: Construction joints in Elevated Slabs, Beams, Grade Beams, and other flexural members shall only be made as shown in the contract drawings or as approved by the Engineer of Record. Joints shall be constructed in accordance with ACI 318 Section 6.4 with provisions made for the transfer of shear and other forces. Reinforcement shall be continuous through these joints unless noted otherwise.
- B. Construction Joints in Walls, Foundations, and Slabs on Grade: Provide keyways at least 1 ¹/₂ inches deep in vertical construction joints in walls and construction joints in slabs on grade and foundations. Discontinue every other horizontal bar through slab on grade construction joints unless noted otherwise.
- C. Preformed Construction Joint for Slabs on Grade: Secure with galvanized steel stakes, 1/8 inch thick by 1-1/8 inches wide with ½ inch deep rib and tapered point. Splice adjoining joints with 24 gage steel, galvanized splice plates.
- D. Isolation Joints in Slabs on Grade: Construct isolation joints in interior slabs using 30 lb. felt. Provide isolation joints at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct isolation joints on exterior slabs abutting vertical surfaces with ½ inch thick expansion joint material.
- E. Control Joints in Slabs-on-Grade:
 - 1. Preformed Strip: Insert premolded rigid plastic, or metal strip into fresh concrete. Cut groove for strip using 10-foot long straight edge cutting tool. Depths of strip shall be one fourth of slab thickness. Press strip into groove such that top of strip is level with the concrete surface. Pull off removable top section, if any, prior to troweling.
 - 2. Saw Cut: Contractor may saw cut control joints instead of using preformed strips. Saw cut joints shall be 1/8 inch wide. Saw cut depth should equal 1/4 of slab depth. Cut joints after concrete has hardened sufficiently to prevent raveling; usually 4 to 12 hours after slab has been cast and finished. Use diamond or silicone-carbide blades.
- F. Control Joints in Walls: Create weakened planes in cantilevered retaining walls at 25 feet on center. Use preformed strips, placed vertically, full height in each face of wall. Depth of strips shall be one inch.

3.6 REMOVAL OF FORMWORK

- A. General: Prevent excessive deflection, distortion, and damage to concrete when forms are stripped. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- B. Formwork and supports at sides of concrete shall remain in place for 24 hours after concrete placement. This period represents cumulative number of hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 degrees

F. Formwork and shoring which support the weight of concrete shall not be removed until concrete has attained its specified compressive strength.

C. Ensure safety of the structure. Do not superimpose any load on concrete until forms are removed and concrete is cured.

3.7 RE-USE OF FORMS

- A. General: Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are intended for successive concrete placement, thoroughly clean surfaces and remove fins and latence. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes fabrication and installation of deformed bar and welded wire fabric reinforcing steel.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Forming and Accessories Section 031000.
- B. Cast In Place Concrete Section 033000.

1.3 REFERENCE STANDARDS

- A. American Concrete Institute (ACI), latest versions:
 - 1. ACI 301 Specifications for Structural Concrete for Buildings
 - 2. ACI 315 Details and Detailing of Concrete Reinforcement
 - 3. ACI 318 Building Code Requirements for Structural Concrete
- B. American Society for Testing and Materials (ASTM), latest versions:
 - 1. ASTM A82/ A82M Standard Specification for Steel Wire, plain, for Concrete Reinforcement
 - 2. ASTM A185/A185M Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
 - 3. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- C. Concrete Reinforcing Steel Institute (CRSI). Design Handbook, latest version

1.4 SUBMITTALS

A. Shop Drawings: Submit shop drawings for reinforcing steel. Comply with ACI 315 requirements showing layout, bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of reinforcing steel. Shop Drawings shall not be made by reproduction of the Contract Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60. Stirrups and ties may be Grade 40.
- B. Welded Wire Fabric: ASTM A 185, flat sheets.
- C. Steel Wire: ASTM A 82, 16 gage.
- D. Supports for Reinforcing Steel: Wire bar type and precast concrete block type meeting the requirements of CRSI Manual of Standard Practice.

2.2 FABRICATION

A. Fabricate reinforcing steel in accordance with fabricating tolerances in ACI 315.

B. Do not fabricate reinforcing steel until shop drawings are approved.

PART 3 - EXECUTION

3.1 PLACING BAR SUPPORTS

- A. General: Provide bar supports meeting the requirements of CRSI Specification for Placing Bar Supports.
- B. Slabs-on-grade: Use supports with sand plates or precast concrete blocks or horizontal runners where base material will not support chair legs.

3.2 PLACING REINFORCING STEEL

- A. General: Comply with CRSI Code of Standard Practice for "Placing Reinforcing Bars".
- B. Clean reinforcing steel of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcing steel against displacement by formwork, construction, or concrete placement operations. Place reinforcing steel to obtain minimum coverages. Arrange, space and securely tie bars and bar supports to hold reinforcing steel in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 - a. Concrete Cover:
 - a. Concrete cast against and permenantly exposed to earth: 3 inches
 - a. Concrete exposed to earth or weather:
 - a. Bars larger than No. 5 2 inches
 - a. Bars No.5 or smaller 1¹/₂ inches
- Rebar Splices: Locate at points of minimum stress or as shown on contract drawings. Unless noted otherwise, provide lap splices 30 bar diameters (18 inches minimum) in length.
- E. Welded Wire Fabric Splices: Lap one complete wire spacing.
- F. Corner Reinforcing: Provide corner bars of same size and spacing as horizontal reinforcing steel. Lap with horizontal reinforcing 30 bar diameters or 18 inches minimum length.
- G. Reinforcing at Construction/Control Joints: Continue reinforcing steel through construction joints unless noted otherwise. Discontinue reinforcing steel 2 inches from preformed construction joints in slabs-on-grade. Cut alternate longitudinal bars at weakened plane control joints in walls.

END OF SECTION 032000

SECTION 033000 - CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers cast-in-place concrete including finishing, surface repair and curing.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Forming and Accessories Section 031000
- B. Concrete Reinforcement Section 032000
- C. Under Slab Vapor Retarder Section 072600

1.3 REFERENCE STANDARDS

- A. Meet the requirements of the following codes, specifications and standards.
 - 1. American Concrete Institute (ACI) Publications, latest versions;
 - a. ACI 301 Specifications for Structural Concrete
 - b. ACI 305.1 Specification for Hot Weather Concreting
 - c. ACI 306.1 Standard Specification for Cold Weather Concreting
 - d. ACI 318 Building Code Requirements for Structural Concrete.
 - 2. ASTM International (ASTM), latest versions;
 - a. ASTM C31/C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C33/C33M Standard Specification for Concrete Aggregates
 - c. ASTM C39/C39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - d. ASTM C94/C94M Standard Specification for Ready-Mixed Concrete
 - e. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - f. ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - g. ASTM C143/C143M Standard Test Method for Slump of Hydraulic Cement Concrete
 - h. ASTM C150/C150M Standard Specification for Portland Cement
 - i. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
 - j. ASTM C172/C172M Standard Practice for Sampling Freshly Mixed Concrete
 - k. ASTM C173/C173M Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
 - 1. ASTM C231/C231M Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
 - m. ASTM C260/C260M Standard Specification for Air Entraining Admixtures for Concrete
 - n. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - o. ASTM C330/C330M Standard Specification for Lightweight Aggregates for Structural Concrete
 - p. ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete

- q. ASTM C567 Standard Test Method for Determining Density of Structural Lightweight Concrete
- r. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- s. ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and admixtures.
- B. Concrete Mix Design:
 - 1. Submit mix design in accordance with ACI-301, Section 4.
 - 2. Submit with mix design results of laboratory tests performed within previous 12 months indicating aggregates from the proposed source comply with the requirements of ASTM C 33 or C 330 as applicable.
 - 3. Submit the proposed area of use for each mix design submitted (footings, stemwalls, slabs, walls, columns, etc.).
- C. Granular Base Course: Submit gradation, plasticity index, and wear information.
- D. Test Reports: Submit copies of test reports for concrete compressive strength, air content, temperature and slump. Submit copies of granular base course test reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
 - 1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, low alkali. Use one brand of cement throughout project.
- B. Normal Weight Aggregates: ASTM C 33. Provide aggregates from a single source for exposed concrete.
- C. Water: ASTM C1602.
- D. Air-Entraining Admixture: ASTM C 260.

- E. Water Reducing Admixture: ASTM C 494.
- F. Fly-Ash: ASTM C 618.
- G. Moisture-Retaining Cover: Provide waterproof paper, polyethylene film, or polyethylene-coated burlap meeting the requirements of ASTM C 171.
- H. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound meeting the requirements of ASTM C 309; Type 1-D with fugitive dye for interior concrete and foundations; Type 2, white pigmented, for exposed exterior concrete except exposed exterior Architectural concrete, use Type 1-D.
- I. Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs. Curing compound to be used on integrally colored concrete slabs shall be approved by the manufacturer of the color.
- J. Vapor Retarder shall comply with Section 07 26 00 of these Specifications.
- K. Granular base shall meet the following grading requirements when tested in accordance with ASTM C 136.
- L. Granular base shall meet the gradation and material properties requirements as listed in the General Structural Notes.
- M. The plasticity Index shall be no greater than 3 when tested in accordance with ASTM D 4318. The coarse aggregate shall have a percent wear of 50 or less when tested in accordance with ASTM C 131.

2.2 PROPORTIONING AND DESIGN OF MIXES

- 1. Prepare design mixes for each type and strength of concrete by either laboratory trial mixture or field experience methods as specified in ACI 301, Section 4. If trial mixture method is used, employ an independent testing facility, acceptable to Architect, for preparing and reporting proposed mix designs.
- 2. Submit written reports to Architect, or Engineer, of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been approved.
- 3. Refer to the General Structural Notes for concrete strengths.
- 4. Slabs-on-ground or on vapor retarder shall have a water/total cementitious ratio not to exceed 0.45.
- 5. Admixtures:
- 6. Use water reducing admixture conforming to ASTM C 494, Type A, in all concrete unless approved otherwise by the Structural Engineer.
- 7. All other admixtures shall have the written approval of the Architect or Structural Engineer.
- 8. Calcium chloride is not permitted.
- 9. All admixtures, except high range water reducers, shall be added to the concrete at the batch plant.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned

and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

3.2 PREPARATION

A. Before placing concrete, clean and roughen surface of previously placed concrete. Clean reinforcing steel. Remove debris, providing clean-outs at bottom of forms when necessary. Moisten surfaces to receive concrete unless otherwise prepared. Remove excess water before placing concrete.

3.3 CONCRETE PLACEMENT

- A. General: Comply with ACI 301.
- B. Place concrete continuously in layers not deeper than 24 inches. Concrete shall not be placed against concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete as nearly as practicable to its final location to avoid segregation. Do not use vibrators to transport concrete.
- C. Maintain reinforcing in proper position during concrete placement operations.
- D. Consolidate concrete, immediately after placing, by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
- E. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface. Do not disturb slab surfaces prior to beginning finishing operations.
- F. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength caused by frost, freezing or low temperatures. Comply with ACI 306.1.
- G. Hot Weather Concreting: When hot weather conditions exist that would impair quality and strength of concrete, reduce delivery time of ready mix concrete, lower the temperature of materials, or add retarder to ensure that the concrete is plastic. Retempering with water is not allowed. Comply with ACI 305.1.

3.4 FINISH OF FORMED SURFACES

A. Rough Form Finish: Provide where formed concrete surfaces are not exposed to view. Tie holes and surface imperfections shall be repaired and patched and fins and other projections exceeding ¹/₄ inch in height rubbed down or chipped off.

3.5 FINISH OF HORIZONTAL SURFACES

A. At tops of foundation walls and grade beams finish with a texture matching adjacent formed surfaces unless otherwise indicated.

3.6 SLAB FINISHES

A. Float Finish: Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven or hand floats. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to

power units. Check and level surface plane to a tolerance not exceeding ¹/₄ inch in 10 feet when tested with a 10 foot straightedge.

- B. Scratch Finish: Apply scratch finish to slab surfaces that are to receive floor topping. Roughen surface before final set, using stiff brushes, or brooms.
- C. Trowel Finish: Apply trowel finish to all slab surfaces unless noted otherwise. After floating, begin first trowel finish using a power-driven or hand trowel. Finish concrete surface by a final hand-trowel operation, free of trowel marks, and uniform in texture and appearance. The final surface finish for slabs-on-grade shall have a minimum FF = 25 and a minimum FL = 20 per ACI requirements.
- D. Broom Finish: Apply on exterior slabs, ramps, steps, and sidewalks. Immediately after concrete has received a float finish, draw a broom or burlap belt across the surface to give a coarse transverse scored texture.

3.7 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Continue curing for at least 7 days.
- B. Moisture-retaining Cover curing: All interior concrete slabs, except exposed integrally colored concrete slabs, are to be cured with a moisture retaining cover for the first 7 days. After that time, the cover shall be removed and the slab should be allowed to dry. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed. Repair any holes or tears in cover during curing period.
- C. Curing compound: At contractor's option, exterior concrete slabs may be cured using curing compound. All vertical concrete (walls, beams, etc...) shall be cured using curing compound apply compound to the vertical surface as soon as the forms are removed. Apply curing compound uniformly in accordance with the manufacturer's printed instructions. Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs.
- D. Exposed integrally colored concrete slabs: Use curing compound recommended by the concrete supplier. Apply with and airless sprayer.

3.8 CONCRETE SURFACE REPAIRS

A. Patching Surface Imperfections: Remove loose material and patch surface imperfections and holes left by tie rods with cement mortar. Surface imperfections include honeycomb, excessive air voids, sand streaking and cracks.

3.9 FOR EXPOSED-TO-VIEW SURFACES

A. Blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

3.10 FIELD QUALITY CONTROL

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Sampling Fresh Concrete: ASTM C 172.
- C. Slump: ASTM C 143; one test for each set of compressive strength test specimens.
- D. Air Content: ASTM C 173 or C 231 for each set of compressive strength test specimens.
- E. Concrete Temperature: ASTM C138; Test hourly when air temperature is 40 degrees F. and below, when 80 degrees F and above; and when compression test specimens are made.
- F. Compression Test Specimen: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required. Mold one set of standard cylinders for volume of concrete specified below or fraction thereof.

1.	Slabs on Grade or Metal Deck		30 cubic yards
2.	Footing and stem walls		50 cubic yards
~		• 、	a a b b b b b b b b b b

- 3. All other locations (unless noted otherwise) 30 cubic yards
- G. Compressive Strength Tests: ASTM C 39; test 1 specimen at 7 days, 2 specimens at 28 days, and retain one specimen in reserve for later testing. Additional Tests: The testing laboratory will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure as directed by the Architect. The testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Architect or Engineer. The Owner shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.
- H. Granular Base Course: ASTM C 136 and ASTM D 4318 for every 500 square yards of building slab area.
- I. DENSITY: IN ACCORDANCE WITH ASTM C138.

END OF SECTION 033000

SECTION 033800 - POST TENSIONED STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Cast -in-place, post tensioned, concrete framing members and slabs.
- B. Tensioning tendons and sheathing for unbonded system.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate layout, tendon sizes, grouping, spacing, placing sequence, supports and locations, tendon supports, and accessories.
- B. Design Data: Indicate calculations for tendon elongation curves.
- C. Project Record Documents: Accurately record actual locations of tendons stressing sequence, tension loads established, and elongation of tendons.
- 1.3 QUALIFICATIONS
 - A. Post-tension design shall be under the direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of New Mexico.

PART 1 - PRODUCTS

2.1 MATERIALS

- A. Formwork, Bar Reinforcement, and Concrete: In accordance with Section 03 30 00.
- B. Tendon Strand: ASTM A 416, Grade 270 seven-wire stranded steel cable; full length without splices; 1/2 inch diameter, regular stress relieved or low relaxation type.
- C. Tendon Anchor: Type compatible with tendon of strength not less than tendon.

2.2 ACCESSORIES

- A. Sheathing: High density polypropylene, not less than .025 inch thickness.
- B. Lubricant: Grease, non-corrosive, high viscosity.
- C. Chairs, Bolsters, Bar Supports, Spacers: Size and shape for strength and support of reinforcement during tendon location, installation, and placement of concrete. Plastic coated.
- 2.3 MIXES
 - A. Mix: In accordance with Section 03 30 00 and General Notes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and position tendons anchors, seats, plates, and other items to be cast into concrete. Protect from displacement.

POST TENSIONED STRUCTURAL CONCRETE B. Grease entire length of tendon.

3.2 TENSIONING

- A. Begin tensioning operations only after concrete has reached a minimum compressive strength of 3000psi
- B. Confirm concrete strength with test cylinders prior to tensioning.
- C. Measure prestressing force. Maintain jacking and tensioning records as work progresses. Provide 4 copies to Architect on a daily basis.
- D. Jack against tendon pressure plate, not against concrete.
- E. Cut off excess tendon inside face of concrete. Apply touch-up primer to cut end.
- F. To minimize moisture access to the tendons, anchorage pockets shall be filled with nonshrink grout as soon as practical after stressing. Grout containing chlorides shall not be used.

3.3 REMOVAL OF FORMS

- A. Removal of Forms: In accordance with Section 03 30 00 and ACI 301.
- B. Do not remove forms, shores, and bracing until concrete has been completely tensioned.

END OF SECTION 033800

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install all structural plywood, blocking, supports, non-structural nailers, and stripping as required for securing other work, shown on Drawings. Furnish all hardware, miscellaneous rough carpentry and related accessories as indicated on the Drawings or specified herein for a complete installation.

1.2 SUBMITTALS

- A. Product Data: Submit copies of manufacturer's product data indicating specifications and installation requirements for rough hardware items specified, i.e., connectors, joist hangers, etc.
- B. Letters: Submit letter of compliance that all lumber is grade-marked in compliance with specified products and that lumber is of species and fiber stress specified.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: All lumber shall conform to all requirements of the International Building Code. All framing lumber and plywood shall be appropriately grade marked with an agency certified by the American Lumber Standards Committee Board of Review for lumber or the American Plywood Association for plywood.
- B. Coordination: Contractor shall coordinate location of blocking with other related trades. Other Contractors will furnish exact locations of grounds and blockings to this Contractor for proper installation of their Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber:
 - 1. Standard Grade Hem-Fir: Non-structural furring, concealed blocking and stripping, and miscellaneous nailers, grade marked with WWPA stamp.
- B. Framing Lumber:

a.

- 1. Studs, sills, plates, ledgers, stiffeners, bridging, etc. Size and spacing as indicated and as required, shall be:
 - a. Species: Spruce-Pine-Fir: Grade No. 2 or better

1)	Fb =	875 psi
2)	Ft =	450 psi
3)	Fv =	70 psi
4)	Fc =	125 psi perpendicular to grain
5)	Fc =	725 psi parallel to grain
6)	Ec =	1,300,000 psi
nd mem	bers 2" to 4" thick 5" and	wider

2. Wood members 2" to 4" thick, 5" and wider.

Speci	es:	Hem-Fir:	Grade No.	. 1	or better
1)	Fb	=			1200 nsi

1)	Fb =	1200 psi
2)	Ft =	800 psi

	3)	Fv =	75 psi	
	4)	Fc =	425 psi perpendicular to grain	
	5)	Fc =	1050 psi parallel to grain	
	6)	Ec =	1,500,000 psi	
Beam and Stringers.				
a.	Species: Hem-Fir: Grade No. 1 or Douglas Fir-Larch: Dense No. 2			

		6
1)	Fb =	1050 psi
2)	Ft =	525 psi
3)	Fv =	70 psi
4)	Fc =	405 psi perpendicular to grain
5)	Fc =	750 psi parallel to grain
6)	Ec =	1,300,000 psi

C. Fasteners:

3.

- 1. Nails: Meeting the requirements of ASTM F1667
 - Common wire nails. Use galvanized box nails where rough carpentry is a. exposed to moisture.
 - Non-corrosive finish nails of either stainless steel, aluminum or high quality b. hot-dipped galvanized shall be used on all exposed decorative lumber and redwood flooring.
- Bolts: ASTM A307-94 "Standard Specification for Carbon Steel Bolts and Studs, 60 2. 000 PSI Tensile Strength," galvanized for exterior connections. Use washers under all heads where in contact with wood; use washers under all nuts. Bolts shall meet the requirements of ANSI/ASME Standard B18.2.1.
- Screws: In accordance with ANSI/ASME Standard B18.6.1. 3.
- Connectors, Joist Hangers, Anchors, Etc.: Type and size to meet job conditions and 4. as indicated on the Drawings, or as required, as manufactured by Simpson Co., San Leandro, California 94577 or acceptable substitution.

PART 3 - EXECUTION

3.1 **INSTALLATION**

- A. Provide and securely fasten wood nailing strips, plates, blocking, etc., at proper levels in stud partitions, to anchor all items which require use of wood blocking to fasten or support components and accessories, and as nailers used in conjunction with roofing membrane, sheet metal and flashing and roofing accessories.
- B. Workmanship and General Framing
 - Selection of Lumber Pieces: Carefully select all members, selecting pieces so that 1. knots and obvious defects will not interfere with placing bolts, nailing or making connections. Lumber may be rejected by Architect, whether or not is has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
 - Shimming: Do not shim sills, joists, short studs, trimmers, headers, lintels, or other 2. framing components.
 - Framing: Set all horizontal or sloped members with crown up. Do not notch, bore, or 3. cut members for pipes, ducts, conduits, or other reasons except as indicated on Drawings or approved by Architect.
 - 4. Bearings: Make all bearings full unless indicated otherwise. Finish all bearing surfaces on which structural members are resting to give sure and even

support. Where framing members slope, cut or notch ends as required for uniform bearing surface.

- 5. Blocking: Install all blocking required to support all items of finish and to cut off all concealed draft openings, both vertical and horizontal, between ceiling and floor areas. Fire stops shall be two (2) inches (nominal) thick, by full width of opening being blocked. Provide fire stop in accordance with the Uniform Building Code, Chapter 25.
- 6. Bridging: Cross bridging shall be of not less than two (2) inches by three (3) inches nominal wood or of metal cross bridging of equal strength. Space lines of bridging at eight (8) feet max.
- 7. Nailing:
 - a. All nailing shall be in accordance with the Contract Drawings.
 - b. For conditions not covered in the Contract Drawings, provide penetration into piece receiving the point of not less than 1/2 the length of the nail or spike.
 - c. Do all nailing without splitting wood. Pre-bore as required. Replace all split members at Contractor's expense.
- 8. Bolting: Drill holes 1/16 inch larger in diameter than bolts being used. Drill straight and true from one side only.
 - a. Bolt threads shall not bear on wood. Use washers under head and nut where both bear on wood. Use washers under all nuts.
- 9. Screws: Pre-bore holes in accordance with the National Design Specification for Wood Construction.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Roof sheathing.
 - 3. Sheathing joint and penetration treatment.
- B. Related Requirements:
 - 1. Section 06 10 00 "Rough Carpentry" for plywood backing panels.
 - 2. Section 07 25 00 "Weather Barriers" for water-resistive barrier applied over wall sheathing.
- C. Related Documents:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 ACTION SUBMITTALS

- A. 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 plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For following products, from ICC-ES:
 - 1. Preservative-treated plywood.
 - 2. Foam-plastic sheathing.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Certified Wood: 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. Plywood.
 - 2. Oriented strand board.
 - 3. Fiberboard wall sheathing.
 - 4. Particleboard underlayment.
 - 5. Hardboard underlayment.
- C. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- D. Oriented Strand Board: DOC PS 2.
- E. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- F. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood unless otherwise indicated. Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: sheathing.
 - 1. Span Rating: as indicated on the drawings.
 - 2. Nominal Thickness: as indicated on the drawings
- B. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.
 - 1. Span Rating: as indicated on the drawings
 - 2. Nominal Thickness: as indicated on the drawings

2.4 ROOF SHEATHING

A. Plywood Roof Sheathing: Exposure 1 sheathing.
Indigenous Design Studio + Architecture

- 1. Span Rating: Not less than 32/16.
- 2. Nominal Thickness: Not less than 15/32 inch.
- B. Oriented-Strand-Board Roof Sheathing: Exposure 1 sheathing.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: Not less than 15/32 inch (11.9 mm)

2.5 FASTENERS

- A. A General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 - 1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C 954.
- G. Screws for Fastening Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Paper-Surfaced Gypsum Sheathing: Elastomeric, medium-modulus, neutralcuring silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 07 92 00 "Joint Sealants."
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

- 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.
- C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 or ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
 - 1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Subflooring:
 - a. Glue and nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends.
 - 2. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 061600

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.
 - 2. Wood girder trusses.
 - 3. Wood truss bracing.
 - 4. Metal truss accessories.
- B. Related Requirements:
 - 1. Section 06 16 00 "Sheathing" for roof sheathing and subflooring.
 - 2. Section 31 31 16 "Termite Control" for site application of borate treatment to wood trusses.
- C. Allowances: Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Section 01 21 00 "Allowances."
- D. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plateconnected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For wood-preservative-treated lumber metal-plate connectors, metal truss accessories, and fasteners.
 - 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 and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.

C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer in the state of New Mexico responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer professional engineer and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated lumber.
 - 2. Fire-retardant-treated wood.
 - 3. Metal-plate connectors.
 - 4. Metal truss accessories.

1.5 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fireretardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection Under Design Loads:
 - a. Roof Trusses: Vertical deflection of 1/360 of span.
 - b. Floor Trusses: Vertical deflection of 1/360 of span.
- C. Comply with applicable requirements and recommendations of the following publications:
 - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Certified Wood: For metal-plate-connected wood trusses and permanent bracing, 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."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- C. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for both top and bottom chords.
- D. Minimum Specific Gravity for Top Chords: 0.50.
- E. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 06 10 00 "Rough Carpentry".

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. Retain only first option in subparagraph below if authorities having jurisdiction require quality mark on all materials.
 - 2. For exposed trusses indicated to receive a stained or natural finish, mark end or back of each piece.

2.4 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Alpine Engineered Products, Inc.; an ITW company.
 - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
 - 3. CompuTrus, Inc.
 - 4. Eagle Metal Products.
 - 5. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
 - 6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
 - 7. Robbins Engineering, Inc.
 - 8. Truswal Systems Corporation; an ITW company.
- B. Source Limitations: Obtain metal connector plates from single manufacturer.
- C. General: Fabricate connector plates to comply with TPI 1.
- D. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), highstrength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304 Type 316, and not less than 0.035 inch (0.88 mm) thick.

1. Use for exterior locations[, wood-preservative-treated lumber, and where indicated.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 - 2. Where trusses are exposed to weather, in ground contact, made from pressurepreservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.6 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. 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.
- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), highstrength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304 or Type 316.
 - 1. Use for exterior locations and where indicated.
- G. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches (38 mm) wide by 0.050 inch (1.3 mm) thick. Tie fastens to one side of truss, top plates, and side of stud below.
- H. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/4 inches (57 mm) wide by 0.062 inch (1.6 mm) thick. Tie fits over top of truss and fastens to both sides of truss, top plates, and one side of stud below.

- I. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/2 inches (63 mm) wide by 0.062 inch (1.6 mm) thick. Tie fits over top of truss and fastens to both sides of truss, inside face of top plates, and both sides of stud below.
- J. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches (32 mm) wide by 0.050 inch (1.3 mm) thick. Clip is fastened to truss through slotted holes to allow for truss deflection.
- K. Floor Truss Hangers: U-shaped hangers, full depth of floor truss, with 1-3/4-inch- (44-mm-) long seat; formed from metal strap 0.062 inch (1.6 mm) thick with tabs bent to extend over and be fastened to supporting member.
- L. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches (38 mm) wide by 1 inch (25 mm) deep by 0.040 inch (1.0 mm) thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.
- B. Protective Coatings: SSPC-Paint 22, epoxy-polyamide primer or SSPC-Paint 16, coal-tar epoxy-polyamide paint.

2.8 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.9 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
 - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
 - 2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate does not comply with the Contract Documents.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- 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.
 - 1. Install bracing to comply with Section 06 10 00 "Rough Carpentry."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- D. Protective Coating: Clean and prepare exposed surfaces of 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 coating system manufacturer.

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 AWPA C20, Interior Type A. Kiln dry after treatment to a maximum moisture content of 19 percent.
- B. Plywood: Comply with performance requirements in AWPA 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.

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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).

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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 AWPA C20 (lumber) and AWPA 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; zincplated 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.

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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 closedgrain 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.

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- 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.

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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.

NM15-32 Units Ojo Amarillo, NM

Indigenous Design Studio + Architecture

- 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 unsolled 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 072413 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

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. Section Includes:
 - 1. Exterior insulation and finish system (EIFS) applied over masonry or exterior grade sheathing substrate.
- B. Related Sections:
 - 1. Division 06 Section "Sheathing" for sheathing and weather-resistant sheathing paper.
 - 2. Division 07 Section "Joint Sealants" for sealing joints in EIFS with elastomeric joint sealants.
- C. Products furnished, but not installed under this Section, include anchors and other attachment devices to be embedded in masonry assemblies.

1.3 SYSTEM DESCRIPTION

A. Class PB EIFS: A non-load-bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

1.4 PERFORMANCE REQUIREMENTS

- A. EIFS Performance: Comply with the following:
 - 1. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 - 2. Weathertightness: Resistant to water penetration from exterior into EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of EIFS and assemblies behind it, including substrates, supporting wall construction, and interior finish.
- B. Class PB EIFS: Provide EIFS having physical properties and structural performance that comply with the following:
 - 1. Abrasion Resistance: Sample consisting of 1-inch- thick EIFS mounted on 1/2-inchthick gypsum board; cured for a minimum of 28 days; and showing no cracking,

checking, or loss of film integrity after exposure to 528 quarts of sand when tested per ASTM D 968, Method A.

- 2. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.
- 3. Accelerated Weathering: Five samples per ICC-ES AC219 showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, delamination, or other characteristics that might affect performance as a wall cladding after testing for 2000 hours when viewed under 5 times magnification per ASTM G 153 or ASTM G 155.
- 4. Freeze-Thaw: No surface changes, cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination, or indications of delamination between components when viewed under 5 times magnification after 60 cycles per EIMA 101.01.
- 5. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch clean glass substrate, cured for 28 days, and showing no growth when tested per ASTM D 3273 and evaluated according to ASTM D 3274.
- 6. Salt-Spray Resistance: No deleterious affects when tested according to ICC-ES AC219.
- 7. Tensile Adhesion: No failure in the EIFS, adhesive, base coat, or finish coat when tested per ICC-ES AC219.
- 8. Water Penetration: Sample consisting of 1-inch- thick EIFS mounted on 1/2-inch- thick gypsum board, cured for 28 days, and showing no water penetration into the plane of the base coat to expanded-polystyrene board interface of the test specimen after 15 minutes at 6.24 lbf/sq. ft. of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.
- 9. Water Resistance: Three samples, each consisting of 1-inch- thick EIFS mounted on 1/2inch- thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination after testing for 14 days per ASTM D 2247.
- 10. Wind-Driven-Rain Resistance: Resist wind-driven rain according to ICC-ES AC219.
- 11. Impact Resistance: Sample consisting of 1-inch- thick EIFS when constructed, conditioned, and tested per EIMA 101.86; and meeting or exceeding the following:
 - a. Medium Impact Resistance: 50 to 89 inch-lb.
 - b. High Impact Resistance: 90 to 150 inch-lb.
- 12. Structural Performance Testing: EIFS assembly and components shall comply with ICC-ES AC219 when tested per ASTM E 330.

1.5 SUBMITTALS

- A. Product Data: For each type and component of EIFS indicated.
- B. Shop Drawings: For EIFS. Include plans, elevations, sections, details of components, details of penetration and termination, flashing details, joint locations and configurations, lifting points for prefabricated panels, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.
- C. Panel Schedule: For prefabricated panel fabrication.
- D. Samples for Initial Selection: For each type of finish-coat color and texture indicated.
 - 1. Include similar Samples of joint sealants and exposed accessories involving color selection.
- E. Samples for Verification: 24-inch- square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including custom trim, each profile, an aesthetic reveal, a typical control joint filled with sealant of color selected.
 Include sealants and exposed accessory Samples to verify color selected.
- F. Delegated-Design Submittal: For prefabricated panels indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Qualification Data: For Installer, fabricator/erector and testing agency.
- H. Manufacturer Certificates: Signed by manufacturers certifying that EIFS and joint sealants comply with requirements.
- I. Material or Product Certificates: For cementitious materials and aggregates and for each insulation and joint sealant, from manufacturer.
- J. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each water-/weather-resistive barrier, insulation, reinforcing mesh, joint sealant, and coating.
- K. Compatibility and Adhesion Test Reports: For joint sealants from sealant manufacturer indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- L. Field quality-control reports and special inspection reports.
- M. Maintenance Data: For EIFS to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.
 - 1. Fabricator/Erector Qualifications: Certified in writing by EIFS manufacturer as qualified to fabricate and erect manufacturer's prefabricated panel system using skilled and trained workers.
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.
- C. Fire-Test-Response Characteristics: Provide EIFS and system components with the following fire-test-response characteristics as determined by testing identical EIFS and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

- 1. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E 119.
- 2. Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which EIFS is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies containing foam-plastic insulation.
- 3. Radiant Heat Exposure: No ignition of EIFS when tested according to NFPA 268.
- 4. Potential Heat: Acceptable level when tested according to NFPA 259.
- 5. Surface-Burning Characteristics: Provide insulation board, adhesives, base coats, and finish coats with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
 - 1. Stack insulation board flat and off the ground.
 - 2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify actual dimensions required for prefabricated panels by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate installation of EIFS with related Work specified in other Sections to ensure that wall assemblies, including sheathing, weather-resistant sheathing paper, flashing, trim, joint sealants, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind flashing and barrier coating of EIFS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Dryvit Systems, Inc.
 - 2. El Rey Stucco Company, Inc.; a brand of ParexLahabra, Inc..
 - 3. Master Wall, Inc.
 - 4. Pleko LLC.
 - 5. Senergy; Degussa Wall Systems, Inc.
 - 6. SonoWall; Degussa Wall Systems, Inc.
 - 7. Sto Corp.

2.2 MATERIALS

- A. Compatibility: Provide adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.
- B. Primer/Sealer: EIFS manufacturer's standard substrate conditioner designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.
- C. Flexible-Membrane Flashing: Cold-applied, fully self-adhering, self-healing, rubberizedasphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- D. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use, compatible with substrate, and complying with one of the following:
 - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.
 - 2. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
 - 3. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.
- E. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
 - 1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
 - 2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
 - 3. Dimensions: Provide insulation boards not more than 24 by 48 inches and in thickness indicated, but not more than 4 inches thick or less than thickness allowed by ASTM C 1397.

NM15-32 Units Ojo Amarillo, NM

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- 4. Foam Shapes: Provide with profiles and dimensions indicated on Drawings.
- F. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per ASTM E 2098 complying with ASTM D 578 and the following:
 - 1. High-Impact Reinforcing Mesh: Not less than 15 oz./sq. yd..
 - 2. Strip Reinforcing Mesh: Not less than 3.75 oz./sq. yd..
 - 3. Detail Reinforcing Mesh: Not less than 4.0 oz./sq. yd..
 - 4. Corner Reinforcing Mesh: Not less than 7.2 oz./sq. yd..
- G. Base-Coat Materials: EIFS manufacturer's standard mixture complying with one of the following:
 - 1. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
 - 2. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
- H. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation complying with one of the following:
 - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 - 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
- I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- J. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:
 - 1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
 - 2. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, and fillers used with stone particles for embedding in finish coat to produce an applied-aggregate finish.
 - a. Aggregate: Marble chips of size and color as selected by Architect from manufacturer's full range.
 - 3. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
 - 4. Colors: As selected by Architect from manufacturer's full range.
- K. Water: Potable.
- L. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:
 - 1. For attachment to steel studs from 0.033 to 0.112 inch in thickness, provide steel drill screws complying with ASTM C 954.

- 2. For attachment to light-gage steel framing members not less than 0.0179 inch in thickness, provide steel drill screws complying with ASTM C 1002.
- 3. For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C 1002, Type W.
- 4. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.
- M. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.
 - 1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
 - 4. Window Sill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.
 - 5. Parapet Cap Flashing: Type for both flashing and covering parapet top with design complying with ASTM C 1397.

2.3 ELASTOMERIC SEALANTS

- A. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481 and with requirements in Division 07 Section "Joint Sealants" for products corresponding to description indicated below:
 - 1. Multicomponent, nonsag urethane sealant.
 - 2. Sealant with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Preformed Foam Sealant Products: Provide sealant compatible with adjacent materials and complying with requirements in Division 07 Section "Joint Sealants."
- C. Sealant Color: As selected by Architect from manufacturer's full range.

2.4 MIXING

A. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of EIFS.
- B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after surfaces are dry.
 - 2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.
- C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.
 - 1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

3.3 EXTERIOR CEMENT-BOARD INSTALLATION

- A. Exterior Cement Board: Install on metal framing to comply with cement-board manufacturer's written instructions and evaluation report acceptable to authorities having jurisdiction. Install board with steel drill screws spaced no more than 8 inches o.c. along framing with perimeter fasteners at least 3/8 inch but less than 5/8 inch from edges of boards.
- 3.4 EIFS INSTALLATION, GENERAL
 - A. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

3.5 SUBSTRATE PROTECTION APPLICATION

- A. Primer/Sealer: Apply over gypsum sheathing substrates to protect substrates from degradation and where required by EIFS manufacturer for improving adhesion of insulation to substrate.
- B. Waterproof Adhesive/Base Coat: Apply over sloped surfaces, window sills, parapets or where indicated on Drawings to protect substrates from degradation.
- C. Flexible-Membrane Flashing: Install over weather-resistive barrier, applied and lapped to shed water; seal at openings, penetrations, terminations, and where indicated by EIFS manufacturer's

written instructions to protect wall assembly from degradation. Prime substrates, if required, and install flashing to comply with EIFS manufacturer's written instructions and details.

3.6 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at window sills, and elsewhere as indicated, according to EIFS manufacturer's written instructions. Coordinate with installation of insulation.
 - 1. Drip Screed/Track: Use at bottom edges of EIFS unless otherwise indicated.
 - 2. Window Sill Flashing: Use at windows unless otherwise indicated.
 - 3. Expansion Joint: Use where indicated on Drawings.
 - 4. Casing Bead: Use at other locations.
 - 5. Parapet Cap Flashing: Use where indicated on Drawings.

3.7 INSULATION INSTALLATION

- A. Board Insulation: Adhesively and mechanically attach insulation to substrate in compliance with ASTM C 1397, EIFS manufacturer's written instructions, and the following:
 - 1. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to sheathing unless EIFS manufacturer's written instructions specify using primer/sealer with ribbon-and-dab method. Apply adhesive to a thickness of not less than 1/4 inch for factory mixed and not less than 3/8 inch for field mixed, measured from surface of insulation before placement.
 - 2. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
 - 3. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
 - 4. Mechanically attach insulation to substrate by method complying with EIFS manufacturer's written instructions. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
 - a. Steel Framing: 5/16 inch.
 - b. Concrete and Masonry: 1 inch.
 - 5. Apply insulation over dry substrates in courses with long edges of boards oriented horizontally.
 - 6. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
 - 7. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals.
 - a. Adhesive Attachment: Offset joints of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.
 - b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
 - 8. Interlock ends at internal and external corners.
 - 9. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater

than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.

- 10. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
- 11. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch.
- 12. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch.
- 13. Install foam shapes and attach to structure.
- 14. Interrupt insulation for expansion joints where indicated.
- 15. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
- 16. After installing insulation and before applying reinforcing mesh, fully wrap board edges with strip reinforcing mesh. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
- 17. Treat exposed edges of insulation as follows:
 - a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
 - c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
- 18. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS protective-coating lamina.
- B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:
 - 1. At expansion joints in substrates behind EIFS.
 - 2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
 - 3. Where wall height or building shape changes.
 - 4. Where EIFS manufacturer requires joints in long continuous elevations.
 - 5. Where panels abut one another.

3.8 BASE-COAT INSTALLATION

- A. Base Coat: Apply to exposed surfaces of insulation and foam shapes in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch dry-coat thickness.
- B. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
 - 1. Standard-impact reinforcing mesh unless otherwise indicated.

NM15-32 Units Ojo Amarillo, NM

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- 2. Intermediate-impact reinforcing mesh where indicated.
- 3. High-impact reinforcing mesh where indicated.
- 4. Heavy-duty reinforcing mesh where indicated.
- C. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- wide strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.
 - 1. At aesthetic reveals, apply strip reinforcing mesh not less than 8 inches wide.
 - 2. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.
- D. Foam Shapes: Fully embed reinforcing mesh in base coat.
- E. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.

3.9 FINISH-COAT INSTALLATION

- A. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.
- B. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
 - 1. Texture: As selected by Architect from manufacturer's full range.
 - 2. Embed aggregate in finish coat according to EIFS manufacturer's written instructions to produce a uniform applied-aggregate finish of color and texture matching approved sample.
- C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.10 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in ASTM C 1481.
 - 1. Apply joint sealants after base coat has cured but before applying finish coat.
 - 2. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
 - 3. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
 - 4. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
 - 5. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
 - 6. Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.

NM15-32 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
- B. EIFS Tests and Inspections: For the following:1. According to ICC-ES AC24.
- C. Remove and replace EIFS where test results indicate that EIFS do not comply with specified requirements.
- D. Prepare test and inspection reports.

3.12 CLEANING AND PROTECTION

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 072413

SECTION 072600 - UNDER-SLAB VAPOR RETARDER FOR CONCRETE SLABS-ON-GRADE

PART 1 – GENERAL

1.1 SUMMARY

- A. Products Supplied Under This Section
 - 1. Vapor Retarder, seam tape, mastic, pipe boots for installation under concrete slabs.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-in-place Concrete Section 03 3000
- B. Concrete Forming and Accessories Section 03 2000
- C. Earthwork for Building Construction Section 31 2311

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM), latest versions:
 - 1. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials
 - 2. ASTM E154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
 - ASTM E1643 Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
 - 4. ASTM E1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
- B. American Concrete Institute (ACI), latest version
 - 1. ACI 302.2R, Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.4 SUBMITTALS

- A. Quality Control / Assurance
 - 1. Comply with Section 01 3300 Submittal Procedures.
 - 2. Independent laboratory test results showing compliance with ASTM & ACI Standards.
 - 3. Manufacturer's samples, literature
 - 4. Manufacturer's installation instructions for placement, seaming and pipe boot installation
- B. Delivery, Storage, and Handling
 - 1. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
 - 2. Store materials in a clean dry area in accordance with manufacturer's instructions.
 - 3. Stack membrane on smooth ground or wood platform to eliminate warping.
 - 4. Protect materials during handling and application to prevent damage or contamination.

NM15-32 46 Units Ojo Amarillo, NM

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- 5. Ensure membrane is stamped with manufacturer's name, product name and membrane thickness at intervals of no more than 85" (220 cm).
- C. Environmental requirements
 - 1. Product not intended for uses subject to abuse or permanent exposure to the elements.
 - 2. Do not apply on frozen ground.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Vapor Retarder (Performance-Based Specifications)
 - 1. Vapor Retarder must have the following qualities at minimum and meet floor finish manufacturer's warranty requirements.
 - a. Water Vapor Retarder ASTM E1745: Meets or exceeds Class A
 - b. Maximum Permeance ASTM E96: 0.01 Perms or as required to meet Flooring Manufacturer's Warranties.
 - c. Tensile Strength ASTM E154, Section 9: not less than 45 LBS. Force/Inch
 - d. ASTM D1709, Method B.
 - e. Thickness of Retarder (plastic) ACI 302.1R-96: Not less than 15 mils
 - f. Material: Virgin Polyethylene or Polyolefin
 - 2. Vapor Retarder Products, may be by one of the following manufacturers or an approved equal, as long as the requirements above are met.
 - a. Epro, http://eproserv.com
 - b. Fortifiber, http://www.fortifiber.com
 - c. Stego Industries, http://www.stegoindustries.com
 - d. R. Meadows, http://www.wrmeadows.com
 - e. Raven Industries, http://www.vaporblock.com
 - f. Reef Industries, http://www.reefindustries.com
 - g. Insulation Solutions, http://www.insulationsolution.com

2.2 ACCESSORIES

- A. Seam Tape
 - 1. Tape must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
- B. Vapor Proofing Mastic
 - 1. Mastic must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
- C. Pipe Boots
 - 1. Construct pipe boots from vapor Retarder material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive membrane. Ensure compaction requirements have been completed and geotechnical firm has confirmed compaction requirements have been

met. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturers instructions.

3.3 INSTALLATION

- A. Install Vapor Retarder:
 - 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
 - a. Unroll Vapor Retarder with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Retarder over footings and seal to foundation walls.
 - c. Overlap joints 6 inches and seal with manufacturer's tape.
 - d. Seal all penetrations (including pipes) per manufacturer's instructions.
 - e. No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of Vapor Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 072600

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-milthick 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 lowprofile 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 076200 - SHEET METAL FLASHING AND TRIM

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. Manufactured Products:
 - a. Manufactured through-wall flashing.
 - b. Manufactured reglets.
- B. Related Sections:
 - 1. Section 061000 Rough Carpentry for wood nailers, curbs, and blocking.
 - 2. Section 061600 Sheathing
 - 3. Section 066500 Plastic Simulated Wood Trim for trim transitions
 - 4. Section 076200 PB EIFS

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location in Project.

- 2. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
- 3. Details of termination points and assemblies, including fixed points.
- 4. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
- 5. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter flashings as applicable.
- 6. Details of special conditions.
- 7. Details of connections to adjoining work.
- C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 - 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
 - 3. Accessories and Miscellaneous Materials: Full-size Sample.
 - 4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.
- E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
- F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.

2.2 UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
- B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of manufactured item.

- 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
 - 1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch (75-mm) intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.
 - 1. Stainless Steel: 0.016 inch (0.40 mm) thick.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cheney Flashing Company; Cheney Flashing (Dovetail).
 - 2) Cheney Flashing Company; Cheney Flashing (Sawtooth).
 - 3) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - 4) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
 - 5) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.

- B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.
 - 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. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Heckmann Building Products Inc.
 - d. Hickman, W. P. Company.
 - e. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - f. Keystone Flashing Company, Inc.
 - g. National Sheet Metal Systems, Inc.
 - h. Sandell Manufacturing Company, Inc.
 - i. <Insert manufacturer's name>.
 - 2. Material: Galvanized steel, 0.022 inch (0.56 mm) thick.
 - 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 - 4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 - 5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 - 6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 - 7. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
 - 8. Finish: With manufacturer's standard color coating.

PART 3 - EXECUTION

3.1 EXAMINATION

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

- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches (50 mm).
- C. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- D. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

- 1. Coat back side of uncoated stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact 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 or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Seal joints as shown and as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. 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 (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.
 - 1. Do not solder metallic-coated steel sheet.
 - 2. Pre-tinning is not required for zinc-tin alloy-coated stainless steel and zinc-tin alloy-coated copper.
 - 3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 - 4. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - 5. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.

3.4 WALL FLASHING INSTALLATION

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

B. Opening Flashings in Frame Construction: Install continuous head, sill and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.6 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.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 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.

NM15-32 Units Ojo Amarillo, NM

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- 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.

NM15-32 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 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-RIDGE AND SOFFIT VENTS

PART 1 - GENERAL

.1 SECTION INCLUDES

- A. Ridge 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
 - a. Net Free Area: 13 inches (330 cm) per lineal foot.
 - b. Color: Black.
 - c. 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.
 - a. Net Free Area: 9-1/2 inches (12.5 mm) per lineal foot.
 - b. Color: Natural.

NM15-32 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

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.

NM15-32 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 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. Lymtal, 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.

NM15-32 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

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-precast 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 081100 - STORM DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storm doors with solid wood core doors.

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 doors.
 - 2. Indicate doors to be factory finished and finish requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Pella Windows & Doors; Model 3031 or equivalent
 - 2. Larson Doors
- B. Aluminum Wood Core Lamination:
 - 1. The basic structure shall be laminated core to consist of aluminum sheets laminated to each side of ³/₄" thick, 40-45 lb. density, industrial grad, western particleboard. The wood core shall be one-piece solid wood, or be of a four-piece construction using corrugated fasteners and an adhesive boding process.
 - 2. The aluminum sheets shall be painted by with an electro statically applied bakedon polyester finish. The above components shall be laminated to form a dimensionally stable laminated panel, eliminating sagging, warping, and twisting. The laminated panel shall be sealed with waterproof sealant across bottom edge and up each outer edge to protect from moisture. The laminated
- C. Frame Components:

- 1. All frame and trim components shall be 6063 T6 aluminum extrusion for additional strength and appearance. Minimum wall thickness shall be .045 +_.005. Paint is electro statically applied baked on polyester.
- 2. A gasketed window frame unit shall be factory installed with locking-type interior trim to securely seal the unit into the door panel. The door shall have .045 +_.005 wall thickness z-bars attached for mounting the door unit in the building opening. Z-bars will be weather-stripped with nonabsorbent pile. The top z-bar shall be shaped to serve as a drip cap above the door. The hinge z-bar shall be factory made with four 3-inch, spring loaded, and aluminum leaf hinges, supported by wear-resistant bronze bushings. Color-match vinyl screw cap covers shall be provided to conceal the z-bar installation screws.
- D. Weather-Strip:
 - 1. The door shall be sealed against z-bar trim with nonabsorbent woven pile. The door shall have an adjustable 2'' aluminum extruded expander with flexible vinyl weather-stripping that is field adjusted to seal the door along irregular thresholds.
- E. Moldings: (Model 3031)
 - 1. Colonial One rectangle extruded aluminum molding is installed horizontally on the kick plate.
 - 2. Traditional Two rectangle extruded aluminum moldings are installed vertically on the kick plate.
- F. Grids: (Model 3031)
 - 1. Grid Models An extruded aluminum designer grid is permanently attached to the exterior and interior surface of the glass in alignment creating a three wide, four high lite pattern.
- G. Warranty:
 - 1. Each door shall have a registration label displaying an identification number, which is to be registered upon instillation of the door per warranty procedure described in the installation manual. See door warranty sheet in instruction booklet for details.

2.2 FABRICATION

- A. All aluminum window unit with two-self-storing glass inserts and one screen shall be factory installed and fitted to complete the door unit. All window master frame component shall be .045 +_.005 wall thickness, miter-sawed, mechanically fastened with zinc plated screws. All glass panels shall be .045 +_.005 wall thickness aluminum extrusion, miter sawed, metal keyed, and have mechanically connected corners.
- B. Glass shall be tempered safety glass (ANSI Z97.1). Glazing method shall be a flexible vinyl weather-strip with wrap-around marine-type extrusion. Screen panel shall be aluminum frame

with fiberglass screen mesh. All window panel latches and tilt keys shall be zinc die-cast metal. Window sill area shall be sloped to the exterior, or punched to allow water drainage.

2.3 FACTORY FINISHING

- A. Finish all exposed extruded aluminum components shall be color coated in accordance with AAMA 2603-98 specifications.
- B. Fasteners shall be painted or zinc plated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware kit shall consist of a latch with a lever exterior handle and lock on the inside. It shall also have two heavy-duty pneumatic closers and all necessary screws and fasteners to complete the installation.
- B. Installation Instructions: Install doors per instruction furnished with each door, using zinc plated exterior installation screws.

END OF SECTION 081100

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.

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- 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, stretcherleveled, 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 factoryapplied 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.

NM15-32 50 Ojo Amarillo, NM Indigenous Design Studio + Architecture

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.

NM15-32 50 Ojo Amarillo, NM Indigenous Design Studio + Architecture

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.

TUBULAR DAYLIGHTING SYSTEM

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.
 - 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

NM15-32 50 Ojo Amarillo, NM Indigenous Design Studio + Architecture

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, noncorrosive 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

- 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:
 - Address and telephone number of the hardware supplier. a.
 - Address and telephone number of each hardware manufacturer. b.
 - Maintenance instructions and parts list for each type of operating hardware c. including:
 - Locks 1)
 - d. Warranty for all other hardware.

1.04 DELIVERY, STORAGE, AND HANDLING

- Deliver hardware to the jobsite only after proper provision for storage has been made. A. 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

- Furnish 3 copies of the following written warranty to be included in the Maintenance A. Manual:
 - Warranty against failure of parts of all hardware for a period 1 year. 1.
 - Starting date for all warranty periods to be the date of substantial completion of 5. 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 flathead 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 1 1 1 1 1 1 1	EA EA EA EA SET EA	HINGE DEADLOCK ENTRY LOCK - LEVER DOOR STOP THRESHOLD SEALS DOOR BOTTOM	5PB1 4.5 X 4.5 D241P-6 W511P-6 Q 60 425E X D.W. 155V X D.S. 35VA X D.S.	652 626 626 673 AL AL AL	IVE FAL FAL IVE NGP NGP
HW SI Door HC - E	ET: H R NUN BED/E	C-02 /IBER: 2 /ATH			
EACH 1 1 3	TO F EA EA EA	IAVE: PRIVACY LOCK - LEVER DOOR STOP SILENCER	W301S Q 60 SR66 ALL OTHER HARDWARE BY PRE-HANGER	626 673 GRY	FAL IVE IVE
HW SI DOOR HC-CI	ET: H NUN LOSE	C-03 ABER: 3 T			
EACH 1 1 3	TO F EA EA EA	IAVE: PASSAGE SET - LEVER DOOR STOP SILENCER	W101S Q 60 SR66 ALL OTHER HARDWARE BY PRE-HANGER	626 673 GRY	FAL IVE IVE
HW SI Door HC - F	ET: H R NUN FURN	C-04 /IBER: 3 / W-H			
EACH 1 1 1	TO H EA EA SET	IAVE: PASSAGE SET - LEVER DOOR STOP SEALS	W101S Q 60 155V X D.S. ALL OTHER HARDWARE BY PRE-HANGER	626 673 AL	FAL IVE NGP
HW SI DOOR HC- S	ET: H R NUN TORA	C-05 /IBER: 1 /GE			
EACH 3 1 1 1 1 1 1 1 HW SI DOOR	TO H EA EA EA EA SET EA ET: H	IAVE: HINGE DEADLOCK ENTRY LOCK - LEVER DOOR STOP THRESHOLD SEALS DOOR BOTTOM C-06 IBER: 1	5PB1 4.5 X 4.5 NRP D241P-6 W511P-6 Q 60 425E X D.W. 155V X D.S. 35VA X D.S.	652 626 626 673 AL AL AL	IVE FAL FAL IVE NGP NGP

HC – STORM DOOR EACH TO HAVE:

ALL HARDWARE BY DOOR SUPPLIER

HW S DOOF STD -	ET: S' R NUN FROI	TD-01 4BER: 1 NT/BACK			
EACH 3 1 1 1 1 1 1 1	I TO H EA EA EA EA EA SET EA	IAVE: HINGE DEADLOCK ENTRY LOCK - KNOB DOOR STOP THRESHOLD SEALS DOOR BOTTOM	5PB1 4.5 X 4.5 D241P-6 W511P-6 HAN 60 425E X D.W. 155V X D.S. 35VA X D.S.	652 626 626 673 AL AL AL	IVE FAL FAL IVE NGP NGP
HW S Doof STD -	ET: S' R NUN BED/	ГD-02 ИВЕR: 2 ВАТН			
EACH 1 1 3	I TO H EA EA EA	IAVE: PRIVACY LOCK - KNOB DOOR STOP SILENCER	W301S HAN 60 SR66 ALL OTHER HARDWARE BY PRE-HANGER	626 673 GRY	FAL IVE IVE
HW S DOOF STD -	ET: S' R NUN CLOS	ГD-03 ИВЕR: 3 БЕТ			
EACH 1 1 3	I TO H EA EA EA EA	IAVE: PASSAGE SET - KNOB DOOR STOP SILENCER	W101S HAN 60 SR66 ALL OTHER HARDWARE BY PRE-HANGER	626 673 GRY	FAL IVE IVE
HW S DOOF STD-	ET: S' R NUN FURN	ГD-04 ИВЕR: 3 I / W-H			
EACH 1 1 1	I TO H EA EA SET	IAVE: PASSAGE SET - KNOB DOOR STOP SEALS	W101S HAN 60 155V X D.S. ALL OTHER HARDWARE BY PRE-HANGER	626 673 AL	FAL IVE NGP

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 096513 - RESILIENT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:1. Resilient molding accessories.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.
- 1.3 PROJECT CONDITIONS
 - A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
 - B. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Flexco, Inc.
 - c. Johnsonite.
 - d. R.C.A. Rubber Company (The).
 - e. Roppe Corporation, USA.
- B. Description: Transition strips.
- C. Material: Vinyl
- D. Profile and Dimensions: As required by the adjoining flooring materials.
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products 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. Cove Base Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.
- B. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Do not install resilient products until they are same temperature as the 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.
- C. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Cover resilient products until Substantial Completion.

END OF SECTION 096513

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.

- 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.

099113 - 2

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 surfaceapplied 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 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Corner guards.
 - 2. Door-protection systems.
- B. See Division 08 Section "Door Hardware" for metal armor, kick, mop, and push plates.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of unit and for each color and texture required.
- C. Maintenance data.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide impact-resistant, plastic wall-protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store plastic wall-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall-protection units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MATERIALS

- A. Extruded Rigid Plastic: High-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout.
- B. Plastic Sheet Wall Covering Material: Semirigid, high-impact-resistant PVC or acrylicmodified vinyl plastic sheet with integral color throughout.
- C. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive metal; security-type where exposed to view.

2.3 CORNER GUARDS

- A. Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
 - 1. Available Manufacturers:
 - a. American Floor Products Co., Inc.
 - b. ARDEN Architectural Specialties, Inc.
 - c. Construction Specialties, Inc.
 - d. IPC Door and Wall Protection Systems; Division of InPro Corporation.
 - e. Pawling Corporation.
 - f. Tepromark International, Inc.
 - 2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
 - a. Profile: Nominal 2-inch- long leg and 1/4-inch corner radius.
 - b. Height: 4 feet.
 - c. Color and Texture: As selected by Architect from manufacturer's full range.
 - 3. Retainer: Minimum 0.060-inch- thick, 1-piece, extruded aluminum.
 - 4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
NM15-32 50 Ojo Amarillo, NM Indigenous Design Studio + Architecture

2.4 DOOR-PROTECTION SYSTEMS

- A. General: Comply with BHMA A156.6.
- B. Protection Plates: Fabricated from extruded rigid plastic, of thickness indicated.
 - 1. Available Manufacturers:
 - a. American Floor Products Co., Inc.
 - b. Construction Specialties, Inc.
 - c. IPC Door and Wall Protection Systems; Division of InPro Corporation.
 - d. Korogard Wall Protection Systems; Division of RJF International Corporation.
 - e. Pawling Corporation.
 - f. Tepromark International, Inc.
- C. Kick Plates: Minimum 0.060-inch wall thickness; beveled 4 sides.
 - 1. Size: 12 inches high by door width, with allowance for frame stops.
 - 2. Color and Texture: As selected by Architect from manufacturer's full range.
 - 3. Mounting: Countersunk screws through factory-drilled mounting holes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Complete finishing operations, including painting, before installing impact-resistant wallprotection system components.
- B. Install impact-resistant wall-protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 - 1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
- C. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- D. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

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, $3" 3\frac{1}{2}"$ depth.

TOILET AND BATH ACCESSORIES

- 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 & Hearing-Visual Accessible Units).
 - 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.

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.

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.

- 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.

SECTION 22 0719 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 REFERENCE STANDARDS

- A. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- B. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation.
- C. ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
- D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials.
- F. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.6 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

PLUMBING PIPING INSULATION

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B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER

- A. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perminches.
- D. Vapor Barrier Lap Adhesive: Compatible with insulation.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Connection: Waterproof vapor barrier adhesive.

2.4 POLYETHYLENE (POLYEFLIN)

- A. Insulation: Flexible closed-cell polyethylene tubing, slit lengthwise for installation, complying with applicable requirements of ASTM D1056.
 - 1. 'K' Value: ASTM C177; 0.25 at 75 degrees F.
 - 2. Maximum Service Temperature: 300 degrees F.
 - 3. Density: 2 lb/cu ft.
 - 4. Maximum Moisture Absorption: 1.0 percent by volume.
 - 5. Moisture Vapor Permeability: 0.05 perm inch, when tested in accordance with ASTM E96/E96M.
 - 6. Connection: Contact adhesive.

2.5 JACKETS

- A. PVC Plastic.
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
 - 2. Covering Adhesive Mastic: Compatible with insulation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- F. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert Location: Between support shield and piping and under the finish jacket.

NM15-32 46 Units Ojo Amarillo, NM

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- 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
- 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.
- H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

3.3 SCHEDULES / APPLICATIONS:

- A. Plumbing Systems:
 - 1. Domestic Water Piping installed in *EXTERIOR WALLS*:
 - a. <u>*Both*</u> Hot Water and Cold Water piping shall be insulated with 1/2 inch thick insulation.
 - 2. Domestic Water Piping installed in *INTERIOR WALLS*:
 - a. Hot Water piping shall be insulated with 1/2 inch thick insulation.
 - b. Cold Water piping is not required to be insulated.
- B. Plumbing System Materials:
 - 1. Copper Piping / Tubing: shall be insulated using Glass Fiber insulation.
 - 2. PEX Tubing (Piping) shall be insulated using:
 - a. Preformed flexible elastomeric cellular insulation, or
 - b. Flexible closed-cell polyethylene tubing insulation.

SECTION 22 1005 - PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Pipe hangers and supports.
 - 5. Valves.
 - 6. Water pressure reducing valves.

1.2 RELATED REQUIREMENTS

- A. Section 220516 Expansion Fittings and Loops for Plumbing Piping.
- B. Section 220548 Vibration and Seismic Controls for Plumbing Piping and Equipment.
- C. Section 220553 Identification for Plumbing Piping and Equipment.
- D. Section 220719 Plumbing Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings.
- B. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
- C. ASME B31.9 Building Services Piping.
- D. ASME BPVC-IX Boiler and Pressure Vessel Code, Section IX Welding, Brazing, and Fusing Qualifications.
- E. ASSE 1003 Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems.
- F. ASTM A74 Standard Specification for Cast Iron Soil Pipe and Fittings.
- G. ASTM B32 Standard Specification for Solder Metal.
- H. ASTM B42 Standard Specification for Seamless Copper Pipe, Standard Sizes.
- I. ASTM B88 Standard Specification for Seamless Copper Water Tube.

NM15-32 46 Units Ojo Amarillo, NM

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- J. ASTM B88M Standard Specification for Seamless Copper Water Tube (Metric).
- K. ASTM B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
- L. ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
- M. ASTM C564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- N. ASTM D2235 Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- O. ASTM D2564 Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- P. ASTM D2665 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- Q. ASTM D2855 Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- R. ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- S. ASTM F628 Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core.
- T. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
- U. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.
- V. ASTM F1281 Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
- W. ASTM F1282 Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
- X. AWWA C550 Protective Interior Coatings for Valves and Hydrants.
- Y. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
- Z. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation.
- AA. MSS SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- AB. NSF 61 Drinking Water System Components Health Effects.
- AC. NSF 372 Drinking Water System Components Lead Content.

AD. PPI TR-4 - PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe.

1.4 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.7 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 extra heavy weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. ABS Pipe: ASTM F628.
 - 1. Fittings: ABS.
 - 2. Joints: Solvent welded with ASTM D2235 cement.
- C. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC. Use DWV fittings.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. PVC Pipe: ASTM D2665.
 - 1. Fittings: PVC. Use DWV fittings.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.4 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Copper Pipe: ASTM B42, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F.
 - 2. Fittings: Brass and copper.

2.5 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F.
 - 2. Fittings: Brass and copper.

NM15-32 46 Units Ojo Amarillo, NM

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2.6 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
 - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

2.7 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping Drain, Waste, and Vent:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 4. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
- C. Plumbing Piping Water:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 - 4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

2.8 BALL VALVES

A. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

2.9 PIPING SPECIALTIES

- A. Flow Controls:
 - 1. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
 - 2. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.10 WATER PRESSURE REDUCING VALVES

- A. Up to 2 Inches:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
- B. Over 2 Inches:
 - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 220516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Install valves with stems upright or horizontal, not inverted. Refer to Section 220523.
- J. Install water piping to ASME B31.9.

PLUMBING PIPING

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- K. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- L. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- M. Sleeve pipes passing through partitions, walls and floors.
- N. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- O. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 6. Support cast iron drainage piping at every joint.

3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install ball valves for throttling, bypass, or manual flow control services.
- F. Provide spring loaded check valves on discharge of water pumps.
- G. Provide flow controls in water recirculating systems where indicated.

3.5 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

NM15-32 46 Units Ojo Amarillo, NM

Indigenous Design Studio + Architecture

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

3.7 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved double check backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.

3.8 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - 2. Plastic Piping:
 - a. All Sizes:
 - 1) Maximum Hanger Spacing: 6 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.

SECTION 22 1006 - PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cleanouts.
- B. Hose bibbs.
- C. Hydrants.
- D. Washing machine boxes and valves.
- E. Backflow preventers.
- F. Double check valve assemblies.

1.2 RELATED REQUIREMENTS

- A. Section 221005 Plumbing Piping.
- B. Section 223000 Plumbing Equipment.
- C. Section 224000 Plumbing Fixtures.

1.3 REFERENCE STANDARDS

- A. ASSE 1011 Hose Connection Vacuum Breakers.
- B. ASSE 1012 Backflow Preventer with Intermediate Atmospheric Vent.
- C. ASSE 1019 Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance.
- D. NSF 61 Drinking Water System Components Health Effects.
- E. NSF 372 Drinking Water System Components Lead Content.

1.4 SUBMITTALS

- A. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- B. Certificates: Certify that grease interceptors meet or exceed specified requirements.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.2 CLEANOUTS

- A. Cleanouts at Exterior Surfaced Areas: See construction drawings for specification.
- B. Cleanouts at Interior Finished Wall Areas: See construction drawings for specification.

2.3 HOSE BIBBS

- A. Interior Hose Bibbs: See construction drawings for specification.
 - 1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with lockshield and removable key, integral vacuum breaker in conformance with ASSE 1011.

2.4 HYDRANTS

- A. Wall Hydrants: See construction drawings for specification.
 - 1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

2.5 WASHING MACHINE BOXES AND VALVES

A. Description: See construction drawings for specification.

2.6 BACKFLOW PREVENTERS

A. Reduced Pressure Backflow Preventers: See construction drawings for specification.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

2.7 DOUBLE CHECK VALVE ASSEMBLIES

- A. Manufacturers:
- B. Double Check Valve Assemblies:
 - 1. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.8 MIXING VALVES

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Encase exterior cleanouts in concrete flush with grade.
- C. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on premise isolation, irrigation systems, interior and exterior hose bibbs.
- D. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

SECTION 22 3000 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water Heaters:1. Residential electric.
- B. Diaphragm-type compression tanks.
- C. In-line circulator pumps.

1.2 RELATED REQUIREMENTS

A. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

1.3 REFERENCE STANDARDS

- A. NFPA 70 National Electrical Code.
- B. UL 174 Standard for Household Electric Storage Tank Water Heaters.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS

- A. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide electrical characteristics and connection requirements.
- B. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- C. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

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D. Project Record Documents: Record actual locations of components.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Certifications:
 - 1. Electric Water Heaters: UL listed and labeled to UL 174.
 - 2. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- C. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- D. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.8 WARRANTY

- A. See Section 017800 Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.1 WATER HEATERS

- A. Residential Electric:
 - 1. Type: Automatic, electric, vertical storage.
 - 2. Performance:
 - 3. Electrical Characteristics:
 - 4. Tank: Glass lined welded steel, thermally insulated with one inch thick glass fiber; encased in corrosion-resistant steel jacket; baked-on enamel finish.
 - 5. Controls: Automatic water thermostat with externally adjustable temperature range from 120 to 170 degrees F, flanged or screw-in nichrome elements, enclosed controls and electrical junction box and operating light. Wire double element units so elements do not operate simultaneously.
 - 6. Accessories:
 - a. Water Connections: Brass.
 - b. Dip Tube: Brass.

- c. Drain valve.
- d. Anode: Magnesium.
- e. Temperature and Pressure Relief Valve: ASME labeled.

2.2 DIAPHRAGM-TYPE COMPRESSION TANKS: SEE CONSTRUCTION DRAWINGS FOR ALL REQUIREMENTS.

- A. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- B. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psig.

2.3 IN-LINE CIRCULATOR PUMPS: SEE CONSTRUCTION DRAWINGS FOR ALL REQUIREMENTS.

- A. Casing: Bronze, rated for 125 psig working pressure.
- B. Impeller: Bronze.
- C. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- D. Seal: Carbon rotating against a stationary ceramic seat.
- E. Drive: Flexible coupling.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

SECTION 22 4000 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water closets.
- B. Lavatories.
- C. Sinks.
- D. Bathtubs.
- E. Showers.

1.2 RELATED REQUIREMENTS

- A. Section 221005 Plumbing Piping.
- B. Section 221006 Plumbing Piping Specialties.
- C. Section 223000 Plumbing Equipment.

1.3 REFERENCE STANDARDS

- A. ADA Standards Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. ANSI Z124.1.2 American National Standard for Plastic Bathtub and Shower Units.
- C. ASME A112.18.1 Plumbing Supply Fittings.
- D. ASME A112.19.1 Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures.
- E. ASME A112.19.2 Ceramic Plumbing Fixtures.
- F. NSF 61 Drinking Water System Components Health Effects.
- G. NSF 372 Drinking Water System Components Lead Content.

1.4 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

NM15-32 46 Units Ojo Amarillo, NM

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- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 016000 Product Requirements, for additional provisions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.8 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 GENERAL

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.
NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

2.2 TANK TYPE WATER CLOSETS: SEE CONSTRUCTION DRAWINGS FOR SPECIFICATION.

2.3 LAVATORIES: SEE CONSTRUCTION DRAWINGS FOR SPECIFICATION.

2.4 SINKS: SEE CONSTRUCTION DRAWINGS FOR SPECIFICATION.

2.5 BATHTUBS AND SHOWERS: SEE CONSTRUCTION DRAWINGS FOR SPECIFICATION.

2.6 SHOWERS: SEE CONSTRUCTION DRAWINGS FOR SPECIFICATION. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each ADA fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.

3.4 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

A. Clean plumbing fixtures and equipment.

PLUMBING FIXTURES

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3.6 **PROTECTION**

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

3.7 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
 - 1. Water Closet:
 - a. Standard: 15 inches to top of bowl rim.
 - b. Accessible: 18 inches to top of seat.
 - 2. Lavatory:
 - a. Standard: 31 inches to top of basin rim.
 - b. Accessible: 34 inches to top of basin rim.
 - 3. Shower Heads:
 - a. Adult Male: 69.5 inches to bottom of head.
 - b. Adult Female: 64.5 inches to bottom of head.
 - c. Child: 58.5 inches to bottom of head.
- B. Fixture Rough-In
 - 1. Water Closet (Tank Type):
 - a. Cold Water: 1/2 Inch.
 - b. Waste: 4 Inch.
 - c. Vent: 2 Inch.
 - 2. Lavatory:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.
 - 3. Sink:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.
 - 4. Bathtub:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.
 - 5. Shower:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.

SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B.. Measurement of final operating condition of HVAC systems.

1.2 REFERENCE STANDARDS

- A. AABC MN-1 AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
- B. ASHRAE Std 111 Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1988, with 1997 Errata.
- C. NEBB (TAB) Procedural Standards for Testing Adjusting Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.
- D. SMACNA (TAB) HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association; 2002.

1.3 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Engineer.
 - 2. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Identification and types of measurement instruments to be used and their most recent calibration date.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e. Final test report forms to be used.
 - f. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.

- g. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.
 - 3. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 4. Include actual instrument list, with manufacturer name, serial number, and date of calibration all testing and balancing equipment must be current with calibration.
 - 5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 6. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 - 7. Test Reports: Indicate data on AABC MN-1 forms, forms prepared following ASHRAE Std 111, or NEBB forms. Submit data in SI (metric) units.
 - 8. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Engineer.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Project altitude.
 - j. Report date.
- E. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

1.4 QUALITY ASSURANCE

A. TAB Agency Qualifications: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum five years documented hospital experience

1.5 SEQUENCING AND SCHEDULING

- A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.
- B. Schedule and provide assistance in final adjustment and test of life safety system with Fire Authority.

PART 2 EXECUTION

2.1 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 - 2. SMACNA HVAC Systems Testing, Adjusting, and Balancing.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of five years documented health care experience.
 - 3. Certified by one of the following:
 - a. NEBB, National Environmental Balancing Bureau: www.nebb.org.
- E. TAB Supervisor Qualifications: Certified by same organization as TAB agency.

2.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

2.3 PREPARATION

- A. Coordinate with General Contractor at least one week prior to starting TAB work.
 - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Engineer to facilitate spot checks during testing.

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C. Provide additional balancing devices as required.

2.4 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

2.5 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report.

2.6 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as

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dampers and splitters.

- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. If part of System, adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- 2.7 SCOPE
 - A. Test, adjust, and balance the following:
 - 1. Forced Air Furnaces
 - 2. Direct Fired Furnaces
 - 3. Air Coils
 - 4. Exhaust Fans
 - 5. Split-system units (Indoor and Outdoor)
 - 6. Fans
 - 7. Air Filters
 - 8. Air Inlets and Outlets

2.8 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer
 - 2. Model/Frame
 - 3. HP/BHP
 - 4. Phase, voltage, amperage; nameplate, actual, no load
 - 5. RPM
 - 6. Service factor
 - 7. Sheave Make/Size/Bore
- B. V-Belt Drives:
 - 1. Identification/location
 - 2. Required driven RPM
 - 3. Driven sheave, diameter and RPM
 - 4. Belt, size and quantity
 - 5. Motor sheave diameter and RPM
 - 6. Center to center distance, maximum, minimum, and actual
- C. Split Systems Outdoor Air Cooled Condensers:
 - 1. Identification/number
 - 2. Location
 - 3. Manufacturer
 - 4. Model number

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- 5. Entering DB air temperature, design and actual
- 6. Leaving DB air temperature, design and actual
- 7. Number of compressors
- D. Electric Duct Heaters:
 - 1. Manufacturer
 - 2. Identification/number
 - 3. Location
 - 4. Model number
 - 5. Design kW
- E. Number of stages
 - 1. Phase, voltage, amperage
 - 2. Test voltage (each phase)
 - 3. Test amperage (each phase)
 - 4. Air flow, specified and actual
- F. Air Moving Equipment:
 - 1. Location
 - 2. Manufacturer
 - 3. Model number
 - 4. Arrangement/Class/Discharge
 - 5. Air flow, specified and actual
 - 6. Return air flow, specified and actual
 - 7. Outside air flow, specified and actual if part of system.
 - 8. Total static pressure (total external), specified and actual
 - 9. Inlet pressure
 - 10. Discharge pressure
 - 11. Sheave Make/Size/Bore
 - 12. Number of Belts/Make/Size
 - 13. Fan RPM
- G. Return Air/Outside Air:
 - 1. Identification/location
 - 2. Design air flow
 - 3. Actual air flow
 - 4. Design return air flow
 - 5. Actual return air flow
 - 6. Design outside air flow
 - 7. Actual outside air flow
 - 8. Return air temperature
 - 9. Outside air temperature
 - 10. Required mixed air temperature
 - 11. Actual mixed air temperature
 - 12. Design outside/return air ratio
 - 13. Actual outside/return air ratio
- H. Exhaust Fans:
 - 1. Location
 - 2. Manufacturer
 - 3. Model number

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 4. Air flow, specified and actual
- 5. Total static pressure (total external), specified and actual
- 6. Inlet pressure
- 7. Discharge pressure
- 8. Sheave Make/Size/Bore
- 9. Number of Belts/Make/Size
- 10. Fan RPM
- I. Air Inlet/Outlet Tests:
 - 1. Air diffuser/grille number
 - 2. Room number/location
 - 3. Diffuser/Grille type
 - 4. Neck size
 - 5. Area factor
 - 6. Design velocity
 - 7. Design air flow
 - 8. Test (final) velocity
 - 9. Test (final) air flow
 - 10. Percent of design air flow

SECTION 23 0713 - DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.

1.2 RELATED REQUIREMENTS

A. Section 233100 - HVAC Ducts and Casings: Glass fiber ducts.

1.3 REFERENCE STANDARDS

- A. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- C. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials.
- F. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE

- A. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- B. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- C. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- D. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

2.3 GLASS FIBER, RIGID

- A. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.

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- 3. Maximum Water Vapor Absorption: 5.0 percent.
- 4. Maximum Density: 8.0 lb/cu ft.
- B. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- C. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.4 DUCT LINER: NOT APPROVED

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated ducts conveying air below ambient temperature:

- 1. Provide insulation with vapor barrier jackets.
- 2. Finish with tape and vapor barrier jacket.
- 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
- D. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

3.3 SCHEDULES

A. Outside Air Intake Ducts: Pere 2009 IECC and LEED V3.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

B. Supply Ducts: Per 2009 IECC and LEED V3.

SECTION 23 3100 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal ductwork.
- B. Casing and plenums.
- C. Kitchen hood ductwork.

1.2 REFERENCE STANDARDS

- A. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems.
- C. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible.
- D. SMACNA (KVS) Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines.

1.3 SUBMITTALS

A. Product Data: Provide data for duct materials.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

PART 2 PRODUCTS

2.1 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Kitchen Cooking Hood Exhaust: 1/2 inch w.g. pressure class, galvanized steel.

2.2 MATERIALS

 Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- C. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.4 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flexible Ducts: Black polymer film supported by helically wound spring steel wire.
 - 1. UL labeled.
 - 2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 - 3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 - 4. Maximum Velocity: 4000 fpm.
 - 5. Temperature Range: Minus 20 degrees F to 175 degrees F.

2.5 CASINGS

- A. Fabricate casings in accordance with SMACNA (DCS) and construct for operating pressures indicated.
- B. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.

2.6 KITCHEN HOOD EXHAUST DUCTWORK

A. Fabricate in accordance with ductwork manufacturer's installation instructions, SMACNA (DCS), SMACNA (KVS), and NFPA 96.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Flexible Ducts: Connect to metal ducts with liquid adhesive plus tape.
- E. Duct sizes indicated are inside clear dimensions.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Connect diffusers or light troffer boots to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.

SECTION 23 3300 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Backdraft dampers metal.
- B. Flexible duct connections.
- C. Volume control dampers.
- D. Miscellaneous products:
 - 1. Duct opening closure film.

1.2 RELATED REQUIREMENTS

A. Section 233100 - HVAC Ducts and Casings.

1.3 REFERENCE STANDARDS

- A. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems.
- B. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible.

1.4 SUBMITTALS

A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 BACKDRAFT DAMPERS - METAL

A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.2 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.3 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers:
- C. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

2.4 MISCELLANEOUS PRODUCTS

- A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
 - 1. Thickness: 2 mils.
- PART 3 EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 233100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

- D. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

SECTION 23 3300 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Backdraft dampers metal.
- B. Flexible duct connections.
- C. Volume control dampers.
- D. Miscellaneous products:
 - 1. Duct opening closure film.

1.2 RELATED REQUIREMENTS

A. Section 233100 - HVAC Ducts and Casings.

1.3 REFERENCE STANDARDS

- A. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems.
- B. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible.

1.4 SUBMITTALS

A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 BACKDRAFT DAMPERS - METAL

A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.2 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.3 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers:
- C. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

2.4 MISCELLANEOUS PRODUCTS

- A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.
 - 1. Thickness: 2 mils.
- PART 3 EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 233100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

- D. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

SECTION 23 4000 - HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Disposable, extended area panel filters.

1.2 REFERENCE STANDARDS

- A. ASHRAE Std 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
- B. UL 900 Standard for Air Filter Units.

1.3 SUBMITTALS

A. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.

PART 2 PRODUCTS

2.1 DISPOSABLE, EXTENDED AREA PANEL FILTERS

- A. Media: UL 900 Class 1, pleated, lofted, non-woven, reinforced cotton fabric; supported and bonded to welded wire grid by corrugated aluminum separators.
 - 1. Frame: Non-flammable.
 - 2. Nominal thickness: 1 inch.
- B. Minimum Efficiency Reporting Value (MERV): 11, when tested in accordance with ASHRAE Std 52.2.
- C. Rating, per ASHRAE Std 52.2:
 - 1. Weight arrestance: 85 percent.
 - 2. Initial resistance at 500 FPM face velocity: 0.20 inch WG.
 - 3. Recommended final resistance: 0.6 inch WG.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install air cleaning devices in accordance with manufacturer's instructions.

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- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.

SECTION 23 5400 - 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. Electric furnaces and accessories complete with controls.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each of the following:
 - 1. Furnace.
 - 2. Thermostat.
- 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.
- 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 Electrical requirements:
 - 1. Voltage, required Electrical Clearances.

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 Electric Heating Elements: 5-years.

PART 2 - PRODUCTS

2.1 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. Rheem Manufacturing Company; Air Conditioning Division.
 - 2. Ruud Air Conditioning Division.
 - 3. Trane
 - 4. Lennox Industries Inc
- 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.

2.2 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."

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. 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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

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.

SECTION 26 01 00 - GENERAL PROVISIONS

PART 1 – GENERAL

1.1 SUMMARY

The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.

1.2 ELECTRICAL DIVISION INDEX

26 01 00	General Provisions
26 11 00	Raceways
26 12 00	Wires and Cables
26 13 00	Outlet Boxes
26 13 30	Cabinets
26 14 00	Wiring Devices
26 15 00	Motors
26 15 50	Motor Starters
26 16 00	Panelboards
26 17 00	Motor and Circuit Disconnects
26 18 10	Fuses
26 19 00	Relays and Contactors
26 41 00	Electrical Service
26 45 00	Grounding
26 50 00	Lighting Equipment
26 50 10	Lamps
26 50 20	Ballasts and Accessories
26 51 00	Light Emitting Diode (LED) Fixtures

1.3 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.

1.4 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

- A. Regulatory Agencies: Installation, materials, equipment and workmanship shall conform to the applicable provisions of the National Electrical Code (NEC), the National Electrical Safety Code (NESC) and the terms and conditions of the Electrical Utility and other 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.
- B. Underwriters Laboratories (UL) or Factory Mutual (FM): All materials, appliances, equipment or devices shall conform to the applicable standards of Underwriters Laboratories, Inc. or Factory Mutual, Inc. The label of, or listing by, UL or FM is required.

- C. Standards: Where referenced in these Specifications or on the Drawings, the publications and standards of the following organizations shall apply: Joint Commission on Accreditation of Healthcare Organizations (JCAHO), American Society of Testing and Materials (ASTM), Insulated Power Cable Engineers Association (IPCEA), National Fire Protection Association (NFPA), American National Standards Institute (ANSI), and National Electrical Manufacturers Association (NEMA).
- D. Conflicting code requirements shall be brought to the attention of the Architect. Where two or more codes apply, the most stringent of the codes shall govern.

1.5 SUBMITTALS AND SUBSTITUTIONS

- A. Material List: Within 30 days of Contract Award or Notice to Proceed and before material is ordered, the Contractor shall submit for approval a list of all proposed material and equipment, indicating manufacturer's name and general description.
- B. Shop Drawings: Submit for approval a minimum of six copies of all shop drawings no later than 30 days after the material list has been approved and prior to ordering any material. Show complete outlines, dimensions, electrical services, control diagrams, electrical characteristics of special nature or critical to the installation and pertinent data required for installation. Indicate in the transmittal that submittal has been reviewed and accepted and all Contract deviations identified. In addition to specific references or requests; submit shop drawings for the following applicable items: panelboards, lighting fixtures, transformers, primary cable and gear, alarm systems and all special equipment.
- C. Substitutions may be requested in accordance with Section 31 00 00 Earthwork .

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS: 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. All adjustments to the Drawings reflecting the Electrical System shall be delineated in a submittal to the Architect immediately upon knowledge of the required adjustments. The complete responsibility and costs for such adjustments shall be assigned to the respective section of these Specifications in which the equipment is furnished.

2.2 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 Architect.
- C. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer's current and standard design.
2.3 ALTITUDE: Equipment affected by altitude shall perform satisfactorily the function intended at the altitude of the project site. The altitude of this project is 7320 feet mean sea level.

PART 3 – EXECUTION

- 3.1 GENERAL: 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 the progress of the project. The Contractor shall check all areas and surface where Electrical equipment or 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 the prevailing conditions.
- 3.2 TEMPORARY POWER AND LIGHTING: Furnish and install all temporary Electrical facilities required for construction and safety operation. No part of the permanent Electrical Systems or the existing Electrical System may be used for temporary service unless approved by the Architect.

3.3 UTILITIES

- A. GENERAL: The Drawings reflect requirements of the serving utilities based on information derived from representatives of the utilities. During the project design phase, the fact that the Architect may undertake to show the utility(s) requirements, does not necessarily indicate that the Architect represents the utilities or their requirements; therefore, within 10 working days after Contract Award and/or Notice to Proceed has been issued, the Contractor shall be responsible for coordinating the requirements of the utilities for the Power System. The Owner shall be responsible for coordinating the requirements for the Telephone and Television Systems.
- B. Any deviations from the documents shall be brought to the attention of the Architect no later than 10 working days after Award of Contract and/or Notice to Proceed. Failure to notify the Architect within the 10-day time frame signifies the acceptance of documents and utility requirements by the Contractor and all associated costs therein.
- 3.4 EXCAVATION: Comply with Section 310500, Earthwork.

3.5 PERFORMANCE TESTS

- A. Thoroughly test all fixtures, services and all circuits for proper operating conditions and freedom from grounds and short circuits before acceptance is requested. All equipment appliances and devices shall be operated under load conditions.
- B. After the interior-wiring system installation is complete and at such time as the Architect may direct, conduct operating tests for approval. When requested, test all the wire, cable, devices and equipment after installation to assure that all material continues to possess all the original characteristics as required by the governing codes and standards as listed in these Specifications.

- C. After occupancy of the building has taken place and nominal building power loads have been established, make voltage readings at all panelboards. Based on these readings make final adjustments of taps on all transformers in the building as directed by the Architect. Submit to Architect correspondence and/or drawing delineating readings.
- D. Perform such other tests as required by other sections of these Specifications or as requested by the Architect to prove acceptability.
- E. Furnish all instruments and labor for testing.

3.6 OPERATING INSTRUCTIONS AND MANUALS

- A. Instructions: Without additional charge to the Owner, the Contractor shall provide an experienced and competent representative to instruct the Owner or his representative fully in the concept, theory, operations, adjustment and maintenance of all equipment furnished for the Electrical System. Contractor shall provide at least two (2) weeks notice to the Architect in advance of this period.
- B. Manuals: Upon completion of the work, prepare and deliver to the Owner two (2) sets of complete operating and maintenance manuals for the systems and major equipment installed. Include catalog data, shop drawings, wiring diagrams, performance curves and rating data, spare parts lists and manufacturer's operating and maintenance data. Operating and maintenance manuals as required herein shall be submitted to the Architect for review and distribution to the Owner not less than two (2) weeks prior to the scheduled final acceptance of the Project.
- C. Other: The above requirements are in addition to specific instruction and manuals specified for individual systems or equipment.

3.7 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 and Structural Drawings shall be considered as a part of the work insofar as these Drawings furnish the Contractor with information relating to the design and construction of the building. Architectural Drawings shall take precedence over Electrical Drawings. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, elbows, 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.

3.8 LOCATION OF EQUIPMENT AND OUTLETS

A. The approximate locations of cabinets, panelboards, wiring gutters, switches, light outlets, power outlets, etc., are indicated on the Drawings; however, the exact location shall be determined after thoroughly examining the general building plans and by actual measurements during construction to avoid conflicts with any Structural, Architectural, or other trades, with all locations subject to the approval of the Architect.

B. Verify with the Architect all locations of conduit, boxes, etc., stubbed in the floor prior to installation.

3.9 IDENTIFICATION AND SIGNS

- A. Mark each individual motor controller, disconnect switch, transformer and remote control device to identify each item with its respective service using engraved nameplates.
- B. Provide nameplates with engraved lettering not less than 3/8" high where specified or noted. In general, use white core laminated plastic, attached with screws. Embossed plastic adhesive tape is not acceptable. Flush mounted devices may have identification engraved in the device plate.
- C. Identify panelboards, transformers and cabinets by engraved nameplates with descriptions indicated on the Drawings together with indication of the location of the feeder overcurrent protection. Install on inside of hinged doors or panelboards and cabinets.

Example: Panel 2P 120/208V, 3-phase, 4-wire Fed from Panel MDP/cct. #4

- D. Provide warning signs on all equipment or devices operating at 300 volts or more, reading "DANGER-480 VOLTS", etc. with white letters on red background of standard code size. Signs shall be decals.
- E. All underground utilities indicated on the Drawings shall have a 6" wide plastic marker installed continuously in the trench at 12" below grade. The marker shall have continuous markings embossed in the tape identifying the system installed, i.e., communications, telephone, power, and secured computer.
- F. Identify all exposed conduits, junction and pullboxes at maximum intervals of twenty feet and as indicated below. Identify exposed conduits according to the system carried by means of Brady #B-350 permacode thin film pipe markers or approved equal by the Owner. Identify junction and pullboxes by painted on stencils or approved labels. Identification shall be placed at necessary intervals on straight conduit runs, close to all terminations, adjacent to all changes in directions and where conduits pass through walls or floors. Stencils to be painted on with legible contrasting colors without abbreviations. Painting shall be in accordance with DIVISION - FINISHES.

1. Approved Electrical Conduit Color Codes:

120/208 Volt	Black
277/480 Volt	Orange
Fire Alarm	Red
Nurse Call	Blue
Voice Paging	Brown
Television	Purple
Security	White
Telephone	Gray
Monitoring	Maroon/White
Grounding	Green
Emergency. 120/208	Red/Black
Emergency. 277/480	Red/Orange
Computer/Data	Dark Blue/ White
Medical Gas Alarms	Yellow
110 Volt Control	Black/White

- G. Identify all receptacle and switch devices with the circuit and overcurrent protection device. Identification may be by waterproof, permanent marker on the rear of the device cover plate or as approved by the Architect and Owner.
- 3.10 WARRANTY: Deliver originals of all guarantees and warranties on this portion of the work to the Architect. Warrant all equipment, materials and workmanship for one year in accordance with the terms of the Contract.
- 3.11 PRODUCT HANDLING: Use all means necessary to protect Electrical materials and equipment before, during and after installation and to protect the installed work of other trades.
- 3.12 RECORD DRAWINGS: As part of this Contract, the Contractor shall provide a complete marked-up set of Contract Documents indicating all changes to the documents during the project construction phase to the Architect. Changes to the Electrical System shall be documented on a set of "Record Drawings" on a daily basis.

SECTION 261100 - RACEWAYS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Grounding: Section 264500.

PART 2 PRODUCTS

- 2.1 CONDUITS
 - A. Rigid Steel Conduit: Rigid, threaded, thick-wall with zinc-coated on the inside and either zinc-coated or coated with an approved corrosion-resistant coating on the outside.
 - B. Rigid Aluminum Conduit: Rigid, threaded, thick-wall type, approved for the application.
 - C. Intermediate Metal Conduit (IMC): Rigid, threaded, lightweight steel, zinc-coated or coated on the outside and either zinc-coated or coated with an approved corrosion-resistant coating on the inside.
 - D. Rigid Non-Metallic Conduit: Schedule 40, high impact PVC with 7,000 psi tensile strength at 73.4 degrees fahrenheit, 11,000 psi flexural strength, 8,600 psi compression strength, approved 90 degree conductors. Carlon, Triangle or approved equal.
 - E. 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.
 - F. Flexible Conduit: Commercial Greenfield, galvanized steel, with a separate grounding bond wire installed in the conduit in addition to other wires.
 - G. Liquid-Tight Flexible Conduit: Flexible galvanized steel tubing with extruded liquid-tight PVC outer jacket and a separate grounding conductor installed in the conduit.
 - H. Conduit Size: Minimum conduit size 1/2" except where specifically approved for equipment connections. Sizes not noted on the Drawings shall be as required by the NEC.

2.2 CONDUIT FITTINGS

- A. Rigid Steel Conduit, IMC and EMT Fittings: Iron, steel, or die-cast only.
- B. Rigid Aluminum Conduit Fittings: Malleable iron, steel or aluminum alloy. Ferrous fittings zinc-coated or cadmium plated. Aluminum alloy fittings shall conform to the characteristics defined by UL for rigid aluminum metallic conduit and shall not contain more than 0.04 percent copper.

- C. Rigid Non-metallic Conduit Fittings: Approved for the purpose and as recommended by the manufacturer.
- D. Flexible Conduit Fittings (Commercial Greenfield): Either die-cast, steel, or malleable iron only with insulated throats and shall be of one of the following types:
 - 1. Squeeze or clamp type with bearing surface contoured to wrap around the conduit and clamped by one or more screws.
 - 2. Steel, multiple point type, for threading into internal wall of the conduit convolutions.
 - 3. Wedge and screw type with angular in-edge fitting between the convolutions of the conduit.
- E. 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 seal.
- F. Connectors and Couplings: Compression type threadless fittings for rigid steel conduit or IMC not permitted. Set-screw type fittings for rigid aluminum conduit not permitted. EMT couplings and connectors either die-cast, steel, or malleable iron only, "Concrete-tight" or "Raintight", and either the gland and ring compression type or the stainless steel multiple point locking type. Connectors to have insulated throats. EMT fittings using set-screws or indentations as a means of attachment are not permitted.
- G. Bushings: Insulated type, designed to prevent abrasion of the wires without impairing the continuity of the conduit grounding system, for rigid steel conduit, IMC, and rigid aluminum conduit.
- H. Expansion Fittings: Each conduit that is buried in or rigidly secured to the building construction on opposite sides of a building expansion joint and each run of 100 feet of exposed conduit shall be provided with an expansion fitting. Expansion fittings shall be hot dipped galvanized malleable iron with factory-installed packing and a grounding ring.
- I. Sealing Fittings: Threaded, zinc or cadmium coated, cast or malleable iron type for steel conduits and threaded cast aluminum type for aluminum conduits. Fittings used to prevent passage of water vapor shall be of the continuous drain type.
- 2.3 WIREWAYS: Square D Company square duct lay in type without knockouts with lengths and fittings hinged to provide an unobstructed wireway to "lay-in" conductors, use standard lengths. Field cuts permitted where absolutely necessary. Rust-inhibiting phosphatizing coating on sheet metal parts. Blue-gray baked enamel finish. Hardware plated to prevent cross fittings, transposition section, gussett brackets, nipples, pull boxes, reducer fittings, wall flanges, panels or cabinet flanges, elbows, ceiling and wall support brackets and supporting hardware, etc.

PART 3 EXECUTION

3.1 CONDUIT INSTALLATION

A. Conduit Systems: Rigid steel conduit, IMC, rigid non-metallic conduit or EMT unless otherwise specified.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- B. Aluminum Conduit: Aluminum conduit may be used only in dry locations above ground in sizes two inch or larger for Power and Communications Systems.
- C. Rigid Non-metallic Conduit: Install in accordance with manufacturer's recommendations. Joints shall be solvent welded. Field bends shall utilize approved bending equipment. Provide rigid steel elbows and rigid steel conduit risers on underground runs or runs in concrete. Provide a suitable bond wire in each run except low voltage communications runs. Underground runs under concrete slabs may be direct buried without concrete encasement if of approved type. Rigid non-metallic conduit may be installed outside the perimeter of the building only when encased in concrete. Concrete total encasement shall be a minimum of four inches around outside of conduit. Rigid non-metallic conduit is not permitted to be surface mounted in ducts, plenums or other air handling spaces. All 90 degree bends shall be rigid steel conduit. For encased conduits carrying 600 volts or more, the concrete shall be colored red using a permanent dye.
- D. EMT: Not permitted underground or embedded in concrete.
- E. Flexible Conduits: Use flexible conduit only for motor or equipment connections and then only to the extent of minimum lengths required for connections. Length shall not exceed 5 feet without approval from the Architect and Owner. Install flexible conduit connections at all resilient-mounted equipment. Provide liquid-tight flexible conduit in exterior, wet or damp locations and for connections to wet pipe mechanical systems.
- F. Conduit in Concrete: Rigid steel conduit or rigid non-metallic conduit may not be embedded in concrete that is in direct contact with the earth. When embedded, the outside diameter shall not exceed one-third the thickness of the concrete slab, wall or beam, shall be located entirely within the center third of the member, and the lateral spacing of conduits shall not be less than three diameter unless otherwise prohibited by Architect.
- G. Steel Conduit in Ground: Rigid steel conduit that is not completely encased in concrete but is in contact with ground or on a vapor barrier shall be wrapped with Scotchwrap 51 half-lapped, or shall have an additional outside factory coating of polyvinyl chloride with a minimum coat thickness of 20 mils. Other PVC or Phenolic-resin epoxy coating material which is equally flexible and chemically resistant may be used providing approval by the Architect is obtained prior to the installation.
- H. Exposed Conduits: Install exposed conduit systems parallel to or at right angles to the lines of the building. Right angle bends in exposed runs shall be made with standard elbows, screw jointed conduit fittings or conduit bent to radii not less than those of standard elbows.
- I. Concealed Conduits: Install conduit systems concealed unless otherwise noted. Conduit systems may be exposed in unfinished utility areas, ceiling cavities, and where specifically approved by the Architect. Install concealed conduit systems in as direct lines as possible.
- J. Conduit Openings: Protect all vertical runs of conduits or EMT terminating in the bottoms of boxes or cabinets, etc., from the entrance of foreign material prior to installation of conductors.
- K. Sealing Fittings: Install where required by the NEC, where conduits pass from warm to cold locations and where otherwise indicated.
- L. Sleeves for Conduit: Install sleeves for conduit where shown or as required. Conduit sleeves not used shall be plugged with recessed type plugs. Sleeve all conduit passing through walls.

Sleeves that are used shall be sealed tight with rated fire and smokeproofing compounds as specified in Section 078413.

3.2 CONDUIT SUPPORTS

- A. Supports: Provide supports for horizontal steel conduits and EMT not more than eight feet apart with one support near each elbow or bend and one support within one foot of each coupling, including runs above suspended ceilings.
- B. Straps: Install one-hole pipe straps on conduits 1-1/2" or smaller. Install individual pipe hangers for conduits larger than 1-1/2". Spring steel fasteners with hanger rods may be used in dry locations in lieu of pipe straps.
- C. Trapezes: Install multiple (trapeze) pipe hangers, Uni-Strut or approved equal, where two or more horizontal conduits or EMT run parallel and at the same elevation. Secure each conduit or EMT to the horizontal hanger member by specifically designed and approved fasteners for the system used.
- D. Hanger Rods: Install 1/4" diameter or larger steel rods for trapezes, spring steel fasteners, clips and clamps. Wire or perforated strapping shall not be used for the support of any conduit or EMT.
- E. Fastening: Fasten pipe straps and hanger rods to concrete by means of inserts or expansion bolts, to brickwork by means of expansion bolts, and to hollow masonry by means of toggle bolts. Wooden plugs and shields shall not be used. Power-driven fasteners may be used to attach pipe straps and hanger rods to concrete where approved by the Architect. All conduits not embedded in concrete shall be firmly secured by means of pipe clamps, hangers, etc., equal to Caddy Fasteners of ERICO Products, Inc., or approved equal. Wire wrapped around conduits and supporting members will not be accepted. Conduit fastened to the wall above the ceiling is not acceptable.
- 3.3 IDENTIFICATION: Identify per Section 26 01 00, Paragraph 3.09F.
- 3.4 CLOSING OF OPENINGS: Wherever slots, sleeves or other openings are provided in floors or walls for the passage of conduits or other forms of raceway, including bus ducts, such openings, if unused, or the spaces left in such openings, shall be closed in a manner approved by the Architect and per Section 07 84 13. All closure material along with installation methods shall retain the fire rating integrity of the surface being penetrated. All openings in walls or floors remaining after removal of existing conduits, raceways, or bus ducts shall be closed in a like, approved manner.

SECTION 261200 - WIRES AND CABLES

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Grounding: Section 264500.

1.2 SUBMITTALS

A. Primary Cable: Submit catalog cuts and descriptive literature, including data on conductor type, voltage rating, insulation type and thickness, jacket type and thickness (if any) and evidence of meeting respective IPCEA Standards.

PART 2 PRODUCTS

- 2.1 WIRES AND CABLES (600 VOLTS)
 - A. Type:

Conform to the applicable UL and IPCEA Standards for the use intended. Copper conductors with 600 volt insulation unless otherwise specified or noted on the Drawings. Stranded conductors for No. 6 and larger and where elsewhere specified or noted on the Drawings.

All conductors shall be copper. Aluminum conductors will be permitted only on 600 volt and above systems.

- B. Insulations: Type THWN insulation unless otherwise specified or noted on the Drawings. Type THWN minimum or type XHHW filled cross-linked polyethylene 90 degree C. thermosetting insulation for conductors larger than No. 6 and elsewhere as required by NEC. 90 degrees C. minimum insulation within fixture wireways of fluorescent fixtures.
- C. Size: No. 12 minimum unless otherwise specified or noted on the Drawings. Not less than NEC requirements for the system to be installed.
- D. Color Coding: Phase, neutral and ground conductors color-coded in accordance with NEC. Connect all conductors of the same color to the same phase conductors.

	Phase A Phase BPhase CNeut		se CNeutral	
120/240V/1 Phase	Black	Red		White
208 Y/120 V/3 Phase 277/480 V/3 Phase	Black Brown	Red Orange	Blue Yellow	Gray

Ground shall be Green for all systems.

- E. Conductors No. 12 and 10 shall be solid color compounded for the entire length and each like color shall be connected only to the particular phase throughout the project. Conductor sizes larger than No. 10 may be color-coded at each termination and in each box or enclosure with six inches of half-lapped 3/4" pressure sensitive, plastic tape of respective colors in lieu of solid color compound.
- 2.2 CONTROL CONDUCTORS: Copper, minimum size No. 14 with 19/35 stranding, color-coded filled cross linked polyethylene 90 degree C. 600 volt insulation and neoprene or equal outer jacket, equal to General Electric SI-58109 or SI-58742. Multi-conductor control cables shall be provided where more than three control conductors are installed in the same conduit between common terminations. Provide two spare conductors minimum in each control cable.
- 2.3 COMMUNICATION AND ELECTRONIC CABLE: As required or specified in the section of these Specifications specifying the equipment. Splices shall be crimped or soldered or shall use an approved connector.
- 2.4 VERTICAL CABLE SUPPORTS: Split wedge type supports which clamp each individual conductor and tightens due to weight of the cable shall be used without metallic sheath.
- 2.5 CONNECTORS AND LUGS
 - A. For copper conductors No. 6 and smaller: 3M Scotch-Lok or T & B Sta-Kin, or equal 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 connectors, properly taped or insulated.
- 2.6 TAPE: Plastic tape, 8.5 mils minimum thickness, 1,000,000 megohms minimum insulation resistance, oil resistant vinyl backing, oil resistant acrylic adhesive, incapable of supporting combustion per ASTM D-1000. Equal to 3-M Super 88 Tape.
- 2.7 FEEDER CIRCUITS: Single conductor feeder cables shall be of the size and type as indicated on the Drawings. Sizes shown are for copper conductors unless otherwise noted on Drawings.

2.8 BRANCH CIRCUITS

- A. Branch circuits shall be No. 12 AWG copper minimum and shall be larger AWG size where indicated on Drawings. Where branch circuits exceed 100 ft. in length, the AWG size shall be increased to accommodate voltage drop.
- B. Branch circuits to all equipment, fixtures and outlets shall include a white neutral and green wire equipment ground.
- 2.9 15 KV CABLES: Single conductors, shielded, concentric neutral, stranded aluminum cross-linked polyethylene or ethylene-proplylene insulated, polyvinyl jacketed or polyethylene jacketed, 15 KV, for grounded-neutral service on a 24.9Y/14.4 KV system, conforming to IPCEA Specification S-61-402. Cross-linked polyethylene insulation shall be extended single wall of heat-stabilized and light-stabilized, filled or unfilled, chemically-cross-linked polyethylene confirming to IPCEA Specification S-66-524, and resistant to abrasion, weather, fire oils, chemicals, heat, aging, ozone and corona with high dielectric and impulse strength. Temperature rating not less than 90 degree centigrade over a 40 degree ambient. The conductor shall be accurately centered in the insulation.

15 KV cables shall be as manufactured by Anaconda, General Cable, General Electric, Okonite or Simplex. 15 KV cable size shall be No. 1/0 unless noted.

2.10 TERMINATIONS: Cold shrink stress-relief cones shall be installed at all terminations where shielded cable is used and shall be installed in strict accordance with the recommendations of Electro-Products Division/3M.

PART 3 EXECUTION

- 3.1 WIRE AND CABLE TESTS (600 VOLTS): Measure the insulating resistance of service entrance conductors, feeder circuit conductors and service ground. Measurements shall be taken between conductors and between conductors and ground. Resistance shall be 1,000,000 ohms or more when tested at 500 volts by megger without branch circuit loads. Tests and procedures shall meet the approval of the Architect, and shall be in accordance with the applicable IPCEA standards for the wires and cables to be installed. Furnish all instruments, equipment and personnel required for testing, and conduct tests in the presence of the Architect. Submit written reports of the tests and results when requested by the Architect.
- 3.2 SPLICES (480 VOLTS AND UNDER): Permitted only at outlets or accessible enclosures. Conductor lengths shall be continuous from termination to termination without splices unless approved by the Architect.
- 3.3 PULL WIRES: In each empty conduit, except underground conduits, install a plastic line having tensile strength of not less than 200 pounds. In each empty underground conduit, install a No. 10 AWG bare, hard-drawn copper pull wire or a plastic line having a tensile strength of not less than 200 pounds.
- 3.4 RACEWAYS: Install in rigid conduit, EMT, or flexible metallic conduit, unless otherwise specified or noted on the Drawings.
- 3.5 CABLE BENDS: Radius or bends not less than ten times the outer diameter of the cable.
- 3.6 CONDUCTOR PULL: Conductors shall not be pulled into conduits until after all plastering or concrete work is completed and all conduits in which moisture collected have been swabbed out.
- 3.7 FEEDER IDENTIFICATION: Tag feeder circuits in each enclosure with wrap-around circuit designation labels.
- 3.8 CONNECTORS AND LUGS: Install with manufacturer's recommended tools and with the type and quantity of deformations recommended by manufacturer.
- 3.9 BUNDLING: Conductors No. 10 and smaller shall be neatly and securely bundled and conductors larger than No. 10 shall be neatly and securely cabled in individual circuits, utilizing marlin twine, two-ply lacing or nylon straps.
- 3.10 15 KV CABLE INSTALLATION: Install and terminate 15 KV cables in accordance with the manufacturer's approved recommendations. The conductors shall be free of kinks and twists, and all bends shall be formed with smooth radius not smaller than ten times the diameter of the cable nor smaller than the minimum radius recommended by the manufacturer, whichever is greater. Install cables in continuous lengths without splice unless specifically indicated on the Drawings. Install cable terminations in accordance with the manufacturer's written recommendations. All cables in one conduit shall be pulled in together, using a suitable patented grip on the conductors and a basket weave grip over the insulation, arranged so the stress of pulling is applied to the conductor and not the insulation. Lubricate cables with Cablelube or Minerallac cable pulling

WIRES AND CABLES

compound of the type approved by the cable manufacturer and Architect. Simplex kits are not acceptable. Mark cables for phase identification at each termination by means of Brady "All Temperature" markers or other approved means. Left position Phase "A" black; center position Phase "B" red; right position Phase "C" blue.

3.11 15 KV CABLE TESTS

- A. Scope: Test all 15 KV cables installed or reconnected under this Contract, including the associated splices and terminations to assure that all material continues to possess the original characteristics as required by the governing codes and standards referenced in these Specifications and as recommended by the cable manufacturer. Perform all tests in the presence of the Architect after the cable is installed but before line voltage is applied.
- B. Test Equipment: Furnish all instruments, equipment and personnel required for the tests and provide the source of power required for the test equipment.
- C. Test Procedures: With both ends isolated from tap boxes, air break switches, transformers, etc., the voltage shall be applied between the conductor and the metallic shield and the rate of increase to the specified test voltage shall be approximately uniform and shall be not more than 100 percent in 10 seconds nor less than 100 percent in 60 seconds. The duration of the test shall be for 15 minutes at 35 KV. It should be noted that due to corona at this voltage, the ends of the cable may have to be insulated to achieve a good test.
- D. Acceptance tests shall be in accordance with IPCEA Publication S-19-81 (fourth edition) for the type of cable to be installed, and as approved by the cable manufacturer. Test equipment may be either DC or AC, with test voltages and withstand times in accordance with IPCWA recommendations. Adequate clearances shall be maintained between the circuit ends under test and ground to other equipment to prevent flashovers. Circuit phases not under test shall be raised from zero to the prescribed value with a rate of rise not more than one KV per second, and the test voltage maintained at the prescribed value for the designated time. The test voltage shall then be reduced to zero and the residual voltage on the circuit allowed to reduce to 20% of the test value before discharging and determining the wave from the alternating current voltage. A sphere spark-gap may be used to measure the test voltage. An approved means of measuring the test voltage directly shall be used.
- E. Test Results: A report of the tests shall be prepared and submitted to the Architect in quintuplicate. The report shall list the test equipment used, voltage, time applied for each cable and shall bear the signature of the Contractor and the person in charge of the tests. In the event the cables fail to meet the tests specified, the entire length of cable shall be removed and new cable installed and tested at no additional cost to the Owner.

3.12 CABLE PULLING

- A. After the duct system has been completed and prior to pulling of 15 KV cable, a mandrel not less than 12 inches long, having a diameter approximately 1/4 inch less than the inside diameter, shall be pulled through the duct. The mandrel shall be the type made of a series of sharp cornered metal discs equal to a "Cope Co. Flexible Mandrel". After this, a round brush with stiff bristles shall be pulled through to make certain that no foreign material is left in the run. This procedure shall also be followed when new cable is to be pulled into an existing duct.
- B. When installing cable, the snatch block for holding the pulling rope shall be secured so that the pulling rope is in line with the duct through which power cable is being pulled. Pulling rope or power cables against the surface of the end bells will not be permitted.

3.13 WIRING FOR LOW-VOLTAGE SPECIAL SYSTEMS

- A. General: For the purpose of this Specification, the word "cable" refers to both protected and unprotected cable installations. Special Systems refers to telephone, television, overhead paging, nurse call, building automation, security, data, and fire alarm systems.
- B. Products: Approved cabling shall be used per Section 26 12 00, 2.03.
- C. Protection Requirements: All special systems cable runs inside walls and floors shall be in rigid conduit or BX cable per Section 261100. Cables placed in existing walls may be run in flex if approved by the Architect in advance. Runs exterior to walls and floors shall be as shown in the table below:

System	Requirement	Reference Section
Telephone	Approved cable without additional protection	27 00 00
Television	Approved cable without additional protection	none
Overhead	Approved cable without additional protection	26 77 00
Paging		
Nurse Call	Approved cable without additional protection	26 76 10
Building	Approved cable without additional protection	Division 23
Automation		
Fire Alarm	Approved cable in rigid conduit	26 72 10
Security	Approved BX cable or cable in rigid conduit	26 72 70

- D. Routing: All cable runs shall be routed to avoid passing near sources of electrical noise such as florescent fixtures, power converters, etc. Cable runs shall be routed to avoid paralleling high voltage or high amperage electrical wiring. Cable runs paralleling telephone cables shall have a minimum of twelve inch separation. The Architect will authorize waivers (in writing) for specific cases where the twelve inch separation cannot be maintained.
- E. Horizontal Installation: Horizontal cable runs shall be installed per Section 26 01 00, 3.01 using appropriate stringers, J-hooks, cable trays, and any other devices necessary so no cables above the ceiling shall lay on the ceiling, electrical conduit, ceiling suspension system, piping, ductwork or on any other systems installed in the area. The cable shall not be supported by any of the above mentioned systems. All cable shall be installed in a neat and orderly manner, above or well clear of existing systems. Cable shall not be installed below existing systems or attached to existing systems except on specific written wavier by the Architect.
- F. Vertical Installation: All vertical cable runs shall be installed with appropriate strain reliefs.
- G. Cable Identification: Identify all cable per Section 26 01 00, 3.09 F. Wiring color code shall be approved in advance by the Architect and maintained throughout the scope of the work.
- H. Record Drawings: Per Section 26 01 00, 3.12, the Contractor shall keep accurate records of the cable installation and at the end of the Contract shall turn over to the Architect documentation showing the routing and labeling of all cabling. The format of this documentation shall be approved by the Architect prior to beginning work.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- I. Hazardous Materials: The Contractor shall not disturb any spray-on fire-proofing insulation on roof panels or supporting beams without the approval of the Architect and Owner. Some of this material contains asbestos and proper abatement procedures must be followed. Damage occurring to existing asbestos during the course of the work shall be repaired at the expense of the Contractor.
- J. Wall and Floor Penetrations: All penetrations of smoke and fire walls and floors shall be the responsibility of the Contractor. Conduits and cables penetrating these walls and floors shall be sleeved according Section to 26 11 00, 3.01L, and sealed per Section 26 11 00, 3.04, both inside and out, with approved fire rated materials to prevent the passage of smoke. Fire and smoke penetrations caused by the removal of existing cable shall be properly sealed. The Contractor shall not penetrate any fire wall or structural member without specific authorization by the Architect.
- K. Existing Finishes: The Contractor shall be responsible to repair any damage to the finishes (paint, wallcoverings, tile, carpet, ceiling tile, etc.) caused by the Contractor or his Subs in the areas where he is working.
- L. Ceiling Tile: All ceiling tile removed by the Contractor for ceiling access shall be replaced at the end of each working day. Exceptions to this requirement must be approved by the Architect and Owner.
- M. Equipment Installation: The Contractor shall not install equipment in any equipment room, closet, or in ceiling spaces without authorization from the Architect and Owner. All equipment shall be installed in NEMA enclosures. All wiring entering these enclosures shall be properly secured and protected.
- N. Underground Installations: When installing or removing underground conduit installations, comply with Section 31 05 00: Earthwork.
- O. Cable Tests: All cables shall be tested by the Contractor to insure there are no grounds, opens or shorts. The tests shall be done as appropriate to the type cable being installed and as agreed between the Owner and Contractor. Any deficiency pertaining to these requirements shall be corrected by the Contractor prior to final functional and operational tests of the system with no charge to the Owner.

SECTION 261300 – OUTLET BOXES

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100
- C. Grounding: Section 264500.

PART 2 PRODUCTS

- 2.1 OUTLET BOXES
 - A. Construction: Zinc-coated or cadmium plated sheet steel boxes of a class to satisfy the conditions at each outlet except where unilet or condulet bodies are required. Knockout type with knockouts removed are required. Knockout type with knockouts removed only where necessary to accommodate the conduit entering. Square cornered, straight sided gang boxes, 4" octagon concrete rings and 4" octagon hung ceiling boxes with bars may be folded type; one-piece deep-drawn for all other boxes.
 - B. Size: To accommodate the required number and sizes of conduits, wires and splices in accordance with NEC requirements, but not smaller than size shown or specified. Standard concrete type boxes not to exceed six inches deep except where necessary to permit entrance of conduits into sides of boxes without interference with reinforcing bars. Special purpose boxes shall be sized for the device or application indicated.
 - C. Fixture Studs: 3/8" malleable iron fixture stud in outlet boxes for ceiling lighting fixtures and interior bracket lighting fixtures, other than lamp receptacles and drop cords.
 - D. Exposed: Screw-joint type with gasketed weatherproof covers in locations exposed to the weather.
 - E. Tile Boxes: Rectangular in shape with square corners and straight sides for receptacles and switches mounted in furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls. Install without plaster rings.
 - F. Wall-Mounted Switch, Receptacle and Signal Boxes: Unless otherwise noted or specified not less 4" square by 1-1/2" deep for 2 devices and multi-gang boxes for more than 2 devices. Boxes for switches and receptacles on unfinished walls may be screw-joint type with covers to fit the devices.
 - G. Wall-mounted Telephone Outlet Boxes: 4" square by 2-1/8" deep unless otherwise noted in the Drawings.
 - H. Light Fixture Boxes: 4" diameter by 1-1/2" deep minimum for ceiling and interior bracket fixtures with concealed conduits. Plaster covers for bracket fixtures to have 3" diameter

openings. Screw-joint boxes with canopy seat for ceiling and interior bracket fixtures with exposed conduits.

- I. Grounding Terminal: Provide a grounding terminal in each box containing a green equipment ground conductor, or serving motors, lighting fixtures or receptacles. Grounding terminal shall be green colored washer-in-head machine screw or grounding bushing.
- 2.2 PULLBOXES: Minimum NEC requirements unless larger box is noted. As specified for outlet boxes with blank cover for pullboxes with internal volume not more than 150 cubic inches. As specified for cabinets or pullboxes with internal volume over 150 cubic inches, except covers to have same thickness as box with corrosion-resistant screw or bolt attachment.
- 2.3 FLOOR BOXES: Heavy duty, cast, adjustable type, suitable for the device or application intended, unless noted. Provide metal carpet flanges in carpeted areas.

PART 3 EXECUTION

3.1 OUTLET BOXES

- A. Installation: Unless otherwise specified or shown on the Drawings, outlet boxes shall be flush mounted and the front edges of the boxes or plaster covers shall be flush with the finished wall or ceiling line or if installed in walls and ceiling of incombustible construction, not more than 1/4" back of same. Mount boxes with the long axes of devices vertical, unless otherwise specified. Boxes in plastered walls and ceilings shall be provided with plaster covers. Box extensions and/or covers will not be permitted. Install in a rigid and satisfactory manner with suitable metal bar hanger, box cleats, adjustable box hangers, etc. Use wood screws on wood, expansion shields on masonry and machine screws on steel work. Boxes shall be secured to metal studs with sheet metal screws. Metal stud clips, such as Caddy "MSF", are not acceptable. All boxes shall have far side box supports installed similar to Caddy #766.
- B. Mounting Heights: The mounting height of a wall-mounted outlet box shall be construed to mean the height from the finished floor to the horizontal centerline of the cover plate. On exposed tile, block or brick construction, mount outlet boxes at the nearest bed joint to the mounting height indicated. The height of all outlets shall be at the same height when there is a secondary type wall construction along with the masonry construction. The height in the masonry construction shall be the governing factor. Verify exact height of all boxes with Architect.
- C. Wall mounted switch, receptacle and signal outlets: On columns, pilasters, etc., mount so the centers of the columns are clear for future installation of partitions. Install outlet boxes near doors or windows close to the trim. Install outlet boxes near the doors or the lock sides as shown on Architectural Drawings unless other locations are approved by the Architect.
- 3.2 PULLBOXES: Provide additional pullboxes wherever necessary to meet requirements for maximum lengths of conduit runs and maximum numbers of bends as specified under "Conduit and Fittings".
- 3.3 FLOOR BOXES: Install level with top covers adjusted flush with finished floor or floor tile.
- 3.4 FIXTURE CONNECTIONS: Recessed or surface light fixtures in lay-in or accessible ceilings shall be connected with minimum 1/2" flexible metallic conduits, 4 to 6 feet long with grounding provisions.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

3.5 IDENTIFICATION: Identify all exposed junction and pullboxes according to the system carried by means of painted-on stencils or labels with legible letters and contrasting colors without abbreviations. In general, use yellow color. Painting shall be in accordance with DIVISION - FINISHES.

SECTION 261330 - CABINETS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Grounding: Section 264500.

PART 2 PRODUCTS

- 2.1 GENERAL: Sheet steel except those exposed to wet or rain conditions that shall be raintight unless otherwise noted. Cabinets without through feeder wiring shall be arranged to provide a wiring gutter not less than 4" wide for branch circuit panelboards served by feeders up to 4/0. Panelboards served by feeders in excess of 4/0, up to and including 750 MCM, shall be provided with top, bottom and side gutters 8" wide. Panelboard cabinets in all cases shall meet or exceed the minimum requirements of Article 373-6 of the National Electrical Code. Cabinets shall be of standard make and shall be equal in all respects to those bearing the Underwriters Laboratories label. Cabinets, including boxes shall be made of galvanized steel. All outside surfaces of trim and doors shall be given a factory finish coat of No. 61 ANSI gray paint, or approved manufacturer's standard. Cabinet for telephone and communications systems shall have 5/8" exterior grade, one-face B-grade or equal plywood backboard inside with maximum height and width.
- 2.2 FEED THROUGH GUTTERS: Where feeders go through panelboard cabinets to serve panelboards above or beyond, the wiring gutters in panelboard cabinets shall be a minimum of 8" on sides, top and bottom.
- 2.3 FRONTS: One piece sheet steel frame and a hinged door with catch and lock for flush cabinets. Telephone and signal cabinets for surface mounting shall be equipped with a door hinged directly to cabinet. One piece sheet steel with 3/4" flange with all edges shaped to cover edge of box. Fronts may be secured to box by means of flathead screws with captive nuts or clamps.
- 2.4 DOORS: Doors shall close against a rabbet placed all around the inside edge of the frame with a close fitting joint between door and frame. The doors shall be fitted with substantial flush hinges placed not over 24" apart, nor more than 6" from ends of doors, and fastened permanently to the door and frame with flat-headed rivets or spot welds, or with concealed flush piano hinges. Fastening screws of fronts shall be set not over 24" apart. Doors over 48" in height shall be equipped with a vault hinge and a three point catch.
- 2.5 DOOR-IN-DOOR: Both surface and flush cabinets shall be door-in-door. The door over the interior of the cabinet shall be provided with hinges and combined lock and latch. The outside door over the cabinet gutters shall have a hinge on one side, and machine screws into threaded holes in the cabinet on the other three sides. In order to insure the rigidity of the outside door, surface type cabinets shall have a 1/2" deep lip bent over all around, with the corners welded and grounded; or in the case of flush cabinets, a steel angle frame, equivalent in strength to the bent over lip, shall be welded to the inside of the door. The outside door shall be of such size as to allow a minimum of 2-3/4" opening to all four sides of the wiring gutter. All locks shall be keyed alike.

- 2.6 LOCKS: Furnish each cabinet with a combination catch and flat key lock. The telephone, electrical and signal cabinet locks shall be fitted to separate keying for each system. Furnish two keys for each cabinet.
- 2.7 GROUND BAR: Each cabinet for a panelboard shall be provided with a copper interior ground bar suitably braced or bolted to the cabinet wall. The equipment ground bar shall be equivalent in current carrying pressure connector terminations for the associated feeders, branch circuits, etc.

PART 3 EXECUTION

3.01 CABINETS: Cables installed in the wiring gutters of cabinets shall be neatly bundled, routed and supported. Minimum bending radii as recommended by the cable manufacturer shall not be reduced. Lighting and power cabinets shall be installed with tops 6'-6" above floor and bottoms not less than 12" above floor. The height above floor of the highest over current device handle shall not exceed 6'-6".

SECTION 261400 - WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation and connection of wiring devices.

1.2 RELATED WORK

- A. General Provisions: Section 260100.
- B. Outlet Boxes: Section 261300.
- C. Wires and Cables: Section 261200.
- D. Grounding: Section 264500.

1.3 SUBMITTALS

- A. In accordance with Section 260100 General Provisions, submit the following:
- B. Shop Drawings:
 - a. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - b. Include electrical ratings, dimensions, mounting details, construction materials, grade and termination information.
 - c. Manuals: Two weeks prior to final inspection, deliver four copies of the following to the Resident Engineer: Technical data sheets and information for ordering replacement units.
 - d. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Resident Engineer: Certification by the Contractor that the devices comply with the drawings and specifications, and have been properly installed, aligned, and tested.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. National Fire Protection Association (NFPA): 70-02.....National Electrical Code (NEC)

- C. National Electrical Manufacturers Association (NEMA): WD 1-99General Color Requirements for Wiring Devices WD 6-02Wiring Devices – Dimensional Requirements
- D. Underwriter's Laboratories, Inc. (UL):
 - 5-96 Surface Metal Raceways and Fittings
 - 20-00 General-Use Snap Switches
 - 231-98 Power Outlets
 - 467-93 Grounding and Bonding Equipment
 - 498-01 Attachment Plugs and Receptacles
 - 943-03 Ground-Fault Circuit-Interrupters

PART 2 – PRODUCTS

2.1 RECEPTACLES

- A. General: All receptacles shall be listed by Underwriters Laboratories, Inc., as hospital grade (green dot identification) and conform to NEMA WD 1. (EXCEPTION Receptacle types which have no listing as hospital grade but are listed by UL in their respective categories or receptacles indicated on the drawings as "not hospital grade").
 - 1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a selfgrounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
 - 2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four min.) and side wiring from four captively held binding screws.
- B. Duplex receptacles shall be single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 1 Heavy Duty Type. The duplex type shall have break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.
 - 1. Bodies shall be WHITE in color.
 - 2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The remaining receptacle shall be unswitched.
 - 3. Ground Fault Interrupter Duplex Receptacles: Shall be an integral unit suitable for mounting in a standard outlet box.
 - a. Ground fault interrupter consists of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. It shall be rated for operation on a 60 Hz, 120 volt, 20-ampere branch circuit. Device shall have nominal sensitivity to ground leakage current of five milliamperes and shall function to interrupt the current supply for any value of ground leakage current above five milliamperes (+ or -1 milliamp) on the load side of the device. Device shall have a minimum nominal tripping time of 1/30th of a second. Devices shall meet UL 943.
 - 4. Safety Type Duplex Receptacles:
 - a. Bodies shall be ivory in color.
 - b. Shall be with the following additional requirements.

- 1) Shall permit current to flow only while a standard plug is in the proper position in the receptacle.
- 2) Screws exposed while the wall plates are in place shall be the tamperproof type.
- c. Shall be installed in the following locations:
 - 1) Housekeeping quarters, buildings, waiting areas and lobbies where children might be present.
- C. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete with appropriate cord grip plug. Devices shall meet UL 231.
- D. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap. The weatherproof integrity shall not be affected when heavy duty specification or hospital grade attachment plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.
- E. Lamp Receptacles for Outlet Box Mounting:
 - 1. For use on standard 75 mm (3 inch) and 100 mm (4 inch) outlet boxes.
 - 2. Keyless, porcelain body and skirt supporting a medium screw shell socket, and integral 3-wire grounding receptacle shall have screw terminals and a minimum rating of 600 watts.
 - 3. Porcelain neck shall have shade holder groove.

2.2 TOGGLE SWITCHES AND DIMMERS

- A. Toggle switches shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles shall be ivory in color unless otherwise specified. The rocker type switch is not acceptable and will not be approved.
 - 1. Switches installed in hazardous areas shall be explosion proof type in accordance with the NEC and as shown on the drawings.
 - 2. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plasters ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
 - 3. Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meet the requirements of NEMA WD 1, Heavy-Duty and UL 20.
 - 4. Ratings:
 - a. 120 volt circuits: 20 amperes at 120-277 volts AC.
 - b. 277 volt circuits: 20 amperes at 120-277 volts AC.
 - 5. The switches shall be mounted on the striker plate side of doors.

WIRING DEVICES

- 6. Incorporate barriers between switches with multigang outlet boxes where required by the NEC.
- 7. Switches connected to isolated type electrical power systems shall be double pole.
- 8. All toggle switches shall be of the same manufacturer.
- B. Dimmers: Incandescent modular dimming systems.
 - 1. Incandescent dimming system shall be 2000 watt modular type, with capability for "slaving" larger loads from the "master". System shall have capability of adding additional "slaves", controlled from the original basic dimmer "master". All units shall track with "master". Control units shall be single-phase manual control as shown on the drawings. Dimmers shall have low and intensity adjustment and built-in transient voltage protection and fused on the load side. All remote mounted units shall be completely enclosed in integral metal housing. "Master", "Slaves" and controls shall be of the same manufacturer. All dimmers shall be listed by Underwriters Laboratories, Inc.
- C. Dimmers: Incandescent lamp loads. Wall-mounted incandescent dimmers shall be specification grade with capability of raising and lowering the lighting from completely off at extreme counter-clockwise rotation, to full intensity. Dimmers shall include an "off" position. Dimmers shall maintain full load rating even when two or more units are installed adjacent to one another. All wall-mounted dimmers shall be of the same manufacturer.
- D. Dimmers: Fluorescent lamp loads. Wall-mounted fluorescent lamp dimmers shall be specification grade with large control knob and shall be capable of raising and lowering the lighting from completely off at extreme counter-clockwise rotation, to full intensity. Dimmers shall include an "off" position. Dimmers shall have low end intensity adjustment and maintain full load rating even when two or more units are installed adjacent to one another. All wall-mounted dimmers shall be of the same manufacturer. Dimming ballast shall be provided for each F32 rapid start lamp or pair of lamps. Dimmers shall have adequate capacity for the load served and the environment in which installed.

2.3 WALL PLATES

- A. Wall plates for switches and receptacles shall be WHITE THERMOSPLASTIC. Oversize plates are not acceptable.
- B. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD1.
- C. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- D. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.

2.4 SURFACE MULTIPLE-OUTLET ASSEMBLIES

A. Assemblies shall conform to the requirements of NFPA 70 and UL 5.

- B. Shall have the following features:
 - 1. Enclosures:
 - a. Thickness of steel shall be not less than 1 mm (0.040 inch) steel for base and cover. Nominal dimension shall be 40 by 70 mm (1-1/2 by 2-3/4 inches) with inside cross sectional area not less than 2250 square mm (3.5 square inches). The enclosures shall be thoroughly cleaned, phosphatized and painted at the factory with primer and the manufacturer's standard baked enamel or lacquer finish.
 - 2. Receptacles shall be duplex, hospital grade. See paragraph 'RECEPTACLES' in this section. Device cover plates shall be the manufacturer's standard corrosion resistant finish and shall not exceed the dimensions of the enclosure.
 - 3. Unless otherwise shown on drawings, spacing of the receptacles along the strip shall be 600 mm (24 inches) on centers.
 - 4. Wires within the assemblies shall be not less than No. 12 AWG copper, with 600 volt ratings.
 - 5. Installation fittings shall be designed for the strips being installed including bends, offsets, device brackets, inside couplings, wire clips, and elbows.
 - 6. Bond the strips to the conduit systems for their branch supply circuits.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC and as shown as on the drawings.
- B. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the green equipment grounding conductor.

SECTION 261500 - MOTORS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Grounding: Section 264500.

PART 2 PRODUCTS

- 2.1 GENERAL: Motors will be furnished with the equipment they are intended to operate and therefore generally will be furnished under other sections of these specifications. Furnish nameplates indicating manufacturer, horsepower, phase, cycle, voltage, RPM, type of motor windings, NEMA design and type of enclosure.
- 2.2 SIZE: Adequate for the duty to be performed without exceeding their full rated load or safe operating temperature when the driven equipment is operating at specified capacities with ambient temperatures and altitude compensation simulating actual job conditions.
- 2.3 TYPE: Suitable for the application but not less than Class A insulation and continuous duty classification, based on 40 degrees C. ambient temperature with drip proof frames and totally enclosed for exterior use. Conform to design, construction and performance requirements of NEMA and the Rotating Electrical Machinery Standards of ANSI.
- 2.4 VOLTAGE RATING: NEMA Standard to correspond to circuit voltage serving the motor. Motors operating on 208 volt systems shall be rated 200 volts or shall be specifically wound for the voltage. Rated and covered by the plus or minus 10% rated voltage warranty for 208 volts.
- 2.5 MOTORS:
 - A. For alternating current, fractional and integral horsepower motors, NEMA Publications MG 1 and MG 2 shall apply.
 - B. Voltage ratings shall be as follows:
 - 1. Single phase:
 - a. Motors connected to 120-volt systems: 115 volts.
 - b. Motors connected to 208-volt systems: 200 volts.
 - c. Motors connected to 240 volt or 480 volt systems: 230/460 volts, dual connection.
 - 2. Three phase:
 - a. Motors connected to 208-volt systems: 200 volts.

- b. Motors, less than 74.6 kW (100 HP), connected to 240 volt or 480 volt systems: 230/460 volts, dual connection.
- c. Motors, 74.6 kW (100 HP) or larger, connected to 240-volt systems: 230 volts.
- d. Motors, 74.6 kW (100 HP) or larger, connected to 480-volt systems: 460 volts.
- e. Motors connected to high voltage systems: Shall conform to NEMA Standards for connection to the nominal system voltage shown on the drawings.
- C. Number of phases shall be as follows:
 - 1. Motors, less than 373 W (1/2 HP): Single phase.
 - 2. Motors, 373 W (1/2 HP) and larger: 3 phase.
 - 3. Exceptions:
 - a. Hermetically sealed motors.
 - b. Motors for equipment assemblies, less than 746 W (one HP), may be single phase provided the manufacturer of the proposed assemblies cannot supply the assemblies with three phase motors.

PART 3 EXECUTION

3.1 INSTALLATION: Install motors in accordance with manufacturer's recommendations, the NEC, NEMA, as shown on the drawings and/or as required by other sections of these specifications.

SECTION 261550 - MOTOR STARTERS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100
- C. Grounding: Section 264500
- 1.2 SUBMITTALS: Submit complete shop drawings, control diagrams and descriptive literature.

PART 2 PRODUCTS

- 2.1 GENERAL: Starters shall be as specified in this section unless modified by other sections of these Specifications or by details or control diagrams on the Drawings. Provide NEMA Type I general purpose enclosures, unless otherwise noted or required, with doors arranged for padlocking. Equipment starters with contactors to break each ungrounded line to the motor. Starters shall be as manufactured by General Electric, ITE, Square D, or Cutler-Hammer.
- 2.2 RATING: Each starter shall have a horsepower rating not less than the rating of the motor it controls. Starters and all their related component parts shall be designed and properly coordinated for the rating and characteristics of the motors furnished under the various sections of the specifications. Motor starters and overcurrent devices shall be ambient temperature compensated.
- 2.3 OVERLOADS: Provide ambient temperature compensated thermal overcurrent devices in each ungrounded phase. Provide a suitable reset device for resetting over current trip on the starter front. Overcurrent device ratings shall not exceed code maximums and shall be as recommended by the motor manufacturer for the application.

2.4 CONTROLS

- A. Control circuit conductors shall be grounded in accordance with the NEC and shall be arranged so that an accidental ground will not start the motor.
- B. Energy for control circuits and indicating lights shall be 120 volts.
- C. Provide manual start-stop pushbuttons mounted in starter case unless automatic devices are shown elsewhere on Drawings or specified.
- D. Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motors directly, provided the devices used are designed for the purpose and have an adequate horsepower rating. When the automatic control device does not have such a rating, a magnetic starter shall be used, with the automatic control device actuating the pilot control circuit.

- E. Starters controlled by automatic devices shall be provided with hand-off-automatic selector switch mounted on starter case and connected so motor can be manually operated regardless of the position of the automatic control device. Selector switch shall not be connected to supersede any safety device or safety interlock.
- F. Provide starters with a sufficient number of auxiliary contact (N.O. and/or N.C.) to afford the control and interlocking required. Provide additional relays if required to obtain the correct control.

PART 3 EXECUTION

- 3.1 GENERAL: Provide each motor with a motor starter of proper design to meet the requirements of the motor and drive.
- 3.2 INSTALLATION: Install and connect in accordance with related work specified in other sections of these Specifications and standard industry practice.

SECTION 261600 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100
- C. Grounding: Section 264500.
- 1.2 SUBMITTALS: Submit complete shop drawings with outline dimensions, descriptive literature and complete description of the frame size, trip setting, class and interrupting rating of all overcurrent devices. Identify available space.

PART 2 - PRODUCTS

- 2.1 GENERAL: Dead front, safety type with voltage ratings as scheduled. Panelboards shall be of the type required for the short circuit and duty ratings indicated on the drawings. Panelboards shall be as manufactured by ITE, Square D, or Cutler-Hammer and shall be circuit breaker or fusible type as scheduled.
- 2.2 CABINETS: Each panelboard shall be enclosed in a single sheet metal cabinet with front doors, catches, locks, etc., as specified in Section 261330, Cabinets.
- 2.3 DOOR-IN-DOOR: Both surface and flush panels shall be door-in-door. The door over the interior of the panel shall be provided with continuous piano-hinge type and combined lock and latch. The outside door over the panel gutters shall have a continuous piano-hinge type system on one side and machine screws into threaded holes in the panelboard cabinet on the other three sides. In order to insure the rigidity of the outside door, surface type panels shall have a 1/2" deep lip bent over all around with the corners welded and ground; or, in the case of flush panels a steel angle frame, equivalent in strength to the bent over lip shall be welded to the inside of the door. The outside door shall be of such size as to allow a minimum of 2-3/4" opening to all four sides of the wiring gutter or as required by NEC All locks shall be keyed alike.
- 2.4 BREAKERS: Molded-case or combination molded-case and current limited fuses 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. Automatic tripping shall be indicated by a handle position between the manual OFF and ON position. Provide a trip element for each pole, a common trip bar for all poles and a single molded insulating material handle. Handle ties will not be accepted. Adjustable magnetic trip devices shall be set at the factory to the low trip setting. Provide breaker frame sizes as required for the continuous rating or the interrupting capacity, whichever is larger.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 2.5 BOLTED TYPE: Circuit breaker current-carrying connections to the bus shall be of the bolted type, factory assembled. Stab in type not permitted. Provide bus bars for three phase panelboards of the sequence phased type connection and arranged for three-phase, four wire mains, unless otherwise indicated on the Drawings.
- 2.6 FUSIBLE SWITCH UNITS: Quick make, quick break type with external operation handle suitable for padlocking in OFF position. Provide interlock to prevent opening cover when switch is in ON position unless interlock release is operated. Provide switch frame sizes as required for the continuous rating or the interrupting capacity, whichever is larger. Fusible panelboards shall be UL rated and listed for service entrance where applicable.
- 2.7 SPACE ONLY: Where "Space Only" is noted on the drawings, provide necessary connectors, mounting brackets, etc., for the future insertion of an overcurrent device.
- 2.8 DIRECTORIES: Provide circuit directories on the inside face of the door of each panel.
- 2.9 LABELS: Labels for identifying the breakers shall be engraved laminated plastic strips attached by screws or phenolic buttons or small window frame type. Adhesive stick on labels alone will not be acceptable unless specifically approved.
- 2.10 SKIRTS: Where noted on the Drawings panelboards shall be skirted with complete metal enclosures and barriers separating the panel interior.

PART 3 - EXECUTION

- 3.1 DIRECTORIES: Provide typewritten circuit descriptions referencing permanent room numbering assigned in lieu of the room numbering shown on the Drawings inserted in plastic holder. Text shall be able to be read entirely without moving the card.
- 3.2 CIRCUIT NUMBERING: Circuit numbering shown on the Drawings is based on pole position in the panelboard and not consecutive numbering.
- 3.3 PHASE ROTATION: Phase A, left bus; phase B, center bus; phase C, right bus (front viewing).

SECTION 261700 - MOTOR AND CIRCUIT DISCONNECTS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Grounding: Section 264500.

PART 2 - PRODUCTS

2.1 DISCONNECTING MEANS

- A. Safety Switches: Fusible or non-fusible Type HD quick break safety switches of the sizes and capacities indicated or required. Raintight enclosures at locations exposed to the weather.
- B. Separately Enclosed Motor Snap Switches: Motor snap switches may be used for motor disconnect means, controller and motor overcurrent protection when applicable. These devices shall be horsepower rated and may contain motor running overcurrent protection.
- C. Safety Type Disconnecting Switches: Heavy duty, quick make, quick break type, 250 or 600 volt rating as required for the application. Number of poles and ampacity as noted or required by code. Fusible where noted with fuse clips suitable for Buss Fusetron Class R Fuses. Short circuit rating of 200,000 RMS Amperes with CV Class R rejection feature installed in fuseholders. NEMA 1 enclosures for dry locations. NEMA 3 R enclosures for wet locations or at exposed weather locations unless otherwise noted.

2.2 MANUFACTURERS

A. General Electric, ITE, Square D, or Cutler-Hammer.

PART 3 - EXECUTION

3.1 DISCONNECT MEANS: Install in each location indicated on the Drawings and elsewhere as required by NEC.

SECTION 261810 - FUSES

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Motor and Circuit Disconnect: Section 261700.
- D. Grounding: Section 264500.

PART 2 - PRODUCTS

2.1 FUSES

- A. General: Dual element, time delay type, based on heavy service, Buss Fusetron, or equal, unless otherwise noted or required for installation.
- B. Current Limiting Fuses: Provide where indicated on the Drawings. For individual motor circuit protection, provide fuse sized approximately 125 percent of full load current with 100,000 amperes interrupting capacity. For non-motor feeder protection in conjunction with fused switches, install NEMA Class L fuses sized 125 percent of load current or as required for coordination with air and molded case circuit breakers, shall be furnished by the circuit breaker manufacturer.
- C. Above 600 amps; Class L, "Hi-Cap" as manufactured by Bussman or approved equivalent by Chase-Shawmut or Federal Pacific.
- D. Below 600 amps, as required by short circuit duty, Class K-1, "Limitron" or class K-5, "Low Peak" or Class K-5, "Fusetron" as manufactured by Bussman or approved equivalent by Chase-Shawmut or Federal Pacific.
- E. All switches having current limiting fuses installed shall have a Lamicoid nameplate with white lettering on red background reading:

WARNING, REPLACE ONLY WITH CURRENT LIMITING FUSES AS ORIGINALLY INSTALLED

2.2 COORDINATION: Coordinate the low voltage fuses required for the project to provide basic selective protection and properly coordinate with the other associated protective equipment.

PART 3 - EXECUTION

- 3.1 COORDINATION: Coordinate the low voltage fuses required for the project to provide basic selection protection and properly coordinate with the other associated protective equipment.
- 3.2 SPARE FUSES: Furnish one complete spare set of each size of fuses. Deliver to the Owner in the original boxes. It shall consist of 100% fuse replacement for all fuses required for panelboards and safety switches.
SECTION 261900 – RELAYS AND CONTACTORS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Requirements: Section 260100.
- C. Grounding: Section 264500.

PART 2 PRODUCTS

- 2.1 GENERAL: Electromagnetically operated, mechanically held unless otherwise required. Rugged construction substantially made conforming to NEMA and IEEE test standards for industrial type power relays and the requirements of UL 508, Standards for Safety Industrial Control Equipment. Relays and contactors shall be as manufactured by General Electric, ITE, Square D, or Cutler-Hammer.
- 2.2 RATINGS: As indicated on the Drawings or required, suitable for the application.
- 2.3 CONTACTS: Double break, renewable, solid wiping type, silver to silver or silver tungsten alloy, self aligning, quick make, quick break, with a minimum inductive load rating adequate for the load controlled, but not less than 25 amps.
- 2.4 ENCLOSURES: NEMA 1 for surface mounting in dry locations. Flush mounted with hinged door and flush latch where indicated. Sound-absorbing enclosures where located in or adjacent to occupied areas.

PART 3 EXECUTION

3.1 INSTALLATION: Install and connect in accordance with related work specified in other sections of these Specifications.

SECTION 264100 - ELECTRICAL SERVICE

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100
- C. Raceways: Section 261100.
- D. Wires and Cables: Section 261200
- E. Outlet Boxes: Section 261300
- F. Cabinets: Section 261330
- G. Wiring Devices: Section 261400
- H. Panelboards: Section 261600
- I. Motor and Circuit Disconnects: Section 261700
- J. Grounding: Section 264500

1.2 SUBMITTALS

- A. Submit complete shop drawings with applicable outline dimensions, wiring diagrams, catalog cuts and descriptive literature for the primary cable, pad mount transformer, outdoor switchboard, and distribution switchgear.
- B. Primary Cable: Submit catalog cuts and descriptive literature, including data on conductor type, voltage rating, insulation type and thickness, jacket type and thickness (if any) and evidence of meeting respective IPCEA Standards.
- C. Interruption of Electric Services: Existing Electrical Services shall be interrupted only with written consent from the Owner and the local public utility company. Written requests for outages shall be submitted 10 working days in advance of the outage date. This request will delineate the particular circuits in questions. The time of day the power should be removed, and an approximate number of hours the power shall be off. Such interruptions shall be preceded by all possible preparations by the Contractor that will minimize the down time and expedite that particular phase of the work pursuant to good workmanship. This work shall be done at regular and/or premium time as approved by the Owner without additional expense to the Owner.
- 1.3 REQUIREMENTS: Furnish all labor, materials, service, equipment and appliances required to complete the installation of the revised Electrical Service System in accordance with the following schedule of equipment and as described herein and as indicated on the Drawings.

PART 2 PRODUCTS

- 2.1 GENERAL: Conduits, fittings, supports, 600 volt wire and splices and wiring generally are specified in other sections of these Specifications.
- 2.2 CABLE: Primary Cable is specified under other sections of these Specifications.
- 2.3 PAD MOUNT TRANSFORMERS: Pad mount transformers are specified under other sections of these Specifications.
- 2.4 GROUND RODS: 3/4" diameter, ten feet long, copper or copperclad or as required by National Electrical Code and the local public utility company.

PART 3 EXECUTION

- 3.1 GENERAL: Installation of the distribution system shall be as described herein and as indicated on the Drawings.
- 3.2 FABRICATION, ERECTION AND INSTALLATION of all revised Electrical service equipment shall be done in a first class workmanlike manner by personnel experienced in such work and shall proceed in an orderly manner so as not to hold up the progress of the project. The electrical contractor shall check all areas and surfaces where Electrical service equipment is to be installed and report any unsatisfactory conditions to the Architect.
- 3.3 COORDINATION: Contractor is required to contact serving utilities for power no later than 10 days after Award of Contract/Notice to Proceed and coordinate exact requirements of utilities as they relate to this project. Any deviations from the documents shall be brought to the attention of the Architect/Engineer no later than 20 days after Award of Contract, failure to notify the Architect/Engineer signifies acceptance of documents and utility requirements.

SECTION 264500 - GROUNDING

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Raceways: Section 261100.
- D. Lighting Equipment: Section 265000.
- E. Lamps: Section 265010
- F. Ballasts & Accessories: Section 265020

PART 2 PRODUCTS

2.1 Materials, equipment and devices related to the grounding system are specified under other sections of these Specifications.

PART 3 EXECUTION

3.1 GENERAL: 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 as 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.

3.2 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.
- B. Common Ground Point: Establish one common ground point in the main service equipment by interconnecting the insulated neutral bus (or bar), the uninsulated equipment ground bus (or bar), and service grounding electrode conductor.
- C. Neutral Disconnecting Means: Install a neutral disconnecting means in the main service equipment for disconnecting and isolating the neutral bus from the common ground. The disconnecting means may be disconnecting links in the interconnection between the insulated neutral and uninsulated equipment ground.

D. Neutral Bars: Provide an insulated neutral bar, separate from the uninsulated equipment ground bar, in all panelboards, transformers, starters, disconnect switches, cabinets, etc., which have neutral connections.

3.3 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 connections 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 and to provide a low impedance path to ground for possible ground fault currents.
- B. Common Ground Point: Establish one common ground point as specified elsewhere in this section of the specifications for interconnection of the equipment grounding system and the service grounding electrode conductor.
- C. Service Equipment Enclosure: Bond the enclosure of the main service equipment to the uninsulated equipment ground box (or bar) with a conductor or bar sized for 50% of the largest service overcurrent device.
- D. Ground Bar: Provide an uninsulated equipment ground bar, separate from any insulated neutral bar, in all panelboards, starters, disconnect switches, cabinets, etc. for grounding the enclosure and for connecting other equipment ground conductors. The ground bar shall be an integrally mounted and braced bus bar in panelboards or a separately mounted bar adequately braced or bolted to the enclosure after thoroughly cleaning both surfaces to assure good contact. Provide solderless pressure connectors for all conductor terminations. Number and size of pressure connectors on equipment grounding bars as required for the termination of equipment grounding conductors. In addition to the active circuits, provide pressure connectors for all three-phase spares and spaces.
- E. Conduits: Where metallic conduits terminate without mechanical connection to a metallic housing of electrical equipment by means of lock nut and bushings, provide ground bushing connected with a bare copper conductor to the ground bar in the electrical equipment. Metallic conduits containing ground wiring only shall be bonded to the ground wire at both conduit entrance and exit. Install grounding conductor in each nonmetallic conduit or duct except those used for telephone, sound, or low voltage signals and in all flexible conduit that does not have a built-in ground conductor. Bond the conductor at both ends to the equipment grounding system.
- F. Feeders and Branch Circuits: Provide a separate green insulated equipment grounding conductor for each single or three phase feeder and each branch circuit with a three phase protective device. Provide a separate green insulated equipment grounding conductor for single phase branch circuits where indicated on the Drawings. Install the required grounding conductor in the common conduit or raceway with the related phase and/or neutral conductors and connect to the box or cabinet grounding terminal. Where there are parallel feeders installed in more than one raceway each raceway shall have a green insulated equipment ground conductor installed.
- G. Devices: Install a minimum No. 12 green insulated equipment bonding conductor from a grounding terminal in the respective outlet or junction box to the green ground terminal of all

receptacles and through flexible conduit to all light fixture housings and other fixed equipment.

- H. Motors: Install a separate green insulated equipment grounding conductor from the equipment ground bar in the motor control center or separate starter through the conduit and flexible conduit to the ground terminal in the connection box mounted on the motor. Install the grounding conductor in the common conduit or raceway with the related motor circuit conductors.
- 3.4 SEPARATELY DERIVED SYSTEMS: Transformers creating separately derived distribution systems, such as dry type transformers, shall utilize the equipment ground bars in the transformer enclosure for both secondary equipment ground and secondary neutral ground with separate grounding conductor extended to an approved ground electrode.
- 3.5 GROUNDING ELECTRODES: Two 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-H). 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 the application.
- 3.6 GROUNDING CONDUCTORS: The grounding conductors for both service ground electrodes shall be insulated or bare copper, sized in accordance with NEC 250-94, 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 the 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 of 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.
- 3.7 GROUND CONNECTIONS: 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 "Galvanoz", or equal.

3.8 TESTS

- 1. Remove all jumpers between the equipment ground busses and the service (neutral) ground busses in the main service panel and all separately derived systems. See Section 3.02.C.
- 2. For each grounding system, using a megger, measure the resistance between the two ground busses at the panel where the jumper was installed. The resistance shall be greater than 10 megohms.
- 3. Re-connect the equipment and service bus jumpers on all systems. See Section 3.02.C.
- 4. For each grounding system, using a megger, measure the resistance between the two ground busses at the panel farthest away (electrically) from the panel where the jumper was installed. The resistance shall be less than 5 ohms.

5. Submit a written report to the Engineer for approval. The service shall not be energized if the test shows more than 5 ohms, unless approved by the Architect.

SECTION 265000 - LIGHTING EQUIPMENT

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Grounding: Section 264500
- D. Lamps: Section 265010
- E. Ballast and Accessories: Section 265020

1.2 SUBMITTALS

- A. Submit for approval complete shop drawings, catalog cut, special installation instruction, photometric data, descriptive literature, and actual fixture when requested by Architect.
- B. Each fixture submittal shall be inclusive of lamp manufacturer's data for lamp to be furnished for each particular fixture. Review of fixtures will not be started until this provision has been met.

PART 2 PRODUCTS

- 2.1 GENERAL: Furnish all lighting fixtures throughout of the type indicated on the drawings, complete with lamps, sockets, wiring, fitters, hangers, plaster rings, canopies, etc., as required.
- 2.2 METAL HALIDE FIXTURES: All metal halide fixtures shall be provided with a clear glass lens integral to fixture.
- 2.3 RECESSED FIXTURES: All recessed fixtures shall be provided with thermal protection as required by National Electrical Code.

PART 3 EXECUTION

- 3.1 SUPPORTS: Support ceiling fixtures by anchorage to the ceiling only where the ceiling is concrete or masonry units. For ceiling of other construction, anchor ceiling fixtures to metal or wood supports provided for the purpose, of suitable strength and stability, adequately attached to and supported by joists, trusses or other structural members, unless other methods of support are specifically approved by the Architect. Where lay-in construction is used fixtures shall be of the lay-in type. Fixtures shall be supported at all four corners to structure above. Coordinate supports for lay-in fixtures with ceiling Installer/Sub-Contractor.
- 3.2 LOW DENSITY CEILING: Special attention is directed to the code restriction against mounting fluorescent fixtures on combustible low density cellulose fiberboard ceilings (NEC 410-77b). If fixtures are to be installed that are not UL approved for this condition a suitable mounting arrangement shall be developed which meets the approval of the Architect.

- 3.3 CEILING TRIM AND MEANS OF SUPPORT: The ceiling trim and means of support of recessed fixtures shall be coordinated with the type of ceiling to be installed within or on to insure proper installation.
- 3.4 SUSPENDED FIXTURES: Provide swivel hangers and canopies to insure a plumb installation. For single unit suspended fluorescent/LED fixtures provide tubing or stems for wiring at one point and a tubing or rod suspension provided for each unit of chassis. Provide 3/16" diameter rods minimum.
- 3.5 BLOCKING: Protect housing of recessed lighting fixtures during installation by internal blocking or framing to prevent distortion of sides or dislocation of threaded lugs which upon completion must be in perfect alignment and match the corresponding holes in frames or rims so that holding screws can be installed freely without forcing and remain so they can be easily removed when servicing. Threads to receive holding screws shall be chased after plating and finishing to insure easy installation and removal of knurled headed screws by thumb pressure.
- 3.6 LAMP GUARDS: Provide wire guards on open type fluorescent fixtures to prevent lamps from falling.
- 3.7 CLEAN UP: At final inspection the fixtures and lighting equipment shall be in first class operating order, in perfect condition as to finish, 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.
- 3.8 CEILING TRIM: Furnish proper ceiling frames for the ceiling material in which recessed fixtures are to be installed, verify prior to ordering. Rims of all fixtures that overlap ceilings shall be installed tight and snug against the ceiling surfaces so that no light leakage occurs around the rim. If unevenness or surface of fixture allows light to show, then this contractor shall provide soft sponge filler or gasket on all fixtures requiring this treatment, and as approved by Architect.
- 3.9 FIXTURES
 - A. Special attention is directed to the special provisions for flush and recessed fixtures in the National Electrical Code.
 - 1. All recessed fixtures shall have top connections to the outlet boxes installed in accordance with the code.
 - 2. Connection to lay in fixtures shall be made with flexible connections of 4'-0" minimum, 6'-0" maximum length. Fixture-to-fixture wiring is not permitted.
 - 3. All recessed fixtures shall be furnished with UL listed thermal protective device.

SECTION 265010 - LAMPS

PART 1 GENERAL

- 1.1 RELATED WORK SPECIFIED ELSEWHERE
 - A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
 - B. Grounding: Section 260100.
 - C. Lighting Equipment: Section 265000.
 - D. Ballast and Accessories: Section 265020

PART 2 PRODUCTS

- 2.1 FLUORESCENT LAMPS: Fluorescent lamps shall be GE 3500 degree K/SP35 with 80CRI (minimum) or approved equal, energy saving lamps matched for usage to energy saving ballast. The ballast/lamp system shall be capable of providing 6000 initial lumens for two lamps with 75 watts system input.
- 2.2 INCANDESCENT LAMPS: Incandescent lamps shall be inside frosted, medium base, extended service, 130 volt unless otherwise noted. PAR or R lamps shall be provided if called for on the Drawings.
- 2.3 METALLIC HALIDE LAMPS: Metallic halide lamps shall be phosphor coated, mogul base and shall be furnished for proper lamp burning position as determined by fixture installed within. Correlated lamp color temperature shall be as follows:

100 watt 3200 degrees K 175 watt 3200 degrees K 250 watt 3200 degrees K 400 watt 3700 degrees K 1000 watt 3400 degrees K

Color temperature may vary 100 degrees K plus or minus.

- 2.4 HIGH PRESSURE SODIUM LAMPS: High pressure sodium lamps shall be clear, mogul base with an apparent color temperature of 2100 degree K, or as indicated. Lamps shall be furnished for proper lamp burning position as determined by fixture installed within.
- 2.5 SAFETY: All Metallic Halide Lamps shall be furnished with a means of immediately extinguishing the lamp when the outer lamp envelope is either penetrated or broken.
- 2.6 MANUFACTURERS: General Electric, Sylvania, or Cutler-Hammer are approved. Where a specific manufacturer's product is mentioned, then it shall be so furnished.

PART 3 EXECUTION

3.1 INSTALLATION: The Contractor shall install new lamps in all lighting fixtures. Installation of the new lamps shall be made seven (7) days before final inspection, unless otherwise approved by the Architect in writing.

SECTION 265020 - BALLASTS AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. Grounding: Section 260100
- C. Lighting Equipment: Section 265000.
- D. Lamps: Section 265010

PART 2 PRODUCTS

- 2.1 GENERAL: Ballast shall be supplied for the voltage that the fixture is connected to. All ballast shall be high power factor and UL listed.
 - A. Ballasts: Fluorescent ballasts shall be energy savings type and shall be usable with energy savings lamps so that the ballast/lamp system shall be capable of providing 6000 average initial lumens for two lamps at 75 watts of system input. Ballast performance with such lamps shall be certified by ETL or approved equal laboratory with a United States Government Registered Certification Mark for fluorescent lamp ballast. Performance certification with such lamps shall be according to component test method and appear on ballast nameplate; the relative light output shall be 95% with a tolerance of +5% to -2-1/2% and input watts shall be 78 watts with a tolerance of 5%. The ballast case temperature shall not exceed 90 degree C. Ballast shall be UL listed, Class P, Premium. Mercury vapor, metal halide, and high-pressure sodium ballasts shall be manufactured with the following features:
 - 1. .125 minimum thickness extruded aluminum housing with heat dissipating fins.
 - 2. Die cast aluminum end cap closure.
 - 3. Thermally isolated capacitor enclosed in a diecast compartment with easy access for serviceability.
 - 4. Constant auto stabilized, high-power factor.
 - 5. Constant Wattage, auto-stabilized, high power factor. Core and coil encapsulated in a thermally conductive Class F (155 degree C.), insulation material which isolates sound attenuating vibration.
 - 6. Stand-By feature with instant incandescent light from energizing or re-energizing of current to 70% of rated output of HID lamp.
- 2.2 MANUFACTURERS: Advance, General Electric, Jefferson, Universal, Halo, Prescolite, or approved equal for function specified.

PART 3 EXECUTION

3.1 All ballasts shall be installed within specific fixtures in a manner so as to assure a completely silent operation with attainment of maximum ballast life as specified by the manufacturer.

SECTION 265100 – LIGHT EMITTING DIODE (LED) LIGHTING

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract, including General Conditions, Supplementary General Conditions (if any) and General Requirements apply to the work specified in this section.
- B. General Provisions: Section 260100.
- C. Raceways: Section 261100.
- D. Grounding: Section 264500.
- E. Lighting Equipment: Section 265000.
- F. Lamps: Section 265010.
- G. Ballasts: Section 265020.

1.2 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI/NEMA/ANSLG C78.377-2008, Specifications for the Chromaticity of Solid-State Lighting (SSL) Products.
- B. In Situ Temperature Measurement Test (ISTMT), contained within the ENERGY STAR Manufactures Guide.
- C. Illuminating Engineering Society of North America (IESNA)
 - 1. LM-63-2002, Standard File Format for Electronic Transfer of Photometric Data.
 - 2. HB-10-11, Lighting Handbook, Reference and Application, 10th Edition.
 - 3. LM-79-08, Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products.
 - 4. LM-80-08, Approved Method for Measuring Lumen Maintenance of LED Light Sources.
 - 5. TM-21-11, Projecting Long Term Lumen Maintenance of LED Light Sources.
- D. National Fire Protection Agency (NFPA)
 - 1. NFPA 70, National Electrical Code
 - 2. NFPA 101, Life Safety Code
- E. Underwriters Laboratories, Inc. (UL)
 - 1. UL 1598-2008, Standard for Luminaires.
 - 2. UL 8750-2009, Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products.

- 3. UL 924, Standard for Emergency Lighting and Power Equipment.
- 4. UL 1598B, Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires
- F. Rebate requirements and equipment listings.

1.3 DEFINITIONS

- A. L70: Reported useful life of the LED light engine in operating hours for the system to reach 70% lumen maintenance.
 - 1. Lumen maintenance is defined as \geq 70% of initial lumens @ 50,000 hours minimum, unless otherwise indicated.
 - 2. Calculated according to IESNA TM-21-11 using data determined by IESNA LM-80.
- B. Total Harmonic Distortion (THD): The root mean square (RMS) of all the harmonic components divided by the total fundamental current.
- C. CRI: Color rendering index as defined by the IESNA.
- D. CCT: Correlated Color Temperature as defined by the IESNA

PART 2 - PRODUCTS

- 2.1 GENERAL
 - A. Manufacturers and their products are shown to establish a level of performance and quality only. Unless otherwise indicated, Contractor may submit data for approval as required under Section 01300 Submittals for alternate products they have investigated and believe to be equal in performance and quality.
 - B. All products shall be new and free from defects.
 - C. Power supplies/drivers, LED arrays, boards or light engines shall be easily field replaceable using common hand tools (e.g., screwdrivers, pliers, etc.) and without uninstalling the luminaire.
 - D. Electrical:
 - 1. Operating voltage: universal voltage (120/277 Vac).
 - 2. Power factor: ≥ 0.90 (at full luminaire output and across specified voltage range).
 - 3. THD: $\leq 10\%$ (at full luminaire output and across specified voltage range).
 - 4. Surge protection: ANSI C62.41-2002 Category A surge protection standards up to and including 2.5 kV.
 - 5. Sound: Class A not to exceed a measured value of 24dB.
 - 6. Maximum standby power: 1W.
 - 7. Driver efficiency (at full load):
 - 8. $\geq 85\%$ for drivers capable of ≥ 50 watts.
 - 9. $\geq 80\%$ for drivers capable of < 50 watts.
 - 10. Federal Communications Commission (FCC) compliance: FCC Part 15 Class A

(Commercial) requirements for EMI/RFI emissions.

- E. Correlated Color Temperature (CCT):
 - 1. Only allowed CCTs are 4000/4100K
 - 2. Acceptable tolerances as provided in ANSI C78.377-2008
- F. Color rendering index (CRI): \geq 80 with a positive R9 value
 - 1. Tested per LM-79-2008
- G. Listed for application by an independent national testing laboratory which is acceptable to the Authority having Jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the project to verify proper conditions for correct execution of the work, prior to commencing work. Changes in contract price will not be allowed for construction conditions that could have been determined by inspection of the site.

3.2 PREPARATION

A. Refer to Section 16500 – General Lighting.

3.3 INSTALLATION

A. Installation of new luminaires, retrofit kits and linear LED lamps.

- 1. Contractor shall make connections based on the circuit diagram provided by the manufacturer.
- 2. Wiring connections shall be made so as to preserve the functional requirements of existing lighting systems, switching controls, and emergency lighting circuits, unless otherwise specified.
- 3. All unused ballasts shall be completely removed from retrofitted fixtures.
- B. Lamp holders
 - 1. Replace damaged and defective lamp holders in existing luminaires when required to remain in place for use with new retrofit.
 - 2. Abandoned lampholders shall be removed.
- C. Lenses and Louvers
 - 1. Lenses or louvers that are to remain shall be removed, cleaned thoroughly, wiped clean, and installed back in the luminaire.
 - 2. New lenses shall be installed prism side down.
- D. New luminaires
 - 1. Install surface-mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
 - 2. Install suspended luminaires according to manufacturer's instructions and local, state and federal codes.

- 3. Install all necessary accessories furnished with each luminaire
- 4. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within the luminaire.
- 5. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.4 CLEANING

A. Refer to Section 16500 – General Lighting.

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 plantprotection 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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

- 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 onsite.

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.

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. Project's Geotechnical Report.

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 soild 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 web 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, dampproofing, 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.
SECTION 312311 - EARTHWORK FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

2.1 SUMMARY

A. The work covered by this Section consists of furnishing all plant, labor, equipment, appurtenances and material in performing all operations, hauling, placing, spreading, watering, processing, compacting and shaping earth sections, within the building limits, complete in place in accordance with the Project Manual and Drawings.

2.2 RELATED REQUIREMENTS

- A. Clearing Section 31 1000
- B. Under-Slab Vapor Retarder Section 07 2600
- C. General Foundation Notes on Drawings.
- D. Project Soils Report shall be completely reviewed and understood by the contractor. In case of conflict or omission, the Project Soils Report shall govern.

2.3 SUBSURFACE SOIL DATA

- A. Subsurface soil investigations have been made and the results are available for examination by the Contractor. This is not a warranty of conditions, the Contractor is expected to examine the site and determine for himself the character of materials to be encountered.
- B. No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal, or removal of any unclassified materials.

2.4 **REFERENCES**

- A. ASTM International, latest versions:
 - 1. ASTM D1556 Standard Test Method for Density of Soil in Place by the Sand-Cone Method
 - 2. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard effort (12,400 ft-lbf/ft^3(600Kn-M/M^3))
 - 3. ASTM D4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - 4. ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

2.5 SUBMITTALS

A. Submit copies of materials certificates and test results for materials in accordance with type of tests, frequencies and remarks as outlined in the sampling and testing schedule.

2.6 TESTING AND INSPECTION

A. General: The Owner shall employ the services of a registered, licensed Geotechnical Engineer to observe all controlled earthwork soil testing. The testing laboratory shall provide continuous on-site observation by experienced personnel during construction of fill material. The Contractor shall notify the testing laboratory at least two working days in advance of any field operations of controlled earthwork, or of any resumption of operations after stoppages.

- B. Report of Field Density Tests
 - 1. The Geotechnical Engineer shall submit, daily, the results of field density tests required by these specifications.
- C. Costs of Tests and Inspection
 - 1. The cost of testing, inspecting and engineering, as specified in this section of the specifications, shall be borne by the Owner.
- D. Lines and Grades: Alignment and grade of all elements shall be made on true tangents and curves. Grades shall conform to the elevations indicated on Drawings, with minor adjustments, to provide a smooth approach at building lines, at connections to existing paving and to provide proper drainage. Correct irregularities at no cost to the Owner.

2.7 WEATHER LIMITATIONS

A. Controlled fill shall not be constructed when the atmospheric temperature is below 35 degrees F. When the temperature falls below 35 degrees, it shall be the responsibility of the Contractor to protect all areas of completed work against any detrimental effects of ground freezing by methods approved by the testing laboratory. Any areas that are damaged by freezing shall be reconditioned, reshaped, and compacted by the Contractor in conformance with the requirements of this specification without additional cost to the Owner.

PART 2 - PRODUCTS

3.1 STRUCTURAL FILL MATERIAL

A. Material shall consist of soils that conform to the following physical characteristics:

a.	Sieve Size	Percent Passing				
a.	Sq. Openings	By Weight				
a.	3 Inch	100				
a.	No. 4	50 - 100				
a.	No. 200	50 Max				
Maximum expansive potential (%): 1.5%						

- 1. See geotechnical report for measured sample.
- C. Aggregate base should conform to Section 303 of 2014 NMDOT specifications for Type I of Base Course.

PART 3 - EXECUTION

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4.1 PREPARATION

A. Clearing and Grubbing: Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled offsite or stockpiled for subsequent use in landscaped areas or non-structural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

4.2 CONSTRUCTION AREA TREATMENT

- A. Site Preparation Fill Areas: Prior to placing structural fill the areas to be filled shall be scarified to a depth of eight inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of maximum density as determined in accordance with ASTM D 698. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.
- B. Site Preparation Cut Areas: Following excavation to rough grade all building and pavement areas shall be scarified to a depth of eight inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D 698.

4.3 EQUIPMENT AND METHODS

A. In areas not accessible to heavy equipment, distribute by and compact with hand operated vibratory compactors.

4.4 BORROW

- A. The Contractor shall provide sufficient material for fill to the lines, elevations and cross sections as shown on the contract drawings from borrow areas.
- B. The Contractor shall obtain from the Owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved, and shall pay all expenses in developing the source including the cost of right-of-way required for hauling the material.

4.5 COMPACTION

- A. Fill shall be spread in layers not exceeding 8 inches, watered as necessary, and compacted. Moisture content at time of compaction shall plus/minus 2 percent of optimum moisture. A density of not less than 95 percent of maximum dry density shall be obtained within the building pads.
- B. Optimum moisture content and maximum dry density for each soil type used shall be determined in accordance with ASTM D 698.
- C. Compaction of the fill shall be by mechanical means only. Where vibratory compaction equipment is used, it shall be the Contractor's responsibility to ensure that the vibrations do not damage nearby buildings or other adjacent property. Where vibratory compaction is not possible, pneumatic rolling equipment shall be used.

		MINIMUM
	MATERIAL	PERCENT
		COMPACTION
Structural & g	canular fill in construction area	95
Subgrade below	w structural fill	95
Structural fill u	under exterior walls	95
Miscellaneous	backfill	90

4.6 MOISTURE CONTROL

A. The material, while being compacted, shall be within the moisture range of 2 percent below to 2 percent above optimum, well distributed throughout the layer.

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4.7 DENSITY REQUIREMENTS

A. Density of undisturbed soils, in-place fill and backfill shall be determined in accordance with the procedures of ASTM D 1556 or ASTM D 6938. If tests indicate that the density of in-place soil is less than required, the material shall be scarified, moistened or dried as necessary to obtain proper moisture content and recompacted as necessary to achieve the proper densities. Sufficient density tests shall be made and reports submitted by the Testing Laboratory indicating all cut and fill areas were compacted and graded in accordance with the requirements.

4.8 SLOPE PROTECTION & DRAINAGE

A. Berming and grading shall be done as may be necessary to prevent surface water from flowing into and out of the construction area. Any water accumulating therein shall be removed by pumping or by other methods.

4.9 SOIL EROSION PROTECTION

- A. The Contractor shall ensure that no soil erodes or blows from the site into public right-of-way or onto private property.
- B. The Contractor shall promptly clean up any material which erodes or blows into the public right-of-way or onto private property.

4.10 PRESERVATION OF PROPERTY

- A. Provide temporary fences, barricades, coverings, or other protections to preserve existing items indicated to remain and to prevent injury or damage to persons or property. Apply protections to adjacent properties as required.
- B. Restore damaged work to condition existing prior to start of work, unless otherwise directed.

4.11 EXISTING UTILITIES

- A. The Contractor shall verify the location of any utility lines, pipelines, or underground utility lines in or near the area of the work in advance of and during Earthwork. The Contractor is fully responsible for any and all damage caused by failure to locate, identify and preserve any and all existing utilities, pipelines and underground utility lines. Repair damaged utilities to the satisfaction of the utility owner at no expense to the Owner.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during grading, consult the Architect immediately for directions as to procedures.
- C. Cooperate with the Owner and public or private utility companies in keeping service and facilities in operation.

4.12 WASTE

- A. Dispose of all waste off Owner's property.
- B. Burning of waste will not be permitted.

4.13 AIR POLLUTION

A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt air pollution. Comply with governing regulations pertaining to environmental protection.

MINIMUM SAMPLING AND TESTING SCHEDULE									
SAMPLING AND TESTING SCHEDULE									
FOR EARTHWORK									
FIELD QUALITY CONTROL									
TEST FOR	FREQUENCY	REMARKS							
Compaction in accordance with ASTM D 1556 or ASTM D 6938	1 per 2500 square feet of surface	Conduct a minimum of 3 tests							
Soil Conditions Moisture- Density in accordance with ASTM D 698	Test 1 per soil classification								
Compaction control in accordance with ASTM D 1556 or ASTM D 6938	1 per each lift or every 2500 square feet of surface 1 per each lift for each 2500 square feet of fill	Immediately after placing, Conduct a minimum of 2 tests per section							
	VIMUM SAMPLING AND TI SAMPLING AND TESTIN FOR EARTHWO FIELD QUALITY CO TEST FOR Compaction in accordance with ASTM D 1556 or ASTM D 6938 Soil Conditions Moisture- Density in accordance with ASTM D 698 Compaction control in accordance with ASTM D 1556 or ASTM D 6938	VIMUM SAMPLING AND TESTING SCHEDULE SAMPLING AND TESTING SCHEDULE FOR EARTHWORK FIELD QUALITY CONTROL TEST FOR FREQUENCY Compaction in accordance with ASTM D 1556 or ASTM D 6938 Soil Conditions Moisture- Density in accordance with ASTM D 698 Compaction control in accordance with ASTM D 1556 or ASTM D 6938 I per each lift or every 2500 square feet of surface I per each lift for each 2500 square feet of fill							

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. Crawlspaces: 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 groundsupported 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.

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.

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.

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 readymixed 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 floatfinished concrete surface perpendicular to line of traffic to provide a uniform, fineline 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 1/4inch 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.

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; Urexpan 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. Crafco 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, singlecomponent, 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. Crafco, 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. Crafco 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.

SECTION 32 3113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fence framework, fabric, and accessories.
 - 2. Excavation for post bases.
 - 3. Concrete foundation for posts.
 - 4. Manual gates and related hardware.

1.2 SYSTEM DESCRIPTION

- A. Fence Height: As indicated.
- B. Line Post Spacing: At intervals not exceeding 10 feet.
- C. Fence Post and Rail Strength: Conform to ASTM F1043, Active Standard.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- B. Product Data: Fabric, posts, accessories, fittings and hardware.
- C. Manufacturer's Installation Instructions: Post foundation anchor bolt templates.

1.4 QUALITY ASSURANCE

- A. Supply material according to CLFMI Product Manual.
- B. Perform installation according to ASTM F567.
- C. Manufacturer: Company specializing in manufacturing products specified in this Section with five years' experience.
- D. Installer: Company specializing in performing work of this Section with five years' experience and approved by manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fabric Fabric: All chain link fabric shall be woven into approximately 2 inch mesh. Fence fabric shall be zinc coated steel fabric meeting the requirements of ASTM A392.
 - 1. Wire used in four-foot (4') fence fabric shall be 11-gauge (0.120 inch diameter) and shall be knuckled on the top and bottom selvage.
 - 2. Wire used in six-foot and eight-foot (6', 8') fence fabric shall be 9-gauge (0.148 inch diameter) and shall be twisted on the top selvage and knuckled on the bottom selvage. Wire ends shall be cut at an angle.

- B. Barbed Wire: Barbed wire shall be zinc-coated steel barbed wire conforming to ASTM A121. The barbed wire shall be design number 12-4-5-14R: two twisted strands of 12-gauge wire, and 4-point, 14-gauge barbs spaced 5 inches on center.
- C. Concrete: ASTM C150, portland cement type II, 4,000 psi strength at 28 days.

2.2 COMPONENTS

A. Posts, Post Rails and Braces: All pipe required for construction of the fence and gates shall be round Schedule 40 steel pipe, hot-dip galvanized (interior and exterior), zinc-coated, regular grade (30,000 psi) meeting or exceeding the requirements of ASTM F1083 and ASTM F1043 Group 1A. Pipe sizes for fence components are presented in the following table.

Use	Nominal Pipe Size	Outside Diameter (in.)	Weight (lbs/ft)	Fence Indus- try Trade Reference		
Line Post						
1. 4' Fence	1 1/2"	1.900	2.72	1 7/8"		
2. 6' and 8' Fence	2"	2.375	3.65	2 3/8"		
Brace rail, Intermediate Rail	1 1/4"	1.660	2.27	1 5/8"		
Gate Frames						
1. 4' Fence	1 1/4"	1.660	2.27	1 5/8"		
2. 6' and 8' Fence	1 1/2"	1.900	2.72	1 7/8"		
Terminal, End, Corner &						
Slope/Pull Posts						
1. 4' Fence	2"	2.375	3.65	2 3/8"		
2. 6' and 8' Fence	3"	3.500	7.58	3 1/2"		
Gate Posts						
1. 4' Fence						
Gate leaf up to 4-feet	2"	2.375	3.65	2 3/8"		
Gate leaf over 4' to 10'	2 1/2"	2.875	5.80	2 7/8"		
Gate leaf over 10' to 18'	3 1/2"	4.000	9.11	4"		
2. 6' and 8' Fence						
Gate leaf up to 6-feet	3"	3.500	7.58	3 1/2"		
Gate leaf over 6' to 12'	3 1/2"	4.000	9.11	4"		
Gate post sizes for gate leaf widths greater than listed shall be as directed by the Owner.						

- B. Tension Wire: Tension wire shall have a marcelled pattern. The wire shall be zinc-coated, galvanized steel wire, 7 gage (0.177 inches in diameter), conforming to ASTM A824.
- C. Tie Wire: Ties used to fasten the fabric to posts, rails, and gate frames shall be not smaller than 11 gage galvanized steel, 6 gage aluminum wire, or approved non-corrosive metal bands.

2.3 ACCESSORIES

- A. Chain Link Fence Accessories: The following components shall be zinc-coated steel with a minimum zinc coating of 1.2 oz/ft², and galvanized after fabrication, conforming to ASTM F626. Any additional fence accessory not specifically stated shall also meet these requirements unless otherwise approved by the Owner or the Owner's representative.
 - 1. Post and line caps: Caps shall be designed to fit securely over the outside of the posts and be watertight.
- 2. Rail and brace ends.
- 3. Tie wires, clips, fasteners, and hog rings.
- 4. Tension and brace bands.
- 5. Tension bars: Tension bars shall have a cross section no less than 3/16-inch by 3/4-inch. The tension bar shall be of a continuous length and not shorter than 2 inches less than the nominal height of the fabric.
- 6. Truss rod assembly: The truss rod assembly shall consist of a steel rod not less than 3/8" in diameter and be equipped with a turnbuckle or other equivalent provision for adjustment. The assembly shall be capable of withstanding a tension of 2,000 lbs.

2.4 GATES

- A. Gates and Accessories: Swing gates, complete with latches, stops, keepers, hinges, drop bar, and barbed wire, shall be provided where shown on the plans. Swing gates shall conform to ASTM F900.
 - 1. Gate Frames: Gate Frames shall be Schedule 40 steel pipe as described in 2.2A of this specification.
 - 2. Gate Fabric: The fabric shall be as specified for the fence as described in 2.1A of this specification.
 - 3. All gate accessories shall be zinc-coated with a minimum zinc coating of 1.2 oz/ft², galvanized after fabrication, conforming to ASTM F626 and in accordance with tests set forth in ASTM A90.
 - 4. Hinges: Gate Hinges shall be pressed steel or malleable iron. The hinges shall be designed to permit the gate to swing a full 180 degrees. The hinges shall be of adequate strength, with large bearing surfaces for clamping in position and shall not twist or turn under the action of the gate.
 - 5. Latches: Double gate latches shall be a plunger bar arranged to engage the gate stop. Locking devices shall be constructed so that the plunger bar cannot be raised when the gate is locked. The latching device shall have provision for a padlock and shall be designed such that both gate leaves can be locked with a single padlock. Single gate latches may be of the same style, or a forked latch may be provided. Each latch shall be provided with a padlock, Master or equal, and four keys.
 - 6. Gate Stops: Gate stops shall be provided for all double gates and shall consist of a galvanized, hot-dipped zinc-coated Schedule 40 drop-bar and a receiving gate stop as illustrated on standard details of the construction drawings.
 - 7. Keepers: Keepers shall be provided for each gate leaf 5 feet in width or more. Gate keepers shall consist of a mechanical device for securing the free end of the gate when in the full open position.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install framework, fabric, accessories and gates according to ASTM F567.
- B. Post Location: Line posts shall be spaced equidistantly at intervals not exceeding 10 feet. Terminal posts (end, corner, gate and slope/pull posts) shall be set where an abrupt change in alignment or grade of 30-degrees or more occurs or to divide straight runs of fencing which exceed 500-feet in length.

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- C. Excavate holes for posts to diameter and spacing indicated without disturbing underlying materials.
- D. Posts shall be set in a vertical position, plumb, in line and centered in the footing. Concrete shall be placed 6" below the post and shall extend 2 inches above grade and be crowned to shed water. Forms are not required. Fence fabric shall not be stretched until the concrete has cured for at least 7-days. If solid rock or concrete is encountered, the posts shall be set as recommended by the fencing manufacturer and approved by the Owner or Owner's Representative prior to installation.
- E. Post Footings: Set posts in concrete in holes in diameter and depth as shown in the tables below, unless otherwise shown on Drawings.

4' FENCE POST HOLES							
Type of Post	Diameter of Post Hole	Depth of Post Hole	Depth of post in Concrete				
Line Posts (1.900" OD)	8"	24"	18"				
Terminal Posts (2.375" OD)	10"	24"	18"				
Gate Posts							
1. Gate leaf less than 4' (2.375" OD)	10"	36"	30"				
2. Gate leaf between 4' to 10' (2.875" OD)	12"	36"	30"				
3. Gate leaf over 10' to 18' (4.000" OD)	16"	36"	30"				
Post holes for gate leafs greater than listed shall be as directed by the Owner.							

1. Four-Foot (4') Fence Post Holes:

2. Six-Foot (6') and Eight-Foot (8') Fence Post Holes:

6' AND 8' FENCE POST HOLES						
Type of Post	Diameter of Post Hole	Depth of Post Hole	Depth of post in Concrete			
Line Posts (2.375" OD)	10"	30"	24"			
Terminal Posts (3.500" OD)	14"	30"	24"			
Gate Posts						
1. Gate leaf 6' and less (3.500" OD)	14"	36"	30"			
2. Gate leaf over 6' to 12' (4.000" OD)	16"	36"	30"			
Post holes for gate leafs greater than listed shall be as directed by the Owner.						

- F. Install top rail to be supported at each post so that a continuous brace from end-to-end of each stretch of fencing is formed. The top rail shall be securely fastened to the terminal posts and joined with sleeves or couplings.
- G. Place fabric on posts and rails (allow footings to cure a minimum of seven days before installing fabric and other materials attached to posts).
- H. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- I. Position bottom of fabric 2 inches above finished grade.
- J. Fence Fabric Attachment Point Table:

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

Fence Fabric Attachment to:	Attach with:	Attachment Spacing:	
Terminal Post	Brace Bands & Tension Bar		
Line Post	Tie wire		
Corner Post	Brace Bands & Tension Bar	12"	
Gate Frame Horizontal member	Tie wire		
Gate Frame Vertical member	Brace Bands & Tension Bar		
Tension Wire	Hog ring	18"	

- K. Install bottom tension wire stretched taut between terminal posts.
- L. Attach barbed wire; tension and secure.
- M. Gates: Swing gates complete with latches, stops, keepers, hinges and barbed wire shall be provided where shown on the plans. Swing gates shall conform to ASTM F900 except as otherwise specified.
 - 1. Frames shall be made of pipe as specified in 2.2A.
 - 2. Frames shall be made with corner fittings or welding. Protect welds by applying a zincrich paint in accordance with ASTM A780 and the American Galvanizer Association such as Galvax Cold Galvanizing Paint (95% Zinc) or an approved equal. Where corner fittings are used, gates shall have truss rod assemblies even if not otherwise stated. Gate leaf design shall be as stated below. Interior bracing shall be evenly spaced within the frame. Gate leaf sizes that are not encompassed by the following requirements shall be as noted on the plans or as directed by the Owner.
 - a. 4' fabric gate leaf of 3' 4' width shall have one diagonal truss rod assembly.
 - b. 6' 8' fabric gate leaf of 3' 4' width shall have one horizontal brace.
 - c. 6' 8' fabric gate leaf between 5' to 8' width shall have one horizontal brace, one vertical brace and one diagonal truss rod assembly.
 - 3. Where barbed wire is required, the end members of the gate frames shall extend one foot above the top horizontal member to which three strands of barbed wire, uniformly spaced, shall be attached by use of bands or clips.
 - 4. Fabric shall be attached securely to the gate frame by tension bars, brace bands, and tie wires as specified for fence construction. All fence fabric attachments to gate framing is spaced a maximum of 12".
 - 5. Hinge and latch offset opening space from the gate frame to the gate post shall be no greater than 3" in the closed position.
 - 6. Gate stops for double gates shall be set in a concrete footing of minimum 12" diameter and 24" deep.
 - 7. The gate shall be capable of being opened and closed easily by one person and installed in a manner as to prevent removal of the gate by lifting off.
 - 8. Gates shall swing or slide in the direction indicated in the drawings. Grade clearance and all possible gate obstructions shall be considered to provide adequate operational clearance. Gates shall be true to opening and plumb in a closed position.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

N. Repairs of Damage to Coatings: Welds made after galvanizing shall be ground smooth, then wire brushed to remove loose or burned zinc coating. Where galvanized coatings are cut, broken, burned, abraded, or otherwise damaged, affected areas shall be repaired by applying zinc-rich paint in accordance with ASTM Practice A780.

3.2 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch.
- B. Maximum Offset from Indicated Position: 1 inch.
- C. Minimum distance from property line: 6 inches.

END OF SECTION

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

SITE UTILITIES

33 0000

TECHNICAL SPECIFICATIONS FOR MATERIAL AND WORKMANSHIPOF WATER AND WASTEWATER FACILITIES

TABLE OF CONTENTS

SECTION

PAGE

TABLE OF CONTENTS	1-2
DEFINITION OF TERMS	3

TP 1.0	EXCA	VATION, TRENCHING, & BACKFILLING FOR WATE	R &
	WAST	FEWATER UTILITIES	TP 1.0-5
	1.01	Scope of Work	TP 1.0-5
	1.02	Layout and Staking	TP 1.0-5
	1.03	Protection of Excavation	TP 1-1-5
	1.04	Protection of Existing Utilities	TP 1.0-6
	1.05	Excavation	TP 1.0-6
		1.05.01 General	TP 1.0-6
		1.05.02 Grading and Stacking	TP 1.0-6
		1.05.03 Pavement Cutting	TP 1.0-6
		1.05.04 Rock Excavation	TP 1.0-6
		1.05.05 De-Watering	TP 1.0-7
		1.05.06 Excavation for Structures	TP 1.0-7
		1.05.07 Over-Excavation	TP 1.0-7
		1.05.08 Trench Excavation	TP 1.0-7
	1.06	Placement and Compaction of Pipe Embedment and Backfill	
		Material	TP 1.0-8
		1.06.01 Pipe Embedment	TP 1.0-8
		1.06.02 Compaction Requirements	TP 1.0-9
		1.06.03 Water Jetting	TP 1.0-9
	1.07	Imported Backfill	TP 1.0-10
		1.07.01 Imported Pipe Embedment	TP 1.0-10
		1.07.02 Imported Final Backfill	TP 1.0-10
	1.08	Bedding and Backfill for Structures	TP 1.0-10
		1.08.01 Bedding	TP 1.0-10
		1.08.02 Backfill	TP 1.0-10
	1.09	Settlement of Adjacent Structures	TP 1.0-10
	1.10	Surface Restoration and Resurfacing	TP 1.0-11
		1.10.01 Surface Restoration	TP 1.0-11
		1.10.02 Roadway Patching	TP 1.0-11

TP 2.0 WATER AND WASTEWATER LINE SEPARATION

REQU	UIREMENTS	TP 2.0-13
2.01	General	TP 2.0-13
2.02	Horizontal Separation of Water and Wastewater Lines	TP 2.0-13
2.03	Vertical Separation of Water and Wastewater Lines	TP 2.0-13

		2.03.01 Water Line Above Wastewater Line	TP 2.0-13
		2.03.02 Wastewater Lines Above Water Lines	TP 2.0-13
	2.04	Water Main Separation From Manholes	TP 2.0-14
	2.05	Water and Wastewater Service Line Separation within 5 Feet of	
		the House	TP 2.0-14
	2.06	Separation Between Water Lines and Components of the	
		Wastewater Disposal System	TP 2.0-14
	2.07	Separation Between Residence and Wastewater Lagoons	TP 2.0-14
TP 3.0	WAT	ER MAINS AND APPURTENANCES	TP 3.0-15
	3.01	Scope of Work	TP 3.0-15
	3.02	Water Mains	TP 3.0-15
		3.02.01 Polyvinyl Chloride Pipe and Fittings (PVC)	TP 3.0-15
		3.02.02 Water Main Installation	TP 3.0-16
		3.02.03 Connections to Existing Mains	TP 3.0-16
	3.03	Valves For Water Mains	TP 3.0-17
		3.03.01 Gate Valves	TP 3.0-17
		3.03.02 Valve Boxes	TP 3.0-17
		3.03.03 Valve Installation	TP 3.0-17
	3.04	Fire Hydrant Assembly	TP 3.0-18
		3.04.01 Fire Hydrant	TP 3.0-18
		3.04.02 Hydrant Connections and Auxiliary Gate Valves	TP 3.0-18
		3.04.03 Fire Hydrant and Guard Installation	TP 3.0-18
	3.05	Thrust Blocking	TP 3.0-18
	3.06	Water Main Crossings	TP 3.0-18
		3.06.01 Wash Crossings	TP 3.0-18
		3.06.02 Road Crossings	TP 3.0-18
	3.07	Water Service Connection Material	TP 3.0-19
	3.08	Water Service Line Installation	TP 3.0-19
	3.09	Pressure Tests	TP 3.0-19
		3.09.01 Pressure Test	TP 3.0-19
		3.09.02 Observation Of Tests	TP 3.0-21
	3.10	Disinfections	TP 3.0-21
		Water Line Pressure Test Certification	TP 3.0-23
		Water Line Pressure Test Worksheet 1	TP 3.0-24
		Water Line Pressure Test Worksheet 2	TP 3.0-25
TP 4.0	WAS	TEWATER MAINS AND APPURTENANCES	TP 4.0-26
	4.01	Scope of Work	TP 4.0-26
	4.02	General	TP 4.0-26
	4.03	Materials	TP 4.0-26
		4.03.01 Polyvinyl Chloride (PVC) Sewer Pipe	TP 4.0-26
		4.03.02 Polyvinyl Chloride (PVC) Sewer Pipe Fittings	TP 4.0-26
		4.03.03 Ductile Iron Sewer Pipe	TP 4.0-27
		4.03.04 Ductile Iron Pipe Fittings	TP 4.0-27
		4.03.05 Precast Concrete Manhole Sections	TP 4.0-27

		4.03.06	Manhole Covers and Frames	TP 4.0-27
		4.03.07	Manhole Steps	TP 4.0-27
		4.03.08	Concrete	TP 4.0-28
		4.03.09	Wastewater Cleanout and Frame	TP 4.0-28
	4.04	Installati	ion Of Sewer Pipe	TP 4.0-28
		4.04.01	Pipe Laying	TP 4.0-28
		4.04.02	Depth of Bury	TP 4.0-29
		4.04.03	Installation of Service Connections	TP 4.0-29
	4.05	Manhole	e Installation	TP 4.0-29
		4.05.01	General	TP 4.0-29
		4.05.02	Connection To Existing Manhole	TP 4.0-30
	4.06	Wastewa	ater Main Crossings	TP 4.0-30
		4.06.01	Wash Crossings	TP 4.0-30
		4.06.02	Road Crossings	TP 4.0-30
	4.08	Wastewa	ater Line Testing	TP 4.0-31
		4.08.01	Alignment Test	TP 4.0-31
		4.08.02	Deflection Test	TP 4.0-31
		4.08.03	Ex-filtration Test	TP 4.0-32
		4.08.04	Groundwater Infiltration	TP 4.0-33
	4.09	Manhole	e Testing	TP 4.0-33
	4.10	Observa	tion of Pressure Test	TP 4.0-34
			Wastewater Main/Manhole Test 1 Certification	TP 4.0-35
			Wastewater Main/Manhole Test 1 Worksheet	TP 4.0-36
			Wastewater Main/Manhole Test 2 Certification	TP 4.0-37
		Wa	astewater Main/Manhole Test 2 Worksheet	TP 4.0-38
TP 5.0	FINA.	L SITE (JTILITY INSPECTION REQUIREMENTS	TP 5.0-39
	5.01	Final Ins	spection Package	TP 5.0-39
		5.01.01	As-Built Drawings	TP 5.0-39
		5.01.02	As-Built Notebook	TP 5.0-39
	5.02	Schedul	ing Final Inspection	TP 5.0-39
	5.03	As-Built	Drawing Requirements	TP 5.0-40
		5.03.01	General Requirements for all Sheets	TP 5.0-40
		5.03.02	Cover Sheet	TP 5.0-40
		5.03.03	Plat Sheet	TP 5.0-41
		5.03.04	Utility Plan View Sheet(s)	TP 5.0-41
			Water/Wastewater Plan and Profile Sheet(s)	TP 5.0-44
			Cost of Plant (Example)	TP 5.0-45

DRAWING STANDARDS AND LEGEND

Utility Transfer Agreement......TP 5.0-46

DEFINITION OF TERMS:

Owner:	The organization or its representative authorizing and administer			
	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 <u>General</u>

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 <u>Rock Excavation</u>

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 <u>Over-Excavation</u>

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 <u>Trench Excavation</u>

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 <u>Pipe Embedment</u>

<u>Pipe embedment</u>: 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.

<u>Bedding</u>: 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.

<u>Haunching</u>: 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.

<u>Initial Backfill</u>: 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.

<u>Final Backfill</u>: 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.

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%

Percent of Maximum Density - D1557

* or the existing condition within the undisturbed bottom of the trench.

1.06.03 <u>Water Jetting</u>

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 <u>Roadway Patching</u>

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 <u>Wastewater Above Water</u>

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 <u>Water Main Separation from Wastewater Manholes</u>

No waterline pipe shall pass through, under, or come into contact with any part of a wastewater manhole.

2.05 <u>Water and Wastewater Service Line Separation Within 5 feet of the House</u>

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 <u>Separations Between Waterlines and Components of the Wastewater</u> <u>Disposal System</u>

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 <u>Separation Between Residences and Wastewater Lagoons</u>

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 <u>Water Mains</u>

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 <u>Water Main Crossings</u>

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 <u>Road Crossings</u>

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 <u>Curb Stops</u>

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 4inches 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/Coppersetters

Yokes or coppersetters 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 39-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 3inch diameter PVC-DWV pipe shall be cut so that the top of the adapter extends 3 to 6-inches above ground surface.

3.08 <u>Water Service Line Installation</u>

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:

$$Q = \frac{N*D*(P)}{7400}^{1/2}$$

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 TEST	TED:				
			Include Pro	ject Name & N	umber	
DATE(S) TEST	WAS CON	DUCTED:				
GAUGES MAN	UFACTURI	ER AND MOI	DEL: 1)_			
			2) _			
STANDARD LI	ENGTH OF	PIPE IN TEST	Γ SECTION: _			FEET.
TEST SECTION	J:					
1201 0201101		(Sta	Sta., Line No	., etc.)		
Length (StaSta.)	Line Size/Type	Pipe Pressure	Test Pressures	Observed Pressure	Total Leakage	Allowable Leakage
Time-Start/End	(Inch)	(PSI)	(PSIG)	(PSIG)	(Gal./2hrs.)	(Gal./2hrs.)
THE TEST ANI	O ATTACHI	ED INFORMA	ATION IS CE	RTIFIED BY:		
Signature	e/Printed Nat	me:				
Organiza	tion/Address	5:				
Address:						
Telephor	ne Number:					
TEST RESULTS	S CHECKEI	O AND APPR	OVED ON: _	Date	a	
₽V·						
NTUA R	epresentativ	e				
COPY OF APPE	ROVAL OF	TEST SENT	ГО:			
ON			BY	Project Age	ncy Involved	
D	Date		Ø 1	NTU	JA	

EXHIBIT B OF TP-3

WATER LINE PRESSURE TEST WORKSHEET 1

Allowable Leakage: $Q = \frac{ND(P)^{1/2}}{7400}$

Q = Gallon per Hour

N = <u>Total Length of Line Being Tested (ft)</u> = _____ = _____ Standard Length of Pipe (ft)

D = Nominal Diameter of Pipe (inches) = _____

P = Test Pressure (psig) = _____

Allowable Leakage (2 Hour Test) = $2Q = \underline{ND} \square (P)^{1/2} X 2 = \underline{(Gals.)}$ 7400

Are the pressure gauges graduated at a maximum of 5-PSI increments?

Was the line pressured to 10 PSI above the test pressure so that the gauge responsiveness could be observed?

Is the length of the test section less than one mile?

Is the elevation difference between the highest and lowest points in the test section less than 57 feet?

Are the pipes in the test section the same pressure rating?

Description of Activity:	Time:	Gauge Readings:	Amount of Water Added:	
	TT		T. ()	0.1
Total Time:	Hrs.		Total:	Gals.

Verified By:

NTUA Representative/Date

Print Name/Title

EXHIBIT C OF TP-3

WATER LINE PRESSURE TEST WORKSHEET 2

Test Section:

(Sta-Sta, Line No., Etc.)

Length (StaSta.) Time: Start	Line Size & Type	Pipe Pressure Rating	Test Pressure	Observed Pressure Range	Total Leakage	Allowable Leakage
& End	(Inch)	(PSI)	(PSIG)	(PSIG)	(Gal./2hrs.)	(Gal./2hrs.)
		/	· · · /	· · · /		

TECHNICAL PROVISIONS 4.0

TP 4.0 WASTEWATER MAINS AND APPURTENANCES

4.01 <u>Scope of Work</u>

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 <u>General</u>

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 <u>Materials</u>

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 <u>Pre-cast Concrete Manhole Sections</u>

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 $\frac{3}{4}$ "-inch by 2-inch by 2-inch recessed slot with a $\frac{1}{2}$ -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 ¹/₂-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 <u>Concrete</u>

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 <u>Manhole Installation</u>

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 <u>Connection to Existing Manhole</u>

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 <u>Wastewater Main Crossings</u>

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 <u>Road Crossings</u>

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 ¹/₄" 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 <u>Sewer Service Line Installations (Not part of the Utility company's facilities)</u>

4.07.01 <u>General</u>

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-feet 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 <u>Wastewater Line Testing</u>

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 <u>Ex-filtration Test</u>

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.

<u>Air Testing</u>: 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

<u>Water Testing</u>: 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 <u>Manhole Testing</u>

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.

<u>Vacuum Testing</u>: 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.

<u>Hydrostatic Testing</u>: 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 CONDUC	TED:	
STANDARD LENGTH OF PIPE	IN TEST SECTION:	FEET.
THE TEST AND INFORMATIO	N IS CERTIFIED BY:	
Signature/Printed Name:		
Organization/Address: _		
Address:		
Telephone Number:		
WASTEWATER TEST 1 RESUL	LTS CHECKED AND APPROVED ON:	
DV.	Duie	
NTUA Representat	tive	
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	Size	Length	Actual	Pass/Fail (P	Remarks			
(MH# to MH#)	(in)	(ft.)	Leakage	or F)				
			(gal.)					

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	Station	Actual	Pass/Fail (P	Remarks					
No.		Leakage (gal.)	or F)						

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:		
Inclu	de Project Name & Number	
DATE(S) TEST WAS CONDUCTED:		
THE GAUGE USED FOR TESTING SHALL HA	VE MIN. DIVISION OF 0.10 PSI.	
STANDARD LENGTH OF PIPE USED ON THIS	S 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	Size	Length	Start Test	Stop Test	Elapsed	Pass/Fail	Remarks
MH# to MH#	(in.)	(ft.)	Pressure	Pressure	Time	(P or F)	
			(Psig)	(Psig)	(Min/Sec.)		

SEWER MAIN AIR TEST

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	Stop Vacuum	Elapsed Time	Pass/Fail (P or F)	Remarks
1.00		(Inch)	(Inch)	(Min/Sec.)	(1 01 1)	

Verifica Dy. Date.

Title/Company: _____

* Lamp test shall be conducted after completion of street construction and final grading.

TP 4.11 <u>Individual Subsurface Disposal Systems (Not part of the Utility Company's</u> Facilities)

4.11.01 <u>General</u>

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 <u>Sewer Pipe and Fittings</u>

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 feet intervals.

4.11.06 Drainfield Materials

4.11.06.01 <u>Gravel</u>

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 + 1-inch throughout the entire length of the trench. The 4-inch perforated plastic pipe shall then be laid level + 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 <u>As-Built Drawings</u>

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 (<u>Total</u>) 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 <u>Utility Plan View Sheet(s)</u>

- **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 <u>final</u> 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 450 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.

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

House No.	Dome Stop	stic	Water	Meter	Curb Stop		Water Main Tap		Yard Clean out		Sewer Wye	
	А	В	А	В	А	В	А	С	А	В	А	С
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

SWING TIES (Examples)

	House		
Item	No.		Distance
		А	В
MH 11A-3	3	56.2	68.4
		А	В
GV-1	5	43.4	63.6
		А	В
GV-2	5	43.6	61.6
		В	С
MH 11A-1-2	15	93.4	73.0
		В	С
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:

						Dimens	sions (in)	
Use	Size (in)	Type of Material	Joint Type	SDR	Pressure Rating PSI				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

NM15-32 46 Units Ojo Amarillo, NM Indigenous Design Studio + Architecture

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 <u>Water/Wastewater Plan and Profile Sheet(s)</u>

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
				Sul	ototal:	\$23,630.94
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
				Su	btotal:	\$49,112.29
TOTAL COST OF UTILITY PLANT:						
Less: Sewer Service Connection not transferred to Operating Utility:						-\$ 4,830.00

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	
Navajo Trib	al Utility Authority: by Signature	Date:
	Printed Name	