GENERAL NOTES

Site Class

Roof Snow:

6. Rain Loads:

a) Allowable Soil Bearing:

SOIL PROPERTIES:

c) Frost Depth

CONCRETE:

Seismic Design Category

Design Base Shear

Analysis Procedure

Ground Snow Load (Pg)

Thermal Factor (Ct)

Isolated Foundations

-cement (WC) ratio of 0.50.

a) All reinforcing steel to be ASTM A615 Grade 60.

b) All reinforcing steel shall conform with CRSI Standards.

<u>3,000 psi Concrete</u>

Length

corners and junctures of walls.

(inches)

Development Splice

number 4 sieves.

REINFORCING STEEL:

Continuous Foundations

Flat Roof Snow Load (Pf)

Snow Exposure Factor (Ce)

Basic Seismic-Force-Resisting System

Seismic Response Coefficient (Cs)

Snow Load Importance Factor (Is)

a) Concrete at interior slabs on grade shall have a minimum compressive

strength of 3.500 psi at 28 days unless noted. All other concrete

shall have a minimum compressive strength of 3,000 psi at 28 days

for Structural Concrete — ACI 318—05 — Strength Design Method" and

details shall conform to the "Manual of Standard Practice for Detailing

graded such that not more than 18 percent nor less than 8 percent

Concrete Institute unless otherwise shown or specified.

c) Concrete subject to freezing and thawing shall have maximum water

d) Concrete for interior slabs—on—grade shall have coarse aggregates

of the total aggregate is retained on the 3/4", 1/2", 3/8" and

c) Reinforcing steel shall have development lengths and splice lengths as

Length

* Note: These lengths apply only to reinforcing stee

* Note: When the reinforcement is located within 12

of 1 1/2" or greater.

d) All bars in concrete walls shall return a full splice lengths as

at all splices, unless otherwise shown on the drawings.

) Walls exposed to ground or weather: 2"

Beams, columns, and piers: 2"

jobsite for review by the inspector.

defined in the table above at corners and junctures of walls.

g) Unless otherwise shown the clear cover for reinforcing bars shall be:

h) Results for all concrete compressive tests shall be available on the

Walls and footings placed on the ground without forms: 3"

with a normal weight concrete & a cover

& splice lengths can be divided by 1.30.

of the bottom of a member, the development

shown in the following tables unless otherwise shown on the drawings.

<u>4,000 psi Concrete</u>

Length

Development Splice

Lengt

Reinforced Concrete Structures" both the lastest editions by the American

Reponse Modification Factor (R)

DESIGN DATA: a.) Applicable Code: 2009 International Building Code b.) Design Loads 1 Roof Loads:

1. Roof Loads:	
Self Weight	5 psf
Collateral — Primary	5 psf
Collateral — Secondary	5 psf
Live Loads (0-200 square feet)	20 psf
Live Loads (200-600 square feet)	1.2-0.001At psf
Live Loads (> 600 square feet)	12 psf
2. Elevated Floor Loads:	Not Applicable

3. Wind Loads: Basic Wind Speed 1.00 Wind Importance Factor (Iw) Building Occupancy Category Wind Exposure Class Internal Pressure Coefficient (GCpi) Components and Cladding (Non-Professional Design) Wind Pressure — Walls Corner

-26.0 psf Wind Pressure - Roof

-24.9 psf b) Steel Fabricator Field Edge -29.5 psfThe steel fabricator shall maintain written procedural and quality control manuals. The steel fabricator must be engaged with an approved special -29.5 psf inspection agency that is performing periodic audits of the steel fabricator's 4. Seismic: operations. Upon completion of the fabrication, the fabricator must submit a "certificate of compliance" to the building official stating that the work Seismic Importance Factor (Ie) was performed in accordance with approved construction documents. Seismic Use Group Mapped Spectral Response Accelerations Spectral Response Coefficients

0.057 x Dead Load

Equivalent Lateral Force

0.330g

0.124g

50.4 psf

Not Applicable

3,000 psf

48 in

he special steel inspector must be a AWS D1.1 Certified Welding Inspector (CWI) and a ASNT TC1A Level Two Certified Technician. d) Submittal of Field Welding Information

a) Concrete masonry units shall be hollow load bearing units ASTM C-90

b) Mortar shall comply with ASTM C—270 Type M or S.

e) Provide minimum reinforcing (per ACI 530)

#4 Vertical at — each side of opening

#4 Horizontal at — bottom and top of opening

a minimum of 12 inches.

mechanical vibration.

SPECIAL INSPECTIONS:

a) Engaging the Special Inspectors

Grade N-1 with a net strength of 2,000 psi and f'm of 1,500 psi.

c) Truss type masonry joint reinforcement shall be installed in all masonry

prefabricated L's and T's at corners and intersections. Lap reinforcement

walls at a maximum spacing of 16 inches center to center. Use

d) All concrete fill placed in cells shall be 2,500 psi pea gravel concrete.

Maximum height of placement is 4'-0". Fill must be consolidated by

wall intersections (continuous

bottom of wall (continuous)

These inspectors must be submitted to the structural engineer for

joist and deck bearing (continuous)

The owner or architect must engage special inspectors to perform special

end of wall (continuous)

The steel erector must submit the welding materials, welding procedures, and welder qualifications to the special inspector for his approval. This approval must be made prior to any steel erection.

e) Periodic Inspection of Field Welds The special steel inspector must provide periodic inspection of: • 10% of all field welds • 10% of all field welds of cold formed steel members. 10% of all field welds of stairs and handrails.

Should any welds, other than deck welds, be found to be inadequate, then 100% of all similar welds must be inspected at the expense of the subcontractor. Inadequate deck welds shall be corrected and reported to the structural engineer prior to covering the welds to determine additional teating requirements. Periodic inspections shall be visual inspections unless noted on drawings or specifications.

f) Continuous Inspection of Field Welds The special inspector must be present and provide continuous inspection of: • All fillet welds exceeding 5/16" size All multi-pass fillet welds All complete and partial penetration welds

Contiuous inspections shall be visual inspections unless noted on drawings or specifications.

g) High Strength Bolts (A325 or A490) The erector shall provide a "tension measuring device" (skidmore) and schedule the bolting technique verification with the special inspector. The special inspector shall observe the pre-installation testing and calibration procedures. The erector shall use the turn—of—the—nut method with matchmarking" techniques, direct tension indicator washers, or alternate design fasteners to tension the bolts. During this pre-installation testing, the steel inspector shall obtain calibrated torque wrench values for later b) Design and construction shall conform to the "Building Code Requirements

> The special inspector must utilize a calibrated torque wrench to inspect • 10% of all bolted connections

h) Concrete Inspector Requirements The special concrete inspector must be an ACI Level 1 technician

The special concrete inspector shall inspect all foundations. This inspection shall include: confirmation of adequate soil condition verification of the use of the design mix • sample fresh concrete as indicated in the specifications

i) Slabs on Grade The special concrete inspector shall inspect all slabs on grade. This inspection shall include: • verification of adequate soil condition by observation of proof rolling verification of the use of the design mix • sample fresh concrete as indicated in the specifications

k) Elevated Slabs on Composite Deck The special concrete inspector shall inspect all elevated slabs on composite deck. This inspection shall include: • sample fresh concrete as indicated in the specifications verification of the use of the design mix • inspection of curing techniques & temperature control techniques

1) Structural Slabs The special concrete inspector shall inspect all structural slabs. This inspection shall include:

reinforcing steel size and placement verification use of the design mix • sample fresh concrete as indicated in the specifications • inspection of curing techniques & temperature control techniques

m) Contractor's Statement of Responsibility The contractors responsible for any work requiring special inspection shall submit a written statement to the prime design professional for submittal to the code officials: acknowledging the awareness of special requirements • acknowledging that control will be exercised to obtain conformance with

construction documents defining procedures for exercising control

• identifying the persons exercising control and stating their qualifications n) Structural Observations

e) All bars in masonry walls shall return 48 bar diameters at A professional engineer employed by Freeland Harris Consulting Engineers shall visit the project during the construction to confirm general compliance f) Reinforcing steel in masonry walls shall lap 48 bar diameters

PART 1 - GENERAL

1.1 DESCRIPTION A. Work Included: Extent of concrete work is shown on drawings.

Supplementary Conditions, and Division 1 of these

B. Related Work: 1. Documents affecting work of this Section include, but are not limited to, General Conditions,

SECTION 03100

CONCRETE WORK

Specifications. 1. 2 QUALITY ASSURANCE

> A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or

1. ACI 301 "Specifications for Structural Concrete for Buildinas 2. ACI 318 "Building Code Requirements for Reinforced Concrete"

3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice. B. Concrete Testing Services

to perform material evaluation tests and to design concrete mixes. 2. Owner will engage testing laboratory to perform sampling and testing during placement of concrete. 3. Owner will engage a testing laboratory to conduct tests of compression test specimens. 4. Materials and installed work may require testing

and retesting as directed by Engineer, at any time

during progress of work. Allow free access to

material stockpiles and facilities. Re-testing of

rejected materials and installed work shall be

1. Engage a testing laboratory acceptable to Engineer

done at Contractor's expense. 1.3 SUBMITTALS

> PART 3 - EXECUTION A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming 3.1 FORMS accessories, admixtures, patching compounds, joir systems, curing compounds, and others as requested by

B. Shop Drawings - Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures showing bar schedules, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete

C. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test as specified.

D. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

PART 2 - PRODUCTS 2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection. complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Form Coatings: Provide commercial formulation formcoating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A615, Grade 60, deformed. B. Welded Wire Fabric: ASTM A185, welded steel wire

specifications, unless otherwise acceptable.

C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI

1. For exposed-to-view concrete surfaces: Where legs of supports are in contact with forms, provide supports with legs which are plastic protected 3.2 PLACING REINFORCEMENT (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I, unless otherwise acceptable to Engineer. Use one brand of cement throughout project, unless otherwise acceptable to

B. Fly Ash: ASTM C618, Type C or Type F. Loss on gnition shall not exceed 3 1/2%. Limit use of fly ash to not exceed 20% of cement content by weight.

C. Normal Weight Aggregates: ASTM C33, and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances. D. Water: Drinkable.

E. Admixtures: The amount of water soluble chloride ions added to the mix by the admixtures shall not exceed 0.3% by weight of cement. Provide admixture manufacturer's written certification of weight of added chloride ions per ounce for each admixture.

2TNI□L 8.8 Air-Entraining Admixture: ASTM C260. Water-Reducing Admixture: ASTM C494, Type A

High-Range Water-Reducing (SuperPlasticizer): ASTM C494, Type F or Type G 4. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C494 Type E 5. Water-Reducing, Retarding Admixture: ASTM C494,

2.4 RELATED MATERIALS

A. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials which are resistant to decay when tested in accordance with ASTM E154, as follows:

1. Polyethylene sheet not less than 10 mils thick. B. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.

C. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C309, Type I, Class A with % solids not less than 30%. Moisture loss not more than 0.03 gr./sq. cm. when 3. 4 INSTALLATION OF EMBEDDED ITEMS applied at 300 square ft./gal.

D. Bonding Compound: Polyvinyl acetate or acrylic base, E. Isolation joint (expansion joint):

1. Provide preformed strips, non-extruding and resilient bituminous type, of thickness indicated, complying with ASTM D1751. 2. If sealants specified in the Sealants and Caulking Section are used in the joints built under this

Section, Contractor will provide a filler

complying with ASTM D1752. 2.5 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete as follows:

1. Prepare concrete mixes, other than slab on grade concrete in accordance with ACI 301 Section 3.9 2. Prepare slab on grade concrete mixes in accordance with ACI 302 Section 5.2.4 (Method B).

B. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Engineer.

C. Design mixes to provide normal weight concrete with the 3.6 CONCRETE PLACEMENT following properties, as indicated on drawings and A. Preplacement Inspection: Before placing concrete inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notif

4000 psi 28-day compressive strength 3000 psi 28-day compressive strength

Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner, and as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using E. Admixtures:

within following limits:

directions.

slump concrete.

elevation and position.

adjacent materials.

H. Concrete Mixes:

3. Other Concrete: 4 inches.

a. Concrete structures and slabs exposed to

5.5% 1-1/2″ maximum aggregate.

4. Use admixtures for water-reducing and set-control

Water-Cement Ratio: Provide concrete for following

conditions with maximum water-cement (WC) ratios as

Ramps, slabs, and sloping surfaces: 4 inches.

Concrete containing HRWR admixture (super-

. Ready-Mix Concrete: Comply with requirements of

specified in ASTM C94 may be required.

Design, erect, support, brace and maintain formwork to

support vertical and lateral loads that might be

applied until such loads can be supported by concrete

structure. Construct formwork so concrete members and

structures are of correct size, shape, alignment,

Design formwork to be readily removable without impact

C. Construct forms to sizes, shapes, lines and dimensions

shock or damage to cast-in-place concrete surfaces and

shown, and to obtain accurate alignment, location,

grades, level and plumb work in finished structures

moldings, rustications, reglets, chamfers, blocking

Provide for openings, offsets, keyways, recesses,

screeds, bulkheads, anchorages and inserts, and other

features required in work. Use selected materials to

obtain required finishes. Solidly butt joints and

provide back-up at joints to prevent leakage of cement

prying against concrete surfaces. Provide crush plates

or wrecking plates where stripping may damage cast

concrete surfaces. Provide top forms for inclined

with bottom forms only. Kerf wood inserts for forming

keyways, reglets, recesses, and the like, to prevent

Provide temporary openings where interior area of

formwork is inaccessible for cleanout, for inspection

before concrete placement, and for placement of

concrete. Securely brace temporary openings to forms

to prevent loss of concrete mortar. Locate temporary

wood, metal, PVC or rubber chamfer strips fabricated to

removable or snap-off metal form ties, designed to

prevent form deflection, and to prevent spalling

concrete surfaces upon removal. Unless otherwise

indicated, provide ties so portion remaining within

concrete after removal is 1" inside concrete and will

not leave holes larger than 1" diameter in concrete

concrete formwork to accommodate work of other trades.

Determine size and location of openings, recesses and

chases from trades providing such items. Accurately

Cleaning and Tightening: Thoroughly clean forms and

adjacent surfaces to receive concrete. Remove chips,

concrete is placed. Retighten forms and bracing after

A. Comply with Concrete Reinforcing Steel Institute's

B. Clean reinforcement of loose rust and mill scale,

recommended practice for "Placing Reinforcing Bars",

for details and methods of reinforcement placement and

earth, ice, and other materials which reduce or destroy

Accurately position, support and secure reinforcement

against displacement by formwork, construction, or

concrete placement operations. Locate and support

reinforcing by metal chairs, runners, bolsters,

coverages for concrete protection. Arrange, space and

securely tie bars and bar supports to hold

operations. Set wire ties so ends are directed into

practicable. Lap adjoining pieces at least one full

mesh and lace splices with wire. Offset end laps in

adjacent widths to prevent continuous laps in either

Construction Joints: Locate and install construction

Isolation (Expansion) Joints in Slabs-on-Grade:

Division 7 sections of these specifications.

sections of these specifications.

joints as indicated or, if not indicated, locate so as

not to impair strength and appearance of the structure,

of contact between slabs on grade and vertical surfaces

Joint Filler and sealant materials are specified in

Construct contraction joints in slabs-on-grade to form

soon as possible after slab finishing as may be

Contraction (Control) Joints in Slabs-on-Grade:

1. Contraction joints shall be formed by saw cuts as

2. Joint sealant material is specified in Division 7

other embedded items required for other work that is attached to, or supported by, cast-in-place concrete.

Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be

Clean re-used forms of concrete matrix residue, repair

B. Coat contact surfaces of forms with a form-coating

C. Thin form-coating compounds only with thinning agent of

compliance with manufacturer's instructions.

stained steel formwork is not acceptable.

where form coatings are not used.

and as herein specified.

placement of forms and reinforcing steel.

type and in amount and under conditions of form-coating

compound manufacturer's directions. Do not allow

excess form-coating material to accumulate in forms or

to come into contact with in-place concrete surfaces

Coat steel forms with a non-staining, rust-preventative

form oil or otherwise protect against rusting. Rust-

other crafts to permit installation of their work;

Moisten wood forms immediately before placing concrete

perimeter insulation and moisture barriers with

General: Comply with ACI 304 "Recommended Practice for

Measuring, Mixing, Transporting, and Placing Concrete'

cooperate with other trades in setting such work

Coordinate the installation of joint materials,

against which fresh concrete will be placed. Apply in

compound before reinforcement is placed.

and patch as required to return forms to acceptable

safely done without dislodging aggregate.

A. General: Set and build into work anchorage devices and

reinforcement in position during concrete placement

D. Place reinforcement to obtain at least minimum

concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as

wood, sawdust, dirt or other debris just before

H. Provisions for Other Trades: Provide openings in

place and securely support items built into forms.

leaks and maintain proper alignment.

supports, and as herein specified.

spacers, and hangers, as required.

bond with concrete.

direction.

as acceptable to Engineer.

and elsewhere as indicated.

panels of patterns as shown.

attached thereto.

PREPARATION OF FORM SURFACES

surface condition.

openings on forms at inconspicuous locations.

F. Chamfer exposed corners and edges as indicated, using

produce uniform smooth lines and tight edge joints.

Form Ties: Factory-fabricated, adjustable-length

surfaces where slope is too steep to place concrete 3.7 FINISH \square F F \square RMED SURFACES

D. Fabricate forms for easy removal without hammering or

swelling and for easy removal.

ASTM C94 and as herein specified. During hot

weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than

plasticizer): Not more than 8 inches after

addition of HRWR to site verified 2 inch to 3 inch

6.0% 1" maximum agaregate.

6.0% 3/4" maximum aggregate

b. Other Concrete: 2% to 4% air.

Subjected to freezing and thawing: WC 0.53.

G. Slump Limits: Proportion and design mixes to result in

concrete slump at point of placement as follows:

freezing and thawing or de-icer chemicals

strict compliance with manufacturer's

D. Deposit concrete continuously or in layers of such 3.10 REMOVAL OF FORMS thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation 1. Use water-reducing admixture or high range water reducing admixture (super plasticizer) in concrete of seams or planes of weakness. If a section cannot be as required for placement and workability. The placed continuously, provide construction joints as use of a water-reducing admixture is required for herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation. slabs on grade. 2. Use non-chloride accelerating admixture in

Placing Concrete in Forms: Deposit concrete in forms concrete slabs placed at ambient temperatures below 50 degrees F. (10 degrees C.). in horizontal layers not deeper than 24" and in a 3. Use air-entraining admixture in exterior exposed manner to avoid inclined construction joints. Where concrete. Add air-entraining admixture at placement consists of several layers, place each layer manufacturer's prescribed rate to result while preceding layer is still plastic to avoid cold concrete at point of placement having total air content with a tolerance of plus-or-minus 1-1/2%

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with recommended practices.

G. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly 3 penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment reinforcement and other embedded items without causing segregation of mix.

H. Maintain reinforcing in proper position during concrete placement operations.

Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures. in compliance with ACI 306 and as herein specified.

When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C.), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F. (27 degrees C) at point of Do not use frozen materials or materials

containing ice or snow. Do not place concrete on

frozen subgrade or on subgrade containing frozen materials. 3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix

des igns.

Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F (32 degrees C). Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option. Cover reinforcing steel with water-soaked burlap

will not exceed the ambient air temperature mmediately before embedment in concrete. Fog spray forms, reinforcing steel and subgrade just before concrete is placed. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

if it becomes too hot, so that steel temperature

Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off. 3. Smooth Form Finish: For formed concrete surfaces obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams.

projections completely removed and smoothed. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal.

Repair and patch defective areas with fins or other

1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process. . Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces

occurring adjacent to formed surfaces, strikeoff smooth

surfaces to receive trowel finish and other finishes as

and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

concrete placement as required to eliminate mortar 3.8 MONOLITHIC SLAB FINISHES A. Float Finish: Apply float finish to monolithic slab

hereinafter specified. 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat

surface to a uniform, smooth, granular texture. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view.

After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. 3. Consolidate concrete surface by final troweling operation, free of trowel marks, uniform

texture and appearance, and with surface leveled to a tolerance of Ff 23, Fl : 4. Grind smooth surface defects which would telegraph through applied floor covering system.

Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps and elsewhere as indicated. Immediately after trowel finishing, slightly

roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application. Construct isolation joints in slabs-on-grade at points 3.9 CONCRETE CURING AND PROTECTION

> premature drying and excessive cold or hot temperatures. 1. Start initial curing as soon as free water has disappeared from concrete surface after placing

A. General: Protect freshly placed concrete from

and finishing. Weather permitting, keep continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid

Moist curing: Provide moist curing by covering

sealed by waterproof tape or adhesive.

Immediately repair any holes or tears dur

Curing Methods: Perform curing of concrete by moist curing, moisture-retaining cover curing, or curing and sealing compound as herein specified.

rapid drying at end of final curing period.

concrete surface with absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent covers. Moisture-retaining cover curing: Provide moistureretaining cover curing by covering concrete surfaces and edges with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and

curing period using cover material and waterproof 3. Curing and sealing compound: Provide curing and sealing compound to interior slabs and to exterior slabs, walks, and curbs, as follows: Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain

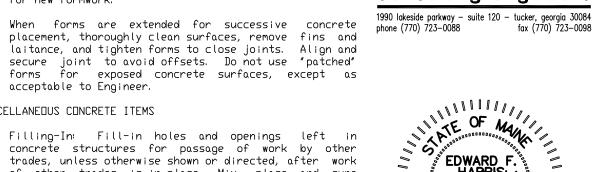
continuity of coating and repair damage during curing period. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting and other coatings and finish materials, unless otherwise acceptable to

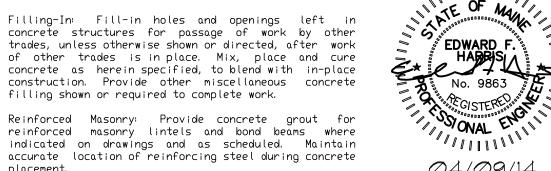
C. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of curing and sealing compound unless otherwise noted.

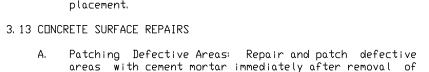
> 1. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover unless otherwise

Formwork not supporting weight of concrete may be removed after cumulatively curing at not less than 50 degrees F. (10 degrees C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided

Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed freeland harris







1. Cut out honeycomb, rock pockets, and voids over 1/4" in any dimension, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

forms, when acceptable to Engineer.

filling shown or required to complete work.

curing and protection operations are maintained.

acceptable to Engineer.

2 MISCELLANEOUS CONCRETE ITEMS

For exposed to view surfaces: Blend white portland cement and standard portland cement so that, when dry, patchina mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding

Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.015" wide, spalling, pop-outs, honeycomb, rock pockets and

Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days. Repair defective areas, except random cracks and single

holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Fill areas with concrete repair mortar. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete. Repair isolated random cracks and single holes not over

1" in diameter with concrete repair mortar. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix repair mortar in accordance with manufacturers printed instructions. Place repair mortar after bonding compound has dried. Finish to match existing concrete. Keep patched area continuously moist for not less than

Perform structural repairs with prior approval of Engineer for method and procedure, using specified epoxy adhesive and mortar.

Repair methods not specified above may be used, subject to acceptance of Engineer.

14 QUALITY CONTROL TESTING DURING CONSTRUCTION The Owner will engage a testing laboratory to perform and report compressive strength tests. All concrete

certified level 1 technician. Sampling and testing for quality control during placement of concrete will include the following:

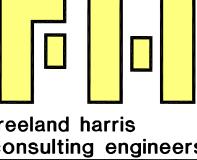
for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed. 3. Air Content: ASTM C173, volumetric method for lightweight or normal weight concrete; ASTM C231 pressure method for normal weight concrete; one for each day's pour of each type of concrete. Concrete Temperature: Test hourly when air temperature is 40 degrees F (4 degrees C) and below, and when 80 degrees F (27 degrees C) and

Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test 1 result falls below specified compressive by more than Check Set

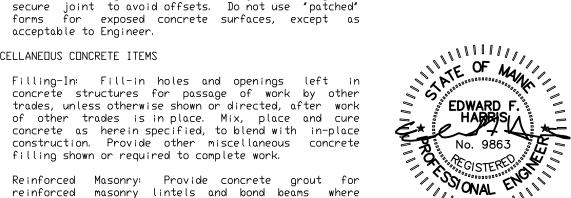
both 7-day tests and 28-day tests.

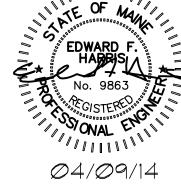
Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but will not be used as the sole basis for acceptance (rejection.

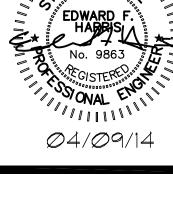
END OF SECTION



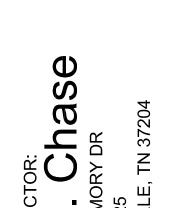
surfaces. Apply new form coating compound as specified consulting engineers



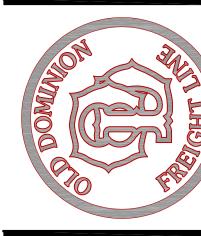


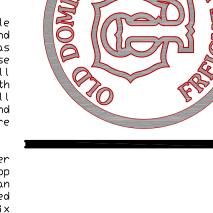










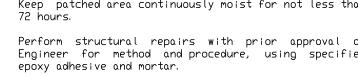


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sampling and testing shall be performed by an ACI

Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94. Slump: ASTM C143: one test at point of discharge

above; and each time a set of compression test

specimens made. Compression Test Specimen: ASTM C31; one set of 3 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cubic yards plus additional sets for each 100 cubic vards over and above the first 50 cubic yards of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected

batches or from each batch if fewer than 5 are

Test results will be reported in writing to Engineer for Permit and Dwner within 24 hours that tests are made. Reports Revisions of compressive strength tests will contain the project identification name and number, date of concrete Revisions placement, slump and temperature at time of sampling, Revisions name of concrete testing service, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for

Additional Tests: The testing service will make additional tests of in-place concrete when test results

The Architect hereby reserves its common law indicate specified concrete strengths and other copyright and other property rights in these plans, characteristics have not been attained in the ideas and designs which are not to be reproduced, structure, as directed by the Engineer. Testing changed or copied in any form or manner service may conduct tests to determine adequacy of whatsoever; nor are they to be assigned to any concrete by cored cylinders complying with ASTM C42, or third party without first obtaining the express by other methods as directed. Contractor shall pay for written permission from the Architect. The such tests conducted, and any other additional testing drawing is not final or to be used for construction as may be required, when unacceptable concrete is until signed by the Architect.

verified.

SCHEDULES AND SPECIFICATIONS

Project No