ADDENDUM

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ADDENDUM NO.: **02**

PROJECT NAME: **Williams Park Fieldhouse**

PROJECT NO.: **11320**

CONTRACT NO.: **C1593**

DATE OF ISSUE: **January 18, 2018**

NOTICE OF CHANGES, MODIFICATIONS, OR CLARIFICATIONS TO CONTRACT DOCUMENTS

The following changes, modifications, or clarifications are hereby incorporated and made an integral part of the Contract Documents. Unless clearly expressed otherwise by this Addendum, all terms and conditions defined in the original Contract Documents shall continue in full force and effect and shall have the same meaning in this Addendum. Issued Addenda represent responses/clarifications to various inquiries. Contractors shall be responsible for including all associated labor/material costs in its bid. Drawings/specifications corresponding to inquiry responses will be issued with the Issue for Construction Documents, upon issuance of building permit.

ITEM NO. 1: **CHANGE TO KEY DATES**
None.

ITEM NO. 2: **REVISIONS TO BOOK 1 – PBC INSTRUCTIONS TO BIDDERS**
None.

ITEM NO. 3: **REVISIONS TO BOOK 2 – PBC STANDARD TERMS AND CONDITIONS**
None.

ITEM NO. 4: **REVISIONS TO BOOK 3 – TECHNICAL SPECIFICATIONS**
Change 1 **Book 3 – Volume 1** – **REPLACED** – 03 30 00 – Cast-In-Place Concrete
Change 2 **Book 3 – Volume 1** – **REPLACED** – 03 36 00 – Special Concrete Floor Finishes
Change 3 **Book 3 – Volume 1** – **REPLACED** – 07 62 00 – Sheet Metal Flashing and Trim

ITEM NO. 5: **REVISIONS TO DRAWINGS**
Change 1. **REVISED** Drawing A1.3, A8.2, A9.5, A10.1, A10.2

ITEM NO. 6: **REQUESTS FOR INFORMATION**

RFI-1.
Question: **In the drawings I see where there are security cameras on the layout however in the specs it says that electronic safety and security is not being used.**
Are access control and CCTV portions out for bid on this project?
Response: **CCTV and access control equipment shall be procured and installed by Chicago Park District's vendor (Active Alarm Company). Contractor is responsible to furnish and install infrastructure, in accordance with the Contract Documents.**

RFI-2.
Question: **The hardware schedule calls for the acoustical seals for certain doors, are these doors supposed to be acoustical or are they supposed to be the material type indicated in the Door Schedule on sheet A10.1**
Response: **Doors are not required to be fabricated to acoustical door standards.**

RFI-3.

Question: **Please reference drawings A2.3 and A4.2. On A2.3, the reflected ceiling plan shows no drywall ceiling in the entry lobby 110, while on Detail 1 of A4.2 it appears that Keynote 28 at the ceiling shows a drywall ceiling. Please clarify what is to be provided.**

Response: **Drywall ceilings at entry lobbies are indicated on drawing A2.2 – Lower Reflected Ceiling Plan, of the Contract Documents.**

RFI-4.

Question: **Please reference A2.1 and Wall types on A9.1**

a. In the family toilet room, please confirm there is both a C1b and C1c chase wall.

Response: **Confirmed. Both C1b and C1c are required, in accordance with the Contract Documents.**

RFI-5.

Question: **Key Note 5 on drawing TZ2.1 refers to drawing T3.1, but drawing T3.1 does not exist. Is this note referring to drawing T4.1? Or if drawing T3.1 is missing, please provide.**

Response: **Key Note 5 on drawing TZ2.1 incorrectly listed T3.1. Key Note 5 on drawing TZ2.1 is referring to drawing T4.1.**

RFI-6.

Question: **Please confirm who is required to purchase the water feature equipment.**

Response: **Contractor is required to furnish and install the water feature equipment, in accordance with the Contract Documents.**

RFI-7.

Question: **Drawing A9.5 indicates that a sizable portion of the SOG shall be polished and colored. Again what color, the tint is not clarified. Nor if this color tint is to be integral concrete tint or stained concrete. Please advise.**

Response: **The Finish Schedule on sheet A9.5 and Specification Section 03 30 00 have been revised and are included in this Addendum.**

RFI-8.

Question: **The documents are calling for architectural concrete;**

A) Drawing A1.3 indicates that the Spray Pool and it's Curb are to be architectural concrete, and is also designated as concrete 5, but what that is (i.e. added color tint / texture), I cannot find within the documents.

B) The spec 033300 indicates that the seating wall shall be architectural concrete, but what that is (i.e. added color tint / texture), I cannot find within the documents.

C) Drawing A1.3 indicates that the Entry Stoops and Perimeter Band to be concrete 3. This is different than the sidewalk (concrete 4), and I thus assume a different tint. However, what that is (i.e. added color tint / texture), I cannot find within the documents.

The architectural concrete spec, 033300, sets forth that we are "to match the architects sample." However, there is no sample submitted. Please provide for each of the three items above (and any others that I may have missed).

Response: **The Finish Schedule on Drawing A9.5 and Specification Section 03 30 00 have been revised and are included in this Addendum to clarify basis-of-design manufacturer and color information. Samples will be provided to the Contractor for matching.**

A. The spray pool slab is not required to be Architectural Concrete. Notes on A1.3 have been revised. The spray pool curb and seat walls are required to be Architectural Concrete. Concrete 5 shall be white concrete utilizing white cement, with a light sandblasted finish. Basis of design is Scofield Ash White. Please refer to Finish Schedule on Drawing A9.5, revised and included in this Addendum.

B. Seating wall shall be Architectural Concrete as indicated. Architectural concrete is defined in specification 03 30 00 1.3.A, and entails higher construction, tolerance and an aesthetic requirement compared to standard cast-in-place concrete. Seating wall color/finish shall be Concrete 5, as revised on Drawing A1.3, included in this Addendum.

C. Concrete 3 shall be dark gray concrete with a light sandblasted finish. Basis of Design is Scofield C-34 Dark Gray. Please refer to the Finish Schedule on Drawing A9.5, revised and included in this Addendum.
D. Concrete 4 shall be natural color concrete with a finish to match adjacent sidewalks at north and south of the project. Please refer to the Finish Schedule on Drawing A9.5, revised and included in this Addendum.

RFI-9.

Question: Please provide details and specifications of required backing for the basketball backstop as noted on A8.1 detail 2.

Response: Backing for backstops shall be provided as part of cold-formed framing, in accordance with Specification Section 05 40 00 3.2.A.5 of the Contract Documents. Attachment to the backing shall be furnished and installed in accordance with Specification Section 11 66 23 2.3.D, and the Contract Documents. Drawing 2 on Sheet A8.2, has been revised and is included in this Addendum.

RFI-10.

Question: Please provide more detail on the operable plastic cover A9.6 detail 3.

Response: Operable (removable) cover is removed via screwdriver access to frame fasteners through indicated holes in plastic cover at details 3 & 4 on A9.6.

RFI-11.

Question: Please confirm the GC is not responsible for testing as noted on SO.2.

Response: Contractor's Work must conform to the Contract Documents. An Independent Testing Laboratory will provide Quality Assurance on behalf of the Owner.

RFI-12.

Question: There is a Furniture, Fixtures, and Equipment Manual book including all the unit price. Does that mean we are required to use these unit prices for all the equipment/sports equipment (on A11.1) and furniture (on A11.2)?

Response: No. These quotes were obtained by Chicago Park District and are included for Contractor reference and information only.

RFI-13.

Question: Per the door hardware spec 087100, is it the architect's intent to use Blumcraft panics at both the interior and exterior vestibule doors 109, 110a, 110b and 111? Also, what is the function of the exit devices at these doors?
(Arch Ref: 087100, Part 2.6C and Sheet A10.1)

Response: Sheet A10.1, included in this Addendum, has been revised as follows:

A10.1 Hardware set 1:
"Function of panic devices should be exterior deadbolt with interior accessible thumbturn."

A10.1 Hardware set 2:
"HARDWARE SET #2:
TOP AND BOTTOM PIVOTS
PUSH/PULL UNIT
DOOR CLOSER
THRESHOLD
AUTOMATIC DOOR OPERATOR"

RFI-14.

Question: In section 76200 paragraph 2.1 A exposed flashing to be LIC Stainless Steel. While in section 76200 paragraph 2.6 A shows .050" Aluminum, B &C show .040" Aluminum. Please clarify what material is to be used.

Response: Paragraphs 2.1.A and 2.1.B are correct. Specification Section 07 62 00, included in this Addendum, has been revised as follows:

Paragraph 2.6.A:
"Copings: Copings shall be fabricated as part of the flat-lock metal wall panel system as indicated on the drawings. Fabricate with hammered and sealed or soldered joints to be watertight.

1. **Fabricate from the Following Materials:**
   a. **Light Interference Color (LIC) stainless steel, .04 inches thick."**

Paragraphs 2.6.B and 2.6.C are correct, indicating requirements for aluminum (concealed) and LIC stainless steel (exposed) flashings as indicated in 2.1.A and 2.1.B.

RFI-15.

Question: **On the all glass doors - the details show Blumcraft 1301 - the elevations show patch fittings 1301 is only available in brushed or polished stainless - not dark bronze anopdized. The auto closer does not work with patch fittings - it has a slide arm (specd closer - not aware of others). It could work with rails at head and sill of doors - then the question is what size? If the doors remain at 108" - which is what they will - with application and windload as entry - concern about deflection - 5/8" is the recommended GANA thickness. Can you please clarify all asap?**

Response: **Blumcraft 1301 rails are correct as indicated on A10.1. Elevation on A10.2 has been revised to remove reference to patch fittings and is included in this Addendum. Bronze is available as a clad finish per Blumcraft product information. Blumcraft technical information indicates that the 1301 system accommodates Besam, LCN, Horton, or Norton operators and other operators upon request. The Basis of Design operator is LCN. Glass thickness is to be engineered by the glass fabricator. The 1301 channels can accommodate either ½" or ¾" glass. If 5/8" is required, then ¾" may be provided to coordinate with 1301 channel.**

List of Attachments and Drawings:

This Addendum includes the following attached Specifications and/or Documents:

1. Section 03 30 00 – Cast-In-Place Concrete
2. Section 03 36 00 – Special Concrete Floor Finishes
3. Section 07 62 00 – Sheet Metal Flashing and Trim

This Addendum includes the following attached Drawings:

1. A1.3 Partial Site Plan, dated 1/10/2018
2. A8.2 Interior Elevation - Gym, dated 1/10/2018
3. A9.5 Finish Plan and Schedule, dated 1/10/2018
4. A10.1 Door Schedule, dated 1/10/2018
5. A10.2 Door Schedule, dated 1/10/2018

END OF ADDENDUM NO. 02

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

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.

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. Substructure.
2. Slabs-on-ground.
3. Concrete toppings.

B. Related Sections include the following:

1. Division 03 Section "Architectural Concrete" for general building applications of specially finished or formed concrete.
   a. Coordinate with architectural and structural drawings where exposed structural concrete requires specific color and finishes.
2. Division 05 Section "Structural Steel Framing" for steel framing and post-installed concrete anchors.
3. Division 05 Section "Steel Decking" for metal decks.
4. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.

3 DEFINITIONS

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

4 SUBMITTALS

A. General:

1. Review of submittals is of a general nature only, and the responsibility for conformance with intent of drawings shall remain with the Contractor. Review does not imply or state that the fabricator has correctly interpreted the construction documents.

2. All submissions shall be in accordance with the submission schedule developed and agreed between the Architect and Contractor at the commencement of the project. Submission shall include dates of order and delivery of materials to the shop and the site.
3. Shop drawing schedule shall allow adequate time for reviews. Reinforcing steel shall not be fabricated or placed before the shop drawings have been reviewed by the Architect and returned.

B. Product Data: For each type of product indicated, including ICC-ES for mechanical couplers.

C. Design Mixtures: Each concrete mix design to be used on the project shall be reviewed and approved by the Testing Agency and Architect prior to concrete being delivered to site. Submit proposed mix designs for each class of concrete on the Mix Design submittal form included at the end of this specification. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. For each concrete mixture, the following information shall be included: where the mix is to be used, all materials and admixtures including their source and proportions in the mix; Water content, water-to-cement ratio, slump, and aggregate grading; whether the mixture is appropriate for pumping; and total chloride content.
2. Provide shrinkage test results for mixes with shrinkage criteria showing that mix meets performance criteria. The mix design number must match with the mix design number shown on the test data.
3. Indicate compressive strength and method used to determine strength. The compressive strength of the concrete shall be proportioned per ACI. Include all calculations and tests required by ACI 318 Section 5.3 and 5.4. Laboratory test data must be submitted along calculations that show with each mix design meets the strength requirement. Mix design number must match the mix design number shown on the test data. Include all test results or past history back up data specific as part of the submittal. Test results within the past two years shall be used to indicate performance in accordance with past history.
4. Indicate amounts of mixing water to be withheld for later addition at Project site.
5. Each mix shall be stamped and signed by a Professional Engineer licensed in the State of Illinois.

D. Steel Reinforcement Shop Drawings: Placing drawings in accordance with SP 66 that detail fabrication, bending, and placement. Direct copies of the contract documents are not acceptable as a submission from the Contractor.

1. 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. Include any welding to be done.
2. Shop drawings shall make it clear where each bar is located. Beams, grade beams and walls shall be shown in elevation. On elevations show locations of sleeves and penetrations.

3. Check architectural, structural, mechanical, and electrical and other contract documents for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
4. Show all areas of congestion. Identify where reinforcing steel will interfere with the placement of embedded items such as anchor bolts, anchors, inserts, conduits, sleeves and any other items which are required to be cast in concrete.

E. Submit schedule of concrete placement operations before commencing Work.

F. Show on one or more plans and/or elevations, locations of construction, contraction and expansion of joints, slab edges, curbs, equipment pads, depressions, sleeves and openings.

G. Formwork: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Design Criteria:

a. Design of concrete formwork, shoring, reshoring and bracing shall be the sole responsibility of the Contractor and shall conform to Code requirements and shall be in accordance with the recommendations of ACI 347. Forms shall provide the required shape and dimensions specified on the Documents.
b. Provide forms complete and of such strength and adequately braced so as to prevent any spreading, shifting or settling when concrete is placed to ensure finished concrete surfaces of the required tolerances.
c. Forms shall be tight to prevent leakage or washing out of cement mortar from concrete.
d. Bolts, rods, and other devices when used for internal ties and spreaders shall be of such construction that when the forms are removed, no metal shall be within 1 inch of the exterior concrete surfaces or within 1/2 inch of interior concrete surfaces.

2. Shop Drawing Requirements:

a. Shop Drawings shall show location and layout of construction joints, reveals, slab edges, form joints, sleeves, openings, locations of tie holes or plugs, location of embedded items and blockouts, and all related details affecting Architectural quality.
b. Shop Drawings will show dimensioned location to the face of formwork for walls, beams, columns, slab edges, slab depressions, etc.
c. Formwork details affecting Architectural finish quality shall be reviewed by the Architect.
d. Indicate where formwork release agent will be used, as applicable.
e. Where a mock-up is required, submit shop drawings of the mock-up.

H. Samples: For waterstops vapor retarder formwork, as requested by Architect.

I. Welding certificates.

J. Welding Procedures for all reinforcement welding.

K. Mill Test Reports: Submit steel producer's certificates of mill analysis for each heat or melt of reinforcing steel, including steel source, description, heat number, yield point, ultimate tensile strength, elongation percent, bend test and the chemical composition of each heat as determined by ladle analysis, before delivery of steel to site. Where steel is required to be welded, mill reports shall be used to help verify the weldability of the steel.

L. Qualification Data: For Installer manufacturer testing agency. Submit qualification of Concrete Foreman, showing 5 years' experience with this type of concrete installation.

M. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Normal weight aggregate (per ASTM C33). Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity. Include evaluation of reactivity and the following:

    a. Abrasion Resistance: ASTM C131; Los Angeles Machine.
    b. Cleanness Value: Test Method NO. C 227; coarse aggregate only.
    c. Fineness: ASTM C117.
    d. Organic Impurities: ASTM C40.
    e. Potential Reactivity: ASTM C289.
    f. Sand Equivalent: Test Method No. C 217.
    g. Sieve Analysis: ASTM C136.
    h. Soundness: ASTM C88.
    i. Absorption for lightweight aggregate: Maximum 15%.

N. Product Test Reports and Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials, per ASTM C150.
2. Admixtures. Where more than one admixture is used, include certification that admixtures are compatible. Per ASTM C494 for each type used; include chloride ion content.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Welding Electrodes
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Non-shrink grout, per ASTM C1107.
10. Bonding agents.
11. Adhesives.
12. Vapor retarders.
13. Semirigid joint filler.
14. Joint-filler strips.
15. Post-installed concrete anchors.
16. Repair materials.

O. Submit a complete description of the system proposed for meeting the specified floor slab flatwork tolerances. Submit survey data from a minimum of two previous slab installations to demonstrate capability to satisfy specified tolerances.

P. Field quality-control test and inspection reports.

Q. Submit an affidavit identifying cementitious material used, including manufacturer's lot number, date of shipment by manufacturer, date of receipt by the concrete supplier, place of storage and date of use. If such information is not available, a sample of cementitious material used on the Project shall be taken for each day's pour and shall be tested as directed by the Architect.

R. Transit-Mix Delivery Slips

1. Keep record at the Site showing time and place of each pour of concrete, together with transit mix delivery slip certifying contents of the pour per ASTM C94. Include the time water was added to dry mix.
2. Make the record available for inspection at the Site and to the Architect for his review upon request.
3. Upon completion of this portion of the Work, deliver the record and the delivery slips to the Architect.

S. Complete minutes of preinstallation conference within (5) business days.

5 QUALITY ASSURANCE

A. Standards: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
2. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
3. ACI 318, "Building Code Requirements for Reinforced Concrete."
4. ACI SP-66, "Detailing Manual"
5. American Welding Society (AWS) D1.4, "Structural Welding Code - Reinforcing Steel"
6. Chicago Building Code.

B. 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.

C. 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."

D. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
3. Shop and field testing and inspection of steelwork shall be performed by an inspector currently certified as an AWS Certified Welding Inspector.

E. Testing Agency: Shall be selected and paid for by the Owner, unless otherwise specified; re-testing paid for by the Contractor.

F. Contractor's Quality Control Plan: Quality Control includes the functions performed by the Contractor to ensure that the material and workmanship of concrete construction meets the project specifications and applicable standards. The Contractor shall submit a Quality Control Plan that addresses all inspection issues, including testing and inspection per ACI. The verification testing and inspection carried out by the Testing Agency does not relieve the contractor of the responsibility for conducting their own quality control/inspection program to ensure the requirements of the Contract Documents have been met. The Contractor's Quality Control Plan will be reviewed by the Testing Agency.

G. Quality Control Inspector Qualifications: Along with Quality Control Plan, Contractor shall submit written qualifications for all inspectors to be assigned Quality Control functions for concrete work.

H. 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.

I. Unidentifiable Reinforcing Steel: Tested by testing agency; paid for by Contractor:

1. Test reinforcing delivered to site which cannot be properly identified by heat number and mill mark for compliance with ASTM A615 as follows:

   a. No. 8 Bar and Smaller: One tensile test and one bend test of each size per 7-1/2 tons, or portion thereof.
   b. No. 9 Bar and Larger: One tensile test of each size per 10 tons, or portion thereof.

J. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

1. Welders whose work fails to pass inspection shall be requalified before performing further welding.

2. Firm specializing in furnishing and installing reinforcement shall have a minimum of 5 years experience on projects with requirements similar to this project and shall have sufficient production capacity.
3. All welding shall be performed by operators who are qualified for the types of welds used. Each operator shall have been qualified within the preceding one year as prescribed by AWS. Welder qualification shall include passing the Charpy tests when specified for the electrode.
4. Require welders to retake the qualification test if, as determined by the Architect, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify, they shall not perform any welding on the project.

K. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to test concrete mixtures. When mixes, are proportioned by trial batch method, engage a Laboratory conforming to ASTM E329 and under direction of a Professional Engineer licensed in Illinois.

L. Mockups: Cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Mock-up shall be constructed using the same mixes, materials, products, procedures and methods as will be used for the permanent construction. See wiki commentary.

1. Build panel approximately 10x10 sq. ft. for formed surface lobby area in the location indicated or, if not indicated, as directed by Architect. Maintain sample panel exposed to view for duration of concrete work.
2. Obtain Architect's acceptance of visual qualities.
3. Approved panels may become part of the completed Work if undisturbed at time of Substantial Completion.

M. Prefabrication and Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

    a. Contractor's superintendent.
    b. Independent testing agency responsible for concrete design mixtures.
    c. Ready-mix concrete manufacturer.
    d. Concrete subcontractor.
    e. Laboratory responsible for field quality control.
    f. Admixture manufacturer (s)
    g. Concrete pumping subcontractor

2. During meeting, review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.
3. The concrete contractor shall confirm that the proposed mix designs will enable him to properly place, pump, finish and achieve the required concrete quality specified.

6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement:

1. Deliver, store, and handle steel reinforcement to prevent bending and damage.
2. Deliver reinforcing to Site properly bundled and tagged. Use tags that indicate bar size, lengths and marks corresponding to markings shown on shop drawings. Segregate so as to maintain identification after bundles are broken.
3. Store reinforcement in a manner that will prevent excessive rusting or fouling with/ grease, oil, dirt, and other bond weakening materials.
4. Do not use damaged, reworked, or deteriorated material.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

C. Formwork: Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

D. Concrete Materials:

1. Protect cement from moisture and rotate stock to ensure fresh materials.
2. Protect aggregates as necessary to maintain saturated condition when batched.
3. Storage methods should comply with ACI 301 4.1.4.

PART 2 - PRODUCTS

1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2 FORM-FACING MATERIALS

A. A minimum of 50% of the wood materials used for formwork (e.g., dimensional lumber, plywood) shall be "FSC Certified" products which have been harvested in accordance with the "FSC Principles and Criteria" for well-managed forests developed by the Forest Stewardship Council (FSC) of Reston, VA.

B. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.

C. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

D. For exposed surfaces not otherwise specified use Special exterior Type Douglas Fir, Grade AB plywood, conforming to NBS PS-1, minimum 3/4 in. thick and constructed so that finished concrete will be straight, smooth, dense, free from honeycombs, bulges, or depressions. Keep joints between plywood sections to a minimum and make tight and strongly backed so that adjoining edges remain flush and true.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

F. Form Gaskets (for sealing form panel joints) Gaskets shall be closed cell, completely skinned, foam rubber or neoprene, with pressure sensitive paperbacked adhesive on surfaces to be bonded to forms. Gaskets shall be of sufficient thickness, widths and compressibility for specific use.

G. Form Sealer (Wood Forms): All form sealers shall be of a type which will not harmfully affect the appearance and/or utility of the concrete surface or the application of sealers, paint, vinyl fabric or any other finishes. In addition, form sealer shall prevent the development of bond or adhesion to concrete.

H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1-1/2 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface and permit neat and solid patching at every hole.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

J. Expansion Joint Filler:

1. Fiber Type: Preformed asphalt impregnated fiber, ASTM D1751, 1/2 inch thick unless otherwise noted.
2. Cork Type: Preformed cork expansion joint, ASTM D1752. Type II, 1/2 inch thick unless otherwise noted.

K. Expansion Joint Sealant: ASTM C920, Type M, Class 2 5; two-part polyurethane traffic grade sealant, gray color.

1. Horizontal Joints: Pourable, Grade P, Use T.
2. Vertical Joints: Nonsag, Grade NS, Use NT.

L. Foam Filler or High Density Styrofoam Fill: Expanded polystyrene foam, ASTM C578, Type IX, 1.9 pounds per cubic foot density.

3 STEEL REINFORCEMENT

A. Reinforcing Bars:

1. ASTM A615, Grade 60, deformed, unless noted otherwise.
2. ASTM A706, deformed, where bars are welded,.

B. Headed Bar Reinforcement: ASTM A970.

C. Tie Wire: American Wire 16 gauge or heavier black annealed wire.

D. Plain-Steel Wire: ASTM A82, [as drawn] [galvanized].

E. Deformed-Steel Wire: ASTM A496.

F. Plain-Steel Welded Wire Reinforcement: ASTM A185, plain, fabricated from as-drawn steel wire into flat sheets.

G. Deformed-Steel Welded Wire Reinforcement: ASTM A497, flat sheet.

4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs. [Shop paint with iron oxide zinc chromate primer.]

B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view or where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports, unless noted otherwise.
2. Where supports are placed against ground or atop vapor barrier use precast concrete blocks not less than 3 inches square with two 16 gauge embedded wires.
3. At Architectural Concrete and surfaces exposed to weather; CRSI Class 1 plastic protected.

D. Welding Electrodes: As required in AWS D1.4. As a minimum, use E90XX electrodes.

E. Deformed Bar Anchors: Nelson, flux filled deformed bar anchors, type D2L, as manufactured by Nelson Stud Welding Division of TRW or approved equal.

5 REINFORCEMENT FABRICATION

A. Fabricate reinforcing in accordance with ACI 301, 315 or CRSI "Manual of Standard Practice."

B. Bending:

1. Do not bend or kink reinforcing except as shown on the Drawings.
2. Minimum bend diameters and hook extensions as shown on the drawings or per ACI.
3. In case of fabrication errors do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
4. Reinforcing bars are to be bent cold, do not preheat, unless approved by Architect.
5. Do not rebend reinforcement that has previously been bent within 6 inches of new bend except as allowed in section 3.3.2.8 of ACI 301.

C. Spirals: Provide a minimum of 1-1/2 finishing turns top and bottom.

D. Unacceptable Materials: Reinforcement with any of the following defects shall not be permitted in the Work and will be replaced without cost:

1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2. Bend or kinks not shown on the Drawings or final shop drawings.
3. Bars with reduced cross-section due to rusting or other cause.
4. Bars with dirt, mud, grease or form release agent.

6 CONCRETE MATERIALS

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

1. Portland Cement: ASTM C150, Type II, unless noted otherwise.

   a. Portland Cement: ASTM C150, Type I/II, gray.

2. Supplement Portland Cement with the following Supplementary Cementitious Materials (SCM):

   a. Fly Ash: ASTM C618, Class C or F.
   b. Slag Cement: ASTM C989, Grade 100 or 120.
   c. Silica Fume: ASTM C1240. [MasterLife SF 100 (formerly Rheomac SF100) by BASF Corporation or approved equal.]
   d. Metakaolin: ASTM C618. [MetaMax by BASF Kaolin, Part of BASF Corporation or approved equal.]
   e. The SCM producer shall have a minimum of 5 years experience in the production of acceptable SCM and shall practice an effective quality control program to guard against contamination of the SCM.
3. Cementitious material used shall have at least 2 years of use with proposed aggregates without detrimental reaction.
4. Alkali content shall not exceed 0.6% when tested in accordance with ASTM C114.
5. The temperature of cement delivered to the plant shall not exceed 150 degrees F

B. Silica Fume: ASTM C1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Coarse Aggregate:

   a. Aggregate shall contain no thin or elongated pieces. Any piece having a major dimension more than 2-1/2 times the average thickness shall be considered thin or elongated.
   b. If shrinkage controlled concrete, Coarse Aggregate shall be crushed limestone, granite, or accepted equal.

c. Alkali Silica Reactivity: Aggregate shall be considered non-reactive with documented satisfactory service record for a minimum of ten-year period used in concrete with similar cementitious materials. In the absence of service record the aggregate shall be tested and will be considered non-reactive if it passes ASTM C1260 or ASTM C1293 per requirements of the Engineer of Record.
d. Aggregates shall consist mainly of calcium or magnesium carbonate, e.g., limestone or dolomite, and containing 40 percent or less quartz, chert or flint.
e. The maximum size used in a particular location shall be consistent with the form and dimensions of the section being placed, with the location and spacing of the reinforcing steel and with the method of vibration. The aggregate sizes shall be such as will produce dense, uniform concrete, free of rock pockets, honeycombs, or other irregularities.
f. Combined aggregate gradation for slabs and other designated concrete shall be 8% to 18% for large top size aggregates (1-1/2-inch) or 8% - 22% for smaller top size aggregates (1-inch or 3/4-inch) retained on each sieve below the top size and above the No. 100.
g. Recycled Crushed Concrete Aggregate: Crushed structural concrete is permitted for use as coarse aggregate when shown by testing to produce concrete of adequate strength and durability, and these are found acceptable to the Engineer of Record.
h. Coordinate with architectural and structural drawings and the Architectural Concrete specification where exposed structural concrete requires specific color and finishes which may impact the type of aggregates to be used.

2. Fine Aggregate: Uniformly graded, clean sand, free from excessive fines, organic materials or other deleterious materials. Free of materials with deleterious reactivity to alkali in cement.
3. Combined Aggregate Gradation: Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large size aggregates (1 ½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100.

D. Water: ASTM C1602 clean, free from deleterious matter. Non-potable water is acceptable if meets the chemical content limits of ASTM C1602

7 ADMIXTURES

A. General: Only if accepted by the Owner's Representative in accordance with ACI 318/318R 3.6 if they comply with requirements of ASTM C494. Where more than one is used, admixtures shall be compatible. Use of admixtures shall be consistent throughout Work.

1. Where specified herein do not use other admixtures without the written acceptance of the Architect.
2. Prohibited Admixtures: Admixtures containing intentionally-added chlorides are not permitted. Do not use admixtures that will negatively impact the visual finish of concrete exposed to view.

B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other admixtures .

1. [Available] Products:

a. Grace Construction Materials; Darex AEA or Daravair
b. MasterAir AE 90 (formerly MB-AE 90), MasterAir AE 100 (formerly Micro Air) or MasterAir VR 10 (formerly MB VR Standard) by BASF Corporation or approved equal.Euclid Chemical Company (The); Air Mix

C. 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. .

1. Water-Reducing (Plasticizing) Admixture: ASTM C494, Type A. [Available] Products:

a. Grace Construction Products, W. R. Grace & Co.; "WRDA with Hycol"
b. "MasterPozzolith" (formerly "Pozzolith") Series or "MasterPolyHeed" (formerly "PolyHeed") Series by BASF Corporation or approved equal.
c. Euclid Chemical Company (The); "WR-75, WR-91 or Eucon MR"

2. Retarding Admixture: ASTM C494, Type B. [Available] Products:

a. "MasterSet R" (formerly "Pozzolith") Series or "MasterSet DELVO" (formerly "DELVO") Series by BASF Corporation or approved equal.

3. Accelerating Admixture or Water-Reducing and Accelerating Admixture: ASTM C494, Type C or Type E. [Available] Products:

a. MasterPozzolith AC 534 (formerly Pozzolith NC 534) or MasterSet AC 20 (formerly Pozzutec 20+) by BASF Corporation
b. Accelguard 80, 90 or NCA by The Euclid Chemical Company
c. Polarset by W.R. Grace

4. Water-Reducing and Retarding Admixture: ASTM C494, Type D. [Available] Products:

a. Sika Corporation; "Sikament 30,"
b. Euclid Chemical Company (The); "Eucon Retarder-75"
c. "MasterSet R" (formerly "Pozzolith") Series or "MasterSet DELVO" (formerly "DELVO") Series by BASF Corporation or approved equal.

5. High-Range, Water-Reducing (Superplasticizers) Admixture: ASTM C494, Type F. [Available] Products:

a. Grace Construction Products, W. R. Grace & Co.; "WRDA 19 or Daracem 100"
b. Sika Corporation; "Sikament 300"
c. MasterRheobuild 1000 (formerly Rheobuild 1000) or "MasterGlenium" (formerly "Glenium") Series by BASF Corporation,

d. Euclid Chemical Company (The); "Eucon 37, 1037 or Plastol 5000"

6. Workability-Retaining Admixture: ASTM C494, Type S. [Available] Products:

a. MasterSure Z 60 (formerly RheoTEC Z-60) by BASF Corporation or approved equal.

7. Alkali-Silica Reaction-Inhibiting Admixture: ASTM C494, Type S. Shall contain a nominal lithium nitrate content of 30 percent. [Available] Products:

a. MasterLife ASR 30 (formerly ASRx 30 LN) by BASF Corporation or approved equal.

8. Viscosity-Modifying Admixture: ASTM C494, Type S. [Available] Products:

a. "MasterMatrix VMA" (formerly "Rheomac VMA") Series by BASF Corporation or approved equal.

8 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513,[with factory-installed metal eyelets,] for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers:

a. Greenstreak.
b. Progress Unlimited, Inc.
c. Williams Products, Inc.
d. Fosroc
e. Adeka

2. Profile: As indicated.
3. Dimensions: 4 inches by 3/16 inch thick; nontapered.

9 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape. Plastic Vapor Retarder shall have a water-vapor transmission rate no greater than .012 perms (grain/h xft2 in x Hg) when tested in accordance with ASTM E96.

1. Products:

a. Fortifiber Corporation; Moistop Ultra.
b. Raven Industries Inc.; Vapor Block 10.
c. Stego Industries, LLC; Stego Wrap, 15 mils.

B. Granular Fill: 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.

C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

10 FLOOR AND SLAB TREATMENTS

A. Metallic Dry Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of portland cement, graded emery aggregate and plasticizing admixture with emery aggregate consisting of no less than 60 percent of total aggregate content. Available products: EucoPlate HD, MasterTop 200 (Formerly Masterplate 200) by BASF Corporation, or approved equal.

B. Non-Oxidizing Metallic Floor Hardener: The specified non-oxidizing metallic floor hardener shall be formulated, processed and package under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected portland cement and necessary plasticizing agents. Provide one of the following: Diamond Plate by The Euclid Chemical Company, MasterTop 210 COR (Formerly Lumiplate) by BASF Corporation, or approved equal..

C. Mineral Dry-Shake Floor Hardener: The specified mineral aggregate hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory blended mixture of specially processed graded mineral aggregate, selected portland cement and necessary plasticizing agents. Available Products: Surflex by The Euclid Chemical Company, MasterTop 100 (Formerly Mastercron) by BASF Corporation, or approved equal.

D. Liquid Sealer and Densifier: High performance, deeply penetrating concrete densifier; odorless, colorless, non-yellowing siliconate based solution designed to harden, dustproof and protect concrete floors subjected to heavy vehicular traffic and to resist black rubber tire marks on concrete surfaces. The compound must contain a minimum solids content of 20% of which 50% is siliconate. Available products: Euco Diamond Hard by The Euclid Chemical Company, Seal Hard by L & M Construction, MasterKure HD 210 WB (Formerly Kure-N-Harden) by BASF Corporation, or approved equal.

11 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Available products:

1. MasterKure ER 50 (formerly Confilm) by BASF Corporation or approved equal.

B. Absorptive Cover: AASHTO M182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film, fiber reinforced asphaltic vapor barrier building paper, or white burlap-polyethylene sheet.

1. Provide in a thickness of 42 mils; standard weight of 53 lbs./1000 ft2; tensile strength (machine direction) of 36 lbs./in.; and puncture resistance of 70 lbs.

D. Water: ASTM C1602 clean, free from deleterious matter. Non-potable water is acceptable if meets the chemical content limits of ASTM C1602.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1-D, dissipating. Sodium silicate compounds are prohibited.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, nondissipating[, certified by curing compound manufacturer to not interfere with bonding of floor covering]. Sodium silicate compounds are prohibited. Available products: Diamond Clear VOX or Super Diamond Clear VOX by The Euclid Chemical Company, or approved equal.

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating[, certified by curing compound manufacturer to not interfere with bonding of floor covering]. Sodium silicate compounds are prohibited.

H. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C1315, Type 1, Class A. Sodium silicate compounds are prohibited.

I. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C1315, Type 1, Class A. Sodium silicate compounds are prohibited.

J. Curing and Sealing Compound: (VOC Compliant, 350 g/l): Liquid type membrane forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m2 when applied at 300 sq.ft./gal. Manufacturer's certification is required. Available products: Super Diamond Clear VOX, or Super Aquacure VOX by The Euclid Chemical Company, MasterKure CC 1315 (Formerly Kure 1315) by BASF Corporation, or approved equal.

12 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D2240.

C. Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, 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 I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete. Available products: Duralcrete Series by The Euclid Chemical Company, Sikadur Hi-Mod Series by Sika, MasterEmaco ADH Series (Formerly Concresive) by BASF Corporation, or approved equal.

E. Post-Installed Concrete Anchors:

1. Expansion Anchors: Kwik Bolt TZ by Hilti Inc, Trubolt Wedge by ITW Ramset/Red Head, Power-Stud by Powers-Rawl, or approved equal.
2. Epoxy Dowels / Epoxy Anchors: HIT HY 150 by Hilti, Inc., CIA-Gel 7000 by Covert Operations, SET by Simpson Strong Tie, Power-Fast by Powers-Rawl, or approved equal.
3. Grouted Dowels / Grouted Anchors: High strength non-shrink grout to anchor reinforcing steel or threaded rods in concrete shall be Hi-Flow Grout by The Euclid Chemical Company or MasterFlow 928 grout as manufactured by BASF Corporation, Sika Grout 212 as manufactured by Sika Corporation, or approved equal.

F. Reglets: Fabricate reglets of not less than 26 gauge, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

G. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 22 gauge, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

13 MORTARS AND GROUTS

A. Bonding Grout: Approximately 1 part Portland cement to 1 part fine sand passing a no 30 sieve and a 50/50 mixture of approved bonding admixture and water, mixed to a consistency of thick paint and not exceeding the w/cm of the concrete to be bonded.

B. Patching Mortar for exposed concrete shall be made of the same material and of approximately the same proportions as used for concrete, except that coarse aggregate shall be omitted and mortar shall consist of not more than 1 part Portland cement to 2-1/2 parts damp loose sand by volume.

1. Combine white and gray Portland cement as necessary to match color specified by Architect. Use no more mixing water than necessary for handling and placing.
2. Mix patching mortar in advance and allow to stand with frequent mixing with trowel without adding water until it has reached the stiffest consistency that will permit placing.

C. High Flow Grout:

1. Where high fluidity and/or increased placing time is required, use high flow grout.

2. ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)".
3. When placed at a fluid consistency there shall be at least 95% bearing under an 18 inches x 36 inches base plate.
4. "Hi-Flow Grout" manufactured by The Euclid Chemical Company, "MasterFlow 928" manufactured by BASF Construction Products, or approved equal.

D. Epoxy grout for anchor reinforcing steel or threaded rods in concrete shall be MasterEmaco ADH 1490 (Formerly Concresive 1490) as manufactured by BASF Construction Products, or Sikadur 32 Hi-Mod as manufactured by Sika Corporation, or Epoxy 452 or E3G by Euclid Chemical Company, or approved equal.

E. Cementitious grout for anchor reinforcing steel or threaded rods in concrete shall be MasterFlow 928 grout as manufactured by BASF Corporation, Sika Grout 212 as manufactured by Sika Corporation, Hi-Flow grout by Euclid Chemical Company, or approved equal.

F. Drypack Mortar for Form Holes at Non-Architectural Grade Surfaces: Composed of 1 part Portland cement and 2 parts of fine aggregate and water. Match color of adjacent surfaces.

14 REPAIR MATERIALS

A. High Strength Flowing Repair Mortar: For forming and pouring structural members, or large horizontal repairs, provide the flowable one-part, high strength microsilica modified repair mortar with 3/8" aggregate. The product shall achieve 9000 psi @ 28-days at a 9-inch slump. [Available] products: MasterEmaco S 466 CI (Formerly Emaco S66 CI) by BASF Corporation, Eucocrete by The Euclid Chemical Company, or approved equal.

B. Patching Mortar:

1. Horizontal repairs, ASTM C928. [Available] Products:

   a. Euclid Chemical Co.: Euco Thin Top Supreme, Concrete Top Supreme
   b. Sika Chemical Corp.: Sikatop 121 or 122
   c. BASF Corporation: MasterEmaco T 310 CI (Formerly Emaco R310 CI)

C. 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 C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi i at 28 days when tested according to ASTM C109.

5. Bond Strength: Not less than [1000 psi] <Insert strength> at 28 days when tested according to ASTM C1042.
6. Products:

    a. Euclid Chemical Co.: Super Flo-Top
    b. BASF Corporation: MasterTop 110 SL (Formerly Mastertop 110 Plus)

D. 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 C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
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 strength of substrate at 28 days when tested according to ASTM C109.
5. Products:

    a. Euclid Chemical Co.; Thin Top Supreme or Tammspatch II
    b. BASF Corporation; MasterEmaco N 300 CI (Formerly Emaco R300 CI)

6. Product shall exhibit the following properties: Chaplin Abrasion Test - 0.0079-inches maximum at 28 days.

15 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301. The mixes shall be submitted on mix design submittal form at the end of the specification.

1. Procurement of concrete mix design is responsibility of Contractor.
2. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Limit water-soluble, chloride-ion content in hardened concrete to tthe limits specified in ACI 318.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use accelerating or water-reducing and accelerating admixture in concrete, as required, for cold weather placement or when acceleration of setting time is required.

4. Use high range water-reducing in all fiber concrete pumped concrete, self-consolidating concrete and any concrete with water/cementitious materials ratio below 0.50.
5. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

16 CONCRETE MIXTURES

A. Definition of Mix Properties:

1. Concrete strength (f'c) is the minimum compressive strength at 28 days, tested in accordance with ASTM C39.
2. Aggregate size is the largest of the coarse aggregate.
3. Slump shall be measured at the point of delivery in accordance with ASTM C143. Slump tolerance shall meet the requirements of ACI 117. Slump can be increased with use of a high-range water-reducer to improve workability of mix. After addition of high-range water-reducer, slump shall not exceed 9" at point of delivery.
4. Air content is by volume and may be plus or minus 1.5 percent at point of delivery.
5. Water/cementitious materials ratio is specified by weight.
6. Drying shrinkage limit is percentage change in length after 28 days of drying when tested as per ASTM C157 with 4 inches x 4 inches x 11 inches specimen moist cured 7 days prior to drying.

B. Foundations: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength (f'c): 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Maximum Aggregate Size: 1 inch.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: 5 percent.
6. Shrinkage Limit: .045 percent.

Minimum Compressive Strength (f'c):

C. Slab-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength (f'c): 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Maximum Aggregate Size: 1 inch.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: 5 percent.
6. Shrinkage Limit: .045 percent at 28 days.

D. Normal Weight Concrete Fill in Decking: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength (f'c): 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.40.
3. Maximum Aggregate Size: 3/4 inch .

4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: 2 percent.
6. Shrinkage Limit: .045 percent at 28 days.

E. "Quick-Dry" Concrete: This concrete is used in areas receiving applied finishes where rapid concrete drying is required prior to adhesive application. The floor finish shall be as required by the manufacturer of the specified floor coating or covering

1. Maximum Water-Cementitious Materials Ratio: 0.40.
2. Use high-range water-reducing admixtures.
3. Air Content: 2 percent.

17 FABRICATING REINFORCEMENT

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

18 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. The batching plant shall be equipped with an electric metering device capable of determining moisture content of sand.
2. Begin the mixing operation within thirty minutes after the cement has been intermingled with the aggregates.
3. 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. Alternatively, a retarding admixture may be used where results from testing can be provided for approval by the Engineer of Record.

PART 3 - EXECUTION

1 PRECONSTRUCTION MEETING

A. At least three weeks prior to commencement of concrete work, meet at the Project site to review the proposed mix designs, methods and sequence of concrete construction, standard of workmanship, material selection, testing and quality control requirements, placement procedures, off-site batching requirements, coordination of the work with other trades and other pertinent topics related to the Work. The meeting shall include the following:

1. Owner's Representative
2. Architect/Engineer
3. Construction Manager/General Contractor
4. Concrete Subcontractor
5. Owner's Testing Laboratory

6. Ready Mix Concrete Supplier
7. Admixture Manufacturer Representative
8. Formwork Manufacturer/Supplier
9. Lightweight Aggregate Supplier
10. Concrete pumping subcontractor
11. Any other subcontractor and/or material supplier including plumbing, waterproofing and electrical supplier or manufacturer required

B. The minutes shall include a statement by the concrete contractor indicating that the proposed mix design and placing techniques shall produce the concrete quality required by these specifications.

2 PREPARATION

A. Prior to Work specified in this Section, carefully inspect the installed Work of other trades and verify that such Work is complete to the point where this installation may properly commence.

B. Verify that forms may be constructed in accordance with all applicable codes and regulations, the referenced standards, and the design documents.

1. Ensure Excavations are sufficient to permit placement, inspection, and removal of forms.
2. Verify reinforcing steel has been inspected prior to concealing with formwork.
3. Verify geotechnical engineer has approved all foundation excavations.

C. The Contractor shall verify all dimensions prior to starting construction.

D. Coordinate:

1. Obtain necessary information for coordination of formwork with items to be embedded in concrete.
2. Coordinate size and location of openings in concrete. Obtain Architects approval for openings not shown on Structural Drawings.

E. Discrepancies:

1. Notify the Architect of any discrepancies or inconsistencies.
2. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3 FORMWORK

A. Mock-up: When a mock-up of the concrete is required, do not construct forms for concrete, other than for mock-up, until mock-up has been accepted.

B. 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 and such that formwork can withstand excessive deflection when filled with wet concrete.

C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, camber and position indicated, within tolerance limits of ACI 117. Make proper provision for all openings, offsets, recesses, anchorage, blocking, and other features of the Work as shown or required. Provide openings as required for vibrators and concrete placing.

D. 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.

E. [See Drawings for boards, strips, or other methods of creating patterns and reveals on walls or columns. In these areas forms shall be such as to allow joints to occur in a reveal.]

F. Construct forms tight enough to prevent loss of concrete mortar. Tape all joints at forms for sandblasted finished concrete, including joints between plywood and trim strips.

G. 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.

H. 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.

I. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

J. Chamfer exterior corners and edges of permanently exposed concrete.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

L. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

M. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

N. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Do not allow excess form coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed.

4 EARTH FORMS

A. Earth Forms: Unless otherwise indicated or required by the Construction documents, concrete for foundations that will remain in permanent contact with the soil may be placed directly against vertical excavated surfaces provided the material will stand without caving and suitable provisions are taken to prevent raveling of top edges or sloughing of loose material from walls of excavation. Sides of excavation shall be made with a neat cut and the width made as detailed on Drawings.

1. Where sides are unstable or excavations are not accurately cut tolerances of ACI 301, construct formwork to the extent required, at no additional cost to Owner.
2. Hand trim sides and bottom of earth forms; remove loose dirt prior to placing concrete.
3. Form footings to minimum extent shown on Drawings.

5 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. Ensure that embedded items are placed and held, during placing of concrete, to tolerances consistent with other items that will be attached to them.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.
4. Install concrete accessories in accordance with manufacturer's recommendations: straight, level, and plumb.

B. Provide pipe sleeves when pipes pass through concrete. Fill voids in sleeves, inserts and anchor slots with readily removable material to prevent entry of concrete into voids.

C. No conduit shall be cast in concrete unless specifically indicated on the Structural Drawings.

D. Coring of concrete after placement is not permitted without prior approval by the Engineer of Record.

6 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its specified design compressive strength, f'c. Where a minimum 7-day strength has been specified, formwork may be removed when the 7-day strength as been achieved.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
3. When forms are removed in less than 7 days, curing shall be continued as follows:

   a. Loosen form ties and run water down inside of form to keep concrete wet.
   b. Immediately following form removal, thoroughly wet surface.
   c. Continue curing as specified elsewhere in this specification.

B. Remove forms carefully to avoid damaging corners and edges of exposed concrete. Prying against the face of concrete shall not be allowed.

C. 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.

D. 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.

E. Re-use of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtained if all of the forms were new.

F. All forms below ground surface, along with all shores and braces, shall be removed before backfilling.

7 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. The vapor barrier installation must be approved prior to the concrete placement.

8 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Wherever embedded items interfere with placing of reinforcement notify the Architect and obtain approval before placing any concrete. Do not bend or field cut bars around openings or sleeves.
2. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete. Where there is a potential of rust staining adjacent finish surfaces, take necessary steps to prevent staining.

C. Accurately position, support, and secure reinforcement against displacement, particularly under the weight of workmen and the placement of concrete. Use bar supports in sufficient number, size and location to prevent vertical displacement of the reinforcement and gouging of the formwork. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Do not exceed the tolerances specified in ACI 117.
2. Reinforcement shall be held in place by means of supports adequate to prevent displacement and to maintain reinforcement at proper distance from form face. The use of wood supports and spacers inside the forms is not permitted.
3. Dowels shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowel may be tied, No 3 bars (minimum) shall be added to provide proper support and anchorage.
4. Do not place reinforcement in floor slabs or beams until concrete has been placed in columns and walls, except where bars extend down into columns or walls.
5. Use templates for placement of column dowels.
6. Where Drawings do not show the spacing of the reinforcing, the minimum clear spacing shall conform to ACI 318 Section 7.6.
7. Reinforcing partially embedded in concrete shall not be field bent except as shown on the Drawings or accepted by the Architect.
8. Wherever conduits, piping, inserts, sleeves, etc., interfere with placing of reinforcing steel, obtain acceptance of method of procedure before any concrete is placed. Bending of bars around openings or sleeves not permitted.
9. Weld reinforcing bars according to AWS D1.4, only where indicated on drawings. Welding is not permitted on bars where the carbon equivalent is unknown. Do not weld within 2 bar diameters of where bars have been bent cold. Welding material, wire cuttings and tramp metal shall be thoroughly cleaned from forms for exposed concrete before any concrete is placed.

D. Splicing: Make splices only at those locations shown on the Drawings or as accepted by the Architect. Splice locations not shown on the Drawings shall be approved in shop drawings before fabrication. Stagger splices in adjacent bars wherever possible.

E. Reinforcing shall be rigidly and securely tied with steel tie wire. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. If allowed, field bending or straightening shall be in accordance with section 3.3.2.8 of ACI 301.

G. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing plus 2 inches or 6 inches, whichever is greater. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

H. Install deformed bar anchors in accordance with the manufacturer's recommendations.

I. Install mechanical splices and reinforcing couplers in accordance with manufacturers' recommendations.

9 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Existing Concrete to New Concrete Joints

1. Chip keys and roughen existing concrete surfaces where new concrete abuts. Roughen surface by bushhammering, chipping or sandblasting to remove surface mortar and expose clean aggregate.
2. Drill and install dowels using epoxy grout in accordance with manufacturer's printed recommendations.
3. Prime surface with 10-mil layer of epoxy adhesive using a stiff brush. Place concrete while the epoxy adhesive is still tacky. Re-prime if necessary.

C. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. In walls, do not space construction joints more than 60 feet apart in horizontal direction, maximum 20 feet apart in vertical direction unless otherwise shown. In framed slabs and beams, and on metal deck slabs, do not space construction joints more than 120 feet apart. In slabs on grade, do not space construction joints more than maximum 60 feet in any direction. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise shown.
3. Form keyed joints at all joints. Embed keys at least 1-1/2 inches into concrete.
4. 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.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

6. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Roughen surface at all construction joints where key is not used and under baseplates. Roughen concrete surface while concrete is still green where possible. Do not leave laitance, loosened particles of aggregate or damaged concrete at surface. Forms and reinforcing shall be cleaned of drippings. Dampen contact surfaces of construction joints, leaving them free of standing water, before placing fresh concrete.
8. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

D. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated on the architectural drawings. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

E. 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.

F. 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.

10 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed. Ensure that all foreign material has been removed from surfaces, including reinforcement and embedded items, against which concrete will be placed.

B. The addition of water at the site is contingent upon full time inspection of the process by the owners testing laboratory and the acceptance of the Inspector. Comply with ACI 301, section 4.3.2.1.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Method: Convey concrete as rapidly and directly as practicable to preserve quality and to prevent segregation.

1. Do not deposit concrete that has initially set. Retempering of concrete, which has partially set, is not permitted.
2. Maximum time for discharge of concrete shall be per ASTM C94.

E. Sequence: Pour all walls and columns full height to designated construction joints. Pour all beams, and horizontal structures to designated construction joints. Construction joints to be made in walls only where indicated on the Drawings.

F. Placement: 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. Deposit concrete to avoid segregation.

1. When placing is once started, carry it on as a continuous operation until placement of the panel or section is complete. Construction joints to be made only where indicated on the Drawings or on approved shop drawings. Prevent the formation of cold joints at other locations.
2. Deposit concrete 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. Deposit concrete in a manner to avoid inclined construction joints.
3. Particular care shall be used when starting a concrete pour to maintain the continuity of appearance. Use all means necessary to avoid blemishes, imperfections, or changes in the finish.
4. Maintain reinforcement in position on chairs during concrete placement.

G. Consolidation: Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301. Use and type of vibrator shall conform to ACI 309, Guide for Consolidation of Concrete.
2. 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. Place vibrating element directly in concrete and not attached to either inside or outside of forms or to reinforcing steel.

3. 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. Do not over-vibrate concrete.

4. Consolidation is typically not necessary for self-consolidating concrete. However, the contractor shall have internal vibrators as recommended in ACI 301 on site in case internal vibration is needed due to delays in placement or the concrete has a lower than expected slump flow and has to be placed to prevent the formation of a cold joint. Prior approval by the Architect/Engineer shall be obtained if minimal vibration (external or internal) is required for proper consolidation due to congested reinforcement or space restrictions.

H. Initial Finishing:

1. Screed slab surfaces with a straightedge and strike off to correct elevations.
2. Where floor drains or floor slopes are indicated, slope slabs uniformly to provide even fall for drainage.
3. 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.

I. Fill Over Steel Deck:

1. At floor slabs, increase fill thickness as required to compensate for deflection of beams and deck at no additional cost to Owner. Obtain specified fill thickness at high points of the deck. Finish floor to specified tolerances for floor flatness and levelness, including at suspended fill on steel deck floors
2. At roof, maintain specified thickness of concrete uniformly over deck. Slab need not conform to flatness and levelness tolerances

J. 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 concrete is expected to be placed at air temperatures of less than 40 deg F, contractor shall review with Architect all special procedures that will be used including mix design modifications and methods of protection. This review shall occur prior to the expected extreme temperatures.
2. Provide sufficient protection material and equipment on the Project site in advance of the time when the mean daily temperatures are expected to drop below 40 degrees F.
3. 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. In addition, take precautions including, but not limited to:

    a. Use non-chloride, non-corrosive accelerating admixture in accordance with previously accepted submittals.
    b. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

c. Do not use calcium chloride, salt, or other materials containing antifreeze agents unless otherwise specified and approved in mixture designs.

K. Hot-Weather Placement: Comply with ACI 305.1 and as follows:

1. When concrete is expected to be placed at air temperatures of greater than 80 deg F, contractor shall review with Architect all special procedures that will be used including mix design modifications and methods of protection. This review shall occur prior to the expected extreme temperatures.
2. Provide sufficient protection material and equipment on the Project site in advance of the time when the mean daily temperatures are expected to rise above 80 degrees F.
3. When air temperature exceeds 80 deg F, take special precautions to prevent slump loss, rapid setting, and plastic shrinkage; including but not limited to:

   a. 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.
   b. Use set retarding admixture in accordance with previously accepted submittals.
   c. Use microsynthetic fibers in the concrete mixture to minimize plastic shrinkage cracking.
   d. Convey, deposit, finish and commence curing of concrete as rapidly as practicable.

4. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

L. Mass Concrete: Comply with ACI 301 Section 8, and as follows:

1. When concrete dimensions are large enough to require that measures be taken to cope with generation of heat from hydration of the cement and attendant volume change that leads to cracking, contractor shall review with Engineer all special procedures that will be used including mix design modifications and methods of protection. This review shall occur prior to the batching of concrete.
2. The following types of hydraulic cement are acceptable for use in mass concrete construction, where the heat of hydration does not exceed 70 cal/g at 7 days per previous records, or the cement contains no more than 8% tricalcium aluminate:

   a. Portland cement Types II (MH), and V, as covered by ASTM C 150;
   b. Blended hydraulic cement Types P, IP, S, IS, I(PM), and I(SM), as covered by ASTM C 595 and ASTM C1157;
   c. Portion of Portland cement shall be limited to 300 lb/cyd.

3. Take special precautions to control internal and surface temperature differentials, including but not limited to the following, at the Contractor's option, and in compliance with ACI 207.4R where applicable:

   a. Chilled mixing water or chopped ice, provided water equivalent of ice is calculated to total amount of mixing water.

b. Liquid nitrogen, insulating blankets, and/or precooling of coarse aggregate to 50 deg F.
c. Use of air-entraining, water-reducing or set-controlling admixture in accordance with previously accepted submittals.
d. Set-accelerating admixtures shall not be permitted.
e. Embedded cooling coils shall be pre-approved by Architect.
f. Evaporative cooling of surfaces by water curing.

4. Placing: Place mass concrete foundations in layers appropriate for the vibration equipment to be used to achieve proper consolidation. Layers shall be executed in a stepped fashion to produce setbacks of approximately 5 feet between forward edges of successive layers. When placing concrete in lifts, layer thickness shall be an even fraction of the lift height. The joint surface between lifts shall be sand- or high-pressure water-blasted clean and free from surface moisture before pouring next lift.
5. Consolidation: To ensure proper consolidation, the vibrators should penetrate the lower layer for 2 to 4 in. and be maintained in a vertical position at each penetration during vibration. To prevent imperfections along lift lines and layer lines at form faces, these areas should be systematically deeply revibrated as each layer advances from the starting form, along each of the side forms, to the other end form. Any visible clusters of separated coarse aggregate should be scattered on the new concrete before covering with additional concrete. During consolidation, the vibrators should remain at each penetration point until large air bubbles have ceased to rise and escape from the concrete.

11 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 exceeding 1/4 inch.

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.

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.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

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

12 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, 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.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten 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. 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) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15. These values apply to all floors and slabs unless noted otherwise.

2. 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. These values apply to slabs-on-grade Slabs supporting modular office partitions, adhered flooring systems, or compact storage shelving must also comply with the manufacturer's tolerance requirements.
3. Slabs scheduled to receive wood flooring must also comply with tolerances required for installation of wood flooring. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch.
4. Fill or grind completed floors as necessary to achieve specified finish tolerances. Fill shall be with a self-leveling cementitious product capable of being tapered to a feathered edge.

a. Repair any floor section measuring below either the minimum local F-number or the minimum local L-number.

E. Trowel and Fine-Broom Finish: 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: 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. 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 for the mineral aggregate hardener and at a rate of 150 lb/100 sq.ft. for the metallic and non-oxidizing metallic hardeners.
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. Schedule of Concrete Finish Types, unless otherwise indicated on Drawings:

1. Formed Surfaces Not Exposed To View: Rough Formed.
2. Formed Surfaces Exposed To View At Building Interior: Smooth Formed.
3. Formed Surfaces Exposed To View At Building Exterior: Smooth Formed.
4. Formed Surfaces to Receive:

   a. Paint: Grout Cleaned.
   b. Waterproofing, Dampproofing: Smooth Formed.
   c. Veneer Plaster: Smooth Formed.

5. Exposed Interior Slabs: Trowel.
6. Exposed Stair Fills and Ramps: Nonslip Aggregate.
7. Slabs to Receive:

a. Concrete Toppings: Float.
b. Mortar Setting Beds: Scratch.
c. Membrane Waterproofing: Float.
d. Fluid Applied Waterproofing: Trowel.
e. Resilient Flooring: Trowel.
f. Carpet: Trowel.
g. Tile (thin-set): Fine Broom.

8. Exposed to View Curbs: Provide monolithic finish by stripping forms while concrete is green and steel-troweling surfaces to a dense, hard, finish with corners intersections and terminations slightly rounded.

13 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. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

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

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

E. Post-Installed Concrete Anchors

1. Install in accordance with the manufacturer's recommendations and ICC-ES reports.
2. Use washers on all bolts.
3. Use care to avoid cutting or damaging reinforcing bars.
4. When exposed to view in the final structure, bolts shall be of a length that will extend entirely through but not more than 1/4-inch beyond the nuts unless otherwise shown on the Drawings.

F. Install concrete fill on a continuous wire mesh of not less than 14 gage welded wire fabric, 2 inch square, supported approximately ½ inch above the bottom of pans. Screed concrete fill level and finish with wood float.

14 CONCRETE PROTECTING AND CURING

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. Where supplementary cementitious materials are used, extra precautions shall be taken to prevent premature drying.

C. 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.

D. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

E. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

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 (7) 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 (7) days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a strippable or dissipating curing compound.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
5. Interior slabs to receive resilient flooring: Cure only with moisture retaining cover. Strippable or dissipating curing compounds may be used on trowel finished surfaces.
6. Interior slabs to receive thin set of tile: Cure only with moisture retaining cover. Do not cure with curing compound.
7. Exterior Flatwork: Apply 1 coat of curing/sealing compound as soon as possible after finishing.

15 LIQUID FLOOR TREATMENTS

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.

B. Polished Concrete Floor Treatment: Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.

1. Machine grind floor surfaces to receive polished finishes level and smooth [and to depth required to reveal aggregate to match approved mockup].
2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
3. Continue polishing with progressively finer grit diamond polishing pads to gloss level to match approved mockup.
4. Control and dispose of waste products produced by grinding and polishing operations.
5. Neutralize and clean polished floor surfaces.

C. 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.

16 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 one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

17 CONCRETE SURFACE REPAIRS

A. Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval. Repair and replacement work will be done at Contractor's expense.

B. Defective Concrete is defined as concrete which is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets voids, spalling, exposed reinforcement, that has any sawdust, wood, or debris embedded in it, or is otherwise defective, and in the Architect's judgment these defects impair the proper strength or appearance of the work. Any concrete work not in accordance with the Specification and Drawings will be deemed to be defective.

C. 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.

D. 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.

E. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with polymer 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.

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

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

18 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a [special inspector] [and] [qualified testing and inspecting agency] to perform field tests and inspections and prepare test reports.

B. Inspections:

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

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 at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143; 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 C231, pressure method, for normal-weight concrete; ASTM C173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Water Content and W/cm: In accordance with AASHTO T318.
5. Concrete Temperature: ASTM C1064; 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.
6. Density: ASTM C567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C31.

    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.

8. Compressive-Strength Tests: ASTM C39; 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 field-cured specimens at 7 days and one set of specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of specimens obtained from same composite sample and tested at age indicated.

c. Number of specimens in each set shall follow requirements of ACI 318 Section 5.

9. 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.
10. 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, when the specified strength is 5000 psi or less; or by more than 10 percent of specified strength, when the specified strength is above 5000 psi.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28 -day tests.
12. Monthly charts and compressive strength, w/cm and air content will be sent to all parties on the pre-concrete conference distribution list.
13. Non-compliant Test Reports: All test reports indicating non-compliance should be e-mailed or faxed immediately to all parties on the test report distribution list. Copies shall be distinguishable from the originals.
14. Nondestructive Testing: Rebound hammer, ultrasonic, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
15. 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 C42 or by other methods as directed by Architect.

    a. If test results indicate that compressive strength requirements have not been met, the Contractor shall justify that the load carrying capacity of the structure has not been reduced. Carry out tests of cores drilled from the area in question as directed by the Architect in accordance with ASTM C42 and ACI 318 Section 5.6.5.
    b. If the compressive tests of the core specimens fail to show the compressive strength specified, the concrete shall be deemed defective and shall be replaced or adequately strengthened in a manner acceptable to the Architect. Perform load tests as outlined in ASTM C39, as directed by the Architect, on the questionable portion of the Work.

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

D. Reinforcing Steel

1. Notify the testing agency and the Architect at least 48 hours before concrete is to be poured or reinforcing is covered up.
2. Before any concrete is poured on any particular portion of the building, the reinforcing steel and form dimensions will be inspected by the Testing Agency. Any errors or discrepancies shall be corrected before concrete is placed.
3. In addition to other required inspections, the following are subject to [Special][Controlled] Inspection as per IBC Chapter 1704.4:

    a. Placement of Reinforcing Steel
    b. Welding of Reinforcing Steel

4. A special inspector from the Testing Agency shall be present during all field bending of reinforcement.
5. Installation of deformed bar anchors to be tested in accordance with Section 7.1 of AWS D1.1.
6. Welding of Reinforcement: There shall be continuous inspection during all welding of reinforcement. All butt welds to be inspected using radiographic testing. At the Owners option recognized non-destructive tests such as resistance, Magnetic Particle Examination, and Liquid Penetrant Inspection may be used to inspect the welds.
7. Comply with ICC-ES approvals with respect to special inspection required during installation.
8. Testing and inspection of mechanical splices and reinforcing couplers to conform to manufacturer's recommendations and ICC-ES approval.

E. Survey and Adjustment: Continuously observe formwork operations, record such observations on a daily basis, and submit reports of the results. Instrument check forms before and during concrete placement to assure no movement has taken place. Make appropriate corrections to reposition displaced forms.

1. Measure floor and slab flatness and levelness according to ASTM E1155 within 48 hours of finishing.
2. Certify, by written report submitted on a weekly basis, for each level and story that the elevations, finish lines and building lines of the hardened concrete are within tolerances, as substantiated by transit survey; also that all embeds and inserts have been installed within tolerance.

19 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

SECTION 033600 – SPECIAL CONCRETE FLOOR FINISHES

PART 1 - GENERAL

1. 1 SUMMARY

A. This section includes the following.
1. Ground, exposed aggregate concrete floor finishes including sealer and hardener.
2. **Colored concrete paving**

B. Related Sections:
1. Section 033000 Cast-In-Place Concrete for mix specification and surface retarder.
2. **Section 32 13 13 Concrete Paving for exterior paving**

1.2 REFERENCES

A. American Society for Testing and Materials:
1. ASTM-C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
2. ASTM G23-81, Ultraviolet Light & Water Spray
3. ASTM C805, Impact Strength

B. American Concrete Institute
1. ACI 302. 1R-89, Guide for Concrete Floor and Slab Construction

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01600- Product Requirements.
1. Provide submittal information within 35 calendar days after the contractor has received the owner's notice to proceed.

B . Product data:
1. Submit special concrete finishes manufacturer's specifications and test data.
2. Submit special concrete finishes describing product to be provided, giving manufacturer’s name and product name for the specified material proposed to be provided under this section.

3. Submit special concrete finishes manufacturer's recommended installation procedures; which when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
4. Submit special concrete finishes technical data sheet giving descriptive data, curing time, and application requirements.
5. Submit special concrete finishes manufacturer’s Material Safety Data Sheet (MSDS) and other safety requirements.
6. Follow all special concrete finishes published manufacturer’s installation instructions.

C. Test Reports:
1. Provide certified test reports, prepared by an independent testing laboratory, confirming compliance with specified performance criteria.
2. **Samples: Sample of not less than 1 pound each color of special aggregate to be provided.**

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, manufacturer's representative, and installers whose work interfaces with or affects concrete finish..
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to application, including manufacturer's written instructions.
4. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
5. Review protection requirements for floor finish after application..
6. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
1. Use an experienced installer and an adequate number of skilled workers thoroughly trained and experienced in the necessary craft.
2. The special concrete finish manufacturer shall certify the applicator.
3. The applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section.

B. Manufacturer’s Certification:

1. Provide letter of certification from concrete finish manufacturer stating that installer is certified applicator of special concrete finishes, and is familiar with proper procedures and installation requirements required by the manufacturer.

C. Mock-ups:
   1. Refer to specification section 033000 for concrete floor mockup sizes.
      a. Ground finish: Provide mockups on site in an area that can be maintained and protected until the acceptance of the completed work in the building.
      b. Colored paving: Mockups of each color of exterior paving.

D. Protection:
   1. Protect concrete mockup slabs and installed work from weather, dirt, water, oil and chemical spills, and other conditions that may affect the finished appearance of the sample.
      a. Protection of mockup shall be maintained in place before and after polishing, until the acceptance of the completed building surfaces.
   2. Protection of installed work
      a. Protection of mockup shall be maintained in place before and after polishing, until the acceptance of the completed building surfaces.
      b. Diaper all hydraulic powered equipment to prevent staining of the concrete.
      c. Do not allow vehicles to be parked on the interior slab areas to receive polished finish without adequate protection.
      d. Do not use pipe cutting machines on the inside floor slab.
      e. Do not place steel on interior slab to avoid rust staining.
      f. Do not allow acids or acidic detergents to come into contact with slab.
      g. Require all trades to protect the slab at all times.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original containers, with seal's unbroken, bearing manufacturer labels indicating brand name and directions for storage.

B. Dispense special concrete finish material from factory numbered and sealed containers. Maintain record of container numbers.

1.6 PROJECT CONDITIONS

A. Environmental limitations:

1. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
   a. Refer to specification section 033000 “Cast-in-Place Concrete” for floor flatness and levelness requirements..

B. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.

PART 2 – PRODUCTS

2.1 MATERIALS AND MANUFACTURERS

A. Hardening / Sealing Agent
   1. Provide the product named below:
      a. Retro-Plate 99; Advanced Floor Products, Inc

B. Grinding media
   1. Polishing pads of varying grit adequate to match Architect’s sample for color, polish and sheen. Architect’s sample represents an approximate 200-Grit sheen.

C. Sealer
   1. Matte penetrating finish sealer to prevent dusting and seal pores to protect against staining and discoloration from dirt, water and oils.

D. Special Aggregate: For Concrete 1, stone aggregate to be mix of white and light grey material, 80% white and 20% light grey.

E. Cement: Utilize white cement where required to match concrete color to specified colors

2.2 RELATED MATERIALS

A. Neutralizing Agent:
   1. Tri-sodium Phosphate

B. Water:
   1. Potable

PART 3- EXECUTION

3.1 SURFACE CONDITIONS:

A. Examine substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.

B. Verify that base slab meet finish and surface profile requirements in Division 3 Section “Cast-In-Place Concrete,” and Project Conditions above. Confirm aggregate is adequately exposed.

C. Prior to application, verify that floor surfaces are free of construction latents.

D. Protection:

1. Protect adjacent surfaces from chemicals, splatter, spray or other damage from floor grinding and sealing processes.

3.2 GRINDING AND SEALING

A. Apply hardener in accordance with manufacturer’s recommendations.

B. Grind floor using sweeping motion in multiple passes, such that the process can be monitored as it progresses and overgrinding will be avoided. Begin grinding with coarsest media and progress to a maximum 200-grit pad.

C. Sealing, Hardening and Polishing of Concrete Surface
1. Concrete must be in place a minimum of 45 days or as directed by the manufacturer before application can begin.
2. Follow manufacturer’s written instructions and procedures.
3. Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface without changing the natural appearance of the concrete, except for the sheen.
4. Polish to required sheen level to match approved mock-up.

3.3 WORKMANSHIP AND CLEANING:

A. The premises shall be kept clean and free of debris at all times.

B. Remove spatter from adjoining surfaces, as necessary.

C. Repair damages to surface caused by cleaning operations.

D. Remove debris from jobsite

1. Dispose of materials in separate, closed containers in accordance with local regulations.

3.4 PROTECTION:

A. Protect finished work until fully cured in accordance with manufacturer's recommendations.

3.5 CONCRETE FINISH SCHEDULE

CONC-1	**Ground and polished concrete with 80% white and 20% light grey aggregate. Sealer.**	**Grind to expose aggregate. 200 grit honed sheen finish. Match architect's sample. White cement as required.**
CONC-2	**Concrete with sealer**	**For back of house and concealed areas**
CONC-3	**Integrally Colored exterior concrete paving with light sandblasted finish. Basis of Design: Scofield Chromix. UV resistant seal coat.**	**Color: Match Scofield Dark Gray.**
CONC-4	**Natural color concrete to match existing adjacent sidewalk color and finish.**	**Contractor may elect to use integrally colored concrete to facilitate concrete match.**
CONC-5	**Integrally Colored exterior concrete paving with light sandblasted finish. Basis of Design: Scofield Chromix. UV resistant seal coat**	**Color: Match Scofield Ash White. White cement as required.**

END OF SECTION 033600

SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Flashing and sheet metal indicated on drawings and specified.

B. Related requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 075419 Polyvinyl-Chloride (PVC) Roofing for requirements relative to roofing system**.**
3. Section 073116 “Flat Lock Metal Wall Panels” for sheet metal flashing material to match shingle material.
4. Section 077100 “Roof Specialties” for Roof edge flashings, reglets and counterflashings.
5. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.2 SUBMITTALS

A. Product Data
1. Submit sheet metal manufacturer's product specifications, installation instructions and general recommendations for standard factory fabricated items.
2. Submit data and color chart for prefinished sheet metal.

B. Samples:
1. Submit 6" square samples of specified sheet metals in specified gauges finished as specified.
2. Submit 12" wide (long) mock-up of the following:
.
a. Flexible expansion joint covers.

C. Shop Drawings:
1. Submit Shop Drawings showing fabrication, jointing and securing of sheet metal. Show expansion joint details and connections to adjoining Work and at obstructions and penetrations.

1.3 QUALITY ASSURANCE

A. Fabricator/Installer: A company experienced in the type of Work required and acceptable to the Roofing Installer.

B. Reference Standards: Except as otherwise specifically shown or specified, comply with applicable recommendations and details of the "Architectural Sheet Metal Manual" by SMACNA

1.4 PROJECT CONDITIONS

A. Coordinate Work with adjacent Work, including installation of roofing to avoid leaving roofing terminations unprotected.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Exposed Flashings and trim: LIC Stainless Steel Sheet: Alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

1. Surface: Smooth, flat finish.
   a. Color range to match range of exterior wall shingles

B. Concealed Flashings and trim: Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:

   a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: Match Architect's sample color chip.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch (0.5 mm) thick, unless otherwise indicated.

D. Scupper boxes: Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

1. Nonpatinated Exposed Finish: Mill.

2.2 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

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

a. Atlas Roofing Corporation; Summit.
b. Engineered Coated Products; Nova-Seal II.
c. SDP Advanced Polymer Products Inc; Palisade.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

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

a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT
c. Henry Company; Blueskin PE200 HT.

2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m)minimum.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder for Stainless Steel: ASTM B 32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer, use a noncorrosive rosin flux over tinned surfaces.

B. Stainless-Steel Welding Rods: Type recommended by stainless-steel sheet manufacturer for type of metal sheets furnished.

C. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

1. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.

D. Solder:

1. For Copper: ASTM B 32, with maximum lead content of 0.2 percent.
2. For Stainless Steel: ASTM B 32, Grade Sn96, with acid flux of type recommended by stainless-steel sheet manufacturer.

E. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur compounded for 15-mil (0.4-mm) dry film thickness per coat.

F. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Elastomeric Sealant: Polyurethane based, one-part elastomeric sealant complying with ASTM C920, Type S, Grade NS, Class 25.

I. Epoxy Seam Sealer for Aluminum: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

J. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

K. Metal Accessories: Furnish sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

L. Roofing Cement: Of type compatible with specified roofing system..

M. Flexible Expansion Joint Covers: Furnish units consisting of exposed 60 mil neoprene sheet bellows; security anchored at both edges to sheet metal nailing flanges 3"-4" wide by special bifurcations formed in the metal, either plain or angle-formed to fit curbs as required; insulated from below with adhesively-applied closed cell; flexible, rubber/plastic insulation not less than 3/8" thick, coordinated with width of elastic sheet.
1. Furnish sheet metal flanges matching counterflashing.
2. Furnish shop fabricated corners and intersections.

2.4 FABRICATION

A. Fabricate sheet metal work to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Work free of oil canning, buckling, and tool marks and that is true to line and levels with exposed edges folded back to form hems.

C. Fabricate nonmoving seams in sheet metal other than aluminum with flat-lock seams. Tin edges to be seamed, form seams, and solder.
   1. Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

D. Space joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection.

E. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

F. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

G. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
   1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

H. Fabricate extruded-aluminum running units with formed or extruded-aluminum joint covers for installation behind main members where possible. Fabricate mitered and welded corner units.

2.5 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers of same material as downspouts and anchors.
   1. Provide shop fabricated downspouts in profiles indicated. Shop fabricate elbows and joints with fully welded watertight seams to provide one-piece downspout.
   2. Fabricate downspout from the following materials:
      a. Stainless Steel: 0.032 inch (0.80 mm) thick.
   3. Provide hangers in accordance with NRCA and SMACNA recommendations.

B. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper. Fabricate from the following materials:

   1. Copper: 16 oz./sq. ft. (0.55 mm thick).

C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes and exterior flange trim. Fabricate from the following materials:

   1. Copper: 16 oz./sq. ft. (0.55 mm thick).

D. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
   1. Stainless Steel: **0**.019 inch (0.48 mm) thick.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Copings shall be fabricated as part of the exterior wall flat-lock metal wall panel system as indicated on the drawings Fabricate with hammered and sealed or soldered joints to be watertight.
   1. Fabricate from the following materials:
      a. Light Interference Colored (LIC) Stainless Steel: 0.04 inch thick

B. Flashings: Shop fabricate interior and exterior corners.. Fabricate from the following materials:
   1. Aluminum: 0.040 inch (1.02 mm) thick.
   2. Light Interference Colored (LIC) Stainless Steel: 0.019 inch (0.48 mm) thick.

C. Counterflashings: Shop fabricate interior and exterior corners.. Fabricate from the following materials:
   1. Aluminum: 0.040 inch (1.02 mm) thick.
   2. Light Interference Colored (LIC) Stainless Steel: 0.019 inch (0.48 mm) thick

2.7 STAINLESS STEEL FINISHES

A. General: Light Interference Colored (LIC) stainless steel sheet, to match exterior wall shingle color range.

2.8 ALUMINUM FINISHES

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

B. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   1. Mica Color: Match Architect's sample. Color selection to be determined after brick selection and color is finalized.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Unless otherwise indicated, install sheet metal work to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place. Conceal fasteners were possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal: Work free of oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal work to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretrin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except where pretinned surface would show in finished Work.
   1. Do not solder aluminum and coil-coated galvanized steel sheet.
   2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
   1. Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

E. Separate dissimilar metals from each other by painting each metal surface in area of contact with a heavy application of bituminous coating, or by other permanent separation as recommended by manufacturers of dissimilar metals.

F. Install Sheet metal Work with provisions for thermal expansion of running items of more than 15'-0" continuous length. Maintain a water-tight installation at expansion seams. Locate expansion seams as shown or, if not shown, at the following maximum spacings for each general flashing use:

   1. Gutters: Midway between drains (at high points in slopes), but in no case more than 30'-0" apart.
   2. Copings, Gravel Stop/Fascias, Counter Flashing and Trim: At 10'-0" intervals.

G. Expansion Joints:
   1. Concealed Splice-Type Expansion Joints: Furnish 4" wide splice plates of same metal and configuration of item to be joined. Set plates under units to be joined. Set units in full bed of non-skinning butyl mastic sealant allowing 1/4" gap between abutting ends of units for 40° to 70°F. temperature range.
      a. Use for gravel stops/fascia..

H. Fabricate and install Sheet Metal Work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, waves and avoidable tool marks, considering temper and reflectivity of metal. Furnish uniform, neat seams with minimum exposure of solder, welds and sealant. Except as otherwise shown, fold back sheet metal to form hem on concealed side of exposed edges.

I. Conceal fasteners and expansion provisions where possible in exposed Work, and locate so as to minimize possibility of leakage. Cover and seal Work as required for a watertight installation.
   1. Furnish continuous cleat-type anchorages for gravel stop/fascias, copings, and trim.

J. Installation of Stainless Steel Items:
   1. Separate stainless steel from dissimilar metals, including regular steel and iron, and from cementitious materials.
   2. Tin the edges of stainless steel to be soldered, for a width of 1-1/2", using solder for stainless steel and acid flux. Remove every trace of acid flux residue from metal promptly after tinning or soldering. Comply with manufacturer's recommended methods for cleaning and neutralization.
   3. Furnish flat-lock seams, soldered, unless otherwise indicated, except at expansion joints. Remove residue of flex promptly and thoroughly.
   4. Clean exposed surfaces of non-coated stainless steel of every substance, which is visible or might cause corrosion of metal surfaces. Exercise extreme care to remove fluxes and ferrous metal particles, including welding spatter and grinding dust.

K. Installation of Nonferrous Items:
   1. In addition to bituminous coatings at locations where metal contacts dissimilar metals, apply a heavy tinning of solder at locations where flashing makes a spot-contact with dissimilar metals.
   2. Furnish flat-lock soldered seams, unless otherwise indicated, with minimum of 1/2" wide hooked flanges, except at expansion joints.
   3. Clean exposed metal surfaces of substances which would interfere with uniform oxidation and weathering.

L. Installation of Aluminum Items:
   1. Where aluminum flashing is shown with contact to non-ferrous or ferrous metal, wood or cementitious materials, apply 15-mil bituminous coating or heavy trowel coating of roofing cement on substrate or as back-coating on flashing.
   2. Furnish form flat-lock seams with epoxy seam sealer or other permanent sealer recommended by aluminum manufacturer except at expansion joints.
   3. Clean exposed aluminum surfaces of every substance, which is visible or might cause corrosion of metal or deterioration of finish.

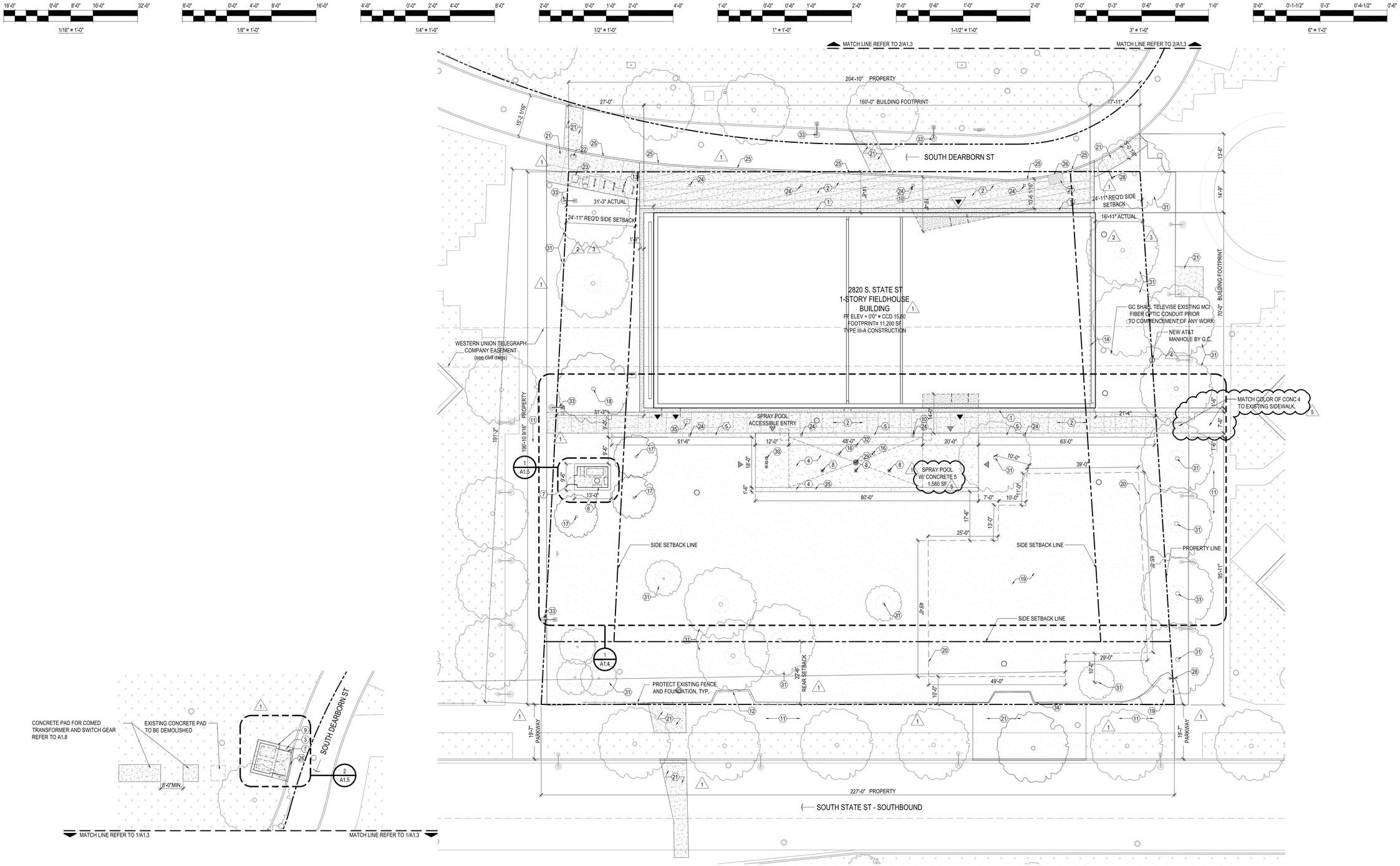
M. Flexible Expansion Joint Covers:
   1. Use factory prefabricated corners, intersections and transitions.
   2. Install in exact accordance with manufacturer's instructions. Use cover plates and mastics manufactured for the purpose.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Furnish final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 076200



SITE PLAN KEYNOTES

1. CAST IN PLACE CONCRETE 3
2. CAST IN PLACE CONCRETE 4
3. CONCRETE BOLLARD
4. SPRAY POOL WITH CONCRETE 5
5. ARCHITECTURAL CAST-IN-PLACE CONCRETE 5 SEATING WALL
6. GAS METER
7. ST. STL. GATE
8. SPRAY FEATURE W050
9. BRICK TRASH ENCLOSURE
10. CCTV WITH DARK GRAY TRIM INTEGRATED WITHIN LIGHT POLE
11. EXISTING CONCRETE SIDEWALK TO REMAIN
12. EXISTING ORNAMENTAL FENCE TO REMAIN
13. BIKE RACKS SEE DETAIL 6,11,12/A1.6
14. LINE OF BUILDING AT GRADE
15. SLOPED SIDEWALK (1:20 MAX)
16. SPRAY FEATURE W040
17. ORNAMENTAL TREE, SEE PLANT LIST ON L1.2
18. CANOPY TREE, SEE PLANT LIST ON L1.2
19. TOP SOIL PLANTING
20. APPROX. LIMIT OF STORMWATER DETENTION (REF. TO CIVIL)
21. CAST-IN-PLACE CONC. TO MATCH EXIST. SIDEWALK
22. FIRE HYDRANT
23. TRASH RECEPTACLE SEE DETAIL 15/A1.6
24. POLE MOUNTED LIGHT FIXTURE
25. CONCRETE CURB
26. DEPRESSED CURB
27. ADA DETECTABLE WARN. PAVEMENT
28. SITE SIGN
29. ALUMINUM 24" DIA. ADA DRAIN
30. DRINKING FOUNTAIN
31. EXISTING TREE TO REMAIN
32. PUSH PEDAL ACTUATOR
33. PROVIDE NEW LIGHT POLE HEAD
34. REINSTALL SALVAGED ORNAMENTAL METAL FENCE
35. NEW AT&T HANDHOLE

LEGEND

- SITE BOUNDARY LINE
- EXISTING ORNAMENTAL FENCE TO REMAIN
- EXISTING LAWN
- EXISTING TO REMAIN
- PROJECT SCOPE
- LAWN
- CAST IN PLACE CONCRETE 3
- CAST IN PLACE CONCRETE 4
- EXISTING TREE TO REMAIN
- TREE
- MAIN ENTRANCE/ EXIT
- EXIT
- ENTRANCE TO SPRAY POOL
- EXISTING HYDRANT
- EXISTING UTILITY MANHOLE
- EXISTING LIGHT POLES
- EXISTING SIGN
- SIGN
- HAND HOLE
- LIGHT POLE
- NEW LIGHT POLE HEAD
- DRINKING FOUNTAIN

GENERAL NOTES

1. THIS SITE PLAN IS BASED ON INFORMATION OBTAINED FROM A SURVEY. THE CONTRACTOR IS REQUIRED TO FIELD VERIFY ALL EXISTING CONDITIONS AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES.
2. REFER TO CIVIL DRAWINGS FOR DEMOLITION, EARTHWORK, PAVING, AND UTILITIES.
3. REFER TO LANDSCAPE DRAWINGS FOR ADDITIONAL INFORMATION REGARDING SITE WORK.
4. BUILDING DIMENSIONS ARE FACE OF MASONRY / STONE UNLESS NOTED OTHERWISE
5. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CODES AND PROJECT REQUIREMENTS.
6. PROTECT ALL EXISTING UTILITIES TO REMAIN.
7. PROTECT ALL TREES ADJACENT TO CONSTRUCTION AREAS. REFER TO LANDSCAPE DRAWINGS FOR ADDITIONAL INFORMATION.
8. G.C. TO COORDINATE BETWEEN TRADES / WITH PRODUCT DATA.

WILLIAMS PARK FIELDHOUSE
PARK #261

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Geotechnical Engineers of Record

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Issuance

Mark	Description	Date
5	Addendum 2	1/10/2018
4	Addendum 1	12/22/2017
	Issue for Bid	12/06/2017
3	Zoning Adjustment Revision	11/08/2017
2	Certified Permit Corrections	10/03/2017
	PBC Format Revision	8/30/2017
1	Certified Permit Corrections	8/03/2017
	Issue for Permit & Bid	6/01/2017

PBC Project Name:Williams Park Fieldhouse
PBC Contract No.: C1593
Project No.: 11320

Title
PARTIAL SITE PLAN

Sheet
A1.3

Date of Issue: January 18, 2018
PBC: Williams Park Fieldhouse_C1593 - Addendum No. 2

16'-0" 0'-0" 8'-0" 16'-0" 32'-0"
1/16" = 1'-0"

8'-0" 0'-0" 4'-0" 8'-0" 16'-0"
1/8" = 1'-0"

4'-0" 0'-0" 2'-0" 4'-0" 8'-0"
1/4" = 1'-0"

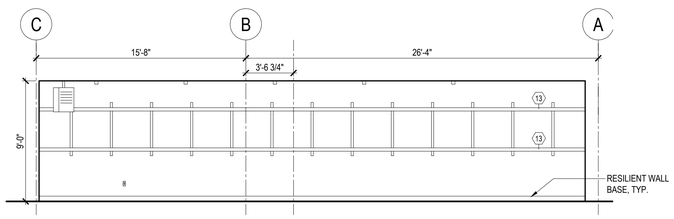
2'-0" 0'-0" 1'-0" 2'-0" 4'-0"
1/2" = 1'-0"

1'-0" 0'-0" 0'-6" 1'-0" 2'-0"
1" = 1'-0"

0'-0" 0'-6" 1'-0" 2'-0"
1-1/2" = 1'-0"

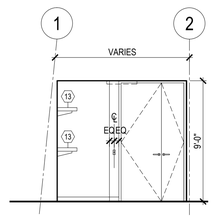
0'-0" 0'-3" 0'-6" 0'-9" 1'-0"
3" = 1'-0"

0'-0" 0'-1-1/2" 0'-3" 0'-4-1/2" 0'-6"
6" = 1'-0"

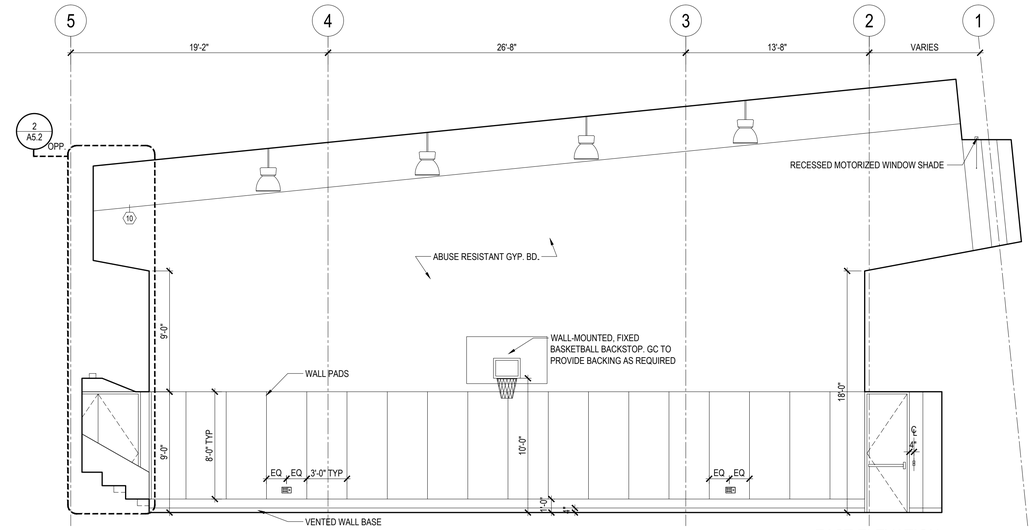


5 SOUTH ELEVATION STORAGE 128
3/16" = 1'-0"

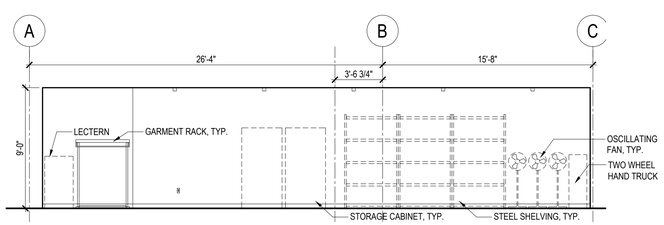
REFER TO A11.1 EQUIPMENT PLAN, A11.2 FURNITURE PLAN, AND FURNITURE, FIXTURES, AND EQUIPMENT MANUAL FOR MORE INFORMATION ON FURNITURE AND EQUIPMENT, TYP. ALL ELEVATIONS ON SHEET



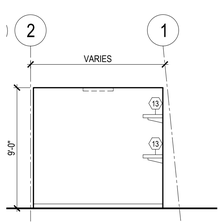
3 WEST ELEVATION STORAGE 128
3/16" = 1'-0"



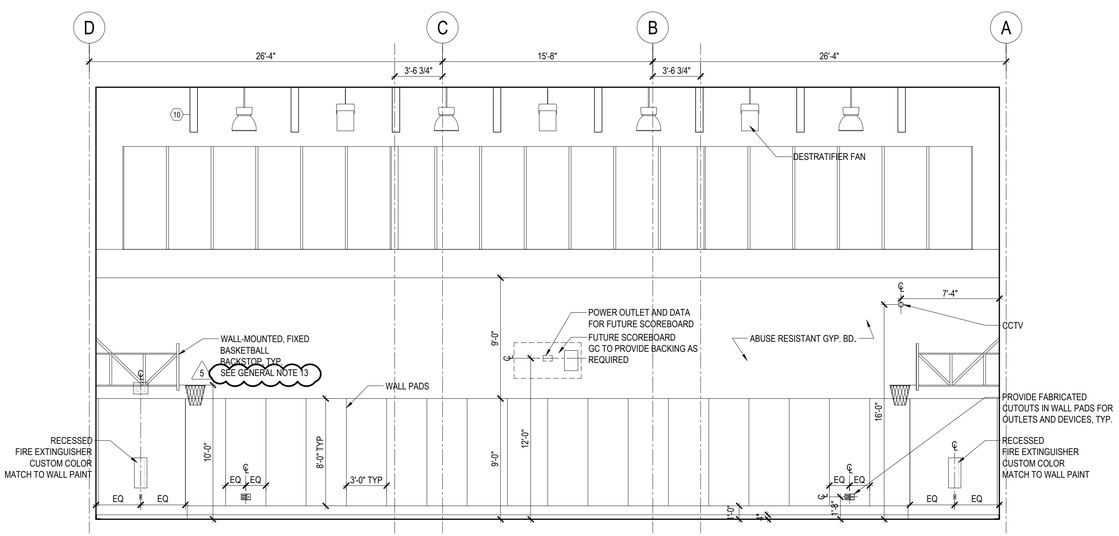
1 EAST ELEVATION GYMNASIUM 125
3/16" = 1'-0"



6 NORTH ELEVATION STORAGE 128
3/16" = 1'-0"



4 EAST ELEVATION STORAGE 128
3/16" = 1'-0"



2 SOUTH ELEVATION GYMNASIUM 125
3/16" = 1'-0"

LEGEND

- FIRE EXTINGUISHER
- RECESSED FIRE EXTINGUISHER CABINET
- PUSH PLATE BOLLARD

KEY NOTES

1. FIXED CAST-IN-PLACE CONCRETE SEATING AND STEPS
2. CONCRETE PAD
3. MECHANICAL WELL
4. STONE PANEL
5. SHIP'S LADDER
6. STAINLESS STEEL SHINGLES
7. METAL COPING TO MATCH STAINLESS STEEL SHINGLES
8. PAINTED STEEL STRUCTURE
9. NOT USED
10. GLULAM BEAMS
11. MILLWORK TROPHY CASE REFER TO 9.4
12. MILLWORK TRASH ENCLOSURE REFER TO 9.4 AND A9.7
13. MILLWORK 16" SHELVING ON BRACKETS AND HEAVY DUTY STANDARDS, REFER TO 9.4
14. MILLWORK REFER TO A9.3-A9.5
15. MILLWORK BROCHURE SHELF REFER TO A9.4
16. MILLWORK RECEPTION COUNTER REFER TO 9.3
17. PVC ROOFING SYSTEM
18. TAPERED INSULATION AREA
19. ROOF DRAIN
20. ALL GLASS STOREFRONT
21. ALUMINUM STOREFRONT
22. ROOF ACCESS HATCH
23. TACKABLE WALL SURFACE
24. OPERABLE PARTITION
25. MOTORIZED WINDOW SHADE
26. FLOOR GRILLE
27. RECESSED AED DEFIBRILLATOR CABINET
28. SINK
29. HI-LOW DRINKING FOUNTAIN
30. RTU
31. REFRIGERATOR
32. LINEAR LIGHT AT MILLWORK
33. EMBEDDED BASEBOARD HEATER
34. SOLID SURFACE WAINSCOTING
35. MICROWAVE
36. ADA PUSH PLATE
37. HAND DRYER WITH TOP DOWN ACCESS AND INTEGRAL DRIP TRAY
38. SINK WITH INTEGRAL, FIXED SOAP DISPENSER

5 13. BASKETBALL BACKSTOPS SHALL BE SUPPORTED BY COLD-FORMED STEEL FRAMING. THE COLD-FORMED STEEL FRAMING SYSTEM SHALL BE DESIGNED TO SUPPORT THE MORE RESTRICTIVE OF THE FOLLOWING:

a. THE BACKSTOP MANUFACTURER'S REQUIREMENTS, OR

b. A COMBINATION OF APPLIED FORCES CONSISTING OF OF A 600LB VERTICAL AND 200LB LATERAL LOAD ACTING SIMULTANEOUSLY. LATERAL LOAD MAY ACT IN ANY LATERAL DIRECTION. THESE FORCES ARE TO BE APPLIED AT THE CENTER OF THE BASKETBALL HOOP. THE TRANSFER OF THESE APPLIED FORCES FROM THE BASKETBALL HOOP TO THE SUPPORTING FRAMING AND COLD-FORMED STEEL FRAMING SYSTEM IS DEPENDENT ON THE SPECIFIC CONFIGURATION OF THE BACKSTOP MANUFACTURER'S ASSEMBLY AND WILL NEED TO BE DETERMINED ONCE THE MANUFACTURER IS SELECTED. THE COLD-FORMED STEEL FRAMING DESIGN SHALL ALSO ACCOUNT FOR ALLOWABLE WALL DEFLECTIONS DUE TO BACKSTOP LOADING.

GENERAL NOTES

1. REFER TO SHEETS G SERIES FOR REQUIRED FIRE RATINGS AT PARTITIONS. HORIZONTAL FIRE-RATED SHAFTWALL CONSTRUCTION SHALL BE PROVIDED AT THE BOTTOM OF ALL SHAFTS.
2. REFER TO SHEET A2.1 FOR PARTITIONS TYPES INDICATED THUS: G1a
3. REFER TO STRUCTURAL DRAWINGS FOR REINFORCEMENT, DOWELS AND HEAD ANCHORS FOR MASONRY PARTITIONS
4. ALL DOORS IN FIRE-RATED PARTITIONS TO BE UL LABELED AS REQUIRED FOR WALL RATING. REFER TO SHEETS G SERIES FOR REQUIRED FIRE RATINGS AT PARTITIONS.
5. REFER TO SHEET A10.1 FOR DOOR SCHEDULE FOR DOORS TAGGED THUS: XXX
6. REFER TO A9 SERIES DRAWINGS FOR FINISH SCHEDULE AND FINISH PLANS.
7. REFER TO CODE MATRIX FOR REQUIRED HOURS OF FIRE RESISTANCE OF BUILDING ELEMENTS. PROVIDE ASSEMBLIES HAVING UL RATINGS MEETING OR EXCEEDING INDICATED REQUIREMENTS.
8. DIMENSIONS GIVEN FOR ROOM LAYOUT ARE TO FACE OF DRYWALL PARTITIONS EXCEPT SOLID SURFACE WAINSCOT WHERE SHOWN ON FINISH PLANS AND UNLESS NOTED OTHERWISE.
9. ALL PARTITIONS ABUTTING EXTERIOR MULLIONS SHALL BE CENTERED ON THE MULLION UNLESS NOTED OTHERWISE.
10. PROVIDE MIN. 16 GA GALVANIZED STEEL SHEET METAL BLOCKING IN PARTITIONS AT ALL WALL-MOUNTED ITEMS.
11. NO COMBUSTIBLE MATERIALS SHOULD BE USED IN ANY ASSEMBLY WITH A 2-HR OR GREATER FIRE-RATING.
12. REFER TO A8.4 FOR FIXTURE TYPE AND MOUNTING HEIGHTS.

PUBLIC BUILDING COMMISSION

CHICAGO PARK DISTRICT

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PARK #261

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Geotechnical Engineers of Record

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Chicago, IL 60606
Cost Estimating

Issuance

Mark	Description	Date
5	Addendum 2	1/10/2018
	Issue for Bid	12/06/2017
	PBC Format Revision	8/30/2017
	Issue for Permit & Bid	6/01/2017

PBC Project Name:Williams Park Fieldhouse
PBC Contract No.: C1593
Project No.: 11320

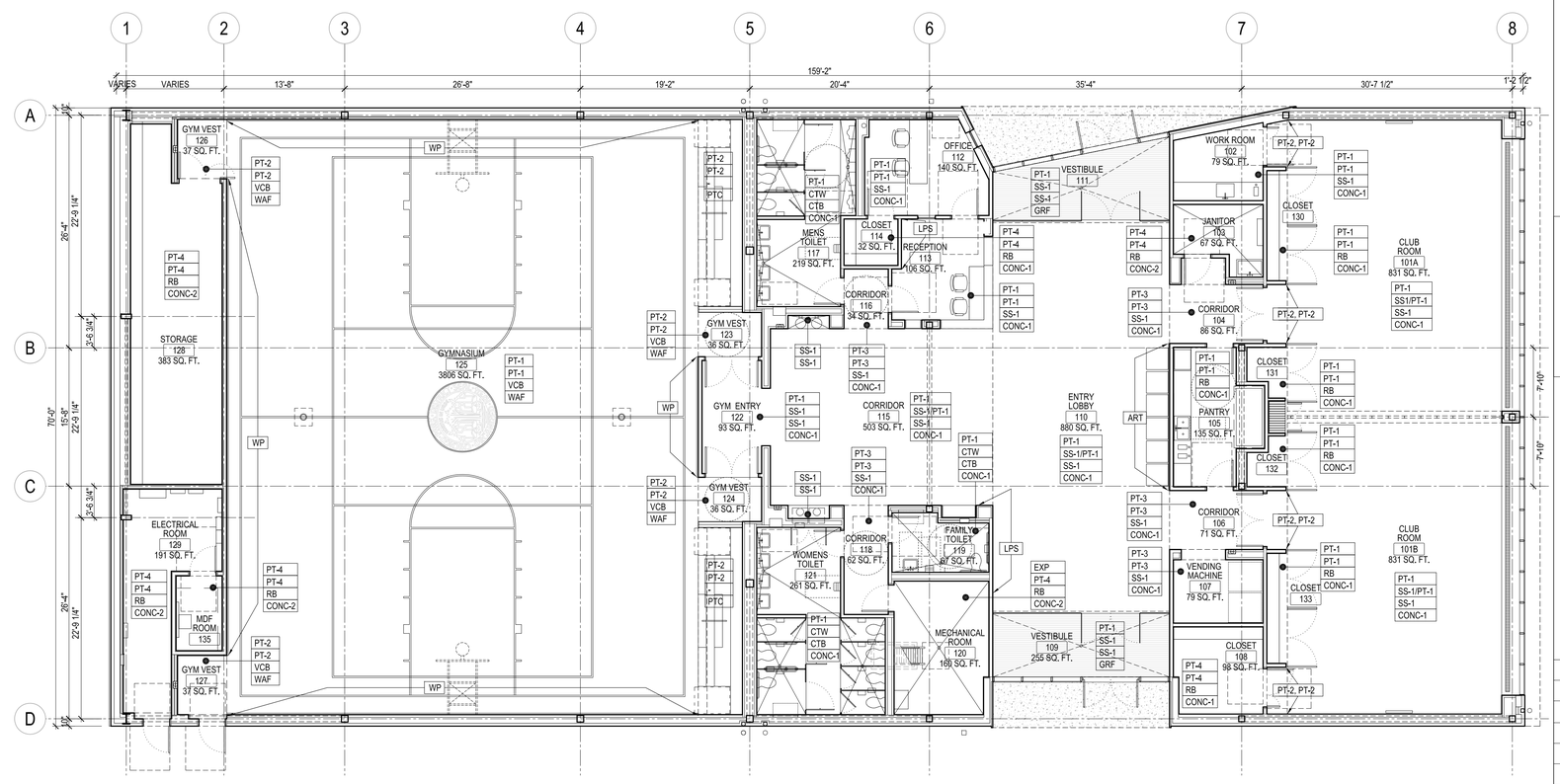
Title
INTERIOR ELEVATIONS - GYM

Sheet
A8.2

1/16" = 1'-0" | 1/8" = 1'-0" | 1/4" = 1'-0" | 1/2" = 1'-0" | 1" = 1'-0" | 1-1/2" = 1'-0" | 3" = 1'-0" | 6" = 1'-0"

TAG	DESCRIPTION	MANUFACTURER & LINE	COLOR / FINISH / SIZE
CEILING			
PT-1	PAINT	PPG	1001-1 DELICATE WHITE
PT-2	PAINT	PPG	MATCH SELECTED WALL PAD COLOR
PT-3	PAINT	PPG	1001-5 DOVER GRAY
PT-4	PAINT	PPG	1001-4 FLAGSTONE
EXP	EXPOSED		
WALL			
PT-1	PAINT	PPG	1001-1 DELICATE WHITE
PT-2	PAINT	PPG	MATCH SELECTED WALL PAD COLOR
PT-3	PAINT	PPG	1001-5 DOVER GRAY
PT-4	PAINT	PPG	1001-6 KNIGHT'S ARMOR
CTW	CERAMIC TILE	2"x2" AMERICAN OLEAN	A33 CHARCOAL
WP	8' WALL PADS	PERFORMANCE SPORTS SYSTEMS	W06 YELLOW
SS-1	SOLID SURFACE WALL	CORIAN	GLACIER ICE / 1/2" THICK. REFER TO SPECS
LPS	LINOLEUM PINNABLE SURFACE.	1/2" THICK. FORBO PINBOARD	2206 OYSTER SHELL
ART	ART WALL	1/2" CERAMIC PRINT GLASS	REFER TO A11.3 AND A11.4
BASE			
SS-1	SOLID SURFACE BASE	CORIAN	GLACIER ICE / 1/2" THICK. REFER TO SPECS
VCB	VENTED COVE BASE	JOHNSONITE	BLACK
CTB	CERAMIC TILE BASE	2"x2" AMERICAN OLEAN	A33 CHARCOAL
RB	RESILIENT BASE	JOHNSONITE	40 BLACK B
FLOOR			
CONC-1	GROUND POLISHED CONCRETE	200 GRID SHEEN REFER TO SPECIFICATION	SEALED FINISH SPECIAL AGGREGATE (NOTE18)
CONC-2	SEALED CONCRETE	REFER TO SPECIFICATION	SEALED FINISH
GRF	RECESSED FLOOR GRILLE	CS	G6 (SEE GENERAL NOTES 15)
WAF	ATHLETIC WOOD FLOORING SYSTEM	ROBBINS BIO-CHANNEL STAR FLOOR	GRADE B
PTC	PAINTED CONCRETE	REFER TO SPECIFICATION	MATCH WALL PAD COLOR
CONC-3	COLORED, LIGHT SANDBLASTED CONCRETE	SCOFIELD / CHROMIX	SCOFIELD DARK GRAY
CONC-4	COLOR/FINISH TO MATCH EXISTING SIDE WALK	SCOFIELD / CHROMIX	NATURAL CONCRETE COLOR
CONC-5	COLORED, LIGHT SANDBLASTED CONCRETE	SCOFIELD / CHROMIX	SCOFIELD ASH WHITE (NOTE 18)

2 FINISH SCHEDULE
N.I.C.



1 FINISH PLAN
1/8" = 1'-0"

FINISH LEGEND

CLNG - CEILING FINISH
WALL - WALL FINISH
BASE - FLOOR BASE
FLOR - FLOOR FINISH

FINISH TAG
SEE FINISH SCHEDULE

GENERAL NOTES

1. ALL INTERIOR WALL AND CEILING FINISHES TO MEET CLASS 1 REQUIREMENTS; FLAME SPREAD 0-25; SMOKE DEVELOPMENT 0-200
2. ALL FLOOR COVERINGS SHALL BE CLASS 'A' WITH CRITICAL RADIANT FLUX OF 0.45 WATTS PER SQUARE CENTIMETER OR HIGHER
3. ALL EXPOSED SURFACES & ITEMS ARE INTENDED TO BE PAINTED WITH THE EXCEPTION OF PREFINISHED ITEMS OR ITEMS SPECIFICALLY INDICATED NOT TO BE PAINTED.
4. ALL FINISH FLOORS TO EXTEND BENEATH ALL BUILT-IN CASE WORK.
5. REFER TO FINISH SCHEDULE AT SHEET A9.1 FOR MATERIAL DECONC-2RIPTIONS.
6. FLOOR MATERIAL CHANGES @ DOORS SHALL ALIGN W/ CENTERLINE OF DOOR IN CLOSED POSITION, UNLESS NOTED OTHERWISE.
7. SEE A9.X FOR TRANSITION DETAILS AND BASE DETAILS
8. RESILIENT BASE WITH COVE PROFILE SHALL BE LOCATED AT HARD SURFACE FLOORS; RESILIENT BASE WITH STRAIGHT PROFILE SHALL BE LOCATED AT CARPET FLOORS
9. ALL ADHESIVES, SEALANTS, AND PRIMERS ARE TO COMPLY WITH THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE #1168
10. ALL PAINTS, COATINGS, AND PRIMERS SHALL NOT EXCEED VOC CONTENT LIMITS DECONC-2RIBED IN GREEN SEAL STANDARD GS-11
11. ALL CARPETS SHALL MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL PLUS PROGRAM
12. REFER TO REFLECTED CEILING PLANS FOR CEILING SIZES. SOME CEILING LAYOUTS REQUIRE CEILING TILES TO BE CUT
13. PROVIDE BLOCK FILLER @ CMU WALLS
14. SEE A9.X FOR MILLWORK DETAIL
15. RECESSED FLOOR GRILLE EDGE BANDING WELDED TO RAILS.
16. SEE STRUCTURAL DRAWING FOR SAW CUT CONTROL JOINT LOCATIONS ON FLOOR SLABS.
17. SEE A1.X SERIES FOR CONC-3, CONC-4 CONC-5 LOCATION.
18. UTILIZE WHITE CEMENT WHERE REQUIRED TO MATCH SPECIFIED CONCRETE COLOR.

WILLIAMS PARK FIELDHOUSE
PARK #261

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Cost Estimating

Issuance

Mark	Description	Date
5	Addendum 2	1/10/2018
	Issue for Bid	12/06/2017
	PBC Format Revision	8/30/2017
	Issued for Permit & Bid	6/01/2017

PBC Project Name:Williams Park Fieldhouse
PBC Contract No.: C1593
Project No.: 11320

Title
FINISH PLAN AND SCHEDULE

Sheet
A9.5

16'-0" 0'-0" 8'-0" 16'-0" 32'-0"
1/16" = 1'-0"

8'-0" 0'-0" 4'-0" 8'-0" 16'-0"
1/8" = 1'-0"

4'-0" 0'-0" 2'-0" 4'-0" 8'-0"
1/4" = 1'-0"

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

1'-0" 0'-0" 0'-6" 1'-0" 2'-0"
1" = 1'-0"

0'-0" 0'-6" 1'-0" 2'-0"
1-1/2" = 1'-0"

0'-0" 0'-3" 0'-6" 0'-9" 1'-0"
3" = 1'-0"

0'-0" 0'-1-1/2" 0'-3" 0'-4-1/2" 0'-6"
6" = 1'-0"

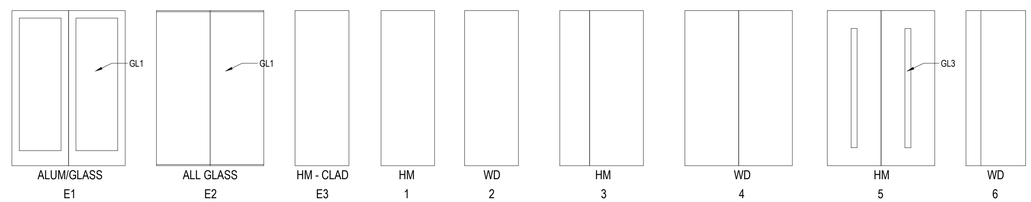
HARDWARE SET #1 **Exterior Entrance with Automatic Operator (Pair)**
GEARED HINGES
POWER TRANSFER
EXIT DEVICE
LOCK
DOOR CLOSER
THRESHOLD
WEATHERSTRIP
SWEEPS
AUTO DOOR OPERATOR
DOOR CONTACTS
5 HS #1 NOTE: FUNCTION OF PANIC DEVICES SHOULD BE EXTERIORDEADBOLTWITH INTERIOR ACCESSIBLE THUMBTURN.
HARDWARE SET #2 **Entry Lobby to Vestibule (Pair)**
TOP AND BOTTOM PIVOTS
5
PUSH/PULL UNIT
DOOR CLOSER
THRESHOLD
AUTO DOOR OPERATOR
HARDWARE SET #3 **Gymnasium to Exterior**
GEARED HINGES
EXIT DEVICE
LOCK
DOOR CLOSER
THRESHOLD
WEATHERSTRIP
SWEEPS
DOOR CONTACTS
HS #3 NOTE: CONCEALED HINGES, CONCEALED SWEEPS AND WEATHERSTRIP, PANIC DEVICE AND ALARM INDICATOR
HARDWARE SET #4 **Electrical Room to Exterior**
HINGES
STOREROOMLOCK
DOOR CLOSER
KICK PLATE
THRESHOLD
WEATHERSTRIP
SWEEPS
DOOR CONTACTS
HS #4 NOTE: KNURLED OUTSIDE LEVER
HARDWARE SET #5 **Club Room (Pair)**
HINGES
CLASSROOM LOCK
DOOR CLOSER
ACOUSTICAL SEALS
HARDWARE SET #6 **Janitor, Storage(Pair), Mechanical Room, MDF Room, Closet**
HINGES
STOREROOM LOCK
DOOR CLOSER
KICK PLATE
ACOUSTICAL SEALS
HS #6 NOTE: KNURL OUTSIDE LEVER ON MECHANICAL AND MDF ROOM
HARDWARE SET #7 **Pantry**
HINGES
CLASSROOM LOCK
DOOR CLOSER
HARDWARE SET #8 **Office, Reception**
HINGES
CLASSROOM LOCK
DOOR CLOSER
ACOUSTICAL SEALS
HARDWARE SET #9 **Mens Toilet, Womens Toilet**
HINGES
LOCK CYLINDER WADA THUMBTURN
DOOR CLOSER
PUSH/PULL UNIT
ACOUSTICAL SEALS
HARDWARE SET #10 **Family Toilet**
HINGES
LOCK OCCUPANCY INDICATOR THUMBTURN LOCK
DOOR CLOSER
ACOUSTICAL SEALS
HARDWARE SET #11 **Gymnasium (Pair)**
HINGES GEARED HINGES
LOCK
EXIT DEVICE
DOOR CLOSER
KICK PLATES
ACOUSTICAL SEALS
HARDWARE SET #12 **Closet at Club Room (Pair)**
TOP & BOTTOM PIVOT
STOREROOM LOCK
DOOR CLOSER
ARMOR PLATE
MANUAL FLUSH BOLTS
HARDWARE SET #13 **Partition Storage (Pair)**
TOP & BOTTOM PIVOT
STOREROOM LOCK
DOOR CLOSER
HARDWARE SET #14 **Workroom at Club Room (Pair)**
HINGES
STOREROOM LOCK
DOOR CLOSER W/ HOLD OPEN
ARMOR PLATE
MANUAL FLUSH BOLTS

1

15 DOOR HARDWARE SCHEDULE
N.T.S.

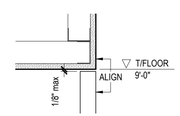
	OPENING NO.	INTO ROOM (EGRESS SIDE)	FROM ROOM (KEY SIDE)	TYPE	DOOR WIDTH	HEIGHT	MATERIAL	FINISH	HARDWARE	FRAME MATERIAL	FINISH	DETAILS HEAD	JAMB	SILL	GLASS	LABEL	NOTES
EXTERIOR DOORS	109	109 VESTIBULE	EXTERIOR	E1	6'-8"	9'-0"	ALUM/GLS	ANOD	1	ALUM/GLS	ANOD	6/A10.2	4	5	GL1		Auto door operator
	111	111 VESTIBULE	EXTERIOR	E1	6'-8"	9'-0"	ALUM/GLS	ANOD	1	ALUM/GLS	ANOD	6/A10.2	4	5	GL1		Auto door operator
	110a	110 ENTRY LOBBY	VESTIBULE	E2	6'-8"	9'-0"	GLASS	GLASS	2	N/A		4/A10.2	7	8	GL1		Auto door operator
	110b	110 ENTRY LOBBY	VESTIBULE	E2	6'-8"	9'-0"	GLASS	GLASS	2	N/A		4/A10.2	7	8	GL1		Auto door operator
	125c	125 GYMNASIUM	EXTERIOR	E3	3'-0"	9'-0"	HM/CLAD	PT/CLAD	3	HM/CLAD	PT/CLAD	9/A6.5	12/A6.5	14/A6.1			Panic device with alarm indicator
	129	129 ELECTRICAL ROOM	EXTERIOR	E3	3'-0"	9'-0"	HM/CLAD	PT/CLAD	4	HM/CLAD	PT/CLAD	9/A6.5	12/A6.5	SIM 14/A6.1			Knurled lever
INTERIOR DOORS	101A	101A CLUB ROOM	CORRIDOR	5	6'-0"	9'-0"	HM	PT/GLS	5	HM	PT	9	10	11	GL3	C(45)	
	101B	101B CLUB ROOM	CORRIDOR	5	6'-0"	9'-0"	HM	PT/GLS	5	HM	PT	9	10	11	GL3	C(45)	
	102	102 WORK ROOM	CLUB ROOM	4	4'-4"	9'-0"	WD	PT	14	WD	PT	9	10	11			UNEVEN LEAVES 1'-4"W & 3'-0"W
	103	103 JANITOR	CORRIDOR	1	3'-0"	7'-10"	HM	PT	6	HM	PT	9	10	11		C(45)	
	105a	105 PANTRY	CORRIDOR	1	3'-0"	7'-10"	HM	PT	7	HM	PT	9	10	11		C(45)	
	105b	105 PANTRY	CORRIDOR	1	3'-0"	7'-10"	HM	PT	7	HM	PT	9	10	11		C(45)	
	108	108 CLOSET	CLUB ROOM	4	4'-6"	9'-0"	WD	PT	14	WD	PT	9	10	11			UNEVEN LEAVES 1'-6"W & 3'-0"W
	112	112 OFFICE	RECEPTION	1	3'-0"	8'-9"	HM	PT	8	HM	PT	9	10	11		C(45)	UNDERCUT 3/4"
	113	113 RECEPTION	CORRIDOR	1	3'-0"	7'-10"	HM	PT	8	HM	PT	9	10	11			
	114	114 CLOSET	OFFICE	1	3'-0"	7'-10"	HM	PT	6	HM	PT	9	10	11			
	117	117 MENS TOILET	CORRIDOR	1	3'-0"	7'-10"	HM	PT	9	HM	PT	9	10	11		C(45)	
	119	119 FAMILY TOILET	CORRIDOR	1	3'-0"	7'-10"	HM	PT	10	HM	PT	9	10	11		C(45)	UNDERCUT 3/4"
	120	120 MECHANICAL ROOM	CORRIDOR	1	3'-0"	7'-10"	HM	PT	6	HM	PT	9	10	11		C(45)	Knurled lever
	121	121 WOMENS TOILET	CORRIDOR	1	3'-0"	7'-10"	HM	PT	9	HM	PT	9	10	11		C(45)	
	125a	125 GYMNASIUM	CORRIDOR	5	6'-0"	9'-0"	HM	PT/GLS	11	HM	PT	9	10	11	GL3	C(45)	
	125b	125 GYMNASIUM	CORRIDOR	5	6'-0"	9'-0"	HM	PT/GLS	11	HM	PT	9	10	11	GL3	C(45)	
	128	128 STORAGE	GYMNASIUM	3	4'-8"	8'-9"	HM	PT	6	HM	PT	9	10	11		B	UNEVEN LEAVES 1'-8"W & 3'-0"W
	130a	130 CLOSET	CLUB ROOM	4	6'-8"	9'-0"	WD	PT	12	WD	PT	12	13	14			
	130b	130 CLOSET	CLUB ROOM	4	6'-8"	9'-0"	WD	PT	12	WD	PT	12	13	14			
	131	131 CLOSET	CLUB ROOM	4	6'-8"	9'-0"	WD	PT	12	WD	PT	12	13	14			
	132	132 CLOSET	CLUB ROOM	4	6'-8"	9'-0"	WD	PT	12	WD	PT	12	13	14			
	133a	133 CLOSET	CLUB ROOM	4	6'-8"	9'-0"	WD	PT	12	WD	PT	12	13	14			
	133b	133 CLOSET	CLUB ROOM	4	6'-8"	9'-0"	WD	PT	12	WD	PT	12	13	14			
	134	134 PARTITION STORAGE	CLUB ROOM	6	3'-4"	9'-0"	WD	PT	13	WD	PT	12	13	14			
	135	135 MDF ROOM	GYMNASIUM	1	3'-0"	8'-9"	HM	PT	6	HM	PT	9	10	11			Knurled lever,

1 DOOR SCHEDULE
N.T.S.

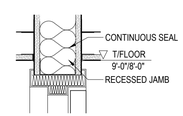


ALUM/GLASS	ALL GLASS	HM - CLAD	HM	WD	HM	WD	HM	WD
E1	E2	E3	1	2	3	4	5	6

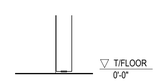
2 DOOR TYPE
N.T.S.



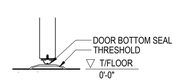
12 HEAD DETAIL
1 1/2"=1'-0" @CLOSET



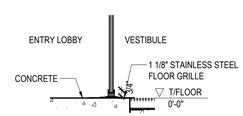
9 HEAD DETAIL
1 1/2"=1'-0" @TYPICAL INTERIOR



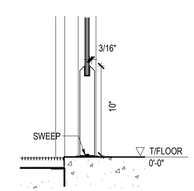
13 THRESHOLD DETAIL
1 1/2"=1'-0" @CLOSET



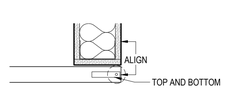
10 THRESHOLD DETAIL
1 1/2"=1'-0" @TYPICAL INTERIOR



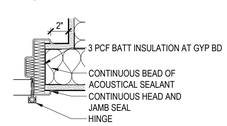
7 THRESHOLD DETAIL
1 1/2"=1'-0" @110a&110b



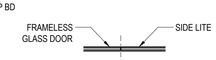
4 THRESHOLD DETAIL
1 1/2"=1'-0" @111&109



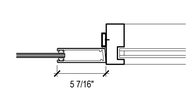
14 JAMB DETAIL
1 1/2"=1'-0" @CLOSET



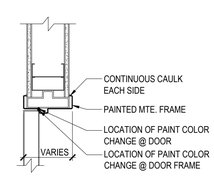
11 JAMB DETAIL
1 1/2"=1'-0" @TYPICAL INTERIOR



8 JAMB DETAIL
1 1/2"=1'-0" @110a&110b



5 JAMB DETAIL
1 1/2"=1'-0" @111&109



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

ABBREVIATIONS

ALUM	ALUMINUM	WD	SOLID CORE WOOD
HM	HOLLOW METAL	ANOD	ANODIZED
GLS	GLASS	PT	PAINTED

DOOR LABELS/FIRE RATINGS

A	2 HOURS
B	1 1/2 HOURS
C	45 MINUTES

GLAZING SCHEDULE

GL-1: INSULATED GLASS UNIT AT EXT. WINDOWS AND WINDOW WALLS
GL-2: CLEAR $\frac{1}{4}$" CERAMIC FIRE RATED GLAZING
GL-3:

TYPICAL DOOR AND FRAME DETAIL NOTES

1. WIDTH OF HOLLOW METAL FRAMES ARE ACTUAL PARTITION THICKNESS PLUS 1" (REFER TO PARTITION TYPES ON SHEET A9.1). PARTITION TYPES ARE KEYED ON FLOOR PLANS.
2. PROVIDE SPECIFIED FRAME ANCHORS (LISTED IN THE SPECIFICATION SECTION 08110 - STEEL DOORS AND FRAMES) TO ACCOMMODATE PARTITION TYPES AND REQUIREMENTS FOR FIRE RATING.
3. AT GYPSUM BOARD PARTITIONS, SPOT GROUT FRAMES AT EACH JAMB ANCHOR.
4. ALL UNDERCUT FIRE RATED DOORS TO COMPLY WITH UL FIRE RATED UNDERCUTTING RESTRICTIONS.
5. PROVIDE SEALANT AT JUNCTION OF ALL FRAMES TO PARTITIONS.
6. AT WOOD DOORS, PAINT ALL METAL GLAZING STOPS OR METAL LOUVERS TO MATCH STAINED & VARNISHED DOOR FINISH.
7. PROVIDE KNURLED HARDWARE AT STORAGE AND MECHANICAL SPACES, ELECTRICAL ROOMS AND OTHER HAZARDOUS AREAS
8. GEARED HINGES FINISH TO MATCH DOOR FINISH COLOR.

GENERAL NOTES

1. ALL LOCKSETS SHALL HAVE ADA COMPLIANT LEVER HARDWARE.
2. ALL UNDERCUT FIRE RATED DOORS TO COMPLY WITH U.L. FIRE RATED UNDERCUTTING RESTRICTIONS.
3. ALL FIRE RATED DOORS TO HAVE CLOSERS WITHOUT HOLD OPEN CAPABILITIES
4. ALL DOORS IN RATED PARTITIONS SHALL HAVE BE UL LABELED AS FOLLOWS: 3-HR RATED WALLS: "A" LABEL; 2-HR RATED WALLS: "B" LABEL; 1-HOUR RATED WALLS: "C" LABEL (45 MIN.). ALL UL LABELED DOORS SHALL HAVE CLOSERS.
5. ALL EXTERIOR DOORS AND FRAMES ARE TO BE GALVANIZED AND INSULATED.
6. ALL DOORS SHALL BE KEYLESS IN THE DIRECTION OF EGRESS. NO SPECIAL HARDWARE OR KNOWLEDGE SHALL BE REQUIRED TO OPERATE DOORS IN THE DIRECTION OF EXIT.
7. ALL DOORS SHALL HAVE A MINIMUM LEAF WIDTH F 3'-0" EXCEPT AT INACTIVE LEAVES.
8. OPERATING HARDWARE SHALL COMPLY WITH ANSI A117.1 PART 309.4 AND DOORS SHALL OPEN WITH LESS THAT 5 LBS PRESSURE (INTERIOR DOORS) AND 8.5 LBS OF PRESSURE (EXTERIOR DOORS).
9. THRESHOLDS SHALL COMPLY WITH ANSI A117.1 PART 303.

PUBLIC BUILDING COMMISSION
CHICAGO PARK DISTRICT
ORGANIZED 1869

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Cost Estimating

Issuance

Mark	Description	Date
5	Addendum 2	01/10/2018
	Issue for Bid	12/06/2017
	PBC Format Revision	8/30/2017
1	Certified Permit Corrections	8/03/2017
	Issued for Permit & Bid	6/01/2017

PBC Project Name:Williams Park Fieldhouse
PBC Contract No.: C1593
Project No.: 11320

Title
DOOR SCHEDULE

Sheet
A10.1

16'-0" 0'-0" 8'-0" 16'-0" 32'-0"
1/16" = 1'-0"

8'-0" 0'-0" 4'-0" 8'-0" 16'-0"
1/8" = 1'-0"

4'-0" 0'-0" 2'-0" 4'-0" 8'-0"
1/4" = 1'-0"

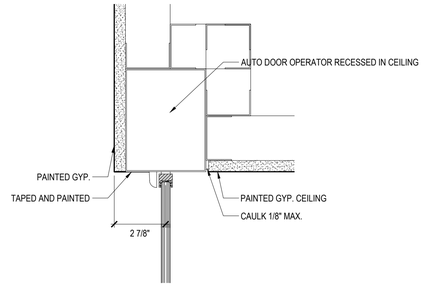
2'-0" 0'-0" 1'-0" 2'-0" 4'-0"
1/2" = 1'-0"

1'-0" 0'-0" 0'-6" 1'-0" 2'-0"
1" = 1'-0"

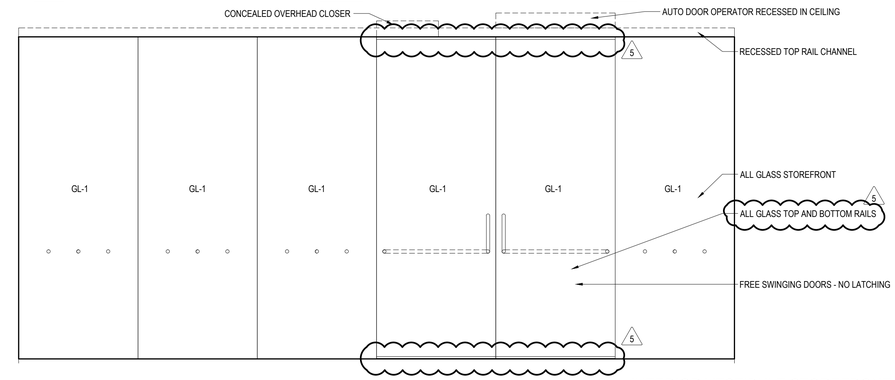
0'-0" 0'-6" 1'-0" 2'-0"
1-1/2" = 1'-0"

0'-0" 0'-3" 0'-6" 0'-9" 1'-0"
3" = 1'-0"

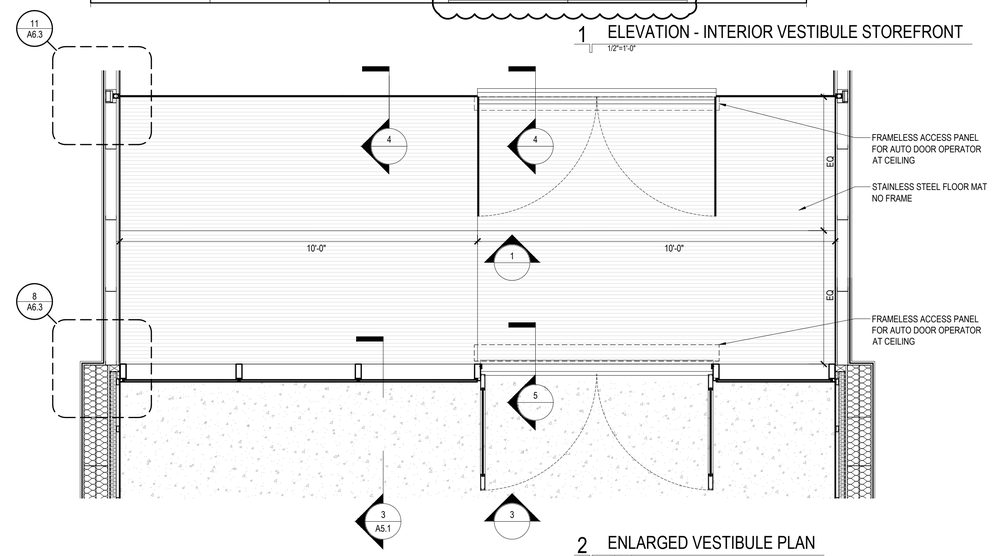
0'-0" 0'-1-1/2" 0'-3" 0'-4-1/2" 0'-6"
6" = 1'-0"



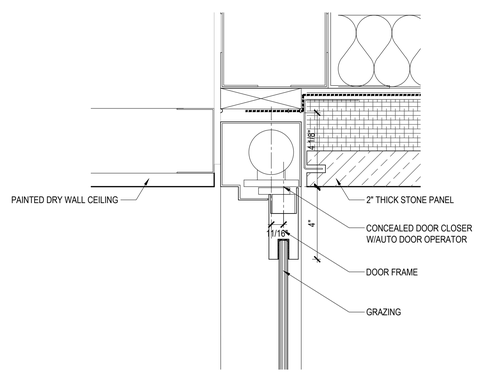
4 SECTION DETAIL
3"=1'-0"



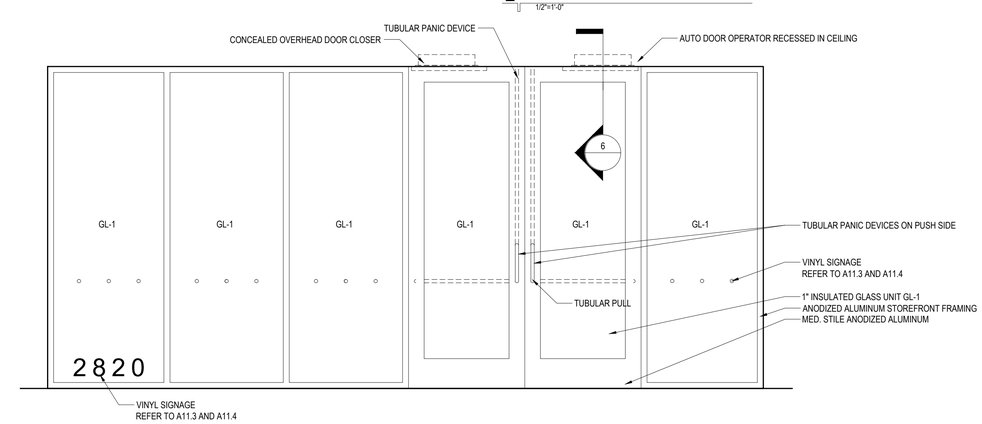
1 ELEVATION - INTERIOR VESTIBULE STOREFRONT
1/2"=1'-0"



2 ENLARGED VESTIBULE PLAN
1/2"=1'-0"



6 SECTION DETAIL
3"=1'-0"



3 ELEVATION - EXTERIOR VESTIBULE STOREFRONT
1/2"=1'-0"

ABBREVIATIONS

ALUM	ALUMINUM	WD	SOLID CORE WOOD
HM	HOLLOW METAL	ANOD	ANODIZED
GLS	GLASS	PT	PAINTED

DOOR LABELS/FIRE RATINGS

A	2 HOURS
B	1 1/2 HOURS
C	45 MINUTES

GLAZING SCHEDULE

GL-1: INSULATED GLASS UNIT AT EXT. WINDOWS AND WINDOW WALLS
GL-2: CLEAR FLOAT GLAZING
GL-3: CLEAR $\frac{3}{4}$" CERAMIC FIRE RATED GLAZING

TYPICAL DOOR AND FRAME DETAIL NOTES

1. WIDTH OF HOLLOW METAL FRAMES ARE ACTUAL PARTITION THICKNESS PLUS 1" (REFER TO PARTITION TYPES ON SHEET A9.1). PARTITION TYPES ARE KEYED ON FLOOR PLANS.
2. PROVIDE SPECIFIED FRAME ANCHORS (LISTED IN THE SPECIFICATION SECTION 08110 - STEEL DOORS AND FRAMES) TO ACCOMMODATE PARTITION TYPES AND REQUIREMENTS FOR FIRE RATING.
3. AT GYPSUM BOARD PARTITIONS, SPOT GROUT FRAMES AT EACH JAMB ANCHOR.
4. ALL UNDERCUT FIRE RATED DOORS TO COMPLY WITH UL FIRE RATED UNDERCUTTING RESTRICTIONS.
5. PROVIDE SEALANT AT JUNCTION OF ALL FRAMES TO PARTITIONS.
6. AT WOOD DOORS, PAINT ALL METAL GLAZING STOPS OR METAL LOUVERS TO MATCH STAINED & VARNISHED DOOR FINISH.
7. PROVIDE KNURLED HARDWARE AT STORAGE AND MECHANICAL SPACES, ELECTRICAL ROOMS AND OTHER HAZARDOUS AREAS

GENERAL NOTES

1. ALL HARDWARE LEVER SETS TO BE ADA COMPLIANT.
2. ALL UNDERCUT FIRE RATED DOORS TO COMPLY WITH U.L. FIRE RATED UNDERCUTTING RESTRICTIONS.
3. ALL FIRE RATED DOORS TO HAVE CLOSERS WITHOUT HOLD OPEN CAPABILITIES
4. ALL DOORS IN RATED PARTITIONS SHALL HAVE BE UL LABELED AS FOLLOWS: 3-HR RATED WALLS: "A" LABEL; 2-HR RATED WALLS: "B" LABEL; 1-HOUR RATED WALLS: "C" LABEL (45 MIN.). ALL UL LABELED DOORS SHALL HAVE CLOSERS.
5. ALL EXTERIOR DOORS AND FRAMES ARE TO BE GALVANIZED AND INSULATED.
6. ALL DOORS SHALL BE KEYLESS IN THE DIRECTION OF EGRESS. NO SPECIAL HARDWARE OR KNOWLEDGE SHALL BE REQUIRED TO OPERATE DOORS IN THE DIRECTION OF EXIT.
7. ALL DOORS SHALL HAVE A MINIMUM LEAF WIDTH F 3'-0".
8. OPERATING HARDWARE SHALL COMPLY WITH ANSI A117.1 PART 309.4 AND DOORS SHALL OPEN WITH LESS THAT 5 LBS PRESSURE (INTERIOR DOORS) AND 8.5 LBS OF PRESSURE (EXTERIOR DOORS).
9. THRESHOLDS SHALL COMPLY WITH ANSI A117.1 PART 303.

PUBLIC BUILDING COMMISSION

CHICAGO PARK DISTRICT

WILLIAMS PARK FIELDHOUSE
PARK #261

2820 SOUTH STATE STREET
CHICAGO, IL 60616

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Issuance

Mark	Description	Date
5	Addendum 2	01/10/2018
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Project No.: 11320

Title
DOOR DETAILS

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A10.2