



Request for Proposal

Pool Stairs Renovation Hartland High School

February 24, 2026

Hartland Consolidated Schools
Operations Department
9525 East Highland Road
Howell, MI 48843

Purpose

Hartland Consolidated Schools is seeking bids for the renovation of the pool slide stairs at Hartland High School.

Timeline

Bid Issued:	February 24, 2026
Pre- Bid Meeting:	Call to schedule appointment.
Deadline for written Classifications:	March 5, 2026 @ 4pm
Bid Due Date:	March 10, 2026 @ 12pm
Opening of Bids Date:	March 10, 2026 @ 12:15pm
Commencement of Work:	May 1, 2026 – June 15, 2026 Work to be coordinated around pool operations.

Submission of Proposal

Description of the information and content required for your bid is attached. Please complete and add necessary information on additional sheets and return to:

Director of Operations
Hartland Consolidated Schools
9525 East Highland Rd
Howell, MI 48843

Mark the return envelope: “Pool Stair Renovation ”
Contractor Name
Contractor Address
Contractor Telephone Number

Late Proposals: All responses must be printed and signed. The bidder assumes the risk of any delay in the mail or in the handling of the mail by employees of Hartland Consolidated Schools. Whether sent by mail or by means of personal delivery, the bidder assumes responsibility for having his bid deposited on time at the place specified.

Returned Proposals: All proposals received after the due date will be unopened and made available to the respective contractor for pick-up, at its sole cost and expense.

Signed Proposal: Each Proposal must be an original and hard copy, and signed by an authorized member of the Contractor’s firm. This member should be the highest-ranking

officer at the local level. NO ORAL, FAX or E-MAILED Proposals will be accepted. Each Proposal must be submitted on the Proposal Forms attached to this RFP.

Copies of Proposal: The contractor shall submit the original proposal and two (2) completed copies of the signed original proposal.

Opening of proposals: At a specified location and due date as stated above all submitted proposals will be publically opened and read aloud at **12:15pm**. All interested parties may attend the proposal opening. No decision will be rendered at the proposal opening.

Email Clarifications: The district intends to communicate with contractors via email (example: clarifications and addendums). Except for the delivery of the proposal itself.

Additional Clarification Request: Prospective contractors may request that the district clarify information contained in this RFP. All such requests must be made in writing via email. The district will attempt to provide a written response to all written Requests For Clarification within five (5) business days after the receipt of such request. The district will not respond to any Request for Clarification received after **4 p.m. on March 5, 2026**. Requests for Clarification and inquiries must be made via e-mail.

All Requests for clarification must be directed to Matt Marino, Director of Operations, mattmarino@hartlandschools.us. With a Subject line: **Pool Stair Renovation RFP Clarifications**

No response will be made to any oral questions. All questions and answers will be posted on the School District's website. It is each Contractor's responsibility to check the School District's website prior to the RFP Due Date to ensure that it has received all of the information, including, but not limited to, all Addenda to this RFP.

Restrictions On Communication: From the issue date of this RFP until a Contractor is selected and the selection announced, a prospective Contractor shall not communicate about the subject of this RFP or any Contractor's Proposal with the District, its Board of Education, or any individual member, administrators, faculty, staff, students, employees, or its Construction Manager, if any, except for additional Requests for Clarification in accordance with the paragraph above, or as otherwise required by applicable law.

RFP/Proposal Information Controlling: The District intends that all Contractors shall have equal access to information relative to this RFP, and that this RFP contains adequate information. No information communicated, either verbally or in writing, to or from a Contractor shall be effective unless confirmed by written communication contained in an addendum to this RFP, a Request for Clarification or other written response thereto, or in the Proposal.

Reservation of Award: The contract will be awarded to the responsible bidder whose proposal is within the competitive range and determined to be the most advantageous to the Hartland Consolidated Schools. Price, experience, references and other factors are considered. Hartland Consolidated Schools reserves the right to make awards within sixty (60) days after the date of the bid opening during which period bids may not be withdrawn. The Board of Education or its designee reserves the right to reject any or all

bids, in part or in total, for any objective or subjective reason whatsoever. Late bids will not be opened.

Collusive Bidding: The Contractor certifies that its Proposal is made without any previous understanding, agreement or connection with any person, firm or corporation making a Proposal for the same work and is in all respects fair, without outside control, collusion, fraud or otherwise illegal action.

General Scope of Work

Existing Conditions and General Responsibility – Paint and Structural Steel Scope

- Contractor shall assume full responsibility for all existing conditions, whether visible or concealed, that affect completion of the Work.
- The Base Scope includes all labor, materials, equipment, supervision, coordination, safety measures, and incidentals required to deliver a complete, functional, and code-compliant pool stair system.
- Bidder understands multiple mobilizations may be required for this work and has included costs for multiple mobilization
- Contractor shall comply with all applicable Occupational Safety and Health Administration (OSHA) regulations, including 29 CFR Part 1926 – Safety and Health Regulations for Construction, and all applicable federal, state, and local safety requirements.
- Contractor shall be solely responsible for the safety of its employees, subcontractors, and visitors, and for maintaining a safe work environment at all times.

2. Handrails and Guardrails – Structural Steel Scope

- Remove, temporarily support, modify as necessary, and reinstall all existing handrails, guardrails, posts, brackets, and attachments impacted by the Work.
- Handrails shall be returned to service in a safe, secure, and code-compliant condition, including all repairs, alignment, tightening, welding, grinding, or replacement of damaged components.
- All modifications required to satisfy inspection or Authority Having Jurisdiction (AHJ) approval are included.

3. Painting and Coatings – Paint Scope

- Provide complete surface preparation and coating of all exposed stair components, including but not limited to:
 - Stair treads (top and underside)
 - Stringers
 - Railings and posts
 - Support columns and arms
 - Metal landings and associated framing
- Surface preparation shall include descaling, grinding, cleaning, and patching as required to meet coating manufacturer requirements.
- Apply epoxy or high-performance protective coating systems suitable for a natatorium environment.
- Include all materials, labor, ventilation, odor mitigation, masking, containment, protection of adjacent areas, and curing requirements.
- Include a \$5,000.00 general allowance.

4. Structural Steel - Structural Steel Scope

- Perform repair, patching, and reinforcement of existing structural steel components affected by corrosion, demolition, grinding, or installation.
- Scope includes central column, support arms, handrail attachment plates, landing framing, and related steel elements.
- Repairs may include welding, plating, grinding, alignment correction, and recoating as required to ensure structural integrity and durability.
- Minor and incidental steel repairs necessary to complete the Work are included.
- Coordinate and support structural inspections during installation and upon completion of the Work.
- Provide access, documentation, and corrections required for inspection approval.
- Include written inspection reports as part of project closeout.
- Include a \$10,000.00 general allowance.
- Contractor to provide and install temporary wall to deck to enclose work area from occupants.

5. Concrete Included in Structural Steel Scope

- Provide additional concrete repair or replacement beyond the defined demolition areas where required to:
 - Restore damaged substrates
 - Achieve proper elevations and transitions
 - Support steel, FRP, or handrail components
- Work includes doweling, reinforcing, forming, placement, finishing, curing, and sealing.
- All exposed concrete shall receive non-slip surface treatment and waterproof sealant.

6. Concrete Testing and Quality Verification - Structural Steel Scope

- Support and coordinate concrete testing and inspection activities, including verification of:
 - Surface finish
 - Non-slip treatment
 - Waterproof sealant application
- Perform corrective work required to satisfy testing or inspection findings at no additional cost.

9. Temporary Protection and Containment - Paint and Structural Steel Scope

- Provide all temporary protection necessary to safeguard:
 - Pool water
 - Pool deck and finishes
 - Adjacent building elements and equipment
 - Building occupants
- Protection measures shall include barricades, dust control, odor containment, ventilation, and masking as required.
- Maintain protection throughout demolition, installation, coating, and cure periods.

10. Pool Operations and Access Coordination - Paint and Structural Steel Scope

- Coordinate all Work with Hartland Consolidated Schools and Barton Malow Builders to maintain pool operations.
- Include sequencing, phasing, barricading, and access control necessary to safely perform the Work during pool use.
- No additional compensation shall be provided for restricted access, sequencing impacts, or coordination requirements.
- Background verification is required and all costs are included

11. Hazardous Materials – Paint and Structural Steel Scope

- Contractor shall comply with all applicable safety and environmental regulations related to materials disturbed by the Work.
- Include proper handling, containment, and disposal of debris generated by demolition, grinding, or coating operations.
- Scope does not include full abatement but includes safe handling of materials encountered within the Work limits.

12. Work Hours, Noise, and Environmental Impacts - Paint and Structural Steel Scope

- Anticipate noise from demolition, grinding, impact drivers, and installation activities.
- Coordinate work hours with the District; include measures to minimize disruption.
- Provide ventilation and odor mitigation during coating operations.

13. Final Cleaning and Site Restoration - Paint and Structural Steel Scope

- Perform final cleaning of all work areas, including:
 - Removal of debris, dust, and residue
 - Removal of protective materials and barricades
 - Cleaning of adjacent surfaces affected by the Work
- Restore work areas to a condition acceptable to the Owner.

14. Closeout and Warranties

- Provide complete closeout documentation, including:
 - Warranties for steel work, FRP systems, coatings, and concrete
 - Inspection and testing reports
 - Certifications and delegated design documents
- Warranties shall comply with District's standard requirements.
- Final acceptance subject to Owner approval.

Contractor Requirements

Contractor shall be responsible for the removal of the existing stair treads, clean and grind metal, fabricate new tread plate as required, sand blast and hot dip treads, paint entire structure and reassemble stair treads as indicated in specifications and drawings. Contractor will be responsible for repair of any imperfections and/or damage to existing structure from removal of existing treads.

Contractor shall be responsible to obtain waste containers for the removal of all its waste materials, rubbish and packing materials resulting from his/her operations. If

installer fails to clean up within seven (7) days after completion, the Owner may do so, and the cost thereof shall be charged to the Installer as a deduction in its contract price.

Contractor shall provide an adequate number of qualified, experienced personnel capable of performing the required work within the time frames set forth in Owner's schedule. All workmen and subcontractors performing work shall be skilled in their respective trades.

Bidders shall be a reputable, recognized organization with at least five years successful experience on work of this type. References of three (3) accounts now being serviced, for which comparable work has been performed, must be furnished. Failure to include references may be ample cause for rejection.

The bidder should attend pre-proposal meeting, if any, as outlined in these documents. Each bidder shall compare the premises with the specifications and be satisfied as to the conditions affecting the services to be provided before submitting their proposal. No allowance or extra consideration on behalf of any bidder will subsequently be allowed by reason or error or oversight on part of the bidder.

The bidder shall be responsible for all final measurements.

The Owner shall conduct a final inspection of project to assure that all work performed meets specifications.

The Contractor must secure all equipment and materials at the site. Contractor shall be responsible for any and all damages to existing building or grounds, sustained as a result of work under this Contract, caused by either the installation of its work or in the delivery of materials and equipment for its use. The cost of repairing or replacing such damage shall be borne by the responsible Contractor. The repair or replacement work shall be done in a manner as to leave the facilities in the same condition as before the damage occurred, to the complete satisfaction of the Owner. The Contractor is responsible for all damages and losses until the installation has been completed and accepted by the Owner.

Installer shall identify one person, acceptable to the Owner, who shall act as liaison with the Owner. This individual should have the authority to make decisions on behalf of the installer.

Satisfactory Workers Compensation insurance and liabilities and property damage insurance must be maintained and paid for the Contractor at all times work is performed.

Commercial General Liability Insurance is required as follows: on an "Occurrence Basis" with limits of liability not less than \$1,000,000 each occurrence, \$3,000,000 aggregate, combined single limit, Personal Injury, Bodily Injury and Property Damage. Coverage shall include the following extensions: A) Contractual Liability; B) Products and Completed Operations; C) Independent Contractor's Coverage; D) Broad Form General Liability Extensions or equivalent; E) Deletion of all Explosion, Collapse and Under group (XCU) Exclusions, if applicable.

Professional Liability Insurance (Errors & Omissions): of \$1,000,000 each occurrence and \$3,000,000 annual.

Workers Compensation including Employer's Liability Coverage: of \$100,000 each accident, \$500,000 annual aggregate, in accordance with all applicable Michigan law.

Specifications

Refer to ATTACHMENT A for all drawings and specifications related to the following scope items:

- Metal stair tread scope
- Metal landing concrete infill (2 landings, 1 mid-level and 1 top level)
- Surface preparation and painting requirements
- All work shall be completed in strict accordance with the drawings and specifications contained in ATTACHMENT A.

Original structure drawings and layouts are provided as reference.

Note: Equivalents may be considered; however, proposals for equivalent materials must be disclosed as an exception to the terms and conditions of this RFP.

Contractual Information

Familial Disclosure Affidavit: All Contractors must provide familial disclosure in compliance with MCL 380.1267 and attach this information to its Proposal. The Proposal must be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner and/or any employee of the Contractor and any member of the School District's Board of Education or the District's Superintendent. The School District will not accept a Proposal that does not include this sworn and notarized disclosure statement. The Familial Disclosure Affidavit is attached to this RFP as ATTACHMENT B.

Iran Economic Sanctions Act: In accordance with Michigan Public Act No. 517 of 2012, all Proposals must be accompanied by a sworn and notarized statement certifying that the Contractor is not an Iran Linked Business. The School District will not accept a Proposal that does not include this sworn and notarized statement. The Affidavit of Compliance – Iran Economic Sanctions Act is attached to this RFP as ATTACHMENT C.

Bid Bond: Bids over \$23,126.00 must be accompanied by a certified check or Treasury listed bid bond, as listed in U.S Dept. of Treasury Circular 570, in minimum amount of 5% of bid amount. Please include this. Bids not received without this guaranty will not be read or considered.

Governing Law: The Contract shall be governed by and construed in accordance with the laws of the State of Michigan. The parties hereby agree to the exclusive jurisdiction and venue of courts sitting in Livingston County, Michigan.

General Indemnification: Contractor shall indemnify, defend and hold harmless the District, its Board of Education, its Board Members, in their official and individual capacities, its administrators, employees, agents, contractors, successors and assignees, from and against any and all claims, counter claims, suits, debts, demands, actions, judgments, liens, costs, expenses, damages, injuries and liabilities, including actual attorney's fees and actual expert witness fees arising out of or in connection with Contractor's performance of the Contract and/or from Contractor's violation of any of the terms of the Contract, including, but not limited to: (i) the negligent acts or willful misconduct of the Contractor, its officers, directors, employees, successors, assignees, contractors and agents; (ii) any breach of the terms of the Contract by the Contractor, its officers, directors, employees, successors, assignees, contractors and agents; (iii) any violation or breach of any applicable Federal, State or local law, rule, regulation, ordinance, policy and/or licensing and permitting requirements applicable to the Contract; or (iv) any breach of any representation or warranty by the Contractor, its officers, directors, employees, successors, assignees, contractors and agents under the Contract. The Contractor shall notify the District by certified mail, return receipt requested, immediately upon actual knowledge of any claim, suit, action, or proceeding for which Hartland Consolidated School District may be entitled to indemnification under the Contract. This paragraph shall survive the expiration or earlier termination of the Contract.

Compliance with Laws: Contractor shall comply with any and all applicable federal, state and local laws, rules, ordinances, policies and regulations, including any licensing and permitting requirements, under the Contract. Contractor, including its personnel, employees, contractors, consultants and agents shall be responsible for knowing the District's policies concerning appropriate behavior of persons in School District facilities and, on School District properties, including for example, the prohibitions of sexual harassment and smoking, and shall comply with all such policies. Contractor represents and warrants to the School District that it shall at all times be in compliance with any and all applicable federal and state laws, rules, ordinances, policies and regulations and licensing and permitting requirement applicable to the Contract. Contractor shall indemnify, defend and hold District harmless from any liability from its failure to so comply.

Pricing: Prices quoted are to be F.O.B. to Hartland Consolidated Schools. All purchases prices shall be net; including transportation, insurance and delivery charges fully prepaid by the successful Contractor to destinations indicated in the Proposal.

Taxes: the Hartland Consolidated School District is exempt from taxes. However, when state and local taxes are required on construction materials installed by the Contractor, such taxes must be included in the Contractor's Proposal price.

Proposal Withdrawal: Contractors may withdraw its Proposals any time before the Due Date. Proposals may not be withdrawn for at least 90 days after the Due Date.

Competition: The name of a model, manufacturer or brand in this RFP shall not be considered as exclusive of other brands. Brands and models specified in this RFP are preferred. The District expects all supplies, materials, equipment or products bid by a Contractor to meet or exceed the Specifications set forth in this RFP. Further, it is the District's intent that this RFP permit competition. Accordingly, the use of any patent,

proprietary name or manufacturer's name is for demonstrative purposes only and is not intended to curtail competition. Whenever any supplies, material, equipment or products requested in this RFP are specified by patent, proprietary name or by the name of the manufacturer, unless stated differently, such specification shall be considered as if followed by the words "or comparable equivalent," whether or not such words appear. The School District in its sole and absolute discretion shall have the right to determine if the proposed equivalent products/brands submitted by the Contractor meet the Specifications contained in this RFP and possess equivalent and/or better qualities. It is the contractors' responsibility to notify the District in writing if any specifications or suggested comparable equivalent products/brands require clarification by the District prior to the Due Date of the Proposals. Any and all deviations from the Specification must be noted on the Proposal Form.

BID PROPOSAL FORM – Pool Stairs Renovation

Contractor Company Name: _____

Name: _____

Signature: _____

Title: _____

Address: _____

Phone #: _____ (Work #) _____ (Cell #)

Bidder agrees to furnish all labor and materials per the specifications contained in these bidding documents. Upon acceptance of the proposal, no adjustments to the price may be made for the full term of the contract.

Addendum Acknowledgment

The undersigned acknowledges receipt of the following addenda, which have been considered in the preparation of this bid:

Addendum No. 1: Dated _____

Addendum No. 2: Dated _____

Addendum No. 3: Dated _____

Perform Stair Tread Renovation total: _____
(including concrete)

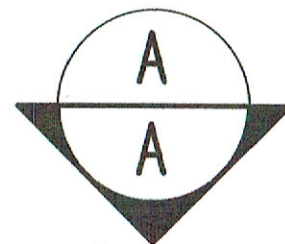
Perform Painting of Entire Structure total: _____

Total for all Work: _____

Attachment A

Construction Sequence / Scope

1. Remove existing stair treads by unbolting from central column support plates and unbolting handrail system connection. Note location with respect to support plate on central column, and location of handrail attachment plate(right or left side at each location).
2. Provide temporary support for handrail system as needed to prevent damage to handrail assembly.
3. Label/mark treads for re-installation in location removed from.
4. Treads shall be refurbished as follows:
 - a. Remove existing concrete pan from tapered support plate.
 - b. Clean and grind support plate as required for further fabrication work.
 - c. Fabricate new tread plate per drawing to match existing tread Plan.
 - d. Weld new tread plate to existing support plate, 3" length at 10" oc each side, staggered spacing on sides.
 - e. Add 4 x 4 x 1/4" gusset plate, weld all around, to each side of tread, see drawing.
 - f. Drill or punch four drainage holes through tread plate for drainage (5/8" or 3/4").
 - g. Sand blast and hot dip galvanize tread/ support plate assemblies.
5. Coordinate with painting contractor for pre-painting prior to installation, if feasible.
6. Install tread assemblies in former location and with respect to plates at center column and handrail attachments.
7. Existing bolts may be reused, clean properly for reuse. New bolts if required shall be A-325.
8. Check alignment of treads for level and consistent riser height, adjust to achieve riser height uniformity within code requirements. Consider depth of FRP tread in addition to steel tread plate.
9. Install FRP Tread material to top of tread plate, using manufacturer's fastening clips. Use Stainless steel self-drilling self-tapping screws, located per drawing. Tread nosing to be a continuous FRP panel edge, with cut edge of panel placed against rear edge of tread plate.



3-0
VERIFY
AFTER

MOLDED TREAD 1 1/2"
(3/4" MICRO MESH by
GRATING PACIFIC)

REINSTALL EXISTING
RAIL

ADD 1/4 BENT PLATE (1 1/2" BEND ON BACK
SIDE FOR TREAD CLOSURE)
WELD TO TOP OF TAPERED PLATE

REUSED
TAPERED PLATE

PL 1/4x4x0-4 NS/FS
GUSSETT PLATE

3/16
CONCRETE STAIR
PAN

TAPERED PLATE
BEFORE

3/16 3-10

REMOVE STAIR TREAD BY
UNBOLTING, CUT BOLTS
IF NEEDED

REMOVE STAIR RAIL BY
UNBOLTING, CUT BOLTS
IF NEEDED, BRACE UP RAIL

REMOVE CONCRETE PAN
FROM TAPERED PLATE

STEEL TUBE OF SPIRAL STAIR

TREADS

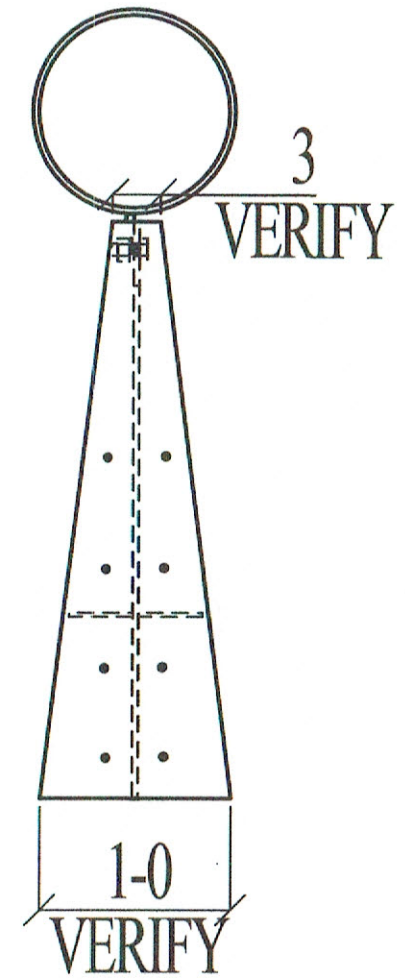


SAND BLAST, HOT DIP GALVANIZED
note: galvainer GALVANIZE BRACKET UPSIDE DOWN

REINSTALL WITH NEW GALVANIZED BOLTS 3/4" a325

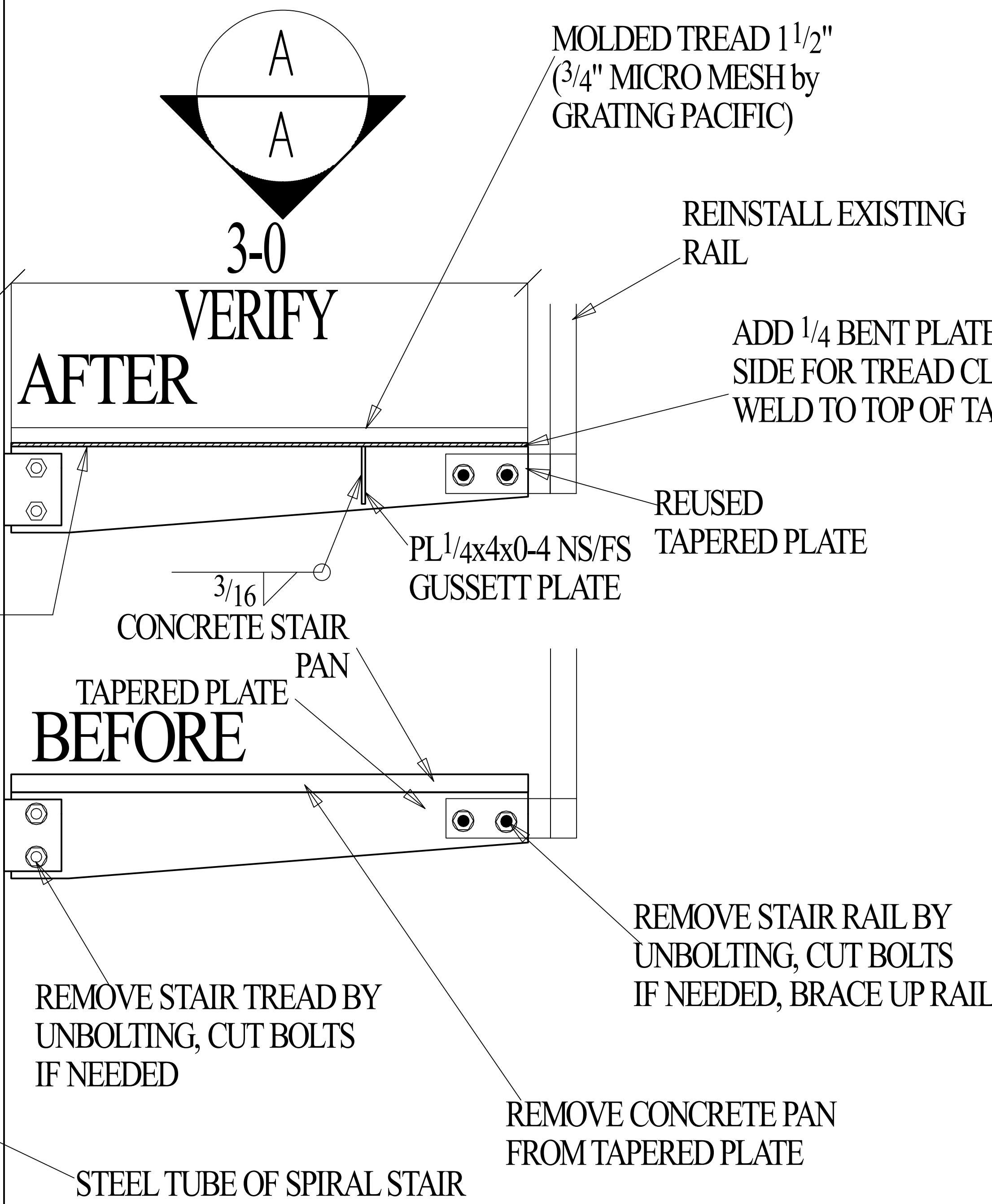
INSTALL MOLDED TEA BAR TREAD TO TOP OF PLATE,
USING TYPE "E" STAINLESS STEEL CLIPS AND
STAINLESS STEEL SCREWS

CORDINATE WITH PAINTER IF PAINTING PRIOR TO
INSTALLATION WOULD BE FEASIBLE.



REV	DATE	DESCRIPTION
B	Feb 23 2026	REVISED

<p>OPEN HOLES 13/16 U.N.O.</p> <p>SLOTS</p> <p>PLATES</p>	<p>Unless Noted Otherwise 1/4" FILLETS SINGLE CONTINUOUS PASS</p> <p>COATING _____</p> <p>MATERIAL GRADE SHALL BE A36 U.N.O. WF SHAPES A992 TUBES A500 Gr B CHANNELS A36 PIPES A53 Gr B REFERENCE _____</p> <p>DRAWN BY: AR CHECKED BY:</p>	<p>HARTLAND CONSOLIDATED SCHOOLS 9525 EAST HIGHLAND RD HOWELL MICHIGAN 48843</p> <p>HARTLAND HIGH SCHOOL POOL SLIDE STAIR TREAD REPLACEMENT</p> <p>HARTLAND HIGH SCHOOL 10635 DUNHAM ROAD HARTLAND MICHIGAN 48353</p> <p>LOCATION ENGINEER ARTESIAN ENGINEERING REF DRAWING ARCH & STRUCT</p> <p>JOB NUMBER # DESCRIPTION SHEET # E2</p>
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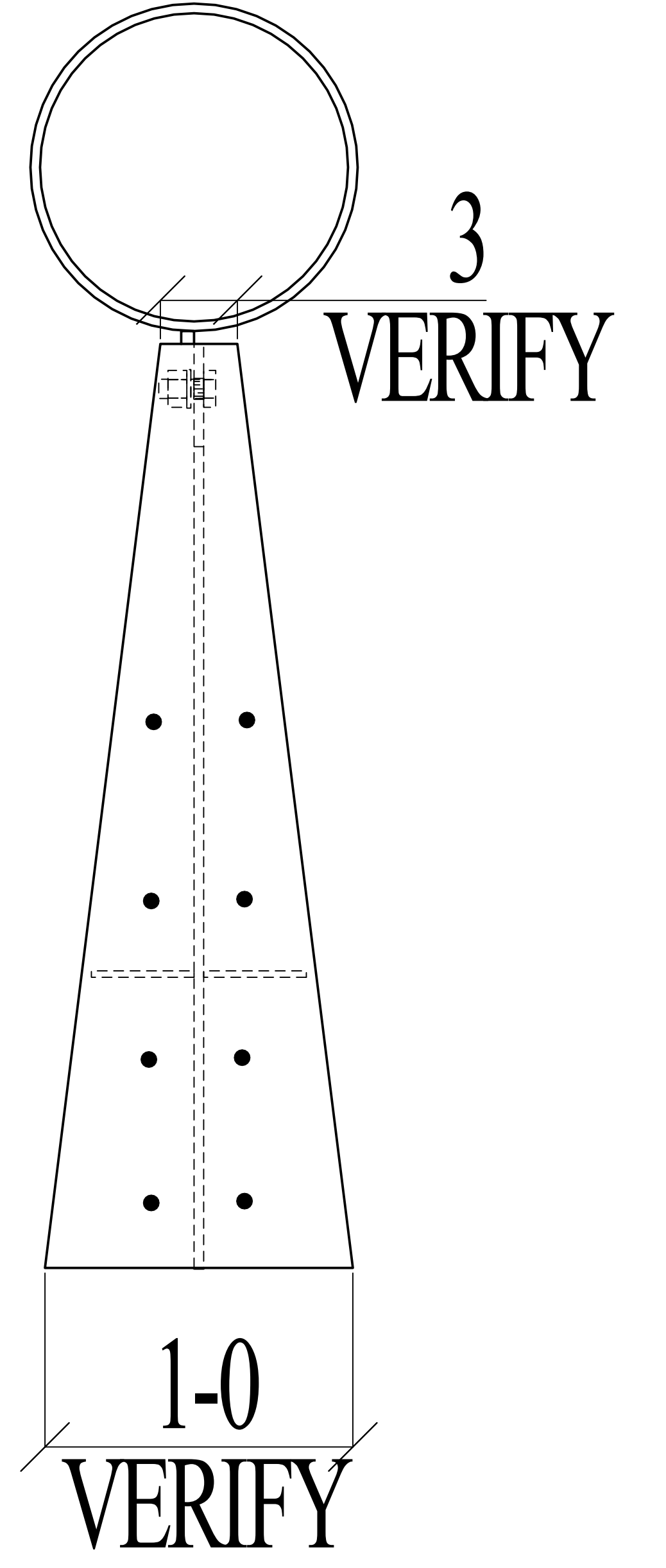


SAND BLAST, HOT DIP GALVANIZED
 note: galvainzer GALVANIZE BRACKET UPSIDE DOWN

REINSTALL WITH NEW GALVANIZED BOLTS 3/4" a325

INSTALL MOLDED TEA BAR TREAD TO TOP OF PLATE,
 USING TYPE "E" STAINLESS STEEL CLIPS AND
 STAINLESS STEEL SCREWS

CORDINATE WITH PAINTER IF PAINTING PRIOR TO
 INSTALLATION WOULD BE FEASIBLE.



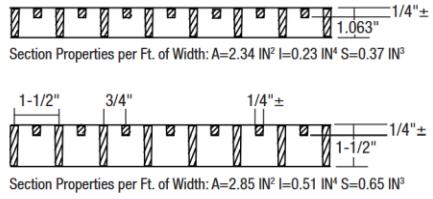
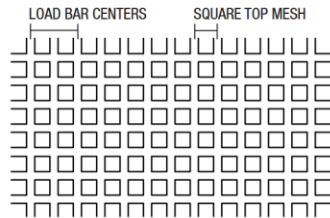
TREADS

REV	DATE	DESCRIPTION
B	Feb 23 2026	REVISED
A	Feb 21 2026	IFA

OPEN HOLES U.N.O TYPICAL PLATES	Unless Noted Otherwise 1/4" FILLETS SINGLE CONTINUOUS PASS	HARTLAND CONSOLIDATED SCHOOLS 9525 EAST HIGHLAND RD HOWELL MICHIGAN 48843 HARTLAND HIGH SCHOOL SLIDE STAIR TREAD REPLACEMENT HARTLAND HIGH SCHOOL 10635 DUNHAM ROAD HARTLAND MICHIGAN 48353 LOCATION HARTLAND HIGH SCHOOL ENGINEER ARTESIAN ENGINEERING REF DRAWING ARCH
	COATING _____ MATERIAL GRADE SHALL BE A36 U.N.O WF SHAPES A992 TUBES A500 GrB CHANNELS A36 PIPES A53 GrB REFERENCE _____	
DRAWN BY: AR CHECKED BY: _____	JOB NUMBER # _____ SHEET DISCRP. # _____ SHEET # E1	

RFP Tread Material

Micro-Mesh® - 3/4" Square Mesh



Depth	Mesh	Panel Size	Weight	Resins	Colors
1"	3/4" Square	4' x 12'	139#	Corvex	Light Gray
1-1/2"	3/4" Square	4' x 12'	216#		



GRATING PACIFIC

MOLDED FIBERGLASS GRATING

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Slabs-on-grade (interior and exterior supported slabs shown on structural drawings).
 - 2. Concrete curing process and procedures.
 - 3. Concrete admixtures
 - 4. Curing compounds, sealers and hardeners.
 - 5. Under-slab vapor barriers.
- B. Related Sections:
 - 1. Division 01 Section "Unit Prices" for unit pricing requests specified in this section.
 - 2. Division 01 Section "Alternates" for alternatives which affect this section.
 - 3. Division 07 Section "Building Insulation" for underslab insulation.
 - 4. Division 09 Sections for requirements relating specified floor coverings to finishing and curing of interior concrete floor slabs.
 - 5. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
 - 6. Division 32 Section "Cement Concrete Pavements, Curbs and Gutters" for exterior concrete other than exterior supported slabs.

1.3 DEFINITIONS

- A. Action Submittals: Mandatory submittals by the Sub-Contractor which require action on the part of the General Contractor, Construction Manager and Design Professional.
 - 1. General Contractor and Construction Manager: Review, Stamp and Forward to the Design Professional.
 - 2. Design Professional: Review, Stamp and Return to the General Contractor or Construction Manager.
- B. Informational Submittals: Mandatory submittals by the Sub-Contractor to the General Contractor, Construction Manager and Design Professional which are not returned but kept by each for their project record.
- C. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.
- 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.
- 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. Construction Joint Layout: Indicate proposed construction joints required to construct the structure and/or floor slabs.
 - 1. Location of construction joints is to be coordinated with control joint layout and is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.
- B. Product Data: For each type of product indicated or proposed for use on the project.
- C. 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.
 - 6. Bonding agents.
 - 7. Adhesives.
 - 8. Vapor barriers.
 - 9. Semi-rigid joint filler.
 - 10. Joint-filler strips.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1.6 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. Testing Agency Services

1. The Construction Manager/Owner will secure and pay for the services of a qualified, independent materials engineer to perform quality assurance testing of concrete materials, to confirm re-bar placement, to verify compliance of materials with specified requirements, and to perform required field and laboratory testing. Testing Agency shall be acceptable to the architect and the owner and shall be licensed to practice in the state in which the project is located.
2. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
3. 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.

D. 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.

E. 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.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. CRSI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. MSP-1, "Manual of Standard Practice."

1.7 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. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL REINFORCEMENT

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

2.3 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:

2.4 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, II or III. At contractor's option supplement with the following (only if historical mix design break data is available for submittal):
 - a. Fly Ash: ASTM C 618, Class C or F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag cement.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded - typical except for architecturally exposed concrete. Provide Class 5S for architecturally exposed concrete. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Foundations, Walls and Piers: Nominal Maximum Aggregate Size: 1-1/2 inches.
 - 2. Floor Slabs on Grade: Nominal Maximum Aggregate Size: 1 inch.
- C. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

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

C. Water Vapor Reducing Admixture

1. At all interior slab on grade, all exterior column bases (piers) and locations indicated on drawings, include Vapor Lock 20/20 admixture as part of concrete mix.
 - a. Manufacturer: Specialty Products Group, Smithville, Ontario
 - b. Sales Representative: ConTech Sales Group, Rochester Hills, MI. Phone: 248-318-4880.
 - c. Follow manufacturers recommendations for concrete mix.

2.6 VAPOR BARRIERS

A. Vapor Barrier must meet or exceed the following standards:

1. ASTM E 1745, Class B or better.
2. ASTM E 96 Water Vapor Transmission Rate: Less than or equal to 0.007 Grains/Ft.²/Hr.

B. Available Products:

1. "Stego Wrap 15 Mil. Vapor Barrier" by Stego Industries: (877) 464-7843
2. "Vaporguard" by Reef Industries: (713) 507-4251
3. "Perminator 15 Mil. Under-slab Vapor Barrier" by W.R. Meadows: (800) 214-2100
4. "Reflex 275" by Carlisle Coatings & Waterproofing: (800) 527-7092

C. Accessories

1. Manufacturer's recommended pressure-sensitive seam tape.
2. Manufacturer's recommended vapor-proofing mastic.
3. Pipe Boots: Construct penetration seals from vapor barrier material, pressure-sensitive seam tape and/or mastic in accordance with the manufacturer's instructions.

A. Granular Sub-Base: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.7 FLOOR AND SLAB TREATMENTS

A. Penetrating Liquid Floor Treatment (noted on architectural drawings as Concrete Hardener and Sealer): Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products: Subject to compliance with requirements, provide one of the following-
 - a. Burke by Edoco; Titan Hard.
 - b. ChemMasters; Chemisil Plus.
 - c. ChemTec International; ChemTec One.

- d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
- e. Curecrete Distribution Inc.; Ashford Formula.
- f. Dayton Superior Corporation; Day-Chem Sure Hard.
- g. Euclid Chemical Company (The); Euco Diamond Hard.
- h. Kaufman Products, Inc.; SureHard.
- i. L&M Construction Chemicals, Inc.; Seal Hard.
- j. Meadows, W. R., Inc.; Liqui-Hard.
- k. Metalcrete Industries; Floorsaver.
- l. Nox-Crete Products Group, Kinsman Corporation; Duranox.
- m. Symons Corporation, a Dayton Superior Company; Buff Hard.
- n. US Mix Products Company; US Spec Industraseal.
- o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Products: Subject to compliance with requirements, provide one of the following-
 - a. Axim Concrete Technologies; Cimfilm.
 - b. Burke by Edoco; BurkeFilm.
 - c. ChemMasters; Spray-Film.
 - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
 - e. Dayton Superior Corporation; Sure Film.
 - f. Euclid Chemical Company (The); Eucobar.
 - g. Kaufman Products, Inc.; Vapor Aid.
 - h. Lambert Corporation; Lambco Skin.
 - i. L&M Construction Chemicals, Inc.; E-Con.
 - j. MBT Protection and Repair, Div. of ChemRex; Confilm.
 - k. Meadows, W. R., Inc.; Sealtight Evapre.
 - l. Metalcrete Industries; Waterhold.
 - m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
 - n. Sika Corporation, Inc.; SikaFilm.
 - o. Symons Corporation, a Dayton Superior Company; Finishing Aid.
 - p. Unitex; Pro-Film.
 - q. US Mix Products Company; US Spec Monofilm ER.
 - r. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, non-dissipating.
 - 1. Products: Subject to compliance with requirements, provide one of the following-
 - a. Anti-Hydro International, Inc.; AH Clear Cure WB.

- b. Burke by Edoco; Spartan Cote WB II.
- c. ChemMasters; Safe-Cure & Seal 20.
- d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Cure and Seal WB.
- e. Dayton Superior Corporation; Safe Cure and Seal (J-18).
- f. Euclid Chemical Company (The); Aqua Cure VOX.
- g. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
- h. Lambert Corporation; Glazecote Sealer-20.
- i. L&M Construction Chemicals, Inc.; Dress & Seal WB.
- j. Meadows, W. R., Inc.; Vocomp-20.
- k. Metalcrete Industries; Metcure.
- l. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 150E.
- m. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
- n. Tamms Industries, Inc.; Clearseal WB 150.
- o. Unitex; Hydro Seal.
- p. US Mix Products Company; US Spec Hydrasheen 15 percent
- q. Vexcon Chemicals, Inc.; Starseal 309.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semi-rigid Joint Filler: Two-component, semi-rigid, 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 Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.10 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 **4100 psi** at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: 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 topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Review: Do not begin concrete operations until proposed mix has been reviewed by architect.
- B. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- C. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- D. Mix design submittal shall include:
 1. Project name
 2. Project component which pertains to submitted mix design
 3. Admixtures
 4. Historical break data from past projects on which the proposed mix was used
 5. General Contractor or Construction Manager review stamp
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Ground Granulated Blast-Furnace Slag: 25 percent.
 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 75 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Note that fly ash and slag may not be used in any interior or exterior slab on grade or any exposed concrete areas.
- F. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- G. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing or high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F.
 4. Use air-entraining admixture in exterior exposed concrete.

5. 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.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Slabs-on-Grade (Interior): Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: **3500 psi** at 28 days.
2. Minimum cement content – 517 # /cy, Maximum W/C 0.53
3. Slump Limit: **4 inches**, plus or minus **1 inch**.
4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
5. Include water vapor reducing admixture.

- B. Exterior Exposed Concrete: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: **4000 psi** at 28 days.
2. Minimum cement content – 564 # /cy, Maximum W/C 0.45
3. Slump Limit: **4 inches**.
4. Air Content: 6 percent, plus or minus 1.0 percent at point of delivery for **1-1/2-inch** nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for **1-inch** or **3/4-inch** nominal maximum aggregate size.

- C. Mix Adjustments: Provided that no additional expense to owner is involved, contractor may submit for architect's review requests for adjustment to approved concrete mixes when circumstances such as changed project conditions, weather, or unfavorable test results occur. Include laboratory test data substantiating specified properties with mix adjustment requests.

2.13 FABRICATING REINFORCEMENT

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

2.14 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.

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, **1/8 inch** for smooth-formed finished surfaces.
 - 2. Class B, **1/4 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. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. 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."

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.

- 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 VAPOR BARRIERS

- A. Vapor Barriers: Place, protect, and repair vapor barriers according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints **6 inches** and seal with manufacturer's recommended tape.
 - 2. Place vapor barrier sheeting with the longest dimension parallel with the direction of the concrete pour.
 - 3. Seal all penetrations using site constructed boots, mastic, pressure-sensitive tape, etc.
- B. Course Graded Granular Sub-Base: Install over rough graded building pad.
- C. Coordinate installation of vapor barrier and use of blotter course and/or capillary break course with the anticipated construction schedule and ACI 302.1R-96, Figure 1. Plan sufficient time into the project schedule to allow for complete slab curing and drying in order to receive moisture sensitive floor finishes.
- D. If the roofing membrane has been installed on the building, the vapor barrier must be placed under a granular blotter course of fine-graded granular material.
 - 1. Fine-Graded Granular Blotter Course: Cover vapor barrier with a 3 inch layer of fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus **0 inch** or minus **3/4 inch**.
- E. If the roofing membrane has not been installed, the vapor barrier may be placed directly underneath the slab concrete on top of a capillary break course of fine graded material.
 - 1. Fine-Graded Granular Capillary Break Course: Install vapor barrier over a 3 inch layer of fine-graded granular material, moistened and compacted with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier 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.

- 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.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Interrupt placement sequence as needed for practical or logistical placement. Install construction joints such that 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 beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. If not indicated, locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction (Control) 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. General: Install and locate joints in concrete slabs according to concrete institute standards and where indicated in the Drawings.
 - a. Drawing locations are schematic.
 - b. Review and coordinate exact locations with the Architect and proposed joints in finish materials.
 - 2. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of **1/8 inch**. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 3. 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. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than **1/2 inch** or more than **1 inch** below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. 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.

3.7 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 as part of the original mix design review process.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least **6 inches** into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - a. Monitor floor structure deflection during placement and supply concrete in sufficient quantity necessary to achieve specified floor elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F 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.

3.8 FINISHING - GENERAL

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. 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.

3.9 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, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.

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.

3.10 FINISHING - FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of **1/4 inch** in 1 direction.
1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings or mortar setting beds for ceramic or quarry tile, portland cement terrazzo or other bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. For distinct rooms or areas greater than 1,500 square feet: Finish surfaces to the following tolerances, according to **ASTM E 1155**, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 3. For distinct rooms or areas less than 1,500 square feet: Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, **10-foot-** long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed **3/16 inch**
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. 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.

H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of **100 lb/100 sq. ft.** unless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

I. Raked Groove Surface Finish: Install at interior and exterior vehicular traffic ramps and other sloped surfaces where indicated. Provide a ¼ inch deep grooved in a direction to control water downward to the sides/curbs of the slope. Prior to construction, review with Architect for acceptable interpretation of requirements.

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.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.12 CONCRETE PROTECTING AND CURING - GENERAL

- 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. Slab on grade to receive rubber, resilient, vct or epoxy flooring must comply with the following requirement prior to flooring installation.
 1. Valid and acceptable test results shall be provided to the end user and flooring installer, including the location of all tests, recorded moisture content and temperature of the concrete subfloor prior to flooring installation. Testing shall be confirmed to have been performed at the correct, controlled ambient surface temperature and humidity following the protocol of ASTM F2170- Standard Test Method for determining Relative Humidity in

Concrete Floor Slabs Using in situ Probes, using a Wagner Rapid RH probes only. When tested at the correct service temperature and ambient humidity the maximum allowable shall be 85% RH.

- a. Testing may be performed by the flooring installer.
- D. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs on temporary formwork, 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.
 - E. Unformed Surfaces: Begin curing immediately after finishing concrete.
 - F. 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.
 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.

3.13 CONCRETE PROTECTING AND CURING – INTERIOR FLOORS AND SLABS

- A. 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. Flatwork: Begin curing floors, slabs and concrete floor toppings immediately after finishing concrete.
- D. Cure concrete according to ACI 308.1 by:
 1. 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 three to seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- a. Use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
- b. Use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

3.14 LIQUID FLOOR TREATMENTS (CONCRETE HARDENER AND SEALER)

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than seven days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
 - 4. Install concrete hardener and sealer at all exposed floor surfaces where floors do not receive other finished material.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.15 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) or as long as possible given the project schedule. 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 semi-rigid 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.

3.16 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 un-reinforced 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.

3.17 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Construction Manager/Owner will engage a special inspector and/or a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:

1. Steel reinforcement placement.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: 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 one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Slump: ASTM C 143/C 143M; 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, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 9. Test results and Inspection Reports shall be reported in writing to Architect, concrete supplier / manufacturer, Contractor, and Authorities having jurisdiction 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.
 10. Non-destructive 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.
 11. 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. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

- D. Measure floor and slab flatness and levelness according to **ASTM E 1155** within 24 hours of finishing.

END OF SECTION 03 3000

Attachment A

Painting Scope of Work

The Contractor shall paint the entire stair structure, including but not limited to:

- All stair treads
- Stringers
- Railings
- Support columns
- Support arms
- Metal landings and associated components

Painting shall be performed in two (2) phases:

- Phase One (Offsite): Offsite preparation and painting of all stair treads.
- Phase Two (Onsite): Surface preparation and painting of the remaining structure. Touch up of structure once treads are reinstalled. Painting contractor will coordinate with steel contractor on timing.

The Contractor shall include all labor, materials, equipment, containment systems, and incidental costs necessary to complete the work.

The Contractor is responsible for providing appropriate barriers, protection, and containment measures to prevent overspray, dust migration, or damage to adjacent surfaces, structures, equipment, or occupied areas. All protective measures shall comply with applicable safety regulations and project requirements.

SECTION 09 96 00 – HIGH-PERFORMANCE COATINGS (MACROPOXY 646 / RESUTILE HTS 100)

PART 1 – GENERAL

1.1 SECTION INCLUDES

- High-performance coating system consisting of a surface-tolerant epoxy intermediate coat and a high-solids, aliphatic polyurethane topcoat.

1.2 PERFORMANCE REQUIREMENTS

- **Adhesion (System):** Minimum 450 psi (concrete failure) per [ASTM D4541](#).
- **Abrasion Resistance (Topcoat):** Maximum 11.7 mg loss per ASTM D4060 (CS-17 wheel, 1000g load, 1000 cycles).

- **Slip Resistance:** Minimum [0.60 Static Coefficient of Friction](#) per ASTM D2047.
- **UV Stability:** Topcoat must be 100% aliphatic to prevent yellowing or chalking.
- **Performance Requirements:** The coating must meet [ASTM D4541](#) for adhesion (minimum 1,037 psi) and ASTM D4060 for abrasion resistance (maximum 84 mg loss).
- **Compliance Standards:** Must conform to [AWWA D102 OCS #5](#) and MPI #108.
- **Submittals:** Provide product data sheets, safety data sheets (SDS), and color samples. For nuclear or specialized facilities, provide NRC license-specific qualifications.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- **Basis of Design:** Sherwin-Williams Protective & Marine / Resin Flooring.

2.2 COATING SYSTEM

- **Material:** Macropoxy 646 Fast Cure Epoxy (B58 series).
- **Physical Characteristics:**
 - **Volume Solids:** [72% ± 2%](#).
 - **VOC Content:** Less than [250 g/L](#) (unreduced).
 - **Mix Ratio:** 1:1 by volume.
- **System Components:**
 - **Prime Coat:** Self-priming or over [Zinc Clad II Plus](#)
- **Intermediate/Prime Coat:** [Macropoxy 646 Fast Cure \(B58 Series\)](#).
 - Volume Solids: 72% ± 2%.
 - DFT: 5.0 to 10.0 mils.
- **Secondary Topcoat:**

Resutile HTS 100 (High Traffic System)

- Type: Three-component, high-solids, moisture-cure urethane.
- VOC Content: [<100 g/L \(Low VOC\)](#).
- Finish: Satin with light texture.
- Mix Ratio: [Pre-measured kit](#) (typically 1:1:1 by unit).

PART 3 – EXECUTION

3.1 SURFACE PREPARATION

- **Surface Preparation:**
 - **Steel (Atmospheric):** SSPC-SP2/3 Hand or Power Tool Cleaning.
 - **Steel (Immersion):** SSPC-SP10/NACE 2 Near-White Metal Blast with 2.0-3.0 mil profile.
 - **Galvanized/Aluminum:** SSPC-SP1 Solvent Cleaning.
- **Application Thickness:** Apply each coat at 5.0 to 10.0 mils DFT (7.0 to 13.5 mils WFT).
- **Environmental Constraints:** Do not apply if surface temperature is below [35°F \(1.7°C\)](#) or relative humidity is above 85%.
- **Field Quality Control:** Utilize [dry film thickness gauges](#) and holiday detectors to verify coverage and film integrity.
- **Intermediate Coat (Macropoxy 646):** Ensure epoxy is clean and dry. If the recoat window exceeds 30 days (or 24 hours in some UV conditions), mechanically abrade/sand the surface to ensure adhesion.

3.2 APPLICATION

- **Topcoat (Resutile HTS 100):**
 - Spreading Rate: 500 sq. ft./gallon.
 - WFT/DFT: ~3.0 mils.
 - Method: Apply using a 3/8" nap roller in V-shaped cross passes to ensure even texture.
- **Curing:** Do not subject to heavy traffic for [24-48 hours](#) at 77°F.

HARTLAND HIGH SCHOOL HARTLAND, MICHIGAN

DRAWING INDEX		
DWG NO.	REVISION	DRAWING TITLE
100	0, A, B, C	DRAWING LIST
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200	0	SLIDE PATH LAYOUT AND TABLES
300	0, B, C	FOUNDATION LAYOUT AND TABLES
400	0	SLIDE SUPPORT LAYOUT AND TABLES
500	0, A, C	TOWER PLANS AND ELEVATION
501	0, A	TOWER STRUCTURAL DETAILS SHEET 1 OF 2
502	0, A, C	TOWER STRUCTURAL DETAILS SHEET 2 OF 2
600	0	MECHANICAL GENERAL NOTES AND SLIDE PUMPING FLOW DIAGRAM
S204	0	POOLSIDER ENTRY AND EXIT DETAILS
S300	0, C	SPREAD FOOTING, PEDESTAL, EMBEDMENT & BASE PLATE STANDARD DETAILS
S400	0	COLUMN AND ARM DETAILS
S415	0	POOLSIDER YOKE AND ASSEMBLY DETAILS

THIS DRAWING NOT INCLUDED →

THIS DRAWING NOT INCLUDED →

INDOOR SLIDE

C	REVISED AS NOTED	NOV 26/2002	
B	DWG. 300 REVISED	JUN 13/2002	
A	DWG. 500, 501 & 502 REVISED	MAY 13/2002	DV
0	ENGINEERING ISSUE	MAY 03/2002	DV
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	PE

DESIGNED BY	DATE	PROJ. ENG. CHECK	DATE
DV	APR 18/2002	DV	MAY 06/2002
DRAWN BY	DATE	DRAFTING CHECK	DATE
MRL	APR 18/2002	JR	MAY 06/2002
SCALE	N/A	ARCHIVE FILE No.	10992-100

NOTE:-- IMPERIAL DIMENSIONS
ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

WHITE WATER
WhiteWater West Industries Ltd
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Tel (604) 273-1068 Fax (604) 273-4518

DRAWING LIST

HARTLAND HIGH SCHOOL
HARTLAND, MICHIGAN

PROJECT No.	DRAWING No.	REVISION
10992	100	C

GENERAL NOTES AND SPECIFICATIONS

A. GENERAL CONDITIONS

These drawings shall be read in conjunction with architectural, electrical and mechanical drawings.

Before any fabrication is started, the General Contractor shall verify the assumed location of the pool corners, and any existing site constraints, which would affect the overall design. Any discrepancies or omissions shall be communicated to WhiteWater for clarification.

Discrepancies not reported to WhiteWater and the associated additional costs incurred due to correction will become the responsibility of the General Contractor.

No extra work shall be carried out and no changes shall be made, unless pursuant to an Addendum or Field Order and no payment for extra work shall be made without a Change Order, or provision for extra payment in an Addendum.

B. SITE WORK

1. Site Survey

General Contractor shall establish base lines and reference points on site, as noted on the drawings. WhiteWater shall be notified of any discrepancy prior to commencement of work. The integrity of such base lines and reference points, once established, shall be carefully preserved and used at all times for the location of principal components of the work. General Contractor shall verify all dimensions and elevations prior to construction.

2. Underground Utilities

The General Contractor shall ensure that underground piping and utilities are not in conflict with the foundations as set forth in these drawings. Any damage caused to such utilities and the possible consequential design changes will be the responsibility of the General Contractor.

C. STRUCTURAL NOTES

1. General

Design conforms to the BOCA NATIONAL BUILDING CODE/1996

2. Foundation

Soil is assumed to be suitable for shallow foundation, allowable soil bearing pressure $q(a) = 2,000$ psf at the depth as indicated on these drawings; permanent ground water level 8 feet or more below fin. grade.

Geotechnical investigation report or any other suitable data (existing boring logs, foundation soil description/recommendations) is required to confirm these assumed conditions.

In the absence of any report or other sufficient information about soil the Owner shall verify soil conditions by an adequate soil test and inform WhiteWater of any deviation from the above.

Footings Backfill (where applicable):

Place native soil and mechanically compact in max. of 12" thick layers to reach 95% SPDD (Standard Proctor Dry Density).

Anchor Bolts

The General Contractor shall ensure that anchor bolts are in position and as specified in these drawings.

3. Concrete

All concrete shall be cast in place and conform to ACI 318-99 with minimum mix properties as follows:

	Compressive Strength @ 28 days	Air Entrainment	Maximum Aggregate
Footings	4000 psi	-	3/4"
Piers/columns	4000 psi	6% +/- 1%	3/4"
Concr. topping (towers)	4000 psi	6% +/- 1%	1/2"

Slump of concrete without additives shall not exceed 3 1/2".

Concrete Cover

- cast against earth 3"
- exposed to earth 2"
- exposed to air/water 1 1/2"

Chamfer

All exposed edges to have 3/4" chamfer or grind off edges after concrete is placed.

4. Reinforcing Steel

Deformed bars for concrete reinforcing steel per ASTM A615. Yield strength $F_y = 60$ ksi min.

Length of lap splices as follows (unless noted otherwise on these drawings) in inches:

	Lap bars in slabs & beams only	
#3 bars ...	15	22
#4 bars ...	18	29
#5 bars ...	26	36
#6 bars ...	32	43
#7 bars ...	36	63
#8 bars ...	42	72
#9 bars ...	48	N/A
#10 bars ..	64	N/A

Welded Steel Wire Fabric

Standard styles and sizes indicated on these drawings per ASTM A185. Yield strength $F_y = 60$ ksi shall be used. Steel to be hot dip galvanized.

Steel Wire

ASTM A82, plain, cold-drawn steel, galvanized.

Grout

Masterflow 713 or approved equal non-shrink, non-metallic grout. Use as recommended by manufacturer.

All applicable drawings shall be checked for locations of block-outs, anchors, inserts, etc. before concrete is placed.

5. Structural Steel

All structural steel to be hot dip galvanized, unless noted otherwise.

Structural steel shall be new material of sizes and shapes listed in current AISC (or CISC) Handbook and as indicated on drawings.

Shapes & plates	: ASTM A36 ($F_y = 36$ ksi).
Steel Pipes	: ASTM A53, Grade B ($F_y = 35$ ksi).
Structural Tubes	: ASTM A500 Grade B ($F_y = 46$ ksi).
Steel Deck	: ASTM A446 Grade A ($F_y = 33$ ksi). 1 1/2" deep corrugated steel - cold formed. Core thickness 0.036" U.N.O.
Anchor Bolts	: ASTM A36, galvanized.
Structural Bolts	: 3/4" dia. and larger: High Strength ASTM A325; galvanized ($F_u = 120$ ksi). 1/2" dia.: High Strength ASTM A325 or SAE J429 Grade 5; galvanized ($F_u = 120$ ksi). 3/8" dia. and smaller (not used on standard assemblies); SAE J429 Grade 5 bolts; galvanized ($F_u = 120$ ksi).
Welding Electrodes	: E70XX electrode.

LEGEND:

F_y - Yield Strength
 F_u - Tensile Strength

HOLE DIAMETERS FOR BOLTS (in):

a) FRAMING CONNECTIONS

BOLT DIA.	GALVANIZED STEEL	NON-GALVANIZED STEEL
1/2	5/8	9/16
5/8	3/4	11/16
3/4	7/8	13/16
1	1 1/8	1 1/16
>1	d + 1/8	d + 1/16

b) ANCHOR BOLTS

BOLT DIA. + 1/4

Bolt Tightening

All A325 bolts to be tightened according to the "turn of nut" method specified in ASTM A325.

Unless otherwise noted all steel components shall be hot dip galvanized & those exposed to field welding shall be cold galvanized with Galvacor or equivalent zinc rich paint. Galvanizing hole sizes shown are for guidance only and actual size, location, and numbers must be established by the fabricator per ASTM A123, A153 and A386.

All plates, shapes and tubes in contact are to be welded with 1/4" fillet welds all around unless otherwise indicated.

Welding shall be done by welders certified with AWS-D-1.1 or CSA W47.1.

These plans, sections and details are design drawings. The fabricator shall prepare fabrication and erection drawings to ensure the exact assembly of all components. Fabrication and erection drawings may be submitted to WhiteWater for review of general compliance and structural integrity only.

6. Lumber N/A

7. Design Loads

SLIDE A: POOLSIDE SLIDE

7.1) WATER SLIDE LOADS (MAX. ALLOWED FOR SLIDE OPERATION)

POOLSIDE SLIDE : DL = 30 lbs/ft
LL = 300 lbs moving concentrated load
Water Flow = 800 gal/min @ 12 ft/sec
= 10 lbs/ft

Legend:

DL - dead load
LL - live load

7.2) TOWER LOADS : DL = 45 psf
23 lbs/ft (railing)
LL = 100 psf

Horiz. Load on Railing = 50 lbs/ft (uniform)
200 lbs (concentrated)

7.4) WIND LOAD : Indoor Slide $q_w = 10$ psf

7.5) SEISMIC LOAD: $A_v = A_a = 0.06$

Seismic Base Shear:
 $V = C_s \times W$

$C_s(\max) = (2.5 \times A_a) / R$
 $R = 2.5$ (Inverted pendulum)
5 (Centrically braced frames)
7 (Eccentrically braced frames)
4.5 (Ordinary moment frames - steel)
3 (Ordinary moment frames - concrete)
 $W =$ total DL per Cl. 1610.4.1

$V_{\max} = 0.06 \times W$

D. SLIDES CONSTRUCTION

Flumes

All slides shall conform to the following guidelines with respect to installation and operational safety:

1. WWA CONSIDERATIONS FOR OPERATIONAL SAFETY - published by World Waterpark Association.
2. Suggested Health and Safety Guidelines for Recreational Water Slide Flumes - Published by U.S. Department of Health and Human Services.
3. Applicable local, state or governing national building codes.
4. WhiteWater West operation and maintenance guidelines.

Polyurethane sealant or any other approved sealant shall be provided on each flange connection.

Flumes shall be inspected by a representative of WhiteWater to ensure a smooth finish prior to acceptance of work. Also by a representative of Carnival and Amusement Division, State of Michigan.

All bolts connecting the flume flanges shall be stainless steel grade 18/8 grade 304 or equal complete with oversize 1" dia washers and nylon insert locking nuts.

E. CERTIFICATION OF WATER SLIDES

"WhiteWater West Industries" strictly prohibits the operation of the water slides prior to receiving an inspection certificate issued by a representative of the company.

The Owner or the General Contractor must ensure that the slides will be fully operational at the time of the inspection so that various test procedures may be undertaken. At such time as WhiteWater's inspector deems the slides to be installed correctly and are operating correctly a certificate for operation will be issued.

A minimum of fourteen (14) days advance notice is required for an inspection.

INDOOR SLIDE

C	REVISED AS NOTED	NOV 26/2002	
0	ENGINEERING ISSUE	MAY 03/2002	DV
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	PE

DESIGNED BY	DATE	PROJ. ENG. CHECK	DATE
DV	APR 19/2002	DV	MAY 6/2002
DRAWN BY	DATE	DRAFTING CHECK	DATE
MRL	APR 19/2002		
SCALE	N/A	ARCHIVE FILE No.	10992-130

NOTE:- IMPERIAL DIMENSIONS
ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

WHITE WATER
WhiteWater West Industries Ltd
6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
Tel (604) 273-1068 Fax (604) 273-4518

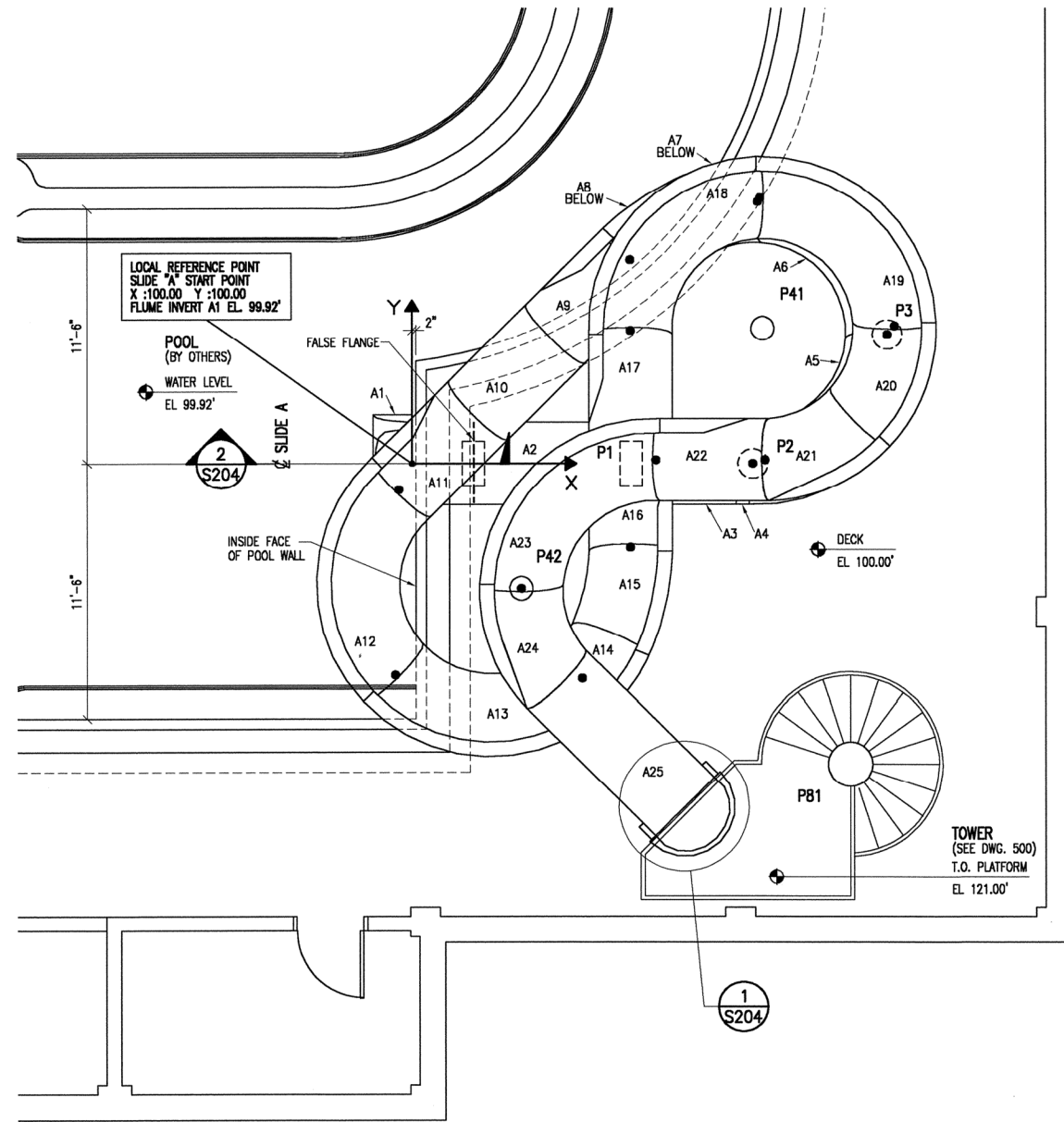
GENERAL NOTES AND SPECIFICATIONS

HARTLAND HIGH SCHOOL
HARTLAND, MICHIGAN

PROJECT No.	DRAWING No.	REVISION
10992	130	C

NOTES:
1. FOR GENERAL NOTES AND SPECIFICATIONS SEE DWG 130.

LEGEND:
 ● INDICATES YOKE LOCATION
 ○ INDICATES COLUMN LOCATION
 □ INDICATES SADDLE LOCATION



SLIDE PATH LAYOUT
SCALE 1/4"=1'-0"

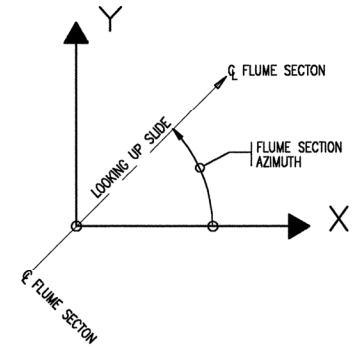
NOTE:
PEDESTRIAN BARRIERS ARE RECOMMENDED AND MAY BE REQUIRED IN ALL AREAS WHERE HEADROOM CLEARANCE OF WATERSLIDE STRUCTURES IS LESS THAN 8'-0". DESIGN AND SUPPLY OF SUCH BARRIERS TO BE FURNISHED BY OTHERS.

CO-ORDINATE TABLE

SLIDE : A TYPE : PS

SECT NO	CATALOGUE CODES	SECTION TYPE	XCOORD (ft)	YCOORD (ft)	AZIM (deg)	ELEV (ft)	GRADE %
AK 1)	PSPE	Pool entry	100.00	100.00	0.0	99.92	10.00
AK 2)	PSSTR	Straight	109.79	100.00	0.0	100.90	10.00
AK 3)	PSSTR	Stri LHS riser	114.69	100.00	0.0	101.39	10.00
AK 4)	PSCCR	Concave w/riser	115.33	100.00	0.0	101.46	14.00
AK 5)	PS90L	LT	121.24	105.91	90.0	102.76	14.00
AK 6)	PS90L	LT	115.33	111.81	180.0	104.07	14.00
AK 7)	PS225L	LT	113.07	111.36	202.5	104.40	14.00
AK 8)	PS225L32	LT	109.67	109.09	225.0	104.98	14.00
AK 9)	PSSTR	Stri RHS riser	106.22	105.64	225.0	105.67	14.00
AK 10)	PS15STR	Straight	102.77	102.19	225.0	106.35	14.00
AK 11)	PSSTR	Stri LHS riser	99.33	98.75	225.0	107.04	14.00
AK 12)	PS90L	LT	99.33	90.40	315.0	108.35	14.00
AK 13)	PS90L	LT	107.68	90.40	45.0	109.66	14.00
AK 14)	PS225L	LT	108.96	92.31	67.5	109.99	14.00
AK 15)	PS225L32	LT	109.76	96.33	90.0	110.57	14.00
AK 16)	PSSTR	Stri RHS riser	109.76	101.20	90.0	111.25	14.00
AK 17)	PSSTR	Stri RHS riser	109.76	106.08	90.0	111.94	14.00
AK 18)	PS90R	RT	115.66	111.98	360.0	113.25	14.00
AK 19)	PS90R	RT	121.57	106.08	270.0	114.56	14.00
AK 20)	PS45R	RT	119.84	101.90	225.0	115.21	14.00
AK 21)	PS45ER	RT w/end	115.66	100.17	180.0	115.87	14.00
AK 22)	PSSTR	Stri LHS riser	110.79	100.17	180.0	116.55	14.00
AK 23)	PS90L	LT	104.89	94.26	270.0	117.86	14.00
AK 24)	PS45EL	LT w/end	106.61	90.09	315.0	118.52	14.00
AK 25)	PSEB	EB no risers	112.18	84.52	315.0	121.00	0.00

Total ride length - Slide A : 149.04 ft



FLUME SECTION DIAGRAM
NOT TO SCALE

COMPONENT TABLE

COMPONENT	DESCRIPTION	QUANTITY		TOTAL LENGTH (ft)
		A	(ft)	
PSSTUB	PSEB Injector	2	0.00	0.00
PSSTR	Straight 1 RHS riser	3	4.92	14.76
PSSTR	Straight 1 LHS riser	3	4.92	14.76
PSSTR	Straight no risers	1	9.84	9.84
PSPE	Pool Entry	1	1.64	1.64
PSFALSE	False Flange	1	0.00	0.00
PSEB	EB no risers	1	9.84	9.84
PSCDUPLER	PSEB Rubber Coupler	2	0.00	0.00
PSCCR	Concave w/riser	1	0.65	0.65
PS90R	90 Curve RT	2	9.37	18.73
PS90L	90 Curve LT	5	9.37	46.83
PS45R	45 Curve RT	1	4.68	4.68
PS45ER	45 Curve RT w/end	1	4.68	4.68
PS45EL	45 Curve LT w/end	1	4.68	4.68
PS225L32	22.5 Left-3.2m	2	4.16	8.33
PS225L	22.5 Curve LT	2	2.34	4.68
PS15STR	5 Foot Straight	1	4.92	4.92

Total ride length - Slide A : 30 149.02

0	ENGINEERING ISSUE	MAY 03/2002	BP
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	PE
DESIGNED BY	AK	DATE	APR 17/2002
DRAWN BY	MRL	DATE	APR 17/2002
SCALE	AS NOTED	ARCHIVE FILE No.	10992-200

NOTE:- IMPERIAL DIMENSIONS
ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

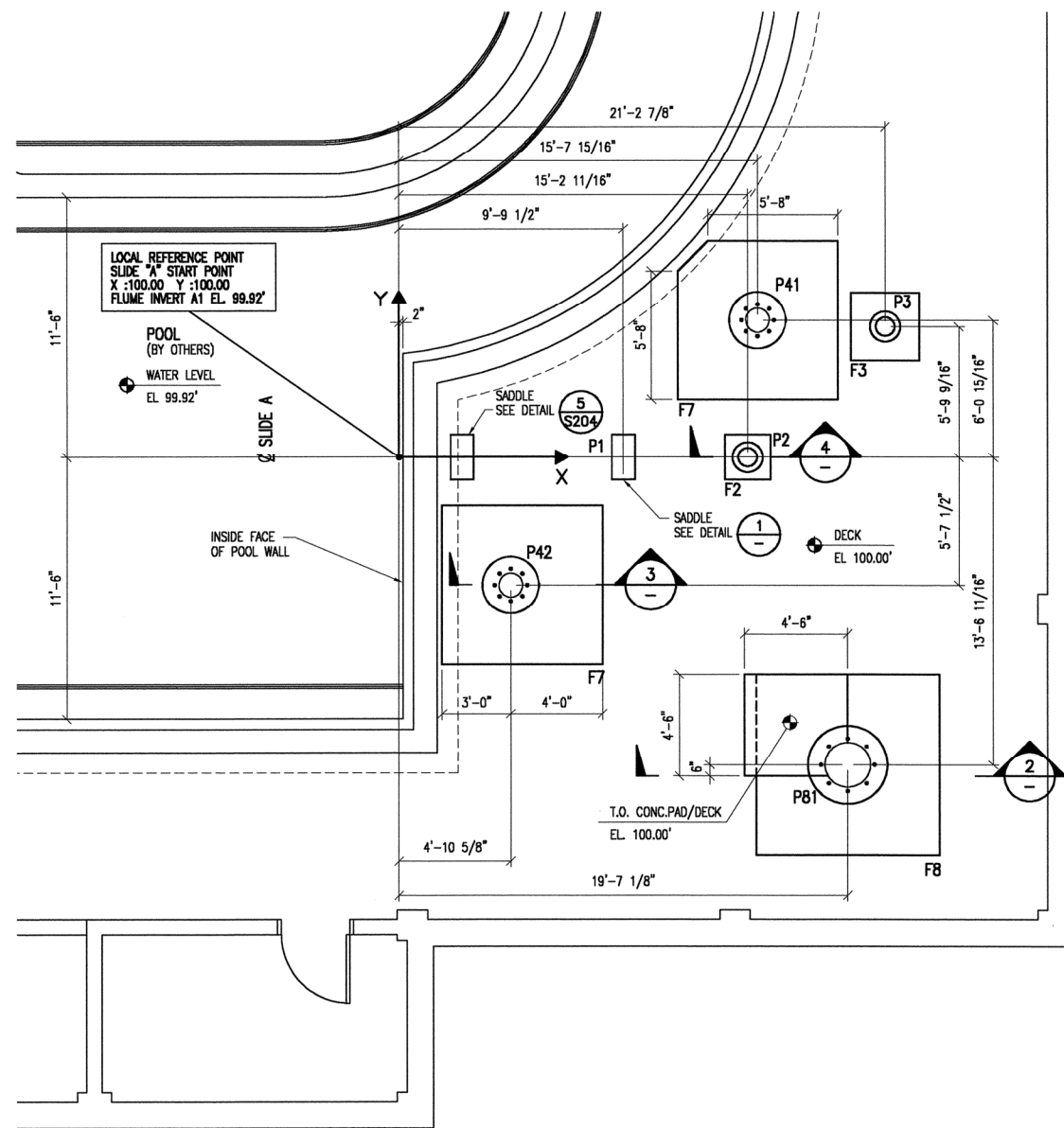
WHITE WATER
 WhiteWater West Industries Ltd
 6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
 Tel (604) 273-1068 Fax (604) 273-4518

SLIDE PATH LAYOUT AND TABLES
HARTLAND HIGH SCHOOL
HARTLAND, MICHIGAN

PROJECT No.	DRAWING No.	REVISION
10992	200	0

PLOT DATE: 02/05/08 FILE NAME: 10992SLIDE.dwg PLOT TIME: 08:42 ALL RIGHTS RESERVED. THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF WHITEWATER AND SHALL NOT BE REPRODUCED OR USED ON ANY OTHER WORK EXCEPT BY WRITTEN AGREEMENT WITH WHITEWATER.

NOTES:
 1. FOR GENERAL NOTES AND SPECIFICATIONS SEE DWG 130.

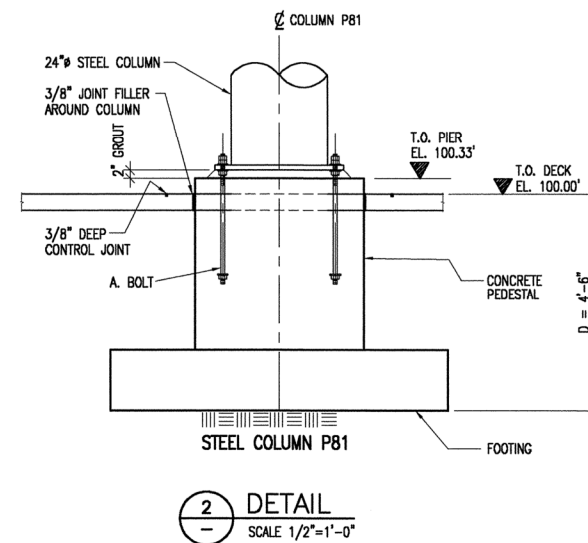
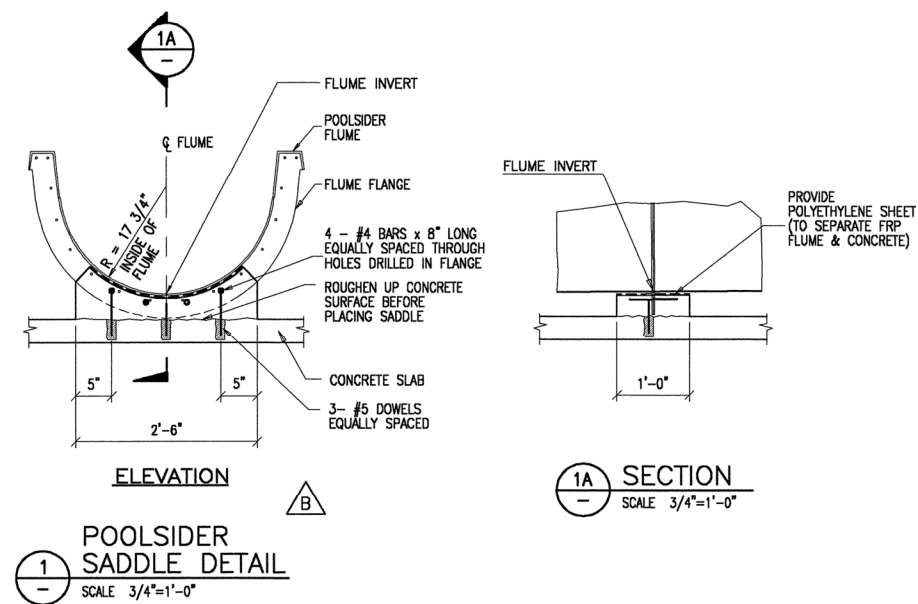


FOUNDATION LAYOUT
 SCALE 1/4"=1'-0"

COL. NO.	X COORD (feet)	Y COORD (feet)	FOOTING TYPE SEE DETAIL 2/S300 and 3/S300	COLUMN OR PEDESTAL TYPE SEE DETAIL 1/S300 and 3/S300	EMBEDDED PLATE (EBP) SEE DETAIL 7/S300	ANCHOR BOLTS SEE DETAIL 4/S300 UNO 0 -D -B	FTG DEPTH "D" AS PER DETAIL 3/S300	TOP OF COLUMN OR PEDESTAL ELEVATION (ft)
P 1	109.794	100.000	-	SADDLE	-	-	-	-
P 2	115.224	100.000	F2	C16	EBP	-	2'-0"	100.87
P 3	121.238	105.797	F3	C16	EBP	-	2'-0"	102.17
P 41	115.664	106.076	F7	C30	-	8-1 -17	3'-0"	100.50
P 42	104.885	94.374	F7	C30	-	8-1 -17	3'-0"	100.50
P 81	119.595	86.443	F8*	C42	-	8-1 -28	4'-6"	100.33

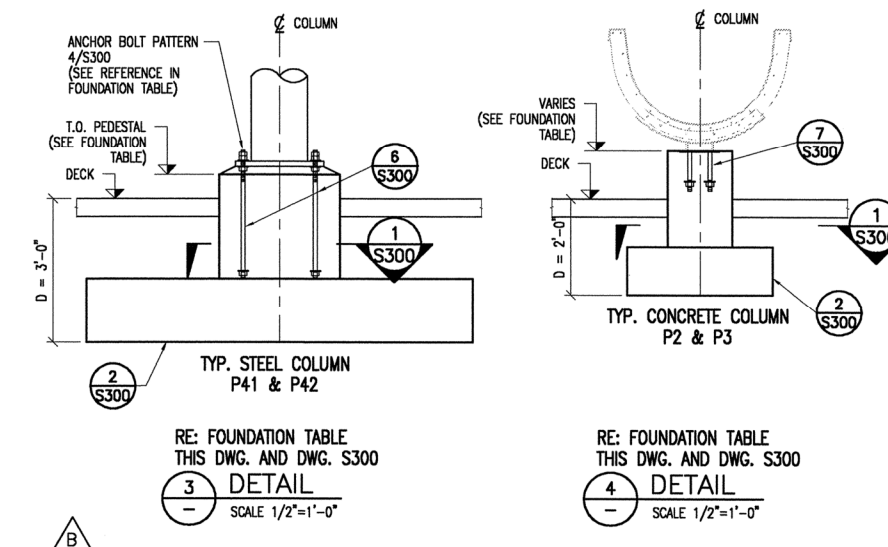
* SEE DETAIL 2/-

COLUMN SIZE/TYP DIAM. x WALL (in)	BASE PLATE SEE DETAIL 8/S300 W -T	ELEVATIONS UNDERSIDE BASE PLATE (feet)	TOP OF COLUMN CAP PLATE (feet)	COL. NO.
				P 1
				P 2
				P 3
12.75 x 0.375	21-1.25	100.67	116.50	P 41
12.75 x 0.375	21-1.25	100.67	117.27	P 42
24.00 x 0.375	32-1.25	100.50	124.83	P 81



CONSTRUCTION SEQUENCE:

CONCRETE PEDESTAL TO BE POURED TO ELEVATION 100.33', WHICH IS APPROXIMATELY 4" ABOVE FIN. DECK ELEVATION. UNDERSIDE OF BASE PLATE TO BE 100.50'. STEEL TOWER TO BE INSTALLED FIRST INCLUDING STAIR TREADS. TWO REIN. CONCRETE STAIR TREADS AT THE BASE TO BE POURED AS SHOWN ON SKETCH - PAGE 4 OF 4. STEEL RAILING WILL NOT CHANGE AS SUCH EXCEPT CONNECTION DETAIL BETWEEN 1 1/2" STD. PIPE POST AND THE SIDE OF CONCRETE PORTION OF THE STAIR. THIS WILL BE DETAILED IN THE SHOP DRAWING PACKAGE.



REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	PE
C	REVISED AS NOTED	NOV 26/2002	
B	REVISED AS NOTED	JUN 13/2002	
O	ENGINEERING ISSUE	MAY 03/2002	DV

DESIGNED BY: DV DATE: APR 17/2002 PERM. ENG. CHECK: DV DATE: MAY 6/2002
 DRAWN BY: MRL DATE: APR 17/2002 DRAFTING CHECK: JR DATE: MAY 6/2002
 SCALE: AS NOTED ARCHIVE FILE No. 10992-300

NOTE:- IMPERIAL DIMENSIONS
 ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
 ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

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 WhiteWater West Industries Ltd
 6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
 Tel (604) 273-1068 Fax (604) 273-4518

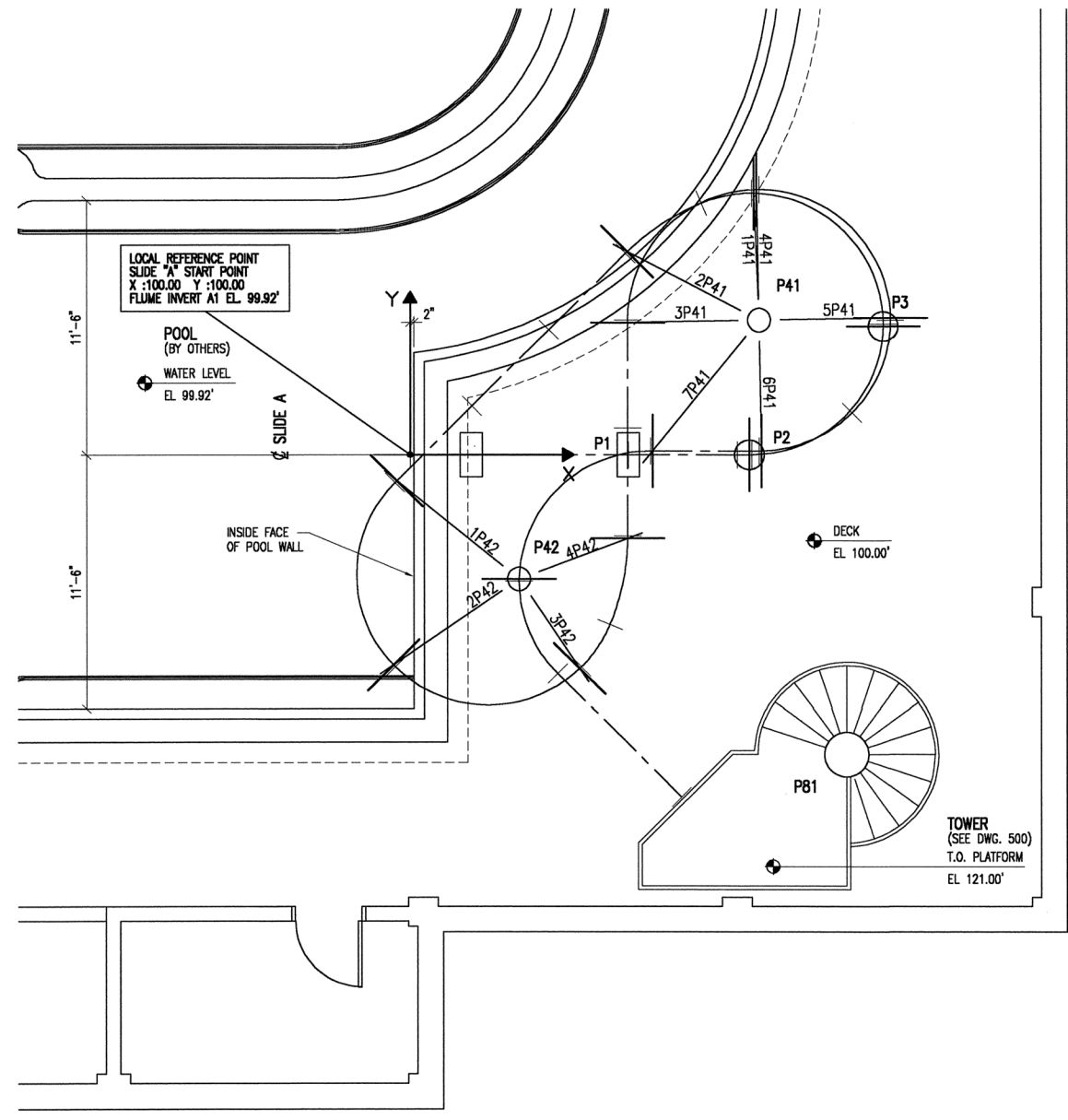
FOUNDATION LAYOUT
 AND TABLES

HARTLAND HIGH SCHOOL
 HARTLAND, MICHIGAN

PROJECT No. 10992	DRAWING No. 300	REVISION C
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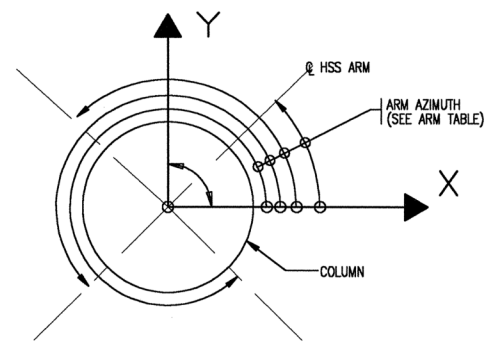
PLOT DATE: 02/11/28 FILE NAME: 10992SLIDE.dwg PLOT TIME: 09:23 ALL RIGHTS RESERVED. THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF WHITEWATER AND SHALL NOT BE REPRODUCED OR USED ON ANY OTHER WORK EXCEPT BY WRITTEN AGREEMENT WITH WHITEWATER.

NOTES:
 1. FOR GENERAL NOTES AND SPECIFICATIONS SEE DWG 130.



SLIDE SUPPORT LAYOUT
 SCALE 1/4"=1'-0"

ARM AND YOKE TABLE														
COL NO	ARM NO	ARM AZIMUTH (deg)	ARM ELEVATION SEE DETAIL 1 OR 2/S400 (feet)	ARM DIMENSIONS (feet)				ARM CONNECTION DETAIL	ARM SECTION (in)	BRACE TYPE UP or DN	YOKE TYPE	YOKE DETAIL	YOKE GRADE (deg)	SUPPORTED SECTION
				A	B	C	D							
P1														A(2)/A(3)
P2										PS-0	1/S415	7.97		A(4)/A(5)
P3										PS-0	1/S415	7.97		A(5)/A(6)
P41	1P41	92.22	103.59	5.50	4.79	3.50	2.23	1/S400	TS 4x4x0.25	UP	PS-1	2/S415	7.97	A(6)/A(7)
P41	2P41	152.47	104.50	6.44	5.73	3.50	2.23	1/S400	TS 4x4x0.25	UP	PS-1	2/S415	7.97	A(8)/A(9)
P41	3P41	181.05	111.46	5.67	4.96	3.75	2.38	1/S400	TS 4x4x0.25	DN	PS-1	2/S415	7.97	A(17)/A(18)
P41	4P41	91.05	112.77	5.67	4.96	3.75	2.38	1/S400	TS 4x4x0.25	DN	PS-1	2/S415	7.97	A(18)/A(19)
P41	5P41	1.06	114.08	5.67	4.96	3.75	2.38	1/S400	TS 4x4x0.25	DN	PS-1	2/S415	7.97	A(19)/A(20)
P41	6P41	271.06	115.39	5.67	4.96	3.75	2.38	1/S400	TS 4x4x0.25	DN	PS-1	2/S415	7.97	A(21)/A(22)
P41	7P41	231.10	116.08	7.35	6.64	3.50	2.23	1/S400	TS 4x4x0.25	DN	PS-1	2/S415	7.97	A(22)/A(23)
P42										PS-0	1/S415	7.97		A(23)/A(24)
P42	1P42	140.92	106.56	6.82	6.11	4.25	2.67	1/S400	TS 4x4x0.25	UP	PS-1	2/S415	7.97	A(11)/A(12)
P42	2P42	214.70	107.87	6.61	5.90	4.25	2.67	1/S400	TS 4x4x0.25	UP	PS-1	2/S415	7.97	A(12)/A(13)
P42	3P42	303.82	109.18	4.64	3.93	2.25	1.51	1/S400	TS 4x4x0.25	DN	PS-1	2/S415	7.97	A(13)/A(14)
P42	4P42	20.75	110.09	4.97	4.26	2.25	1.51	1/S400	TS 4x4x0.25	DN	PS-1	2/S415	7.97	A(15)/A(16)



ARM COLUMN DIAGRAM
 NOT TO SCALE

0	ENGINEERING ISSUE	MAY 03/2002	PE
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	PE
DESIGNED BY	DATE	PROJ. ENG. CHECK	DATE
DRWN BY	DATE	DRAWING CHECK	DATE
SCALE	AS NOTED	ARCHIVE FILE No.	10992-400

NOTE:— IMPERIAL DIMENSIONS
 ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
 ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

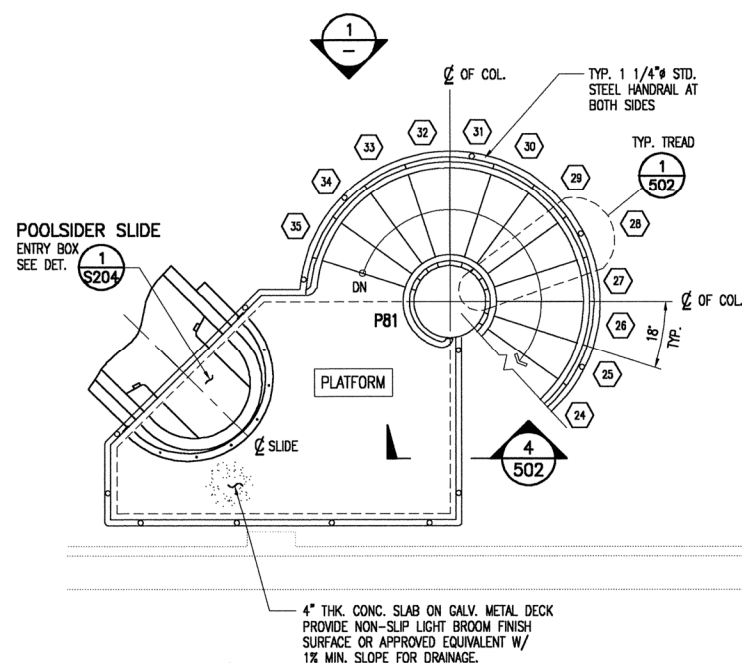
WHITE WATER
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 6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
 Tel (604) 273-1068 Fax (604) 273-4518

SLIDE SUPPORT LAYOUT AND TABLES
HARTLAND HIGH SCHOOL
HARTLAND, MICHIGAN

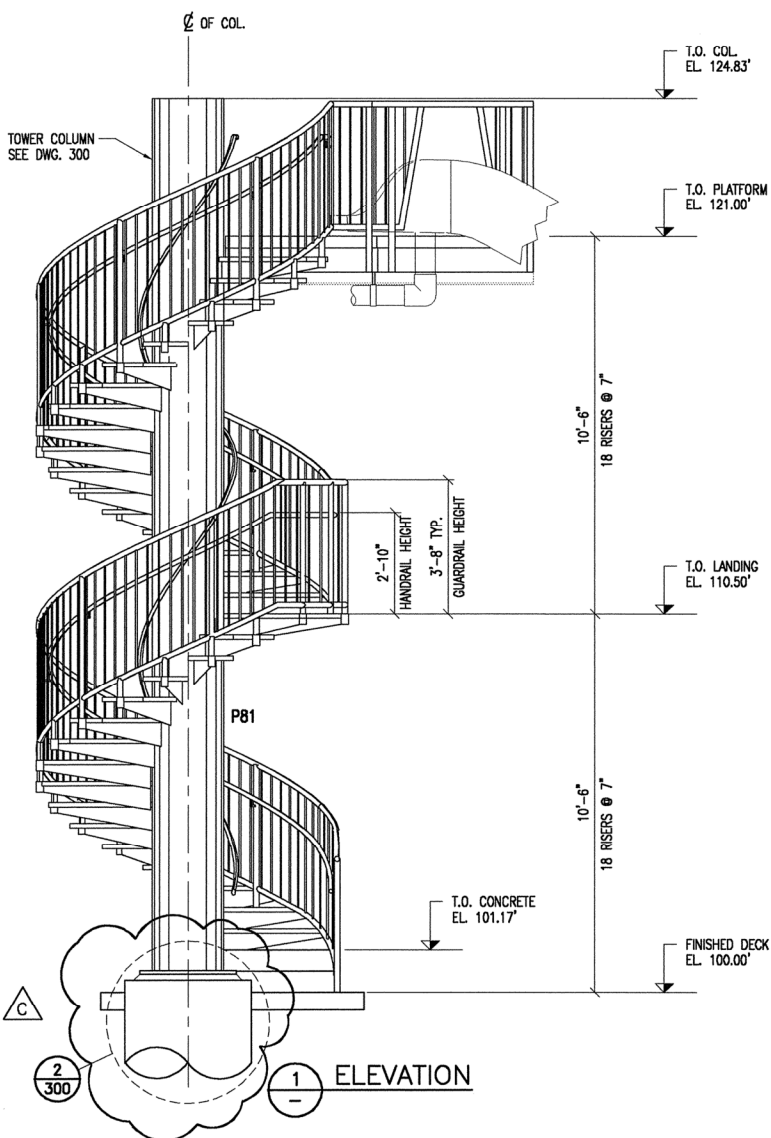
PROJECT No.	DRAWING No.	REVISION
10992	400	0

PLOT DATE: 02/05/06 PLOT TIME: 08:42 FILE NAME: 10892SLIDE.dwg ALL RIGHTS RESERVED. THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF WHITEWATER AND SHALL NOT BE REPRODUCED OR USED ON ANY OTHER WORK EXCEPT BY WRITTEN AGREEMENT WITH WHITEWATER.

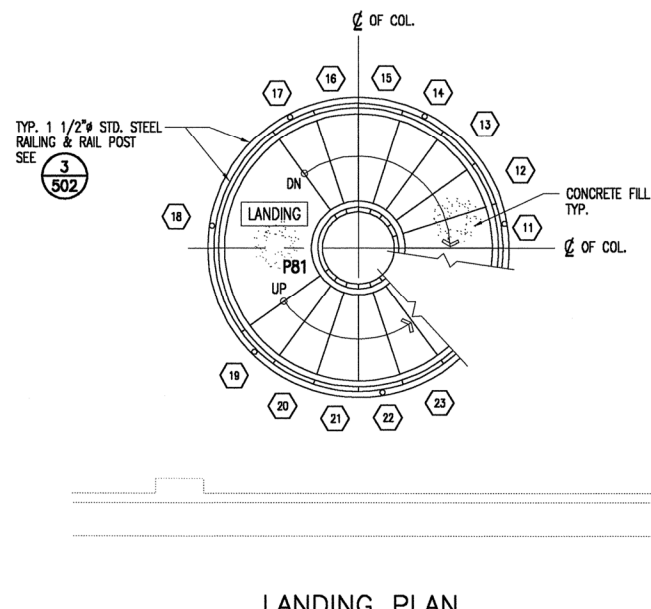
PLOT DATE: 02/11/28 FILE NAME: 10992-500.dwg PROJECT: HARTLAND HIGH SCHOOL TOWER PLANS AND ELEVATION DRAWING NO. 500



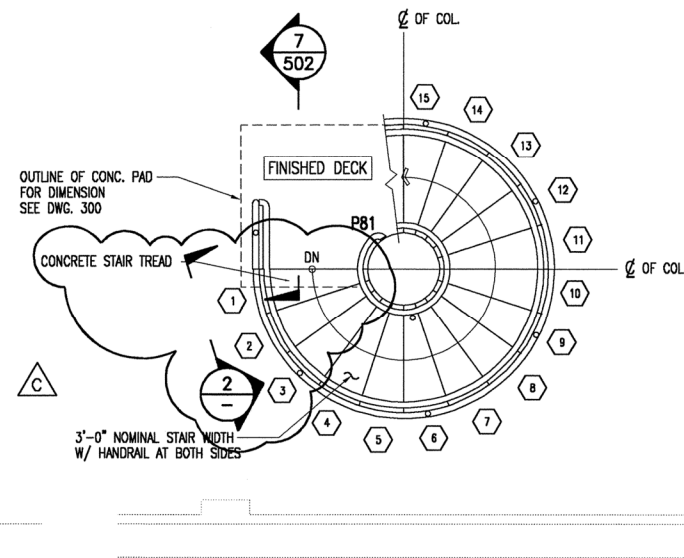
PLATFORM PLAN



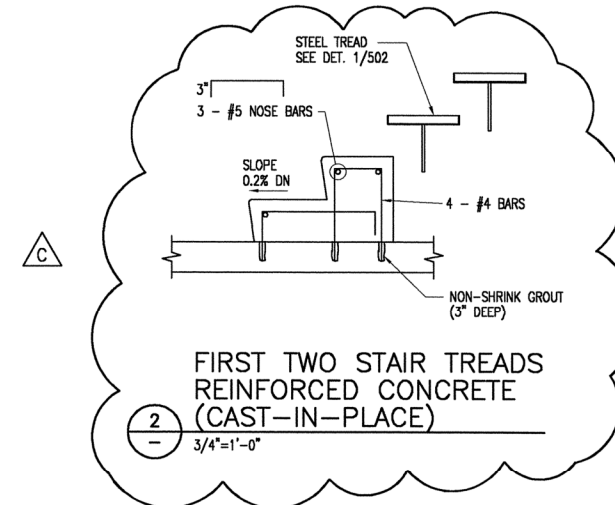
ELEVATION



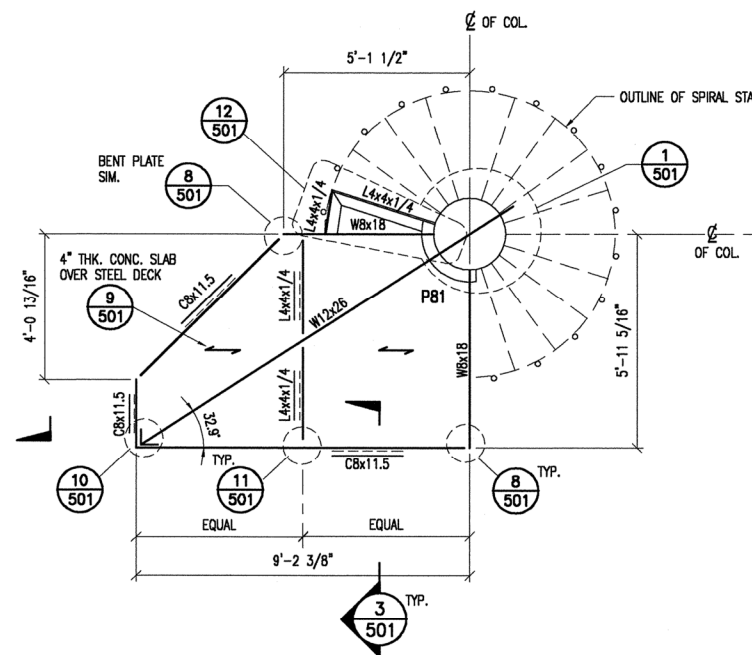
LANDING PLAN



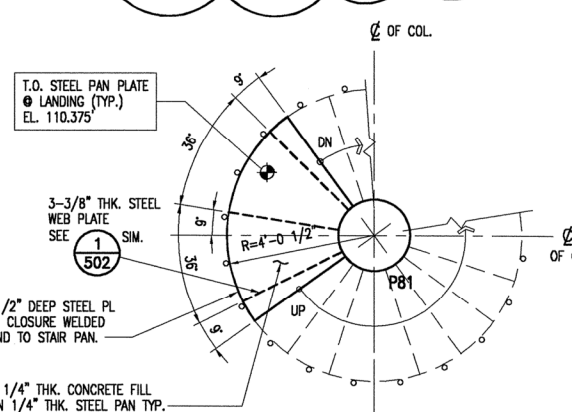
STAIR ENTRY PLAN



FIRST TWO STAIR TREADS REINFORCED CONCRETE (CAST-IN-PLACE)



PLATFORM FRAMING PLAN



LANDING FRAMING PLAN

NOTES:

1. FOR GENERAL NOTES AND SPECIFICATIONS, SEE DRAWING NO. 130.
2. FOR TOWER COLUMN LOCATION, SEE DWG. 300.

LEGEND:

○ - DENOTES NO. OF SPIRAL STAIR TREAD PAN AND LANDING.

C	REVISED AS NOTED	NOV 26/2002	
A	REVISION AS NOTED	MAY 13/2002	
0	ENGINEERING ISSUE	MAY 03/2002	DV
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	PE
DESIGNED BY	DATE	PROG. ENGR. CHECK	DATE
DV	APR 17/2002	DV	MAY 06/2002
DRAWN BY	DATE	DRAFTING CHECK	DATE
DL	APR 17/2002	YR	MAY 06/2002
SCALE	3/8" = 1'-0"	ARCHIVE FILE NO.	10992-500

NOTE: IMPERIAL DIMENSIONS ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

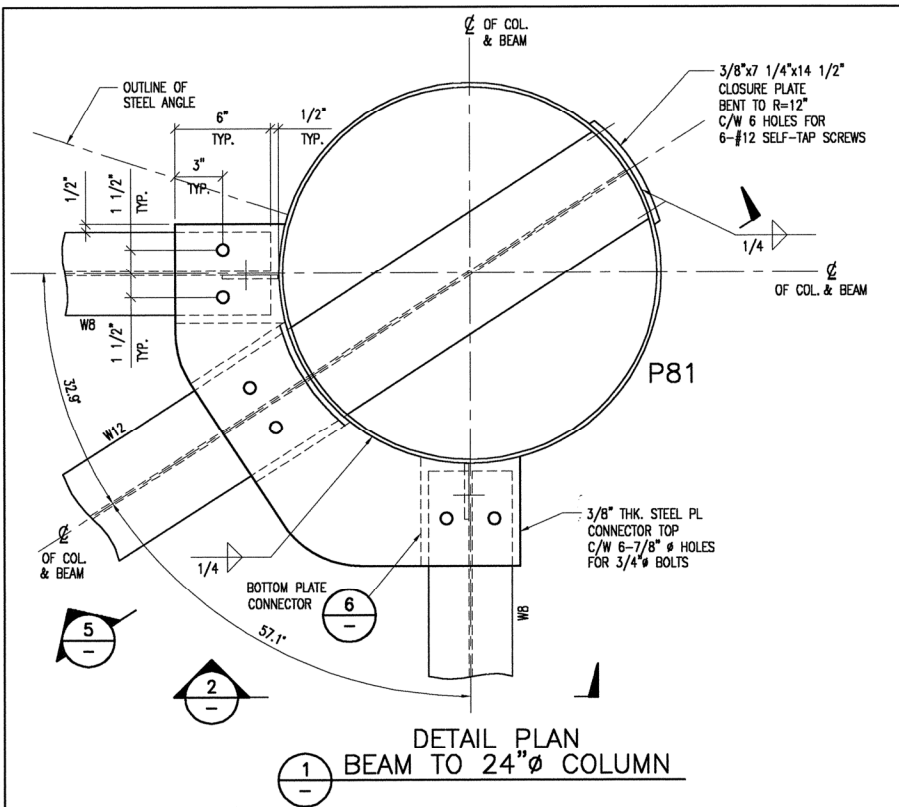
WHITE WATER
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TOWER PLANS AND ELEVATION

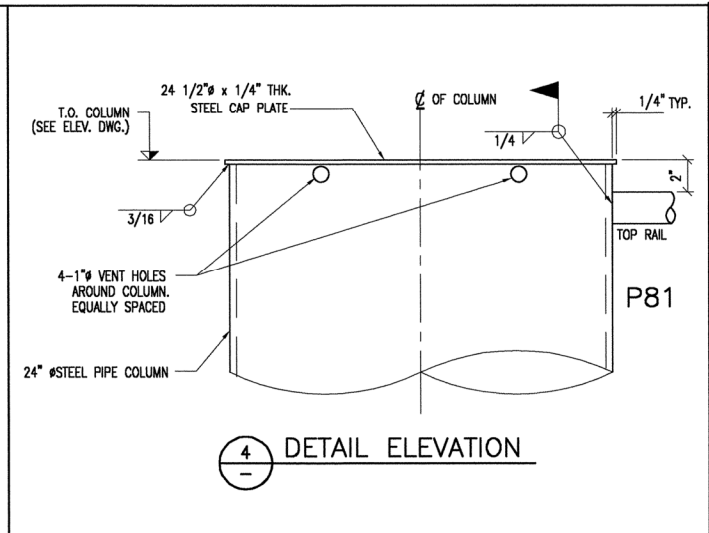
HARTLAND HIGH SCHOOL
 HARTLAND, MICHIGAN

PROJECT NO.	DRAWING NO.	REVISION
10992	500	C

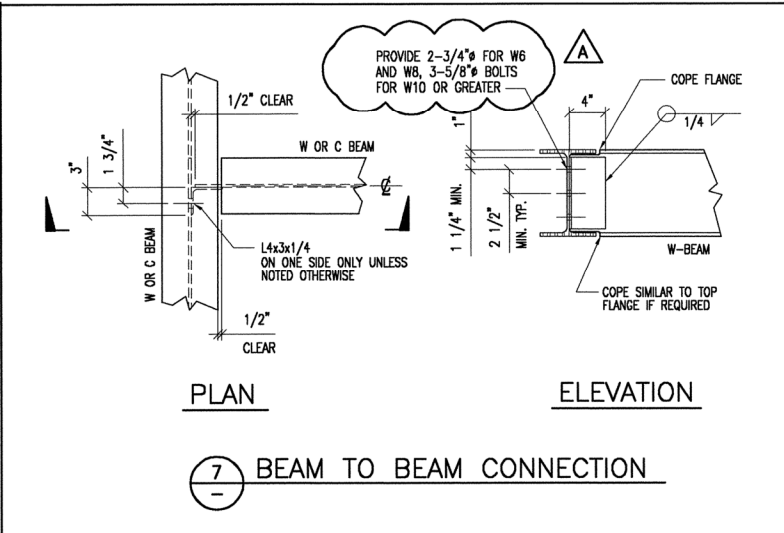
PLOT DATE: 02/05/13 PLOT TIME: 11:44 FILE NAME: 10992-501.dwg ALL RIGHTS RESERVED. THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF WHITEWATER AND SHALL NOT BE REPRODUCED OR USED ON ANY OTHER WORK EXCEPT BY WRITTEN AGREEMENT WITH WHITEWATER.



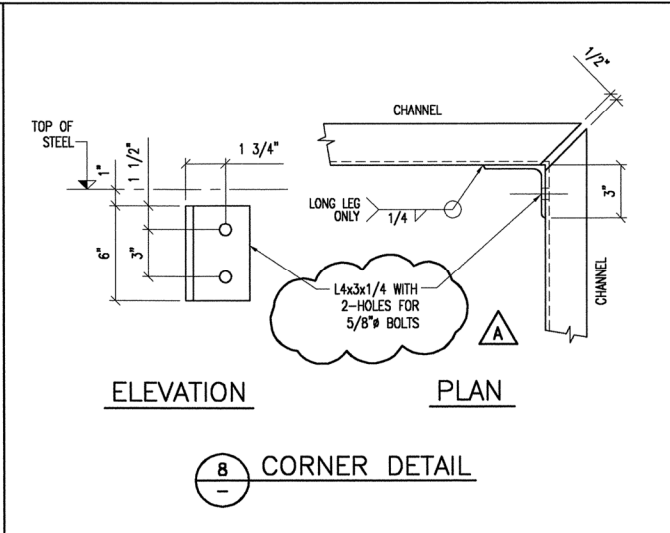
1 DETAIL PLAN BEAM TO 24"Ø COLUMN



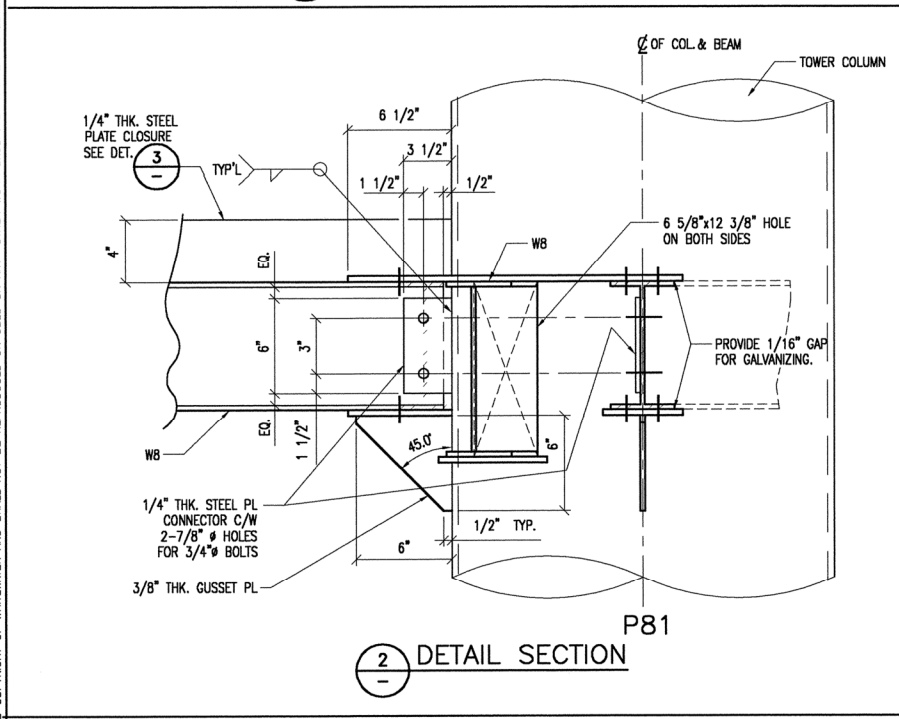
4 DETAIL ELEVATION



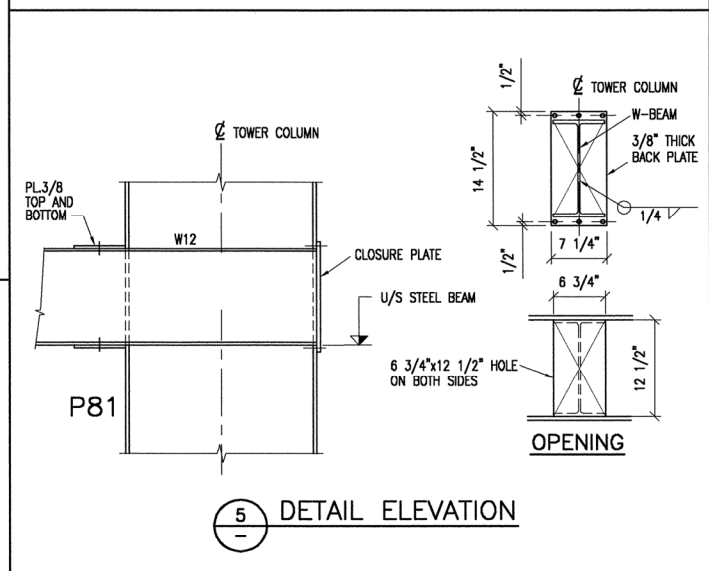
7 BEAM TO BEAM CONNECTION



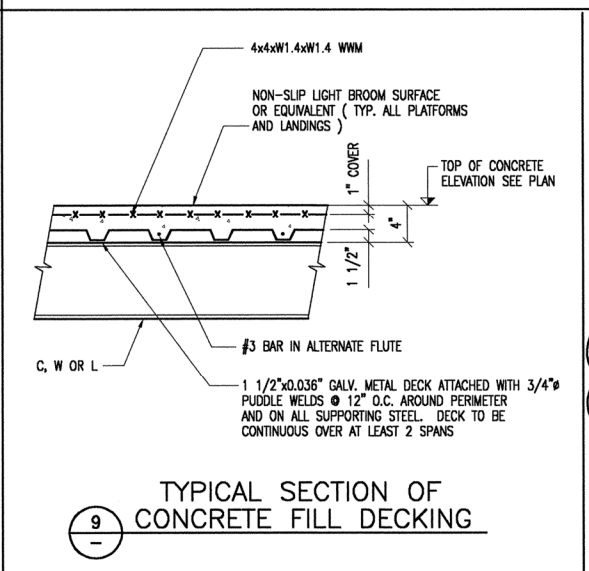
8 CORNER DETAIL



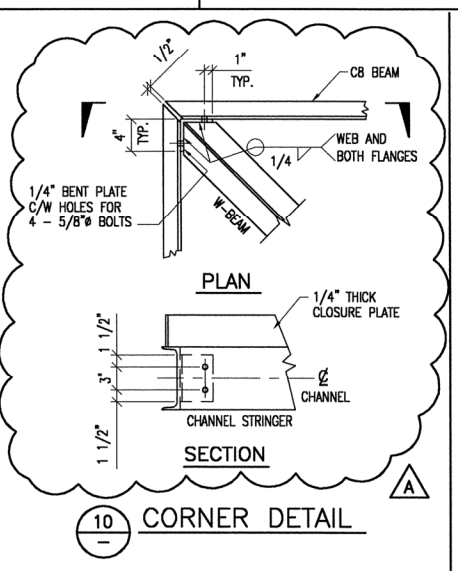
2 DETAIL SECTION



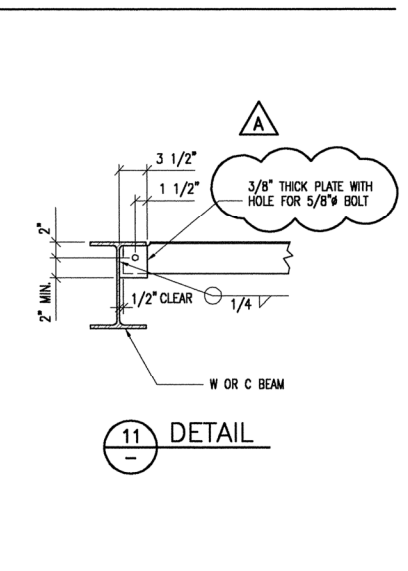
5 DETAIL ELEVATION



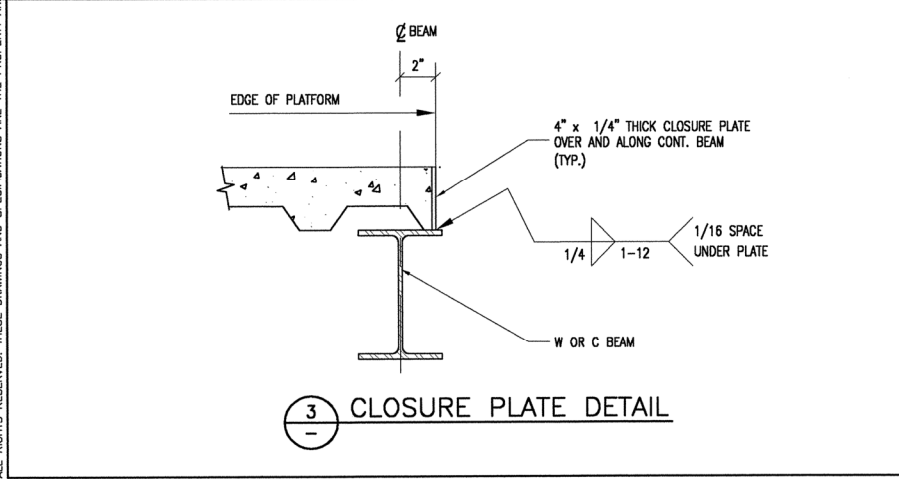
9 TYPICAL SECTION OF CONCRETE FILL DECKING



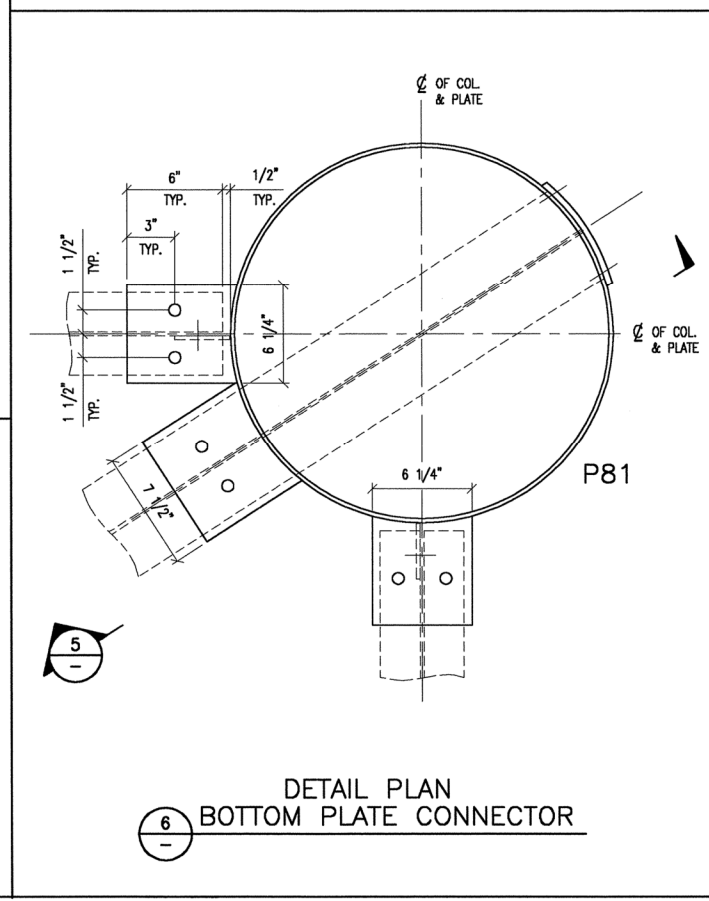
10 CORNER DETAIL



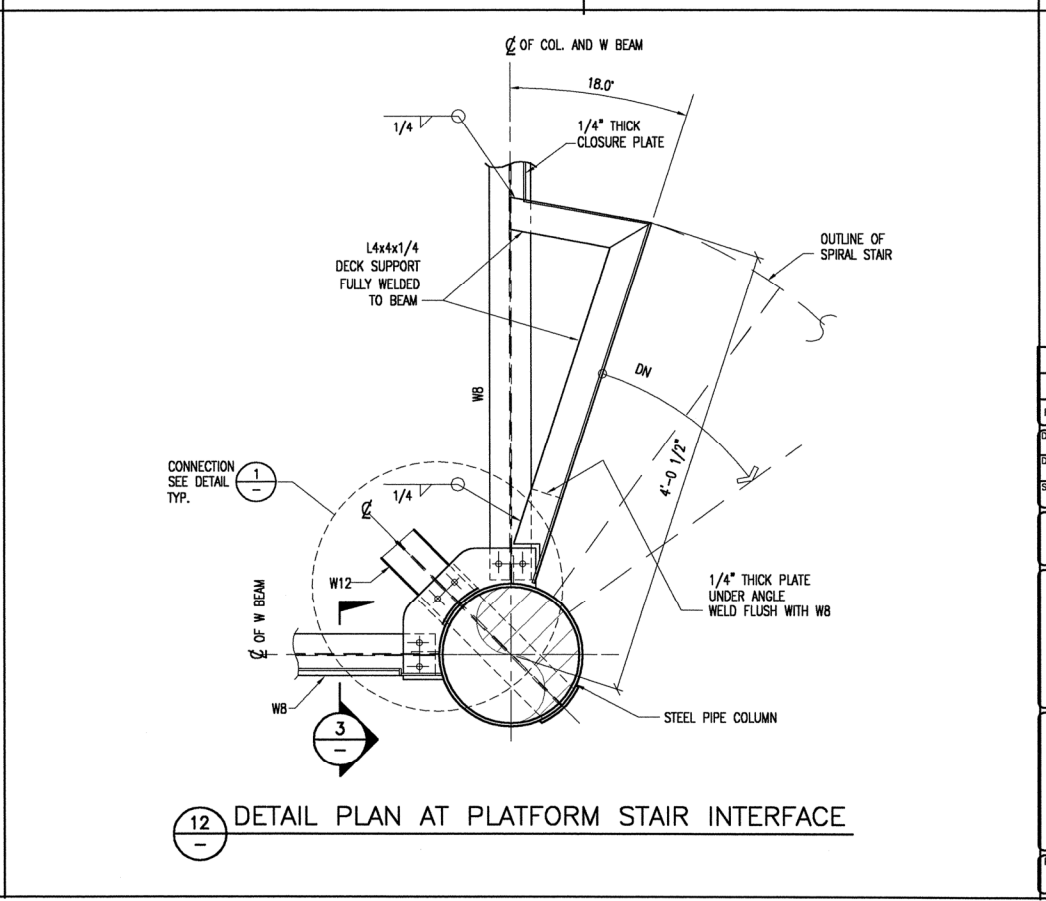
11 DETAIL



3 CLOSURE PLATE DETAIL



6 DETAIL PLAN BOTTOM PLATE CONNECTOR



12 DETAIL PLAN AT PLATFORM STAIR INTERFACE

NOTES:
 1. FOR GENERAL NOTES AND SPECIFICATIONS, SEE DWG. 130.
 2. ALL STRUCTURAL STEEL SHALL BE HOT-DIPPED GALVANIZED U.N.O.

REVISION	DESCRIPTION/ISSUE	RECORD	DATE	PE
A	REVISION AS NOTED		MAY 13/2002	
0	ENGINEERING ISSUE		MAY 03/2002	DV
DESIGNED BY	DATE	PROF. ENG. CHECK	DATE	
DV	APR 18/2002	DV	MAY 06/2002	
DRAWN BY	DATE	DRAFTING CHECK	DATE	
DL	APR 18/2002	YR	MAY 06/2002	
SCALE	1" = 12'-0"	ARCHIVE FILE No.	10992-501	

NOTE:— IMPERIAL DIMENSIONS
 ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
 ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

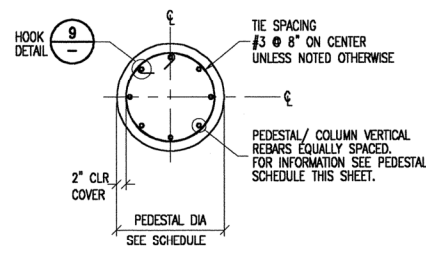
WHITE WATER
 WhiteWater West Industries Ltd
 6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
 Tel (604) 273-1088 Fax (604) 273-4518

TOWER STRUCTURAL DETAILS
 SHEET 1 OF 2

HARTLAND HIGH SCHOOL
 HARTLAND, MICHIGAN

PROJECT No. 10992 DRAWING No. 501 REVISION A

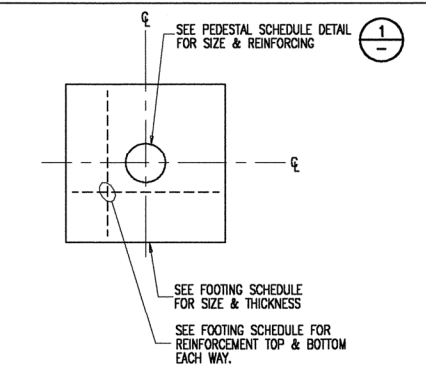
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PEDESTAL SCHEDULE		
PEDESTAL MARK	PEDESTAL DIAMETER (in)	QUANTITY & SIZE OF VERTICAL REINFORCING STEEL
C16	16"	8-#5
C18	18"	10-#5
C20	20"	12-#5
C24	24"	12-#6
C30	30"	12-#7
C36	36"	16-#8
C42	42"	20-#8

1 SECTION - PLAN
NOT TO SCALE

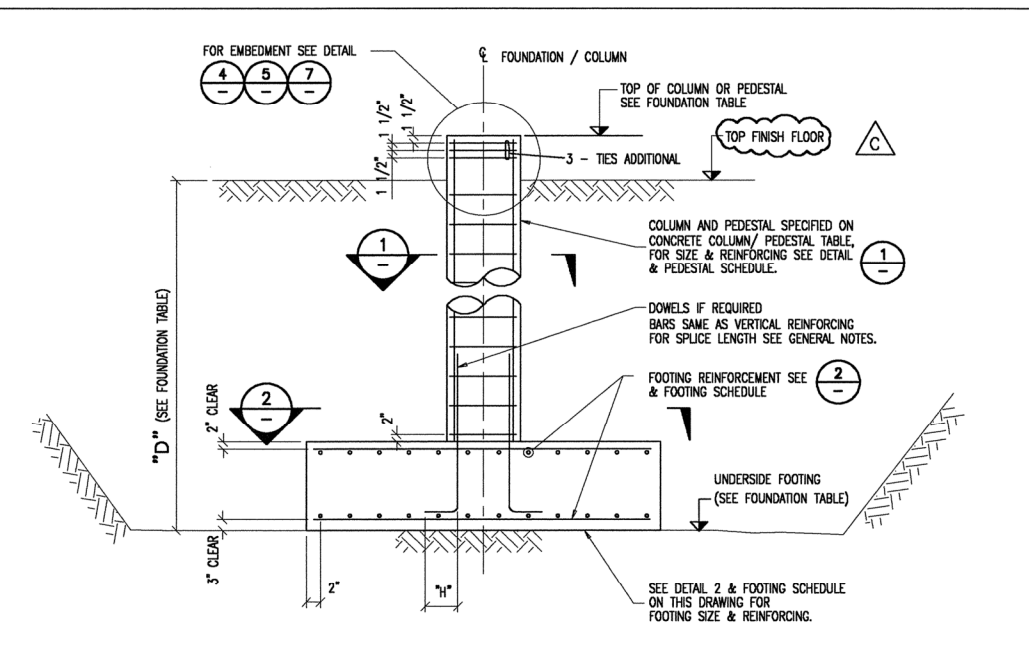
NOTE:
FOR PEDESTAL ELEVATION SEE DETAIL **3**



FOOTING SCHEDULE			
FOOTING MARK	FOOTING SIZE Length x Width x Thickness	Top reinforcing Each Way	Bottom reinforcing Each Way
F2	2'-0" x 2'-0" x 12"	4-#4 x 1'-8"	4-#4 x 1'-8"
F3	3'-0" x 3'-0" x 12"	4-#4 x 2'-8"	4-#5 x 2'-8"
F4	4'-0" x 4'-0" x 12"	4-#4 x 3'-8"	5-#5 x 3'-8"
F5	5'-0" x 5'-0" x 12"	5-#4 x 4'-8"	6-#5 x 4'-8"
F6	6'-0" x 6'-0" x 14"	5-#4 x 5'-8"	6-#6 x 5'-8"
F7	7'-0" x 7'-0" x 15"	6-#5 x 6'-8"	8-#6 x 6'-8"
F8	8'-0" x 8'-0" x 16"	7-#5 x 7'-8"	12-#6 x 7'-8"
F9	9'-0" x 9'-0" x 18"	7-#5 x 8'-8"	13-#6 x 8'-8"
F10	10'-0" x 10'-0" x 20"	8-#5 x 9'-8"	12-#7 x 9'-8"
F11	11'-0" x 11'-0" x 22"	9-#5 x 10'-8"	14-#7 x 10'-8"
F12	12'-0" x 12'-0" x 24"	10-#5 x 11'-8"	17-#7 x 11'-8"
F13	13'-0" x 13'-0" x 24"	11-#5 x 12'-8"	21-#7 x 12'-8"
F14	14'-0" x 14'-0" x 24"	15-#5 x 13'-8"	20-#8 x 13'-8"

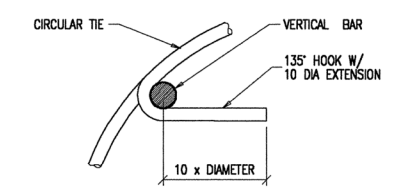
2 PLAN VIEW
NOT TO SCALE

NOTE:
1. FOR FOOTING ELEVATION SEE DETAIL **3**
2. FOOTING TO BE CENTERED BELOW PEDESTAL UNLESS NOTED OTHERWISE
3. FOOTING REINFORCEMENT TO BE CENTERED ON FOOTING.
4. SEE FOUNDATION PLAN FOR FOOTING ORIENTATION.

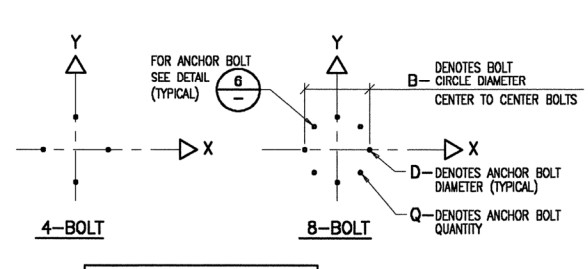


3 TYPICAL COLUMN, PEDESTAL & FOOTING ELEVATION
NOT TO SCALE

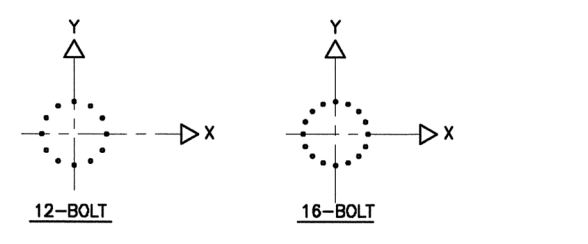
BAR SIZE	DIMENSION 'H' HOOK LENGTH
#5	10"
#6	12"
#7	14"
#8	16"



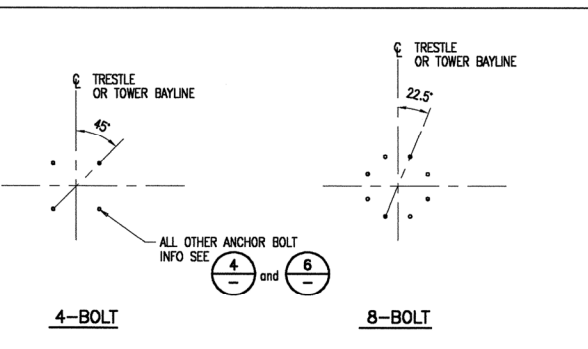
9 TYPICAL TIE HOOK DETAIL
NOT TO SCALE



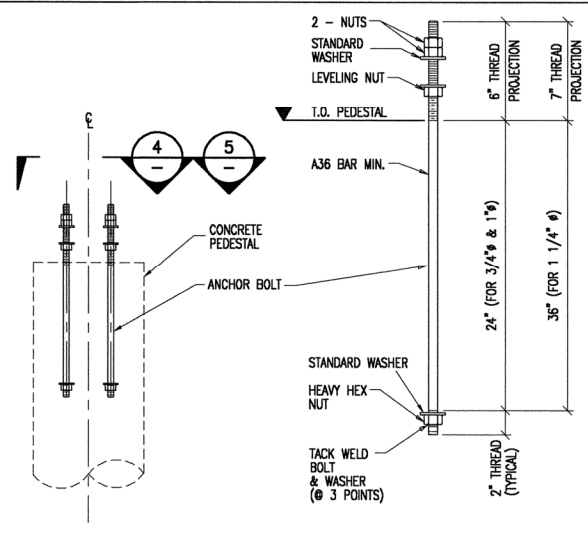
NOTE:
ANCHOR BOLT GROUP SPECIFIED IN FOUNDATION TABLE AS FOLLOWS:
Q - D - B
8 - 1 - 17



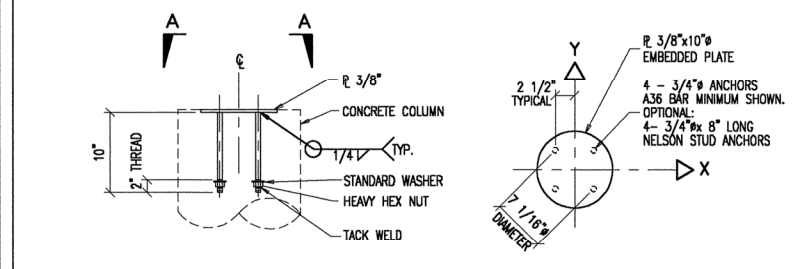
4 TYPICAL ANCHOR BOLT PATTERN
NOT TO SCALE



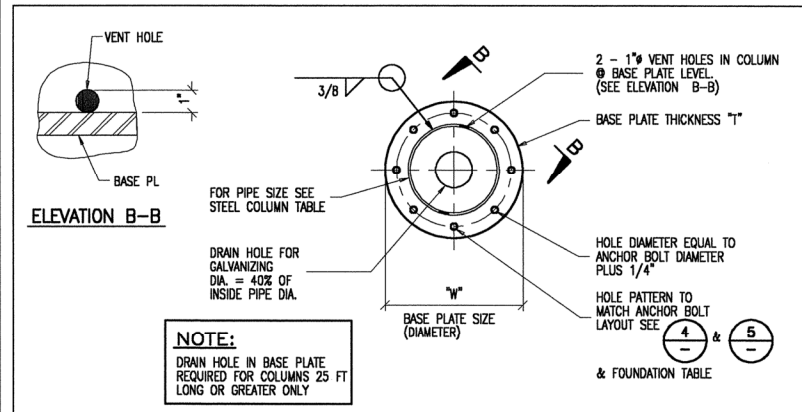
5 TYPICAL TRESTLE OR TOWER COLUMN ANCHOR BOLT PATTERN
NOT TO SCALE



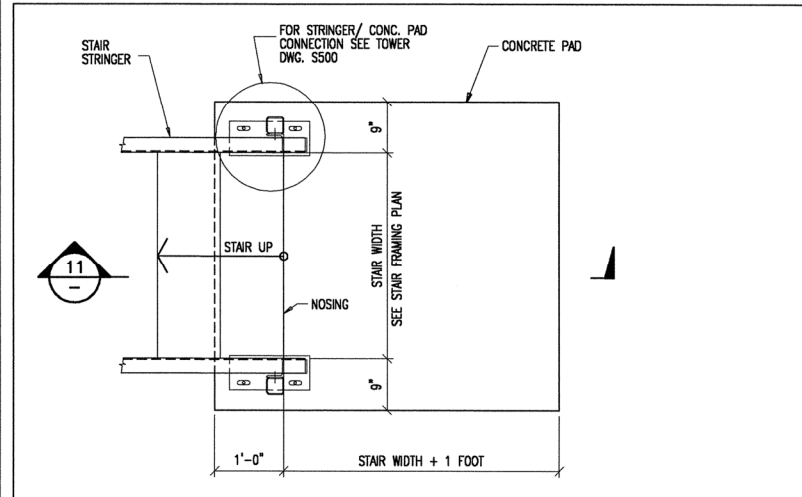
6 TYPICAL ANCHOR BOLT DETAIL
NOT TO SCALE



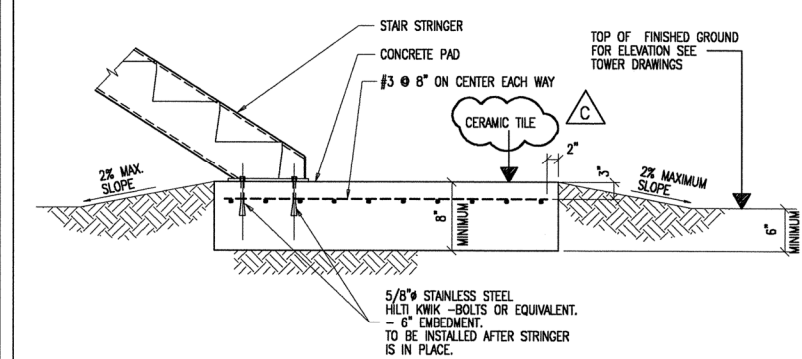
7 TYPICAL EMBEDDED PLATE DETAIL (EBP)
NOT TO SCALE



8 BASE PLATE CALLED UP AS 'W'-'T'
NOT TO SCALE



10 STAIR CONCRETE PAD PLAN
NOT TO SCALE



11 SECTION
NOT TO SCALE

NOTES:
1. FOR GENERAL NOTES AND SPECIFICATIONS SEE DWG 130.

C	REVISED AS NOTED	NOV 26/2002	
0	ENGINEERING ISSUE	MAY 03/2002	DV
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	PE
DESIGNED BY	DV	DATE	APR 17/2002
DRAWN BY	MRL	DATE	APR 17/2002
SCALE	NTS	ARCHIVE FILE No.	10992S300

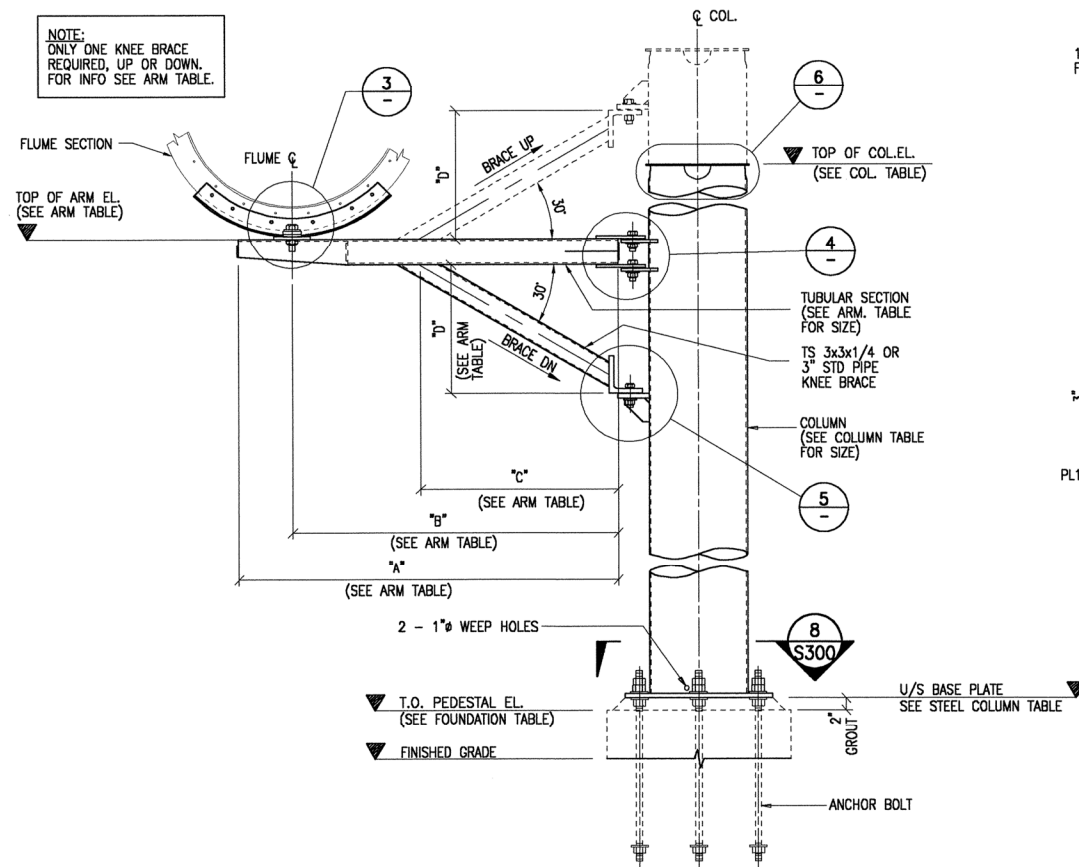
NOTE:— IMPERIAL DIMENSIONS
ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
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WHITE WATER
WhiteWater West Industries Ltd
6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
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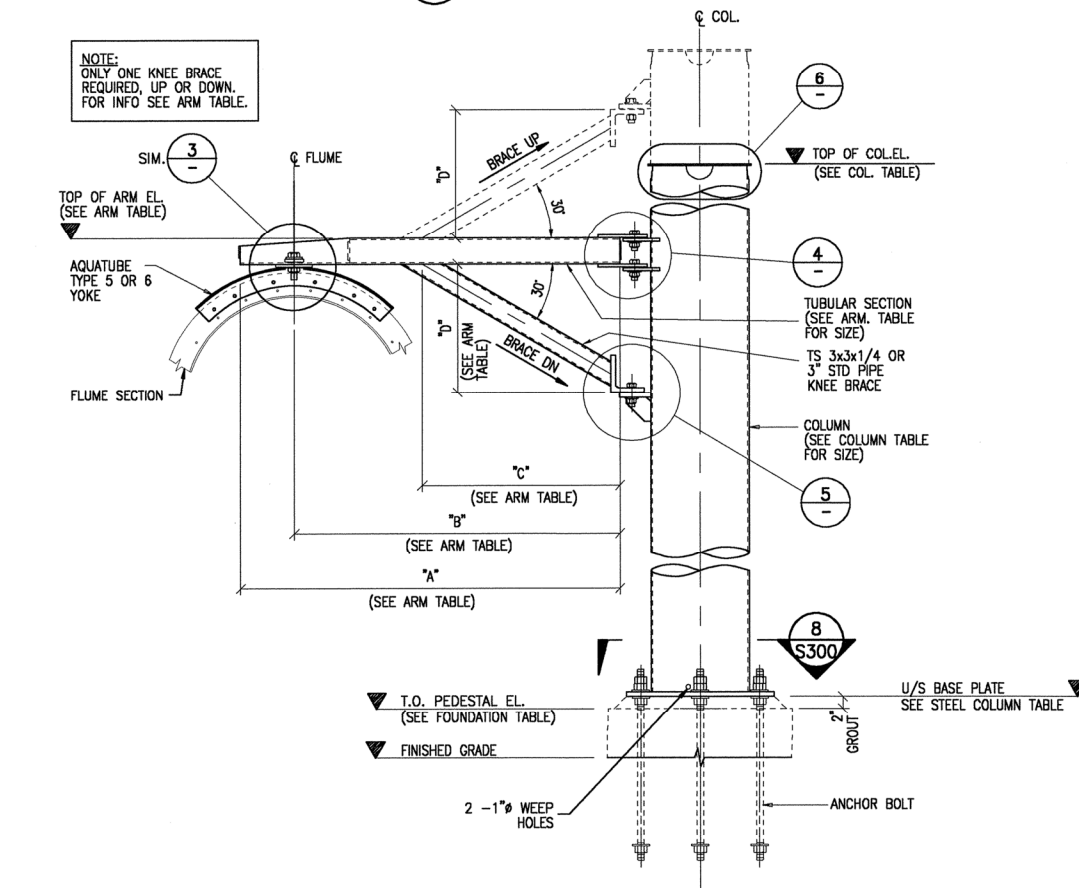
SPREAD FOOTING, PEDESTAL, EMBEDMENT & BASE PLATE STANDARD DETAILS
HARTLAND HIGH SCHOOL HARTLAND, MICHIGAN

PROJECT No. **10992** DRAWING No. **S300** REVISION **C**

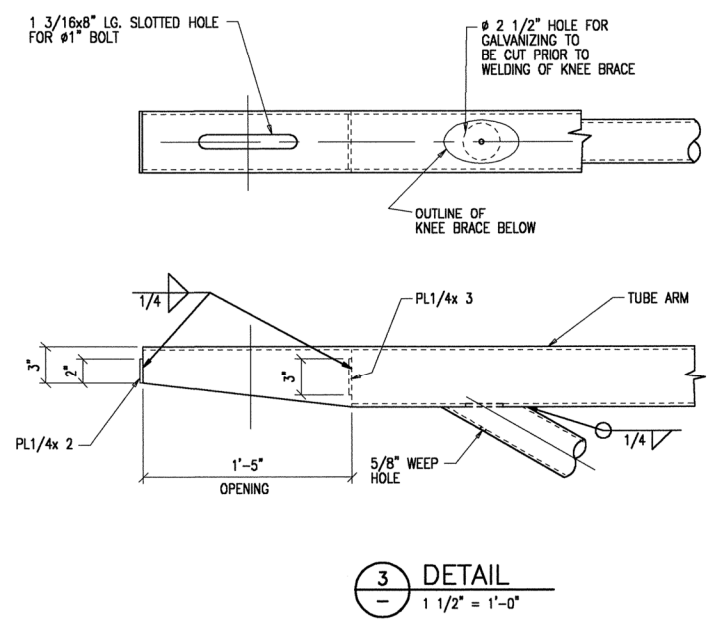
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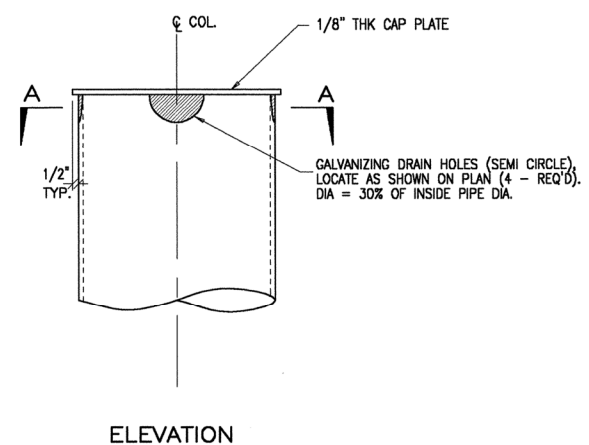
1 SUPPORT COLUMN AND ARM DETAIL
NTS



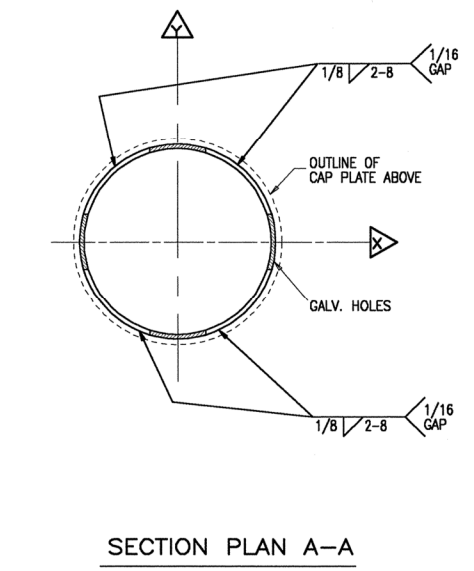
2 SUPPORT COLUMN AND ARM DETAIL
NTS



3 DETAIL
1 1/2" = 1'-0"

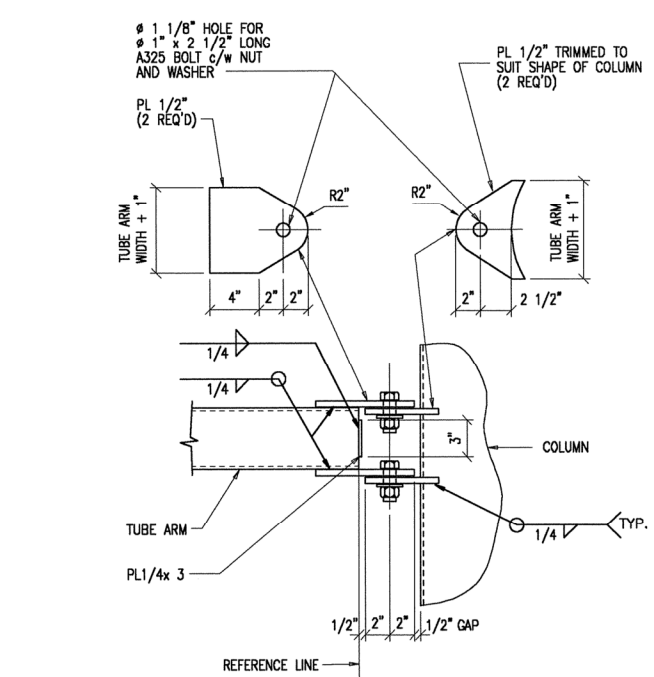


ELEVATION

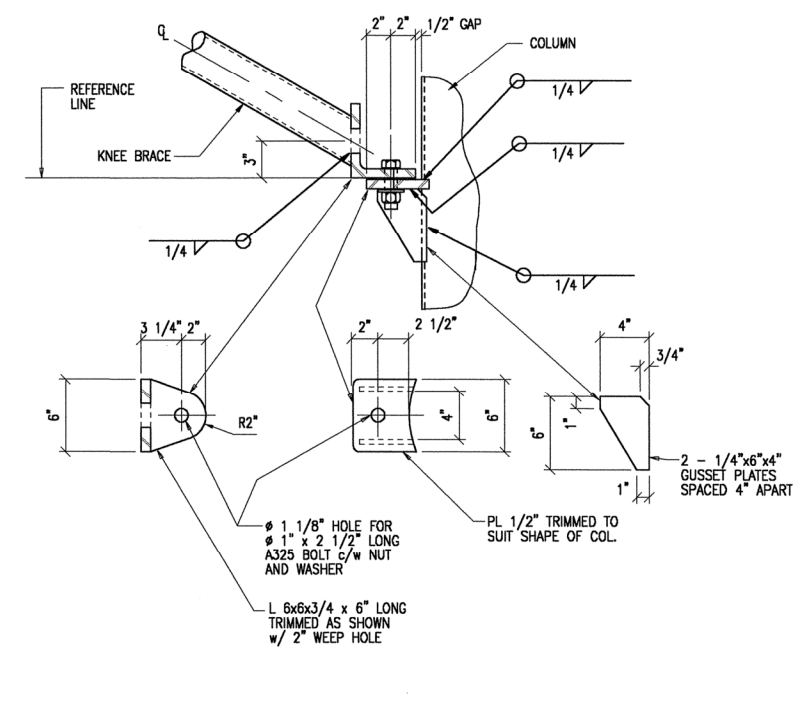


SECTION PLAN A-A

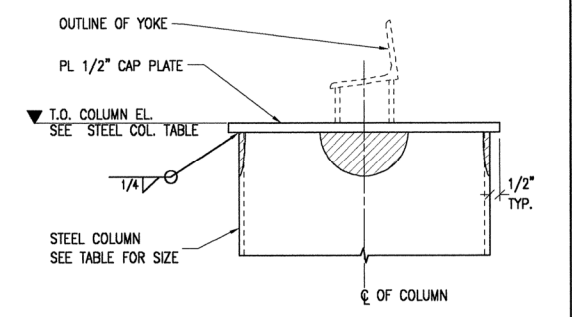
6 CAP PLATE CONNECTION DETAIL
NTS



4 DETAIL
1 1/2" = 1'-0"



5 DETAIL
1 1/2" = 1'-0"



7 CAP PLATE DETAIL (IF YOKE ON COLUMN)
NTS

NOTES:
1. FOR GENERAL NOTES AND SPECIFICATIONS SEE DWG 130.

0	ENGINEERING ISSUE	MAY 03/2002	
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE	BY
DESIGNED BY	DATE	PROJ. ENG. CHECK	DATE
DRWN BY	DATE	DRAWING CHECK	DATE
SCALE	AS NOTED	ARCHIVE FILE No.	10992S400

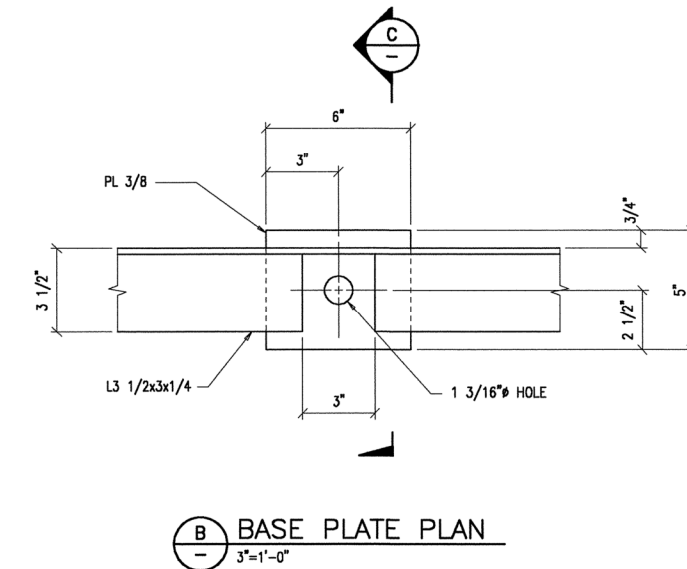
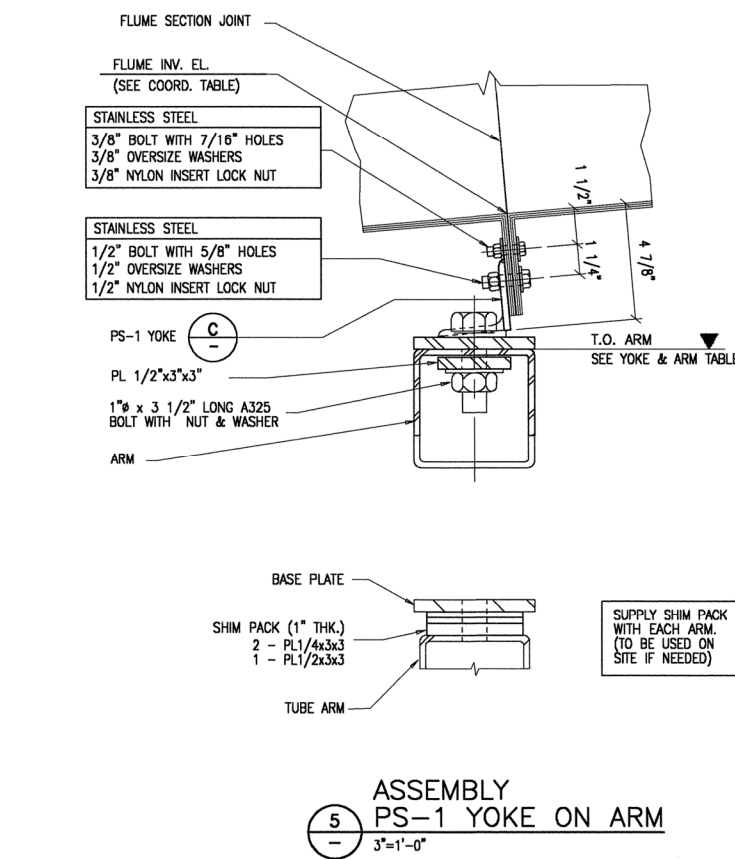
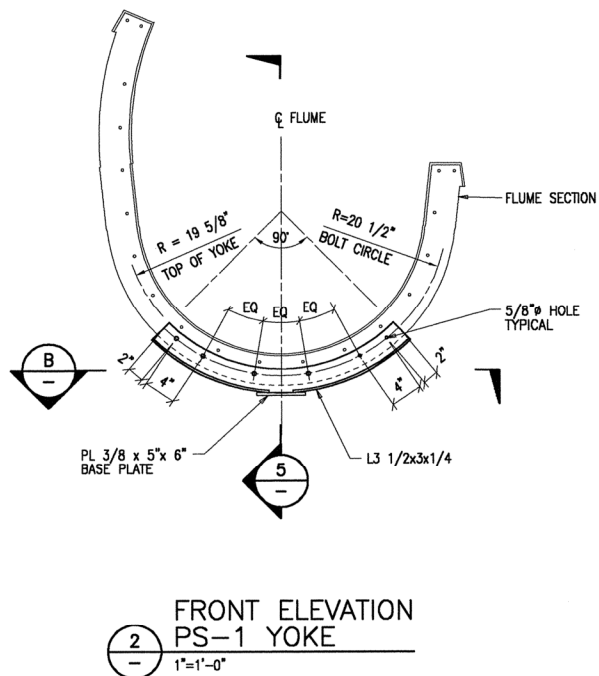
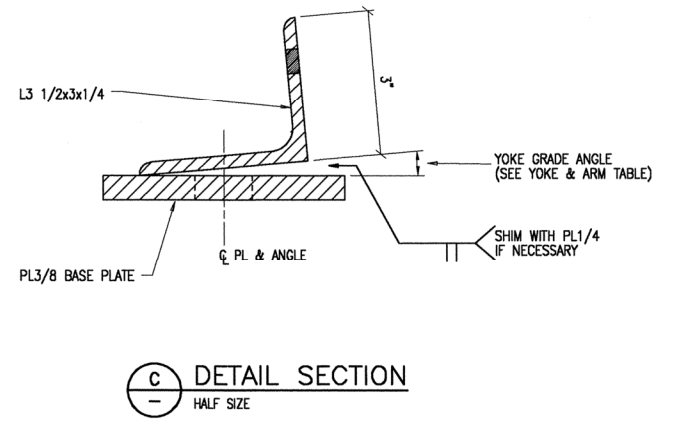
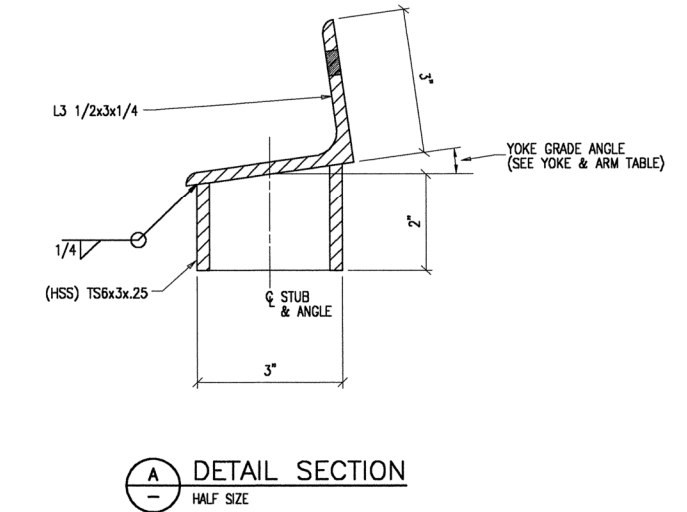
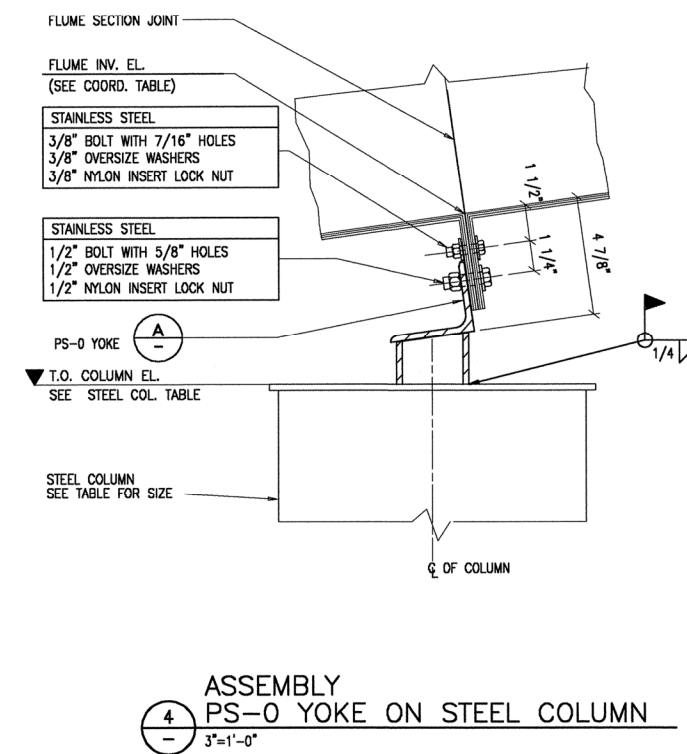
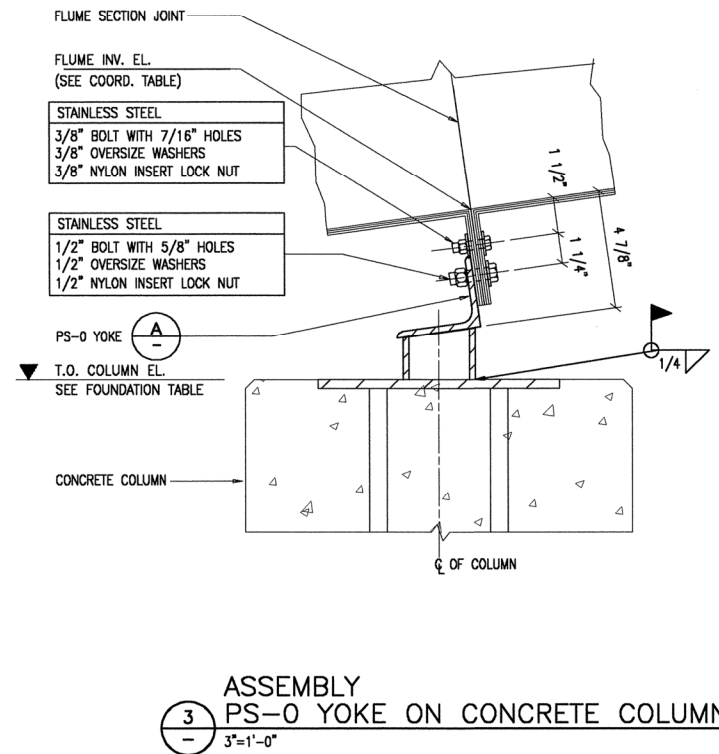
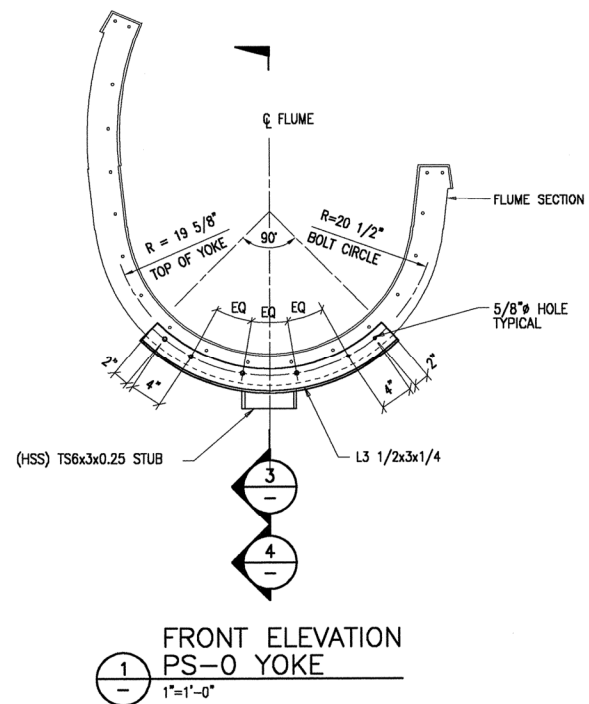
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WHITE WATER
WhiteWater West Industries Ltd
6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
Tel (604) 273-1068 Fax (604) 273-4518

COLUMN AND ARM DETAILS
HARTLAND HIGH SCHOOL
HARTLAND, MICHIGAN

PROJECT No.	DRAWING No.	REVISION
10992	S400	0

PLOT DATE: 02/05/06 FILE NAME: 109925415.dwg
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0	ENGINEERING ISSUE	MAY 03/2002
REV	REVISION DESCRIPTION/ISSUE RECORD	DATE
DESIGNED BY	DATE	PROF. ENG. CHECK DATE
DRAWN BY	DATE	DRAWING CHECK DATE
SCALE	AS NOTED	ARCHIVE FEE No. 109925415

NOTE:-- IMPERIAL DIMENSIONS
 ALL ELEVATIONS AND CO-ORDINATES ARE IN FEET
 ALL OTHER DIMENSIONS ARE IN FEET AND INCHES

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 WhiteWater West Industries Ltd
 6700 McMillan Way, Richmond, B.C. Canada V6W 1J7
 Tel (604) 273-1088 Fax (604) 273-4518

POOLSIDER
 YOKE AND ASSEMBLY
 DETAILS
 HARTLAND HIGH SCHOOL
 HARTLAND, MICHIGAN

PROJECT No.	DRAWING No.	REVISION
10992	S415	0

ATTACHMENT B

SWORN AND NOTARIZED FAMILIAL DISCLOSURE STATEMENT

Important: This disclosure statement must be included with your bid as required by state law (Public Act 232 of 2004).

As required by Public Act 232 of 2004, all bids shall be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner or any employee of the bidder and any member of the Boards of Education, the Superintendent of Schools, or the Business Manager of the Hartland Consolidated Schools:

The Hartland Consolidated Schools' Board of Education shall not accept any bid that does not include this sworn and notarized disclosure statement

The undersigned, owner or authorized officer of _____ (the bidder), pursuant to the familial disclosure requirement provided in the attached invitation to bid, hereby represent and warrant, except as provided below, that no familial relationships exist between the owner(s) or any employee of the company, and any member of the Board of Education, the Superintendent of Schools, or the Business Manager of the school districts listed above. If such a relationship exists, please explain:

BIDDER'S FIRM NAME: _____

BY (SIGNATURE): _____

PRINTED NAME & TITLE: _____

STATE OF MICHIGAN

COUNTY OF _____

Subscribe and sworn before me on this _____

Day of _____, 20____, a Notary Public

In and for _____ County,

Notary Public

My Commission expires _____

ATTACHMENT C

SWORN AND NOTARIZED AFFIDAVIT OF COMPLIANCE IRAN ECONOMIC SANCTIONS ACT

Michigan Public Act No. 517 of 2012

All bidders must submit the following certification statement in compliance with Public Act No. 517 of 2012 (the "Iran Economic Sanctions Act") and attach this form to the bid.

The Hartland Consolidated Schools Board of Education shall not accept any bid that does not include this sworn and notarized certification of statement.

The undersigned, the owner or authorized officer of _____ (the Bidder), pursuant to the compliance certification requirement provided in the Hartland Consolidated Schools Request for Proposal, hereby certifies, represents and warrants that the Bidder (including its officers, directors and employees) is not an "Iran linked business" within the meaning of the Iran Economic Sanctions Act, and that in the event the Bidder is awarded a contract as a result of the aforementioned Request for Proposal, the Bidder will not become an "Iran linked business" at any time during the course of performing the work or any services under the contract.

The Bidder further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than \$250,000.00 or two (2) times the amount of the contract or proposed contract for which the false certification is made, whichever is greater, the cost of the Hartland Consolidated Schools investigation, and reasonable attorney fees, in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on a Request for Proposal for three (3) years from the date it is determined that the person has submitted the false certification.

BIDDER'S FIRM NAME: _____

BY (SIGNATURE): _____

PRINTED NAME & TITLE: _____

DATE: _____

STATE OF MICHIGAN
COUNTY OF _____

Subscribe and sworn before me on this _____

Day of _____, 20____, a Notary Public

In and for _____ County,

Notary Public

My Commission expires _____