

GENERAL NOTES

GENERAL

- The structure is designed in accordance with the applicable requirements of the 2012 International Building Code. All work shall be done in accordance with the building code and all local governing authorities.
- All contractors are responsible for adhering to the requirements as specified in these notes. All parties must carefully study all notes for items which may pertain to their trades. Failure to read these notes does not permit the contractor(s) to deviate from their requirements. Any questions will be answered by the SER. Submit questions in RFI format.
- Acceptance of deviations from any of the requirements of these notes shall be at the sole discretion of the Engineer. Acceptance of a deviation from any requirement shall not be construed as permitting any other deviation.
- In case of conflict between the notes, details, and specifications, the most stringent requirements shall govern.
- Methods, procedures and the sequences (other than that noted on the drawings) of construction are the responsibility of the contractor(s). The contractor(s) shall take all necessary precautions to maintain and insure integrity of the structure at all stages of construction.
- The contractor shall provide bracing as required to maintain plumbness and stability during construction. All walls and framing shall be adequately braced until the entire structural frame has been installed and is structurally sound/stable.
- Work not indicated on a part of the drawings but reasonably implied to be similar to that shown at corresponding locations shall be provided by the contractor(s) at no additional cost.
- Minor details or incidental items not shown or specified, but necessary for a proper and complete installation shall be included as required.
- Miscellaneous wood blocking and/or cold formed framing, framing members, anchors, fasteners, etc. shall be provided as required at no additional cost whether or not specifically indicated on drawings.
- Work shall be performed in accordance with the federal, state and local municipal laws, bylaws, ordinances and regulations in any manner affecting the conduct of this work as well as all orders or decrees which have been promulgated or enacted by any legal bodies or tribunals having authority or jurisdiction over the work, materials, employees or contract. The contractor shall be responsible for maintaining personnel safety on the jobsite. Guidelines for construction safety shall be in accordance with, but not limited to, the construction industry OSHA Safety and Health Regulations for Construction (Part 1926 standards), and any local ordinances or codes that may be applicable.
- All codes and standards referenced in these notes, including all specifications referenced within, and all federal, state and local regulations apply to the design, construction, demolition, quality control and safety of all work performed on the project. Use the latest adopted editions of the codes and standards.
- This project has been designed for the weights of the materials indicated on the drawings and for the superimposed loads indicated in the design data. It is the contractor's responsibility to determine allowable construction loads and provide proper design and construction of falsework, formwork, staging, bracing, sheeting and shoring, etc.
- All contractors and subcontractors on this project shall be responsible for the proper performance of their work, selection of means and methods, coordination with other trades, safety and security on the job site.
- Construction materials shall be provided free from defect and installed plumb and true to the limits set forth on the drawings by experienced tradesmen.
- All construction work shall be coordinated with the Owner to minimize interference with existing facility operations.
- The contractor(s) shall verify all conditions, check all measurements and be responsible for same.
- Locate all underground structures and utilities, such as water mains, sewers, telephone and electric conduits, etc., and above ground utilities, which may be encountered during construction operations. Dig test holes to determine the position of the underground structures and utilities, or arrange with the owners of such underground structures and utilities to assign a representative to mark the locations. The contractor shall pay the cost of digging test holes and likewise shall pay the cost of the service of the representatives of the owners of such utilities for locating the said utilities. The cost of determining the locations shall be included in the lump sum bid prices. The location of existing structures and utilities, if shown on the plans, is simply for the guidance of the contractor. They have not been field located. Since information is as furnished by the respective utilities, or taken from non-as-built plans, the Structural Engineer is not responsible for the accuracy of plans in this respect. Designers and contractors utilizing these drawings and the information contained therein are cautioned to comply with the requirements of local and state regulations for underground utility line protection.
- Contractor shall become familiar with existing conditions prior to execution of work. If drawing contents/dimensions are inconsistent with field details, notify Architect to resolve each discrepancy.
- All existing conditions shall be verified in the field prior to beginning any work. If field conditions do not permit the installation of the work in accordance with the details as shown, the contractor shall notify the appropriate design professional immediately and provide a sketch of the condition with proposed modification for review by the design professional.
- All structural work shall be completed and coordinated with the architectural, electrical, piping and mechanical drawings and specifications.
- Principal openings in the structure are indicated on the Contract Documents. Refer to the architectural, mechanical, electrical and plumbing drawings for additional openings, sleeves, curbs, insets, etc. not indicated. The location of sleeves or openings in structural members must be approved by the SER prior to installation. All openings in walls, floors, roofs, etc., not shown are to be located and sized per mechanical and architectural requirements.
- Coordinate with the architectural, mechanical, plumbing, electrical, (etc.), drawings for the size and locations of concrete housekeeping pads and/or slab depressions.
- Refer to the architectural drawings for additional detail information regarding finishes, fireproofing, etc.
- Refer to the architectural drawings for locations of non-load bearing partitions. Unless specifically shown otherwise, provide slip connections that allow vertical movement at the tops of all partitions. Connections shall be designed to support the top of the walls laterally for the lateral load required by code.

PRE-ENGINEERED METAL BUILDING

- Pennoni Associates Inc. is responsible only for the structural design of the footings, piers, frost walls, slab on grade, anchor rods and hangers/brackets. The pre-engineered metal building manufacturer (MEM) shall be responsible for the structural design of the superstructure. The design of the superstructure shall be in compliance with all governing codes and standards. The MEM shall submit to the governing municipality all erection and fabrication shop drawings with attached Registered Engineer's seal and signature.
- The pre-engineered metal building manufacturer (MEM) is responsible for the selection, design and detailing for all connections not fully detailed on the Contract Documents. Any connection details shown on the Contract Drawings are for graphical representation only. Connections shall be designed and detailed in accordance with AISI's "Steel Construction Manual", 13th edition.

FOUNDATIONS

- Perform site preparation and excavation work related to support of structures in strict accordance with the geotechnical report, dated December 21, 2012, prepared by Pennoni Associates Inc. Contractor(s) shall familiarize themselves with the geotechnical report before commencing work.
- The bottom of all excavations and compacted earthwork shall be inspected and approved by a registered Geotechnical Engineer retained by the Owner prior to placing concrete and/or backfilling. Approval by the Geotechnical Engineer, in writing, shall indicate that the soil is adequate to safely support the specified design foundation pressures and meets the requirements noted on the Contract Drawings. Excavation below the anticipated bottoms of footings along with placement of compacted backfill may be required due to unknown field conditions.
- Backfill shall be accomplished using material consisting of bank run gravel, crushed stone and/or material, approved by a registered Geotechnical Engineer, with optimum moisture content for compacting and shall be free of any debris. The subgrade and each layer of fill or backfill shall be compacted to a dry density at least equal to 95% of the maximum dry density obtained by the Modified Proctor test ASTM D1557.
- The bottom of all exterior footing excavations shall be a minimum of 3'-0" below exterior finished grade to provide frost protection. Verify all proposed bottom of footing elevations against the proposed finished grade elevations on the civil and/or architectural drawings to comply with the minimum frost depth. In case of conflict, notify the SER prior to any construction to allow for adjustment.
- Soil under footings shall be protected from freezing.
- Contractor shall adequately protect walls, piers, etc., from damage due to backfilling.
- Contractor must prevent the foundations from being jeopardized by excavating for utilities, etc.
- Where pipes pass through new walls, drop footings so that pipes pass over the top of the footing. Provide sleeves as required.
- Dewatering procedures, if required, shall not disturb the soil structure.
- The contractor shall employ all means necessary to insure that the structural integrity of any and all adjacent structures will not be compromised.
- Maintain a maximum of 1:1 slope from bottom edge of any excavation to adjacent excavations or foundations.
- Utility lines shall not be placed through or below foundations without the SER's written approval.
- Shoring, sheeting and dewatering shall be the total responsibility of the contractor.
- Do not backfill against basement walls until the basement slab on grade and all framed floors are in place and have attained the specified design strength, or the walls are adequately braced.
- Backfill shall be brought up equally on each side of piers, walls and grade beams.
- Retaining walls, basement walls and exposed concrete walls shall have control joints at a maximum of 30'-0" feet o.c., unless noted otherwise. Walls with integral column piers or pilasters shall have a formed control joint on one side of each pier. On the exposed face of the wall, joints shall be filled with an approved sealant.

STRUCTURAL STEEL

- Structural steel material, design, detailing, fabrication and erection shall be in accordance with the following references:
 *Specification for Structural Steel Buildings, AISC's 13th Edition
 *Structural Welding Code, AWS D1.1, AWS
 *Engineering for Steel Construction", AISC
 *Detailing for Steel Construction", AISC
- The steel contractor shall furnish an affidavit from the producer of the steel certifying that the steel meets the minimum requirements as defined by the applicable ASTM Specification.
- The structural steel contractor shall verify the foundation construction for anchor rod location, elevation of top of concrete and/or leveling plates and bearing plates, alignment, etc., prior to start of erection.
- The steel contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, adequacy of connections, coordinating his work with that of all other trades and performing his work in a safe and satisfactory manner.
- Coordinate with architectural drawings.
- Structural steel rolled shapes shall conform to ASTM A992, unless noted otherwise. Angles, channels, plate and rods shall conform to ASTM A36.
- Structural steel pipe shall conform to ASTM A53, Type E or S, or ASTM A501.
- Structural steel tubing shall conform to ASTM A500, Grade B (Fy = 46 KSI), unless noted otherwise.
- Anchor rods shall conform to ASTM F1554, Grade 36, unless noted otherwise.
- Bolts shall be designed as bearing type bolts, except as noted herein or on plan. Bearing bolts shall be installed in accordance with the " snug tight " condition as outlined in the AISC "Specifications for Structural Joints Using ASTM A325 or A440 Bolts", latest revision. Connection bolts shall have a hardened washer placed under the turned element.
- Steel connections shall be bolted with 3/4" (min) diameter A325-TC high-strength bolts or welded, unless noted or approved otherwise. Bolts shall be spaced 3" o.c. (min), unless approved otherwise by the SER.
- One sided connections shall be full depth with minimum 3/8" thick connection material.
- All welding shall be done by AWS certified welders in accordance with AWS D1.1 (latest edition). Minimum fillet weld shall be 3/16".
- Steel welding rods shall be E70XX (low hydrogen @ 50 KSI material).
- Welds left exposed on the finished structure shall be ground smooth.
- Steel shall have a shop coat of a VOC compliant rust-inhibitive primer, except where steel is to receive spray-on fireproofing, concrete encasement or galvanizing coating. All steel shall be thoroughly cleaned by power tool cleaning (SSPC-SF3) prior to painting, unless noted otherwise.
- All contact surfaces within slip-critical, bolted connections and welding areas shall be free of oil, paint or galvanizing.
- Provide temporary bracing, as required and determined by fabricator or erector, to resist wind, construction loads, etc., during construction. Bracing shall remain in place until the structure is capable of sustaining all such loads.

DESIGN CRITERIA

ROOF DESIGN LOADS

DEAD LOAD	5.0 PSF
COLLATERAL LOAD	5.0 PSF
	10.0 PSF
BASIC ROOF LIVE LOAD	20.0 PSF

STORAGE RACK LOADING ON SLAB

COORDINATE STORAGE RACK LOADING REQUIREMENTS WITH THE OWNER

FLOOR LIVE LOAD

HEAVY STORAGE WAREHOUSE	450.0 PSF
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LATERAL LOAD DESIGN

2012 INTERNATIONAL BUILDING CODE/ASCE 7-10

WIND	
BASIC WIND SPEED (3 SEC. GUST)	V 115.0 MPH
OCCUPANCY CATEGORY	II
WIND LOAD IMPORTANCE FACTOR	Iw 1.00
WIND EXPOSURE CATEGORY	B

SEISMIC

IMPORTANCE FACTOR	Ie 1.00
SHORT PERIOD SPECTRAL ACCELERATION	Sps 0.124g
(I) SECOND PERIOD SPECTRAL ACCELERATION	Spt 0.082g
OCCUPANCY CATEGORY	II
SEISMIC DESIGN CATEGORY	B
SITE CLASSIFICATION	S D
BASIC SEISMIC-RESISTING SYSTEM	TYPE H
RESPONSE MODIFICATION FACTOR	R 3
DEFLECTION AMPLIFICATION FACTOR	Cd 3
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE PROCEDURE

SNOW DESIGN LOADS

ASCE 7-05

GROUND SNOW LOAD	Pg 25 PSF
SNOW EXPOSURE FACTOR	Ce 1.0
SNOW LOAD IMPORTANCE FACTOR	Ie 1.0
THERMAL FACTOR	Ct 1.0
ROOF SNOW LOAD (*)	Pf 18 PSF

(*) ACTUAL PF USED FOR DESIGN = 25 PSF PLUS DRIFTING SNOW.

CRANE LOAD

BUILDING STRUCTURE SHALL BE DESIGNED FOR AND INCLUDE CRANE RAILS FOR FUTURE 10 TON BRIDGE CRANE. RAILS SHALL BE LOCATED 25 FEET ABOVE FINISHED FLOOR. RAILS AND SUPPORTING STRUCTURE SHALL BE DESIGNED, INSTALLED, AND ALIGNED IN ACCORDANCE WITH CMAA #10. BRIDGE CRANE IS NOT IN CONTRACT AND WILL BE PROCURED SEPARATELY. A RAIL SURVEY SHALL BE PERFORMED TO VERIFY RAILS ARE ALIGNED IN ACCORDANCE WITH CMAA (CRANE MANUFACTURERS ASSOCIATION OF AMERICA) 10-2010. THE CONTRACTOR SHALL SUBMIT THE RAIL ALIGNMENT TO THE GOVERNMENT. SEE BUILDING SECTION ON DRAWING S101.

TYPICAL STRUCTURAL SYMBOLS

	CRUSHED STONE		CMU WALL (PLAN)		GRATING
	NEW CONCRETE		VENEER		PREPARED SUBGRADE
	EXIST. CONCRETE		WELDED WIRE REINFORCING IN CONCRETE		SOUND ROCK
	GROUT		REINFORCING STEEL IN CONCRETE		REVISION MARK

STRUCTURAL ABBREVIATIONS

ADD'L	ADDITIONAL	DET.	DETAIL	INFO	INFORMATION	PROJ.	PROJECTION
A.R.	ANCHOR ROD	DIA.	DIAMETER	INV.	INVERT	QTY.	QUANTITY
APPR'D	APPROVED	DIM.	DIMENSION	I.J.	ISOLATION JOINT	RAD.	RADIUS
APPROX.	APPROXIMATE	DSR	DOUBLE SIDE ROD	JT.	JOINT	REF.	REFERENCE
AVG.	AVERAGE	DNL	DONEL	KN	KILONEWTON	REIN.F.	REINFORCED)
ALT.	ALTERNATE	DNG.	DRAWING(S)	K	KIP	REQ'D	REQUIRED
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	E.F.	EACH FACE	KB	KNEE BRACE	REV.	REVISION
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIAL	E.H.	EACH WAY	KPa	KILOPASCAL	SCH.	SCHEDULE
ARCH.	ARCHITECT; ARCHITECTURAL	ELEC.	ELECTRICAL	LL	LIVE LOAD	SECT.	SECTION
B.P.	BASE PLATE; BRG. PLATE	EL.	ELEVATION	LLH	LONG LEG HORIZONTAL	SER	STRUCTURAL ENGINEER OF RECORD
BSMT.	BASEMENT	ELEV'R	ELEVATOR	LLV	LONG LEG VERTICAL	SHT.	SHEET
BM.	BEAM	EMBT	EMBEDMENT	LSL	LONG SLOTTED	SSL	SHORT SLOTTED
BRG.	BEARING	ENGR.	ENGINEER	L.P.	LOW POINT	SIM.	SIMILAR
B.F.	BOTH FACES	EQ.	EQUAL	LBs.	POUNDS	S.O.G.	SLAB ON GRADE
B.S.	BOTH SIDES	EQUIPT	EQUIPMENT	L.W.	LIGHTWEIGHT	SPA.	SPACE
B.LDg.	BUILDING	EXIST., EX.	EXISTING	MFR.	MANUFACTURER	SST	STAINLESS STEEL
BOTT.	BOTTOM	EXP.	EXPANSION	MFD.	MANUFACTURED	STD.	STANDARD
B.O.F.	BOTTOM OF FOOTING	E.J.	EXPANSION JOINT	MAX.	MAXIMUM	STL.	STEEL
B/	BOTTOM OF	F.S.	FAR SIDE	MTL.	METAL	SJI	STEEL JOIST INSTITUTE
CANT.	CANTILEVER	FT.	FEET	MECH'L	MECHANICAL	SHT.	SHEET
CTR.	CENTER	FIN.	FINISHED)	M	METER	STIFFR	STIFFENER
C.L.	CENTER LINE	FL.	FLANGE	mm	MILLIMETER	STR.	STRIP
CLR.	CLEAR	FLR.	FLOOR	MIN.	MINIMUM	SYM.	SYMMETRICAL
COL.	COLUMN	F.D.	FLOOR DRAIN	MISC.	MISCELLANEOUS	STRCT.	STRUCTURAL
CO.	COMPANY	FTg.	FOOTING(S)	MC	MOMENT CONNECTION	TEMP.	TEMPORARY
CONC.	CONCRETE	FDN.	FOUNDATION	N.S.	NEAR SIDE	THK.	THICK
CM.	CONSTRUCTION MANAGER	GALV.	GALVANIZED	N.W.	NORMAL WEIGHT	T&G	TONGUE AND GROOVE
CMU	CONCRETE MASONRY UNIT	GA.	GAGE	N.I.C.	NOT IN CONTRACT	T&B	TOP AND BOTTOM
CONN.	CONNECTION	G.C.	GENERAL CONTRACTOR	N.T.S.	NOT TO SCALE	T.O.F.	TOP OF FOOTING
CONSTR.	CONSTRUCTION	GR.	GRADE	NO.	NUMBER	T.O.S.	TOP OF SLAB; TOP OF STEEL
CJ	CONSTRUCTION JOINT	GRG.	GRATING	O.C.	ON CENTER	T/	TOP OF
CONT.	CONTINUOUS	H.R.	HAND RAIL	O.F.	OUTSIDE FACE	T	TREAD
CONTR.	CONTRACTOR	HDCP.	HANDICAP	OPP.	OPPOSITE	TYP.	TYPICAL
CYL.	CYLINDER	HGR.	HANGER	OPNG.	OPENING	U.N.O.	UNLESS NOTED OTHERWISE
DBA	DEFORMED BAR ANCHOR	H.P.	HIGH POINT	OSHA	OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION	VERT.	VERTICAL
DL	DEAD LOAD	HORIZ.	HORIZONTAL	PERP.	PERPENDICULAR	w	WITH
DEG.	DEGREE	I.D.	INSIDE DIAMETER	Pc	PIECE	w/o	WITHOUT
DEMO.	DEMOLITION, DEMOLISH	I.F.	INSIDE FACE	PL.	PLATE	w/R.	WELDED WIRE REINFORCING
		IN.	INCORPORATED	FL.	FLOOR	W.F.L.	WIDE FLANGE
		INC.		P.J.F.	PREFORMED JOINT FILLER	W.P.	WORKPOINT

DATE	07/09/13
DATE	08/09/13
DATE	12/11/14
DATE	01/23/15
DESCRIPTION	CONCEPT SUBMISSION
DESCRIPTION	95% SUBMISSION
DESCRIPTION	REVISED 95% SUBMISSION
DESCRIPTION	FINAL SUBMISSION
DATE	07/09/13
DATE	08/09/13
DATE	12/11/14
DATE	01/23/15

NAVAFAC

Pennoni

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 PROFESSIONAL ENGINEER
 STATE OF MARYLAND
 LICENSE NO. 14122
 EXPIRES 11-10-2013

DESIGN	DRWLLF
REVIEWED BY	KWW
DATE	
SCALE	
MAXIMUM NO.	
STA. PROJ. NO.	
WORK ORDER NO.	
CONSTR. CONTR. NO.	
NAVAFAC DRAWING NO.	
SHEET	OF
S001	

DEPARTMENT OF THE NAVY
 NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON
 NSF CARDEROCK
 BETHESDA, MD
 CARDEROCK
 PROTOTYPE MATERIALS STORAGE FACILITY
 DESIGN CRITERIA/GENERAL NOTES

DRAWING REVISION: 01 MAY 2006

GENERAL NOTES

CONCRETE

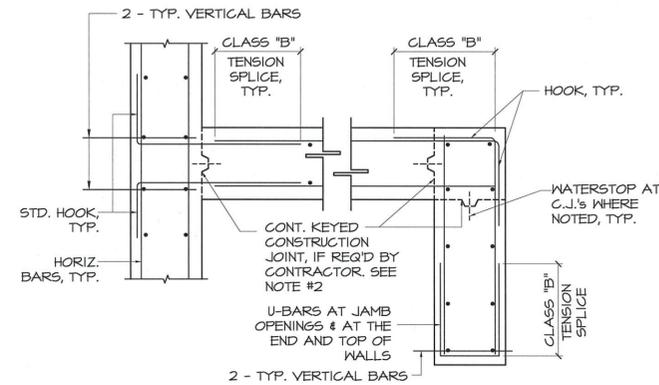
- Concrete work shall comply with the requirements of the latest adopted editions of ACI Building Code Requirements for Structural Concrete and Commentary (ACI 318) and ACI Specifications for Structural Concrete (ACI 301). A copy of ACI 318 shall be available at the project site at all times.
- Reinforcing steel shall be detailed, fabricated and installed in accordance with the latest editions of CRSI "Manual of Standard Practice", CRSI "Placing Reinforcing Bars" and ACI "Detailing Manual (SP-66)".
- Concrete shall have natural sand fine aggregate and normal weight coarse aggregates conforming to ASTM C33, Type I Portland cement conforming to ASTM C150, and shall have the following properties:

APPLICATION	F _c (PSI)	MAX. UNIT WT. (PCF)
Curbs, sidewalks and slabs exposed to weather	4,000	150
Slabs on grade	4,000	150
Grade Beams, Piers, and Pile Caps	3,000	150

- Concrete exposed to freeze/thaw conditions and/or weather (including exterior footings) shall have 4%-6% air-entrainment in accordance with ACI.
- All concrete shall contain an approved water-reducing admixture.
- Slump tests shall be made prior to the addition of plasticizers. Concrete for the preparation of test cylinders shall be taken from the hose end for concrete placed by pumping methods. Slump (at point of concrete placement) shall be 4" (± 1"). If needed for workability, add a high range water reducing admixture (HRWR) to the concrete. When using water reducing admixtures, the slump limits shall be:
 - Prior to addition of admixture: less than 3"
 - After addition of admixture: 8" maximum
- Water shall not be added to the concrete at the jobsite, unless approved in writing by the SER. It shall be the responsibility of the contractor to coordinate the requirements of the concrete supplier and pumper to ensure pumpable and workable mix without the addition of water at the jobsite. The use of plasticizers, retardants and other additives shall be at the option of the contractor subject to the approval of the SER. Follow the recommendations of the manufacturer for proper use of retardants and other additives. Use of calcium chloride or other chloride bearing salts is not permitted.
- The concrete supplier shall submit mix designs for review and approval prior to placing any concrete. Compressive strength must be substantiated by a suitable experience record or by the method of laboratory trial batches. The pertinent criteria of Chapter 5 of ACI 318 (latest edition) shall apply to the proportioning of mix designs and to the acceptance of concrete produced for the job. If during construction any class concrete fails to meet the acceptance criteria, the contractor shall take such steps as are deemed necessary by the SER to improve subsequent test results at no additional cost to the Owner. The contractor shall also bear the cost of special investigation, testing or remedial work necessary because of evidence of low strength or non-conforming concrete or workmanship.
- Reinforcing steel shall be manufactured from high-strength billet steel, deformed type, conforming to ASTM A615, Grade 60.
- Welded wire reinforcing (WWR) shall comply with ASTM A185, latest edition. Deformed WWR shall comply with ASTM A447, latest edition. Reinforcing shall be supplied in flat sheets.
- All concrete pads, sidewalks, etc., not poured integrally with structural slabs, shall be reinforced with 6x6-W2.5xW2.9 WWR at mid-depth of slab, unless shown otherwise.
- Lap all bars a minimum of 40 diameters and in accordance with ACI requirements, unless approved otherwise by SER. Reinforcement designated as "continuous" shall lap 48 bar diameters at splices, unless noted otherwise.
- Lap all WWR a minimum of one full mesh at sides and ends (6" min.), and tie wire together.
- All concrete shall be formed, unless otherwise approved by the SER. All pours shall be terminated by forms. Provide keys, as directed by SER, between adjacent pours.
- Provide a 3/4" chamfer at exposed corners and provide a 3/4" flat fillet at re-entrant corners in precast and cast-in-place concrete beams, columns, slabs, walls, curbs, pads, etc., unless otherwise noted by Architect or SER.
- Continuous top and bottom bars in walls, beams and grade beams shall be spliced as follows:
 - Top bars - at midspan
 - Bottom bars - over support
 - Provide 2-#4 top support bars for length of stirrup spacing where top bars are not otherwise provided.
- No welding of reinforcing shall be permitted, unless specifically called for or approved by the SER. Where reinforcing bars are to be welded, they shall conform to ASTM A706 and AWS D1.4 (latest edition)
- Reinforcing steel shall be accurately placed with steel clear cover in accordance with ACI 318, and adequately supported before the concrete is placed. Reinforcing steel shall be secured against displacement within permitted tolerances. Provide plastic tipped bolsters and chairs at exposed slabs and beams. When supporting epoxy coated reinforcing, bolsters and chairs shall be epoxy coated.
- Contractor shall provide all high chairs, spacers, supports, etc., necessary for proper placement of reinforcing steel.
- All reinforcing steel shall be securely wired together in the forms. Two way mats of steel shall be tied at alternate intersections both ways.
- Bottom steel, for concrete pours on grade, shall be supported on precast concrete block supports (minimum size 3"x3"x3") spaced at 4'-0" o.c. each way. Top bars shall be supported from dowelled concrete blocks or chairs equipped with sand plates. One way top steel shall be tied with #3 bars at 4'-0" o.c. Use of split bricks is not permitted.
- Provide the following concrete clearances from faces of concrete to reinforcement, unless otherwise indicated on the plans or directed by the SER.
 - Walls
 - For dry conditions
 - Walls 8" thick or less 1"
 - Walls over 8" thick 2"
 - Exposed to earth, water or weather
 - Circular tanks with ring tension 2-1/2"
 - All others 2"
 - Footings and base slabs
 - Top of footing or base slab 2"
 - All formed sides and ends and bottoms bearing on concrete workmats 2"
 - At unformed sides and ends and bottoms
 - In contact with earth 3"
 - Over top of piles 2"

- Placing of concrete shall not commence until the placement of reinforcing has been approved by the Owner's inspection agency.
- Floor and slab construction shall conform to the latest edition of "Guide for Concrete Floor and Slab Construction (ACI 302.1R)".
- Concrete slabs shall be finished flat within tolerance, to the elevation indicated on the drawings, using a level or similar device. The contractor shall provide all concrete required to achieve the finished top of slab elevation.
- Construction joints in precast and cast-in-place concrete beams, columns, slabs and grade beams shall be at mid-span and key jointed with reinforcing continuous across joint.
- Slabs with shrinkage steel (example: 6x6-W4.4xW4.4 WWR) shall have construction joints and/or control joints at each column line in each direction. Additional joints shall be provided, such that the maximum spacing between construction and/or crack control joints does not exceed 15' with a maximum length to width ratio of 1.5:1. Provide construction joints at all re-entrant corners. Provide diamond shaped isolation joints around columns.
- Contractor shall submit plan showing pour sequence and type and location of proposed joints in all slabs to SER for approval prior to placing concrete for slabs on grade.
- Coordinate the placement of all slabs on grade with the installation of the underslab utilities, building foundations, equipment pads and foundations, drains, retaining walls, etc.
- Inserts and sleeves shall be cast in place whenever feasible. Drilled or power driven fasteners shall be permitted only when proven to the satisfaction of the SER that the fasteners will not spall the concrete and have the same capacity as cast-in-place inserts.
- Submit sketches of locations and sizes of openings thru walls and slabs, which are not specifically shown on the structural drawings, for approval.
- No splices of reinforcement shall be permitted except as detailed or authorized by the SER. Make bars continuous around corners. When permitted, splices shall be made by contact laps, Class B, unless noted otherwise.
- When column faces are offset 3" or less, provide offset bends on lower verticals; otherwise provide splicing dowels.
- Provide (2)-#6 (1 each face) bars on all sides in openings in walls, unless noted otherwise on drawings. Extend bars 30 inches beyond edge of opening.
- Provide (2)-#4 bars, 4'-0" longer than opening, in top and bottom of solid slabs on four sides of unframed opening 12" square or larger; spread slab bars at openings smaller than 12" square.
- Provide (1)-#5 x 4'-0" long diagonal at each corner, unless noted otherwise.
- Provide (1)-#4 nosing bar in each concrete step.
- Provide (2)-#3 x 4'-0" long bars at all re-entrant corners, placed on the diagonal with 1-1/2" cover from the corner and top/bottom of slab. Refer to detail.
- Slabs, beams and joists shall not have joints in a horizontal plane. Any stop in concrete work shall be made at center of span or at center of support with vertical bulkheads and horizontal keys, unless otherwise shown.
- Bonding agents shall be used where new concrete is placed against existing concrete, unless noted otherwise.
- General contractor shall grout under all leveling and bearing plates with an approved non-shrink, non-metallic grout conforming to ASTM C1107, and shall have a minimum 28-day compressive strength of 5,000 PSI. Pre-grouting of base plates is not permitted.
- Repair concrete exhibiting voids due to snap ties, honeycombs, rock pockets, and runs, spalls or otherwise damaged surfaces with dry pack or cement grout, and finish flush with adjoining surfaces. At the discretion of the SER or as qualified by lab testing, excessive honeycombs or exposed reinforcement that jeopardize the design, shall be removed and replaced at the expense of the contractor.
- Contractor shall take every precaution to protect finished surfaces from stains or abrasions. No fire shall be allowed in direct contact with concrete. Provide adequate protection against injurious action by sun or wind. Fresh concrete shall be thoroughly protected from heavy rain, flowing water and mechanical injury.
- Tops of foundations shall be hand trowel finished and smooth. Refer to drawings for base plate accommodations.
- Set tops of slabs to accommodate architectural finishes.
- Horizontal footing and horizontal wall reinforcement shall be continuous and shall have 90 degree bends and extensions, or corner bars of equivalent size lapped 48 bar diameters, at corners and intersections.
- Horizontal jointing will not be permitted in concrete construction, except as shown on the Contract Documents. Vertical joints shall occur at center of spans at locations approved by the SER.
- Place concrete in a manner to prevent segregation of the mix. Delay floating and troweling operations until the concrete has lost surface water sheen or all free slab surface water.
- Construction joints, if sawcut, shall meet the following requirements:

Joint depth:	1/4 of slab thickness
Soft-cut saw:	Joints to be cut within 2 hours of finishing.
Met-cut saw:	Joints to be cut between 4 and 12 hours after finishing.
- Provide 7 days of curing immediately after finishing using one of the following methods:
 - Continuously watered burlap
 - Waterproof membranes
 - Sprayed-on liquid membranes
- Refer to the manufacturer's specifications for requirements. Protect the concrete surface between finishing operations on hot, dry days or any time plastic shrinkage cracks develop using wet burlap, plastic membranes or fogging. Protect concrete deck at all times from rain, hail or other injurious effects.
- Curing of concrete is to start as soon as finishes will not be marred thereby. It is not permissible to delay the curing until the morning after the concrete is placed.
- When concreting is to be done in hot weather conditions that could adversely affect the properties and serviceability of concrete, preparations and procedures outlined in ACI 305R (latest edition) should be followed, unless otherwise noted in construction specifications.
- When concreting is to be done in cold weather conditions (40 degrees F) that could adversely affect the properties and serviceability of concrete, preparations and procedures outlined in ACI 306R (latest edition) should be followed, unless otherwise noted in construction specifications.
- All column footings shall be centered under column centerline, unless otherwise noted.
- All footing dowels to be same size, number and grade as vertical reinforcement in columns, piers or walls which the footings support.
- The contractor shall ascertain the location of all sleeves, inserts, anchor rods, etc., required by other trades. Installation of all such embedments shall be checked for completeness and location before concrete is poured.
- Unless noted otherwise, waterstops shall be 6"x3/16" serrated centerbulb as manufactured by Vinylux or approved equal. See drawings for location.
- All concrete, including foundation work, shall be vibrated. Proper use of vibrators is a must. Vibrators shall not be used to transport concrete.
- All embedments, including anchor rods, shall be in place prior to pouring concrete.
- Concrete shall be placed in accordance with ACI 304, latest edition. Concrete shall not be subject to drops in excess of 5 feet.



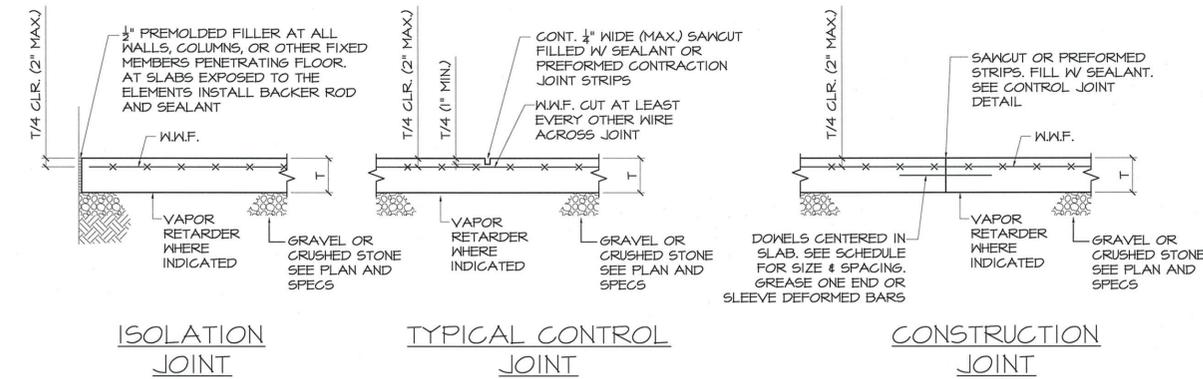
- NOTES:
- CORNER BARS, DOWELS & U-BARS SAME SIZE AND SPACING AS HORIZONTAL REINFORCING.
 - CONSTRUCTION JOINT LOCATIONS TO BE DETERMINED BY THE CONTRACTOR. REFER TO TYPICAL WALL CONSTRUCTION JOINT DETAIL.

C3 TYPICAL GRADE BEAM INTERSECTION DETAILS

SCALE 3/4" = 1'-0"

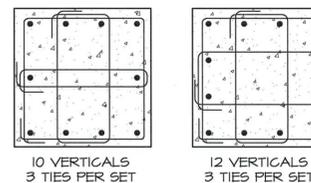
NOTES:

- RE-ENTRANT CORNERS IN FLOOR SLAB SHALL HAVE SLAB JOINTS OR (1) - #3 x 4'-0" L6. T & B DIAGONAL BARS.
- CONTROL/CONSTRUCTION JOINTS SHALL CREATE PANELS OF 225 SQ. FT. (MAXIMUM) WITH A MAXIMUM LENGTH TO WIDTH RATIO OF 1.5:1 UNLESS INDICATED OTHERWISE ON PLAN.
- SAWCUT CONTROL JOINTS WITHIN 1 TO 4 HOURS OF FINAL TROWELING, DEPENDING ON WEATHER CONDITIONS, 1 HOUR IN HOT WEATHER, 4 HOURS IN COLD WEATHER.
- CONTROL JOINTS SHOULD BE CONTINUOUS, NOT STAGGERED OR OFFSET.
- SUBMIT LAYOUT FOR CONTROL & CONSTRUCTION JOINTS TO THE STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO PLACING CONCRETE.



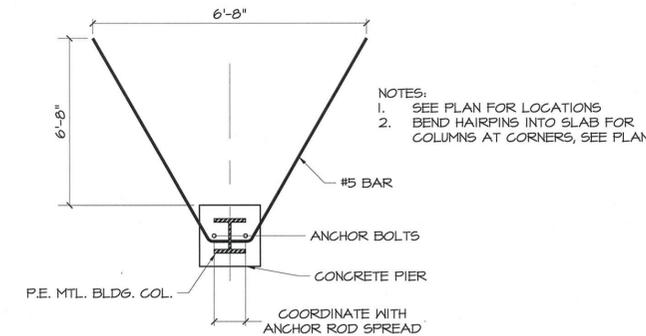
A3 TYPICAL SLAB ON GRADE DETAILS

SCALE 3/4" = 1'-0"



A4 PIER TIE DETAIL

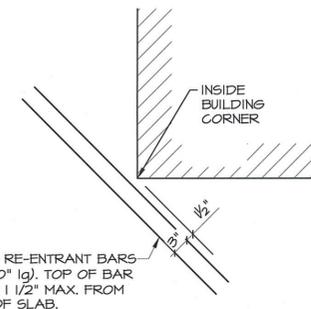
SCALE N.T.S.



- NOTES:
- SEE PLAN FOR LOCATIONS
 - BEND HAIRPINS INTO SLAB FOR COLUMNS AT CORNERS, SEE PLAN

A5 TYP. HAIRPIN DETAIL

SCALE N.T.S.



TYPICAL ALL CORNERS; SLAB ON GRADE AND ELEVATED SLABS

C5 TYPICAL RE-ENTRANT BARS

SCALE 3/4" = 1'-0"

SLAB DEPTH	DOWEL DIAMETER	LENGTH	SPACING
4"	1/2"	18"	36"
5" - 6"	3/4"	16"	12"
7" - 9"	1"	18"	12"
9" - 11"	1-1/4"	18"	12"

DATE	01/23/15
DESCRIPTION	FINAL SUBMISSION
DATE	12/11/14
DESCRIPTION	REVISED 95% SUBMISSION
DATE	08/09/13
DESCRIPTION	95% SUBMISSION
DATE	07/09/13
DESCRIPTION	CONCEPT SUBMISSION
DATE	
DESCRIPTION	

Pennoni

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STATE OF MARYLAND
PROFESSIONAL ENGINEER
JAMES M. PENNONI
No. 41202
Expiration Date: 11-10-2013

DES: KTM DRW: LFF
REVIEWED BY: KWW
PM/DM
CHIEF ENG./ARCH

NAVAL FACILITIES ENGINEERING COMMAND
BETHESDA, MD
NSF CARDEROCK
CARDEROCK
PROTOTYPE MATERIALS STORAGE FACILITY
GENERAL NOTES/TYPICAL CONSTRUCTION DETAILS

CODE ID. NO. 80091 SIZE: D
SCALE:
MAXIMO NO.
STA. PROJ. NO.
WORK ORDER NO.
CONSTR. CONTR. NO.

NAVAC DRAWING NO.
SHEET OF
S002

DRAWING REVISION: 01 MAY 2008