GENERAL NOTES

DESIGN DATA:

a.) Applicable Code: 2009 International Building Code ASCE 7-05

b.) Design 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	100 mph
Wind Importance Factor (Iw)	1.00
Building Occupancy Category	II
Wind Exposure Class	C
Internal Pressure Coefficient (GCpi)	±0.18

Components and Cladding (Non–Professional Design)

Wind Pressure – Walls	
Field	–24.9 psf
Corner	–26.0 psf
Wind Pressure – Roof	
Field	–24.9 psf
Edge	–29.5 psf
Corner	–29.5 psf

4. Seismic:

Seismic Importance Factor (Ie)	1.0
Seismic Use Group	2
Mapped Spectral Response Accelerations	
S_s	0.20g
S_1	0.070g
Spectral Response Coefficients	
S_{ms}	0.330g
S_{ds}	0.124g
Site Class	D
Seismic Design Category	B
Basic Seismic–Force–Resisting System	OSMF
Design Base Shear	0.110 x Dead Load
Seismic Response Coefficient (Cs)	0.110
Reponse Modification Factor (R)	3.0
Analysis Procedure	Equivalent Lateral Force

5. Roof Snow:

Ground Snow Load (Pg)	60 psf
Flat Roof Snow Load (Pf)	37.8 psf
Snow Exposure Factor (Ce)	0.9
Snow Load Importance Factor (Is)	1.0
Thermal Factor (Ct)	1.0

6. Rain Loads: Not Applicable

SOIL PROPERTIES:

a) Allowable Soil Bearing:

Isolated Foundations	3,000 psf
Continuous Foundations	3,000 psf

c) Frost Depth 48 in

CONCRETE:

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 unless noted.

b) Design and construction shall conform to the "Building Code Requirements for Structural Concrete – ACI 318–05 – Strength Design Method" and details shall conform to the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" both the lastest editions by the American Concrete Institute unless otherwise shown or specified.

c) Concrete subject to freezing and thawing shall have maximum water –cement (WC) ratio of 0.50.

d) Concrete for interior slabs–on–grade shall have coarse aggregates graded such that not more than 18 percent nor less than 8 percent of the total aggregate is retained on the 3/4", 1/2", 3/8" and number 4 sieves.

REINFORCING STEEL:

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

b) All reinforcing steel shall conform with CRSI Standards.

c) Reinforcing steel shall have development lengths and splice lengths as shown in the following tables unless otherwise shown on the drawings.

Bar Size	3,000 psi Concrete Development Length (inches)	3,000 psi Concrete Splice Length (inches)	4,000 psi Concrete Development Length (inches)	4,000 psi Concrete Splice Length (inches)
3	12	17	12	16
4	13	23	12	20
5	17	28	15	24
6	20	34	17	29
7	33	55	28	48
8	41	70	36	60
9	51	86	44	74
10	62	105	54	91
11	74	125	64	109

* Note: These lengths apply only to reinforcing steel with a normal weight concrete & a cover of 1 1/2" or greater.

* Note: When the reinforcement is located within 12" of the bottom of a member, the development & splice lengths can be divided by 1.30.

d) All bars in concrete walls shall return a full splice lengths as defined in the table above at corners and junctures of walls.

e) All bars in masonry walls shall return 48 bar diameters at corners and junctures of walls.

f) Reinforcing steel in masonry walls shall lap 48 bar diameters at all splices, unless otherwise shown on the drawings.

g) Unless otherwise shown the clear cover for reinforcing bars shall be:
1) Walls exposed to ground or weather: 2"
2) Walls and footings placed on the ground without forms: 3"
3) Beams, columns, and piers: 2"

h) Results for all concrete compressive tests shall be available on the jobsite for review by the inspector.

MASONRY:

a) Concrete masonry units shall be hollow load bearing units ASTM C–90 Grade N–1 with a net strength of 2,000 psi and f'm of 1,500 psi.

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

c) Truss type masonry joint reinforcement shall be installed in all masonry walls at a maximum spacing of 16 inches center to center. Use prefabricated T's and T's at corners and intersections. Lap reinforcement a minimum of 12 inches.

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 mechanical vibration.

e) Provide minimum reinforcing (per ACI 530)
#4 Vertical at – each side of opening
wall intersections (continuous)
end of wall (continuous)
#4 Horizontal at – bottom and top of opening
joist and deck bearing (continuous)
bottom of wall (continuous)

SPECIAL INSPECTIONS:

a) Engaging the Special Inspectors
The owner or architect must engage special inspectors to perform special These inspectors must be submitted to the structural engineer for consideration.

b) Steel Fabricator
The steel fabricator shall maintain written procedural and quality control manuals. The steel fabricator must be engaged with an approved special inspection agency that is performing periodic audits of the steel fabricator's operations. Upon completion of the fabrication, the fabricator must submit a "certificate of compliance" to the building official stating that the work was performed in accordance with approved construction documents.

c) Special Steel Inspector
The 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
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 testing 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 inspection.

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

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

i) Concrete Foundations
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

j) 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

l) 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
A professional engineer employed by Freeland Harris Consulting Engineers shall visit the project during the construction to confirm general compliance with the design intent.

SECTION 03100

CONCRETE WORK

PART 1 – GENERAL

1.1 DESCRIPTION

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

B. Related Work:

1. Documents affecting work of this Section include, but are not limited to, General Conditions, Supplementary Conditions, and Division 1 of these 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 specified.

1. ACI 301 "Specifications For Structural Concrete for Buildings"
2. ACI 318 "Building Code Requirements For Reinforced Concrete"
3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

B. Concrete Testing Services

1. Engage a testing laboratory acceptable to Engineer 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. 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. Retesting of rejected materials and installed work shall be done at Contractor's expense.

1.3 SUBMITTALS

A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others as requested by Engineer.

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 structures.

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. Use plywood complying with U. S. Product Standard PS–1 "B–B (Concrete Form) Plywood", Class 1, Exterior Grade or better, mill–oiled and edge–sealed, with each piece bearing legible inspection trademark.

B. Form Coatings: Provide commercial formulation form–coating 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 fabric.

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 specifications, unless otherwise acceptable.

1. For exposed–to–view concrete surfaces: Where legs of supports are in contact with forms, provide supports with legs which are plastic protected (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 Engineer.

B. Fly Ash: ASTM C618, Type C or Type F. Loss on ignition 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 0.35% by weight of cement. Provide admixture manufacturer's written certification of weight of added chloride ions per ounce for each admixture.

1. Air–Entraining Admixture: ASTM C260.
2. Water–Reducing Admixture: ASTM C494, Type A
3 High–Range Water–Reducing Admixture (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, Type D

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 1, Class A with % solids not less than 30%. Moisture loss not more than 0.03 gr./sq. cm. when applied at 300 square ft./gal.

D. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.

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 following properties, as indicated on drawings and schedules:

1. 4000 psi 28–day compressive strength
2. 3000 psi 28–day compressive strength

D. 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 in work.

E. Admixtures:

1. Use water–reducing admixture or high range water–reducing admixture (super plasticizer) in concrete as required for placement and workability. The use of a water–reducing admixture is required for slabs on grade.
2. Use non–chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F. (10 degrees C.).
3. Use air–entraining admixture in exterior exposed concrete. Add air–entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus–or–minus 1–1/2% within following limits:
a. Concrete structures and slabs exposed to freezing and thawing or de–icer chemicals
5.5% 1–1/2" maximum aggregate.
6.0% 1" maximum aggregate.
6.0% 3/4" maximum aggregate.
b. Other Concrete: 2% to 4% air.
4. Use admixtures for water–reducing and set–control in strict compliance with manufacturer's directions.

F. Water–Cement Ratio: Provide concrete for following conditions with maximum water–cement (WC) ratios as follows:
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:

1. Ramps, slabs, and sloping surfaces: 4 inches.
2. Concrete containing HRWR admixture (super–plasticizer): Not more than 8 inches after addition of HRWR to site verified 2 inch to 3 inch slump concrete.
3. Other Concrete: 4 inches.

H. Concrete Mixes:

1. Ready–Mix Concrete: Comply with requirements of ASTM C94 and as herein specified. During hot weather, or when under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.

PART 3 – EXECUTION

3.1 FORMS

A. 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, elevation and position.

B. Design formwork to be readily removable without impact, shock or damage to cast–in–place concrete surfaces and adjacent materials.

C. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chanfers, blocking, 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 paste.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

E. 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 openings on forms at inconspicuous locations.

F. Chanfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Form Ties: Factory–fabricated, adjustable–length, 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 surface.

H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.2 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as 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 direction.

3.3 JOINTS

A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Engineer.

B. Isolation (Expansion) Joints in Slabs–on–Grade: Construct isolation joints in slabs–on–grade at points of contact between slabs on grade and vertical surfaces and elsewhere as indicated.

Joint Filler and sealant materials are specified in Division 7 sections of these specifications.

C. Contraction (Control) Joints in Slabs–on–Grade: Construct contraction joints in slabs–on–grade to form panels of patterns as shown.

1. Contraction joints shall be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
2. Joint sealant material is specified in Division 7 sections of these specifications.

3.4 INSTALLATION OF EMBEDDED ITEMS

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

3.5 PREPARATION OF FORM SURFACES

A. Clean re–used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

B. Coat contact surfaces of forms with a form–coating compound before reinforcement is placed.

C. Thin form–coating compounds only with thinning agent of 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 against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

D. Coat steel forms with a non–staining, rust–preventative form oil or otherwise protect against rusting. Rust–stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

A. Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast–in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

B. Coordinate the installation of joint materials, perimeter insulation and moisture barriers with placement of forms and reinforcing steel.

C. General: Comply with ACI 304 "Recommended Practice For Measuring, Mixing, Transporting, and Placing Concrete" and as herein specified.

D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand–spading, rodding or tamping. Use equipment and procedure 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 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 of reinforcement and other embedded items without causing segregation of mix.

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

I. 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.

1. 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 placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

J. 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 placing 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.
2. Cover reinforcing steel with water–soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient temperature immediately before embedment in concrete.
3. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.
4. Use water–reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.7 FINISH OF FORMED SURFACES

A. 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 other surface areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed to view. This is as–cast concrete surface obtained with selected form facing material, arranged orderly and symetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. 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.

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.

3.8 MONOLITHIC SLAB FINISHES

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as 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, grainular texture.

B. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view.

1. After floating, begin first trowel finish operation using a power–driven trowel.
2. 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 in texture and appearance, and with surface leveled to a tolerance of FF 23, FL 17.
4. Grind smooth surface defects which would telegraph through applied floor covering system.

D. Non–Slip Broom Finish: Apply non–slip broom finish to exterior concrete platforms, steps and ramps and elsewhere as indicated.

1. 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.

3.9 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
2. 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 rapid drying at end of final curing period.

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

1. Moist curing: Provide moist curing by covering 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.
2. Moisture–retaining cover curing: Provide moisture–retaining 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 sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
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–sprayy or roller in accordance with manufacturer's directions. Re–coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. 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 Engineer.

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 directed.

3.10 REMOVAL OF FORMS

A. 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 curing and protection operations are maintained.

3.11 REUSE OF FORMS

A. 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 surfaces. Apply new form coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Engineer.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling–In: Fill–in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in–place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.13 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer.

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.

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

C. 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 agent.

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

E. 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.

F. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.013" wide, spalling, pop–outs, honeycomb, rock pockets and other objectionable conditions.

G. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

H. 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.

I. 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 72 hours.

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

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

3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Owner will engage a testing laboratory to perform and report compressive strength tests. All concrete sampling and testing shall be performed by an ACI certified level 1 technician.

B. Sampling and testing for quality control during placement of concrete will include the following:

1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
2. Slump: ASTM C143: one test at point of discharge 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.
4. 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 above, and each time a set of compression test specimens made.
5. 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 required.
6. Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cubic yards plus additional sets for each 100 cubic yards 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 used.

C. 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 result falls below specified compressive by more than 500 psi.

D. Test results will be reported in writing to Engineer and Owner within 24 hours that tests are made. Reports of compressive strength tests will contain the project identification name and number, date of concrete placement, slump and temperature at time of sampling, 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 both 7–day tests and 28–day tests.

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

F. Additional Tests: The testing service will make additional tests of in–place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

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STATE OF MAINE
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No. 9863
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PROFESSIONAL ENGINEER
04/09/14

CHASE

CONTRACTOR:
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OLD DOMINION FREIGHT LINE

Office Renovation & Dock Addition :
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Check Set	03-26-14
Construction Dwgs for Permit	04-09-14
Revisions	04-21-14

Project No. 13061.00

GENERAL NOTES, SCHEDULES AND SPECIFICATIONS

S-0.1