

CASINO BOATHOUSE RECONSTRUCTION PROJECT
PHASE I
Technical Specifications

Inlet's Arrowhead Park
Local Waterfront Revitalization Program
(LWRP #C006824)

This document was prepared with funding provided by the New York State Department of State under Title 11 of the Environmental Protection Fund.

Town of Inlet
160 Route 28
PO Box 179
Inlet, N.Y. 13360

Randal J. Acey, P.E.
Wolf Engineering
PO Box 913 Old Forge NY 13420



SECTION 01 1000

SUMMARY

PART 1 - GENERAL

1.1 PROJECT

- A. Project Name: CASINO BOATHOUSE PROJECT PHASE I - Arrowhead Park
- B. Owners Name: Town of Inlet
- C. Engineers Name: Randal J. Acey, P.E., Wolf Engineering
- D. The Project consists of the construction of a 14' x 26'-8" Changing Room Addition to the Existing Bathhouse located within Arrowhead Park.

1.2 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract, of limited scope, based on a stipulated sum as described in Document; SECTION 004113 - bid form.

1.3 DESCRIPTION OF WORK

- A. Scope of New Work is as follows and as shown on Drawing:
 - 1. Contractor to install Concrete Work: (Foundations & Slabs).
 - 2. Contractor to install Driven Piles; (four (4) total).
 - 3. Contractor to install Wood Framing. (Wall & Deck Framing)
- B. Prevailing Rate Case: PRC #2017009920

1.4 WORK BY OWNER

- A. All work not included in Scope of New Work as shown above and items noted NIC (Not In Contract) will be supplied by the Town of Inlet after Substantial Completion.

1.5 OWNER OCCUPANCY

- A. The Town of Inlet intends to occupy the Project for their work scope by the date stated in the agreement as the contract completion date
- B. Schedule the work to accommodate the Town of Inlet.

1.6 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operation: Limited to areas noted on drawings.
- B. Provide access to and from the site as required by law and the Town of Inlet:
 - 1. Access to the Park is to be maintained. Coordination with the Town of Inlet shall be done during construction deliveries or events requiring limited access to the Park.
 - 2. Do not obstruct roadways, walkways or sidewalks, or other public ways without coordination with the Town of Inlet or without permit.
- C. Existing building spaces may not be used for storage unless coordinated with the Town of Inlet.
- D. Time Restrictions:
 - 1. Limit conduct of especially noisy work to the hours of _____.
- E. Utility Outages and Shutdowns:
 - 1. Do not disrupt or shutdown life safety systems, without prior notice to the Town of Inlet.
 - 2. Prevent accidental disruption of utility services to the existing and other facilities.

1.7 WORK SEQUENCE

- A. Coordinate construction schedule and operations with the Town of Inlet.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION 01 1000

DOCUMENT 004113

BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: CASINO BOATHOUSE RECONSTRUCTION PROJECT - PHASE I
- C. Project Location: Arrowhead Park, Inlet NY
- D. Owner: Town of Inlet
- E. Project Engineer: Randal J. Acey, PE - Wolf Engineering

1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined all the Bidding Documents prepared by **Wolf Engineering** and dated 8/28/17, **having visited the site, and being familiar with all conditions and requirements of the Work**, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:
 - 1. Concrete Work _____ Dollars (\$_____).
 - 2. Driven Piles _____ Dollars (\$_____).
 - 3. Wood Framing _____ Dollars (\$_____).

1.3 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:
 - 1. _____ Dollars (\$_____).
- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 SUBCONTRACTORS AND SUPPLIERS

- A. The following companies shall execute subcontracts for the portions of the Work indicated:
 - 1. Concrete Work: _____
 - 2. Driven Piles: _____
 - 3. Wood Framing: _____

1.5 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Project Engineer, and shall fully complete the Work within 60 calendar days.
 - 1. The Bidder accommodate the Owner’s daily business operations and to schedule work during evenings and weekends whenever possible. Disruptions during business hours are to be kept to a minimum.

1.6 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:
 - 1. Addendum No. 1, dated _____.
 - 2. Addendum No. 2, dated _____.
 - 3. Addendum No. 3, dated _____.
 - 4. Addendum No. 4, dated _____.

1.7 SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2012.

Submitted By: _____
(Name of bidding firm or corporation)

Authorized
Signature: _____
(Handwritten signature)

Signed By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice President)

Witness By: _____
(Handwritten signature)

Attest: _____
(Handwritten signature)

By: _____
(Type or print name)

Title: _____
(Corporate Secretary or Assistant Secretary)

Street Address: _____

City, State, Zip _____

Phone: _____

License No.: _____

Federal ID No.: _____

(Affix Corporate Seal Here)

END OF DOCUMENT 004113

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates

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

1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and accessories.
4. Curing compounds.
5. Floor and slab treatments.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete," [Sections 1 through 5.][Sections 1 through 5 and Section 7, "Lightweight Concrete."]
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 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. Products: Subject to compliance with requirements, provide one of the products specified.
3. 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.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel

wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For chairs to support wire for slabs-on-grade, provide plastic tipped feet with spacing not exceeding 3 feet center to center.

2.5 CONCRETE MATERIALS

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

1. Portland Cement: ASTM C 150, Type I or II Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class [C] [F].
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate. Provide aggregates from a single source.

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: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

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

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

2.7 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

- a. Fortifiber Corporation; Moistop Ultra A.
- b. Raven Industries Inc.; Vapor Block [15] [10].
- c. Reef Industries, Inc.; Griffolyn Type-[65G] [105].

2.8 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing 3/8-inch sieve.
 - 1. Available Products:
 - a. Anti-Hydro International, Inc.; Emery.
 - b. Dayton Superior Corporation; Emery Non-Slip.
 - c. Emery-Crete, Inc.; Emery-Topcrete.
 - d. Lambert Corporation; EMAG-20.
 - e. L&M Construction Chemicals, Inc.; Grip It.
 - f. Metalcrete Industries; Metco Anti-Skid Aggregate.

2.9 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, non-dissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering].
 - 1. Available Products:
 - a. Burke by Edoco; Spartan Cote WB II 20 Percent.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
 - d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
 - e. Euclid Chemical Company (The); Diamond Clear VOX.
 - f. Kaufman Products, Inc.; SureCure Emulsion.
 - g. Lambert Corporation; Glazecote Sealer-20.
 - h. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - i. MBT Protection and Repair, Div. of ChemRex; MasterKure-N-Seal VOC.
 - j. Meadows, W. R., Inc.; Vocomp-20.
 - k. Metalcrete Industries; Metcure 0800.
 - l. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 200E.
 - m. Sonneborn, Div. of ChemRex; Kure-N-Seal.
 - n. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
 - o. Tamms Industries, Inc.; Clearseal WB STD.

- p. Unitex; Hydro Seal 18.
- q. US Mix Products Company; US Spec Radiance UV-25
- r. Vexcon Chemicals, Inc.; Starseal 0800.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Adhesive for Drilled Anchors and Dowels: Hilti HY 150, Hilti Corp., adhesive or equivalent

2.11 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Ground Granulated Blast-Furnace Slag: 50 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

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

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Minimum Cementitious Materials Content: 550 lb/cu. yd.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

2.14 FABRICATING REINFORCEMENT

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

2.15 CONCRETE MIXING

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

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. 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 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 1. Class A, 1/4 inch for smooth-formed finished surfaces.
 2. Class C, 1/2 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
 - 2. Place and compact a 1/2-inch - thick layer of fine-graded granular material over granular fill.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for slabs in the middle third of spans.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent

formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to all surfaces
- C. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
 - 2. After broadcasting and tamping, apply float finish.
 - 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer[**unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project**].

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least six month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around.

Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.

B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

END OF SECTION 03300

SECTION 356216 - STEEL PIPE PILES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes the fabrication and installation, by driving, of steel pipe piling, including cut-offs and dowels.
- B. “Driving piles” refers to both installation by vibratory hammers and traditional methods using impact hammers. This section refers to both methods unless the context clearly refers to one method only.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 033000, Cast-in-Place Concrete

1.3 REFERENCES

- A. AISC: American Institute of Steel Construction.
- B. ASTM: American Society for Testing and Materials.
 - 1. ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - 2. ASTM A252: Standard Specification for Welded and Seamless Steel Pipe Piles
 - 3. ASTM A500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - 4. ASTM A501: Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
 - 5. ASTM A706: Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- C. AWS: American Welding Society.
 - 1. AWS D1.1: Structural Welding Code – Steel, 2010
- D. IBC: International Building Code.
 - 1. IBC Chapter 17: Structural Tests and Special Instructions

1.4 SUBMITTALS

- A. At least two weeks prior to mobilization at the site, submit data fully describing all proposed pile installation equipment including hammers, rams, driving cushions, pile caps, and cap blocks.

- B. Submit certification of yield strength and weldability of steel products, mill certificates of chemical and physical properties, or equivalent.
- C. Submit pile driving template.
- D. Prepare and submit full length installation records for each pile installed. The records shall be submitted within 24 hours after installation is completed for the pile. The records shall include the following minimum information:
 - 1. Final tip elevation.
 - 2. Cut-off elevation.
 - 3. Description of unusual installation behavior or conditions.
 - 4. Pile material and dimensional properties.
 - 5. Elevations at welded joints.
 - 6. Other data which may be useful in evaluating the pile.

1.5 QUALITY ASSURANCE

- A. Welder Qualifications: Qualify welders, welding processes, and procedures in accordance with AWS "2010 Structural Welding Code"

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site in such quantities and at such times to assure the continuity of pile driving operations in keeping with the project schedule.
- B. Store piles in orderly groups above ground and blocked during storage to minimize possible distortion of members. Piles exhibiting variations beyond tolerance limits will be considered distorted and may not be used in the work.

1.7 PROJECT CONDITIONS

- A. Protect existing structures from damage caused by pile driving operations.

PART 2 - PRODUCTS

2.1 OPEN-END PIPE AND SPLICE SECTIONS

- A. Pipe Piles: Shall meet the requirements of ASTM A53, Grade B, Type E or S, $F_y = 35$ ksi; ASTM A501, welded, $F_y = 36$ ksi; ASTM A500, welded, Grade D, $F_y = 36$ ksi.
- B. Piles installed with vibratory hammers shall be open-ended.
- C. Steel Reinforcing: ASTM A706, Grade 60, weldable.
- D. Fabrication: Provide backing bar and pile caps of the same steel as the piling. Fasten to piles with welded connections as shown on the drawings.

1. Welds joining piles shall be complete penetration groove welds.
2. See Section 051200, Structural Steel Framing, for additional fabrication requirements.

2.2 PILE-DRIVING EQUIPMENT

- A. Driving equipment shall be of a type generally used in standard pile-driving practice and shall be operated at the manufacturer's specified rate to develop the required rated energy. Drop hammers will not be allowed.
- B. Impact hammers shall be steam, air, or diesel driven and shall develop a minimum rated energy of 24,000 foot-pounds per blow and no more than 33,000 foot-pounds per blow or as required to achieve the necessary pile tip penetration. The Contractor shall be responsible for selecting driving equipment that will not cause damage to the piling or adjacent structures during driving.
- C. Vibratory hammers shall be of sufficient size and energy to install piles to the required tip elevation.
- D. Driving caps shall be capable of protecting pile head and providing uniform distribution of energy to pile head.
- E. Use fixed rigid type pile driver leads that will hold the pile firmly in position and alignment, and in axial alignment with the driving equipment. Free-swinging, flying leads will not be permitted, except for batter piles. Extend leads to within 2 feet of the elevation at which the pile enters the water.

PART 3 - EXECUTION

3.1 PILE-DRIVING PLANT

- A. Pipe piles shall be driven with an impact or vibratory hammer which is capable of advancing the piles to the desired tip elevation without damage. Hammers may be single-acting, double-acting, or differential; or a diesel hammer may be suitable. Open-ended pipe piles may also be installed with a vibratory type hammer.
- B. Provide equipment of adequate size and capacity to handle, place, drive, and hold the piles to the required penetration and alignment. This equipment shall be able to maintain the alignment of pile and hammer without damage to either.
- C. Driving equipment shall be in good repair and operating condition and shall be capable of being operated as recommended by the manufacturer.
- D. Maintain all pile-driving equipment in safe operating condition at all times.
- E. Any equipment or method which results in regular or repeated damage to piles during driving, or is detrimental to the bearing capacity of piling already driven, will be rejected.

3.2 PILE INSTALLATION AND DRIVING CRITERIA

- A. Locate each pile accurately in accordance with the drawings. Reference cut-off elevation of each pile to bench marks shown.
- B. Mark each pile with horizontal lines at 1-foot intervals, and mark the number of feet from pile point at 5-foot intervals. Place marks prior to the start of driving. Marks and numbers shall be readily seen from a minimum distance of 15 feet.
- C. Continuously drive each pile to tip elevation as shown on the drawings, and to satisfactory embedment and driving resistance.
 - 1. Drive piles to embedment lengths or blow counts that achieve pile capacity in accordance with the contract documents.
 - 2. The Owner reserves the right to modify driving criteria depending on the equipment used, field conditions encountered, and observations made during pile installation.
 - 3. The Contractor will not be responsible for counting blows per foot.
- D. Carefully maintain the center of gravity for each group of piles to conform to the locations shown on the drawings.
- E. Carefully plumb the leads and the pile before driving. Take care during driving to prevent and to correct any tendency of piles to twist or rotate.
- F. Jetting for installation of piling is prohibited.
- G. Avoid excessive driving.

3.3 TOLERANCES

- A. Deviation of pile head of pipe piles under the pile cap may be 6 inches from plan position in any direction, and $\pm 1/4$ inch from the cut-off elevation shown on the drawings. At the Port's option, additional driven piles may be added at no additional cost to the Port.
 - 1. Piles out of tolerance will be rejected, and shall be removed and replaced with new piles.
 - 2. Plumb piles shall not exceed a deviation from the vertical alignment of more than 1 inch in 10 feet.
 - 3. Battered piles shall not exceed a deviation from the required batter alignment of more than 1 inch in 10 feet.
 - 4. Piles exceeding these deviations may be pulled into position only upon prior approval by the Port.
- B. Tolerances shall be measured when piles are released from the driving template, unless the template is used to form the pile cap.
- C. The Contractor shall employ a competent field person to:
 - 1. Survey the location and alignment of each pile to verify that it meets contract requirements. Field notes shall be submitted to the Port on the same day as the work.
 - 2. Survey and verify the alignment of joined pile sections before and after driving.

3.4 WELDING

- A. Fabricate accurately to lines and dimensions shown on the drawings.
- B. Make no more than one field splice and one shop splice per pile unless permitted otherwise by the Port. Splice piles by complete joint penetration weld. Carefully align and hold pieces firm and concentric until welding is complete. Provide backing bar (minimum 1/4 inch thick) for all splices. Underwater welding for pile splicing is prohibited. Splices shall develop the full strength of the pile in tension, bending, and bearing.
- C. Workmanship and technique shall be of the same standard as for structural steel assembly.

3.5 PIPE PILE ASSEMBLY AND FIT-UP

- A. Pipe pile assembly shall follow the applicable sections of AWS D1.1-10, Chapter 5, Fabrication, and as modified below.
 - 1. Articles 5.22.1.1 through 5.22.3.1 shall be used as noted for butt joints. Article 3.3.3 shall be modified as noted in the following: In the second sentence, delete "...or 1/8 inch (3 mm), whichever..."; also delete the second to the last sentence, which reads, in part, "In correcting . . . in 12 inches (305 mm)."
 - 2. Joint root offset shall not exceed 10 percent of the joined material thickness or 1/16 inch for butt joints landing on backing bars (Article 5.22.31).
- B. All piling, piling assembly, and fit-up shall meet the requirements of ASTM A252 for welded and seamless pile, Article 12, Permissible Variations in Weights and Dimensions, Article 13, Straightness, and Article 14, Workmanship, Finish, and Appearance.
- C. All joining sections shall be field-matched and marked for verification to minimize outside diameter differences and shall meet a maximum of 1/16 inch landing difference on each side (total of 1/8 inch).
- D. No pressure tests are required for ASTM A53 pipe.
- E. Pile assembly alignment shall be measured and recorded by the Contractor according to ASTM A252, Article 14, Workmanship, Finish, and Appearance, and verified before calling for acceptance testing by the Port. Each joint shall be checked and recorded according to ASTM A252 and AWS, Chapter 6.
- F. Dents, gouges, or arc strikes in the piling greater than 1/8 inch shall be removed or repaired as required under AWS. Pile deficiencies greater than 1/8 inch will be rejected and pipe shall be removed from the site and replaced by the Contractor at no additional cost to the Port.
- G. The Contractor shall align field splices by means that will hold both the receiving end and adjoining end in concentric alignment without deflections due to pile dead load or construction techniques or equipment. Alignment measurements shall be taken and recorded after tack welding and after final joining weld. Any out-of-tolerance assembly will be rejected. The Contractor shall remove sections and repair or replace sections and reassemble at no additional cost to the Port. If misalignment of pile sections is found either by the Contractor's inspection or the Port's inspection, work will be stopped, the Contractor shall submit to the Port a work plan for correcting alignment and for eliminating future alignment problems, including

equipment modifications, installation procedural changes, and labor practices before work may be started again. The Port will not grant either a contract time extension or additional compensation for the Contractor's delays in production due to pile and joint misalignment.

3.6 CUTTING OF PILES

- A. Cut off tops of piles square with the pile axis and at the elevations indicated.

3.7 OBSTRUCTIONS DURING DRIVING

Change "mud line" in A below if work is on land.

- A. Minor obstructions are obstructions encountered within 10 feet of mud line. Should an obstruction at any greater depth stop the advancement of a pile, it will still be classed as a minor obstruction unless the same obstruction also stops the advancement of a second pile adjacent to the first. No extra payment will be made for the removal of a minor obstruction.
- B. Major obstructions are obstructions not classed as minor. Additional work directed by the Port to acceptably complete the installation of the pile after encountering a major obstruction will be considered extra work under the terms of the General Conditions. A major obstruction will be determined as such after engineering review of pertinent field conditions and driving data. In addition, the Port reserves the right to require the Contractor to demonstrate, at no additional cost to the Port, that the pile cannot be driven by conventional means.

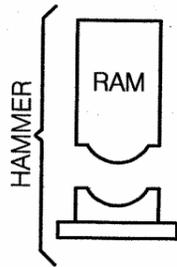
3.8 REJECTED PILES

- A. The Contractor will not be granted time extensions or additional compensation for work that fails inspection and is rejected.
- B. Associated remedial work necessary to acceptably complete the pile installation shall be performed as required by the applicable code. Such remedial work may include, but is not limited to, installation of additional piling, construction of additional framing, and removal and reinstallation of piling. No extra payment or time extensions will be made for remedial work required to acceptably complete pile installation.
- C. No payment or time extension for furnishing, driving, cut-off, or extending will be made for any piling installed by the order of the Port to correct or replace piles which are out of tolerance, misaligned, broken, incorrectly oriented, or otherwise violate these specifications, or for removing and reinstalling any piling incorrectly installed.

ATTACHMENT 1

PILE AND DRIVING EQUIPMENT DATA
THE PORT OF PORTLAND

PILE DRIVING CONTRACTOR: _____



HAMMER

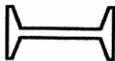
(MANUFACTURER: _____ MODEL: _____
(MAX. RATIO ENERGY: _____ @ _____ LENGTH OF STROKE
TYPE: _____

RAM

(RAM WEIGHT: _____ RAM LENGTH: _____
(For diesel hammers)
(RAM CROSS SECTIONAL AREA: _____

ANVIL

(With diesel hammers) ANVIL WEIGHT: _____

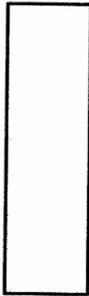


HAMMER

(MATERIAL: _____

CUSHION

(



(CAPBLOCK)

(THICKNESS: _____ PLAN DIMENSIONS: _____

PILE CAP

(PILE CAP WEIGHT: _____

(HELMET)

(PILE TYPE: _____

(LENGTH (In Leads): _____ DIAMETER: _____

(WALL THICKNESS: _____ WEIGHT/FT _____

(DESIGN CAPACITY (Tons): _____

(DESCRIPTION OF SPLICES: _____

(DESCRIPTION OF TIP: _____

PILE

NOTE:

- * SUBMIT ADDITIONAL SHEETS FOR PROPOSED ALTERNATIVE HAMMERS AND DRIVING EQUIPMENT.
- * PROVIDE ALTERNATE EQUIPMENT DATA OF AVAILABLE EQUIPMENT IN CASE OF EQUIPMENT BREAKDOWN.

SUBMITTED BY: _____ TELEPHONE NUMBER: _____

DATE: _____

END OF SECTION 356216

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Wood blocking, nailers, furring.
4. Plywood Wall Sheathing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Engineered wood products.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. All framing lumber shall be pressure treated, unless indicated otherwise on drawings.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry unless otherwise indicated.
 - 1. Wood framing, cants, nailers, blocking.
 - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Framing Lumber:
 - 1. Species:
 - a. Southern pine; SPIB., No 2

2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Extreme Fiber Stress in Bending, Edgewise: **2650 psi** for 12-inch nominal depth members.
 - 2. Modulus of Elasticity, Edgewise: **1,900,000 psi**.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.

3. Cants.
 4. Furring.
- B. For items of dimension lumber size, provide same as indicated for framing lumbers grade and species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:
1. Mixed southern pine; No. 2 grade; SPIB.

2.6 PLYWOOD SHEATHING

- A. Plywood Sheathing shall be exterior grade, pressure treated, C-D in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.
- B. Subfloor: See Section 061600

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. **ALL FASTENERS TO BE IN CONTACT WITH PRESSURE TREATED LUMBER SHALL BE APPROVED FOR USE WITH THE TREATING CHEMICAL USED.**
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A hex nuts and, where indicated, flat washers.

2.8 METAL FRAMING ANCHORS

- A. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those 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.
- B. 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-preserved-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.
- F. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach rough carpentry work to substrate by anchoring and 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.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06100

SECTION 061600 - FLOOR SHEATHING (HEW ADVANTECH)

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. Subflooring.

1.3 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.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.
- B. Code Compliance: Comply with requirements of the following:
 - 1. International Code Council Evaluation Service, ICC-ES ESR-1785.
 - 2. Voluntary Product Standard, DOC PS2-10, "Performance Standard for Wood-Based Structural-Use Panels."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Outdoor Storage: Comply with manufacturer's recommendations:
 - 1. Set panel bundles on supports to keep off ground.
 - 2. Cover panels loosely with waterproof protective material.
 - 3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
 - 4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of flooring and sheathing system that fail due to manufacturing defects within specified warranty period.
 - 1. For subflooring and roof and wall sheathing applications, manufacturer shall warrant that the panels will not delaminate nor require sanding due to moisture absorption during installation within 500 days of purchase.
 - 2. Warranty Period: Limited Lifetime.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory." or GA-600, "Fire Resistance Design Manual."

2.2 WOOD PANEL PRODUCTS

- A. Oriented Strand Board: DOC PS 2-10.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. Thickness shall satisfy minimum and maximum requirements for referenced performance category.
- C. Factory mark panels to indicate compliance with applicable standard.

2.3 SUBFLOORING

- A. Oriented-Strand-Board Combination Subfloor-Underlayment: Exposure 1 single-floor panels.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; AdvanTech Flooring or a comparable product by one of the following:
 - 2. Span Rating and Performance Category: Not less than 23/32 Performance Category.
 - 3. Edge Detail: Tongue and groove.
 - 4. Surface Finish: Fully sanded face.
 - 5. Performance Standard: DOC PS2-10 and ICC-ES ESR-1785 24 oc, 23/32 Performance Category.
 - 6. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches 19.2-inches and 24-inches on center spacings.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification.
- B. ALL FASTENERS TO BE IN CONTACT WITH PRESSURE TREATED LUMBER SHALL BE APPROVED FOR USE WITH TREATING CHEMICAL USED.**

2.5 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Subfloor Panels to Framing: Polyurethane-based or Solvent-based 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 50-70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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.
- 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. ICC-ES ESR-1539 or NES NER-272 for power-driven fasteners.

2. Chapter 23 in ICC's "International Building Code."
 3. 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 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.

END OF SECTION 061600