

State Road PR-129
Km. 27.1
Callejones Ward
Lares, P.R.



S301	STEEL FRAMES REPAIR DETAILS & NOTES
S601	STRUCTURAL NOTES

[illegible]

Professional Seal



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REVITALIZACION
PARQUES LAS CAVERNAS
RIO CAMUY
CAMUY

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PROJECT NO.

PROJECT
Cavernas
Rio Camuy

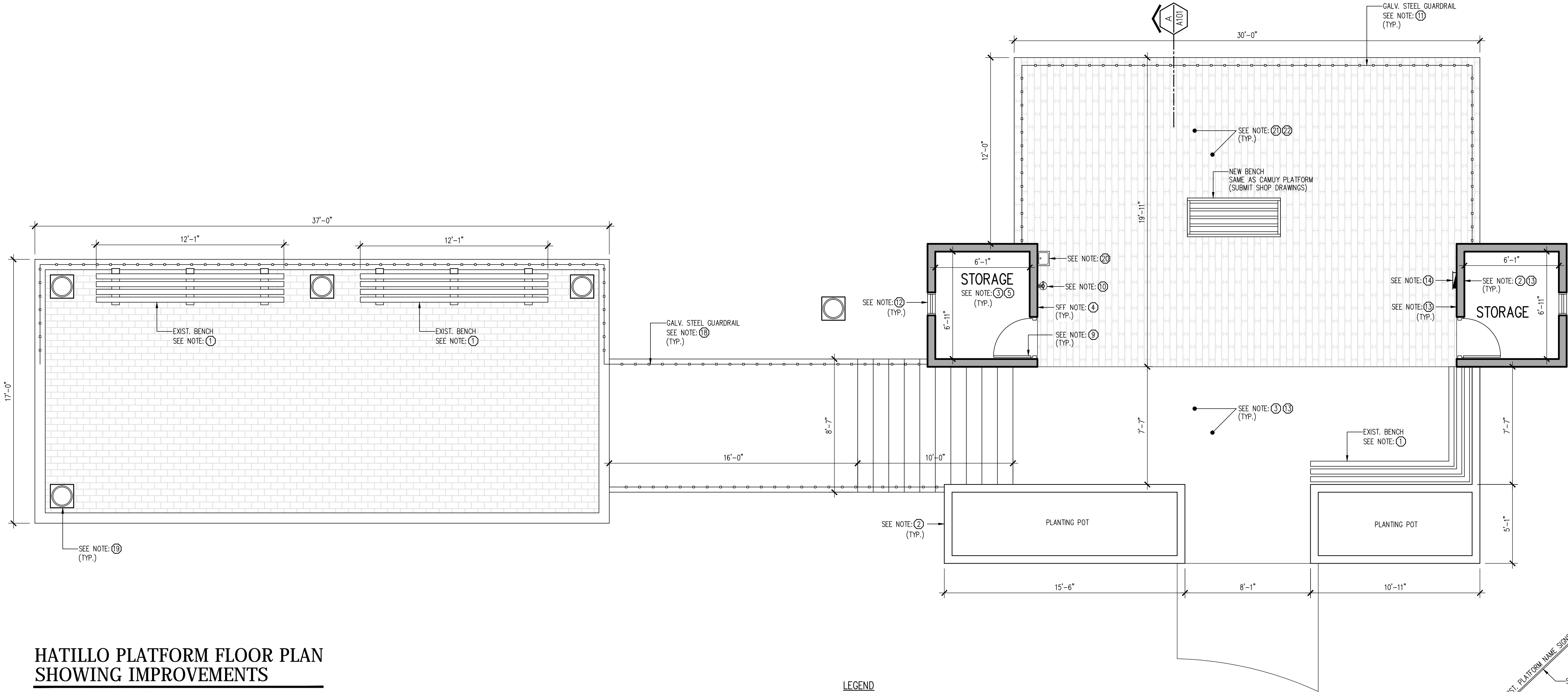
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TITLE , INDEX
& LOCATION PLAN

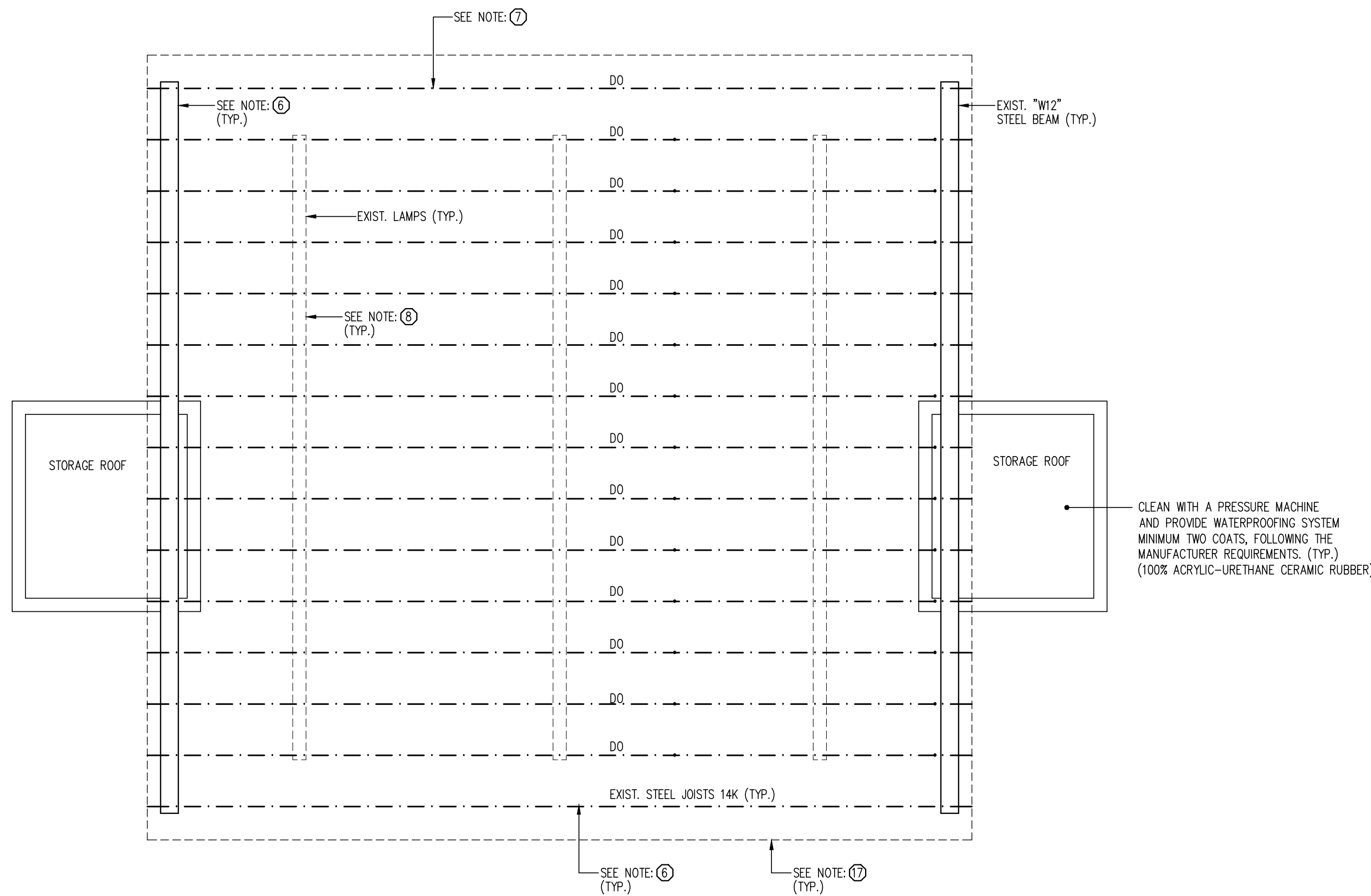
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HATILLO PLATFORM FLOOR PLAN SHOWING IMPROVEMENTS

SCALE: 1/4"=1'-0"



HATILLO PLATFORM ROOF PLAN SHOWING IMPROVEMENTS

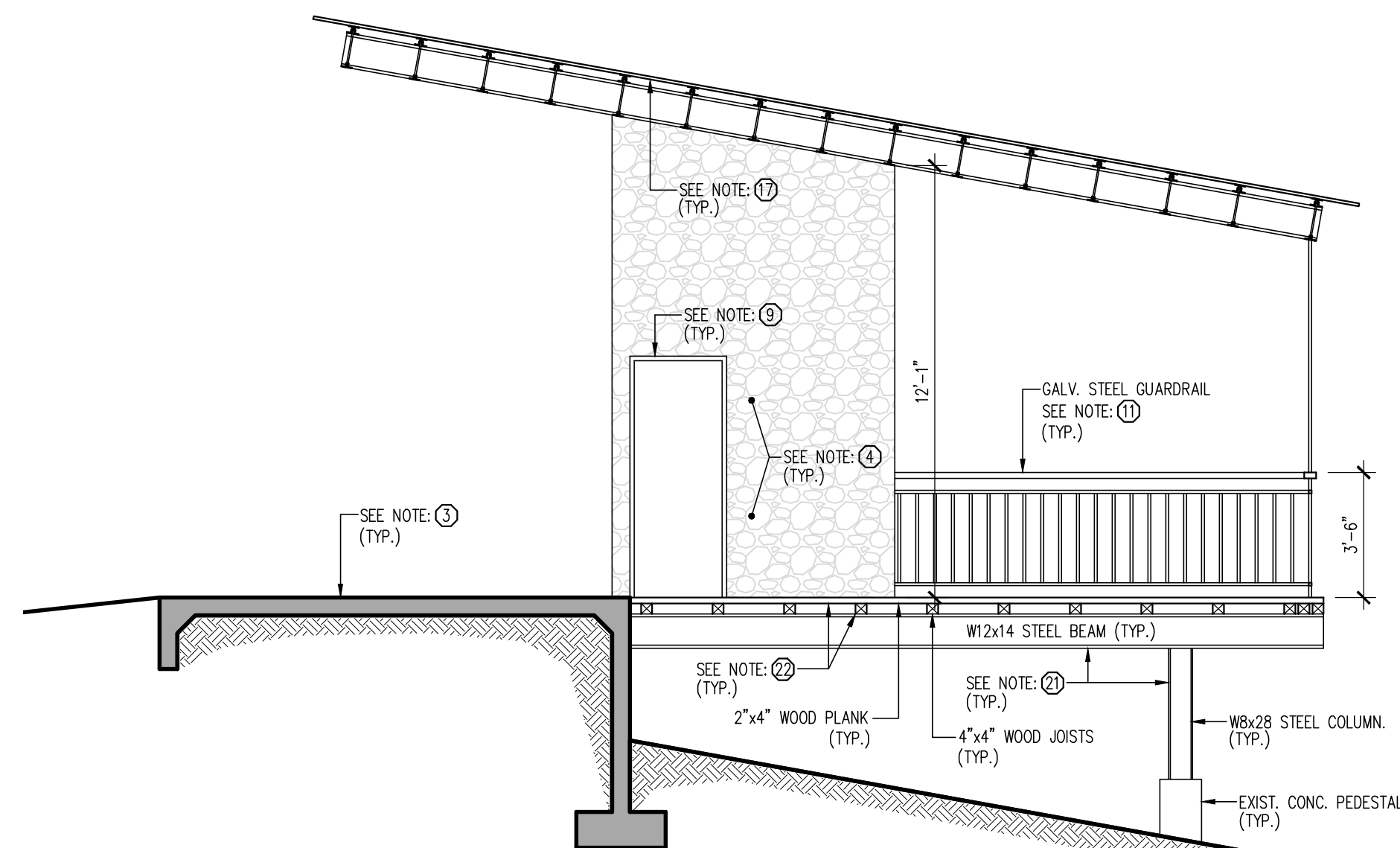
SCALE: 1/4"=1'-0"

*** SOLAR LIGHTING SYSTEM SHALL BE:

- INVERSOR 3 KW @ 48 VDC 120/240 "SPLIT VAC" CON CONTROLADOR DE CARGA INTEGRADO
- (4) PLACAS DE 500 WATTS, (1) "RACK" PARA (3) PANELES (VELOCIDAD DE VIENTOS 150 MPH)
- (4) BATERIAS 12 VDC AGM o GEL CICLO PROFUNDO MAYOR o IGUAL 150 AMP/HR @ 20 HRS
- LAMPARAS "STRIP LEDS" MAYOR o IGUAL A 2,300 LUMENS, MENOR o IGUAL A 20 WATTS, 4' X (2) TUBOS

LEGEND

1. EXISTING BENCH TO BE RECONDITIONED OR REPLACE ELEMENTS W/ ORIGINAL SPECIFICATIONS. THE BENCH ARE IN WOOD WITH A CONCRETE BASE.
2. WALLS TO BE PAINTING WITH A PREMIUM QUALITY PAINT BRAND. APPLY A MINIMUM OF TWO (2) COATS. SURFACE PREPARATION & PAINTING WILL BE IN ACCORDANCE W/ MANUFACTURER REQUIREMENTS. (COLOR TO BE COORDINATE WITH A/E)
3. REMOVE EXISTING PAINT FROM THE FLOOR AND APPLY A FLOOR COATING (TWO-COMPONENT REACTIVE SILOXANE MODIFIED ACRYLIC CONCRETE STAIN). SURFACE PREPARATION & APPLICATION WILL BE IN ACCORDANCE W/ MANUFACTURER REQUIREMENTS.
4. REINSTALL THE MISSING ARCHITECTURAL NATURAL STONE W/ ORIGINAL SPECIFICATIONS. (APPROXIMATE 10 SF.)
5. REMOVE ALL IDLE UTILITIES CABLE AND EXISTING WOOD SHELVES. INSTALL LAMP & HEAVY DUTY STORAGE SHELVING UNIT (COORDINATE W/ OWNER AND A/E). "FUMIGAR CONTRA COMEJEN"
6. STEEL JOIST AND/OR BEAMS TO BE RECONDITION ACCORDING TO THE SPECS ON SHEET S601 (EXISTING STEEL PIECES NOTE). INCLUDING ALSO TO ALL SECONDARY ELEMENTS AND/OR CONNECTIONS.
7. STEEL JOIST TO BE REPAIR ACCORDING TO DETAILS ON SHEET S301.
8. REPLACE EXISTING LAMPS W/ SOLAR LIGHTING SYSTEM, (9) LAMPS = 180 WATTS (**)(SUBMIT SHOP DRAWINGS).
9. EXIST. 81"x32,1/2" ALUM. DOOR TO BE REPLACE W/NEW ALUM. SECURITY DOOR (COLOR TO BE COORDINATE WITH A/E).
10. INSTALL ONE (1) 10 LB FIRE EXTINGUISHER (WALL MOUNTED).
11. EXISTING GUARDRAIL TO BE RECONDITIONED W/ ORIGINAL SPECIFICATIONS. PAINTING W/ A PREMIUM QUALITY PAINT BRAND. SURFACE PREPARATION & PAINTING WILL BE IN ACCORDANCE W/ MANUFACTURER REQUIREMENTS. EXPANDED METAL AND 2x6 TREATED WOOD AT TOP OF THE GUARDRAIL SHALL BE REPLACE W/ THE ORIGINAL SPECS. (COLOR TO BE COORDINATE WITH A/E).
12. EXISTING 14"x17"(HxW) WINDOW TO BE REPLACE W/ A STORM GUARD WINDOW, 3" JALOUSIE (COLOR TO BE COORDINATE WITH A/E).
13. REPLACE THE SWITCHES & RECEPTACLES ELECTRICAL (WATERPROOF COVER WHEN OCCURS).
14. INSTALL LID TO EXISTING ELECTRICAL PANEL.
15. REINSTALL THE FLAG OF THE MUNICIPALITY OF "HATILLO", INCLUDING THE POLE & FOUNDATION. (SUBMIT SHOP DRAWINGS)
16. REINSTALL THE SIGN OF THE PLATFORM NAME (COORDINATE WITH OWNER & A/E).
17. EXISTING ROOF STEEL DECK & PLYWOOD PANEL TO BE REPLACE (FOR DETAILS & SPECIFICATIONS SEE SHEET S301), APPLY SEALER TO PLYWOOD PANEL.
18. EXISTING GUARDRAIL TO BE RECONDITIONED W/ ORIGINAL SPECIFICATIONS. PAINTING W/ A PREMIUM QUALITY PAINT BRAND. SURFACE PREPARATION & PAINTING WILL BE IN ACCORDANCE W/ MANUFACTURER REQUIREMENTS. (COLOR TO BE COORDINATE WITH A/E) REPLACE SFT OF TOP RAIL W/ SAME SPECIFICATION (1"x2" GALVANIZED STEEL TUBE).
19. EXISTING OUTDOOR POST LAMP TO BE REPLACE W/ THE ORIGINAL SPECS (COORDINATE WITH OWNER & A/E).
20. REMOVE EXISTING DRINKING WATER FOUNTAIN INCLUDING PIPING.
21. STEEL BEAMS AND COLUMNS TO BE TO BE REPLACE W/ THE SAME SPECIFICATIONS. INCLUDING ALSO TO ALL SECONDARY ELEMENTS AND/OR CONNECTIONS (SEE SHEET S301). QUANTITY: (4) STEEL FRAMES.
22. REPLACE EXISTING WOOD JOIST & WOODEN PLANK FLOOR (FOR DETAILS & SPECIFICATIONS SEE SHEET S301), APPLY SEALER TO ALL WOOD.



HATILLO PLATFORM SECTION MK'D "A"

SCALE: 1/4"=1'-0"

IMPORTANT NOTES:

1. CLEAN ALL THE SURROUNDINGS OF THE AREAS TO BE RECONDITIONED OR REPAIRED (INCLUYE CORTE Y PODA DE AREAS VERDES).
2. ALL DIMENSIONS, ELEVATIONS, EQUIPMENTS, ELEMENTS & CONDITIONS SHALL BE VERIFY PRIOR TO BID.

Yo, MANUEL A. RIVERA ALBELO, 18.696 PE, certifico que soy el profesional que
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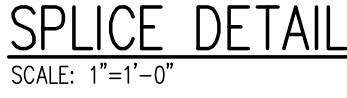
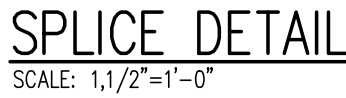
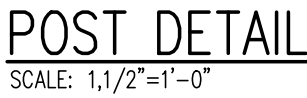
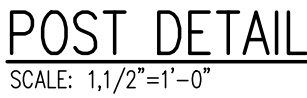
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EXISTING
HATILLO PLATFORM
PLANS & SECTIONS

A

A101

A102



Professional Seal

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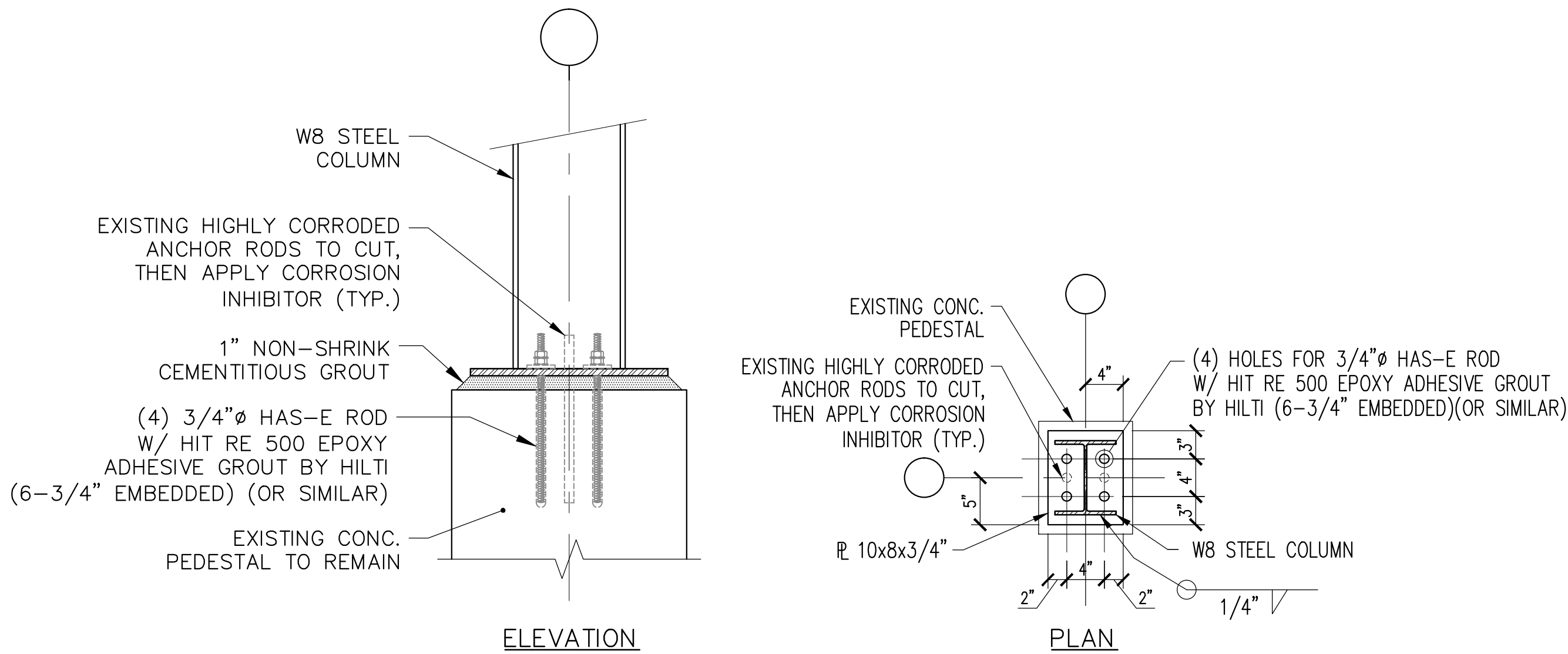
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"CUEVA CLARA"
GUARDRAIL DETAILS

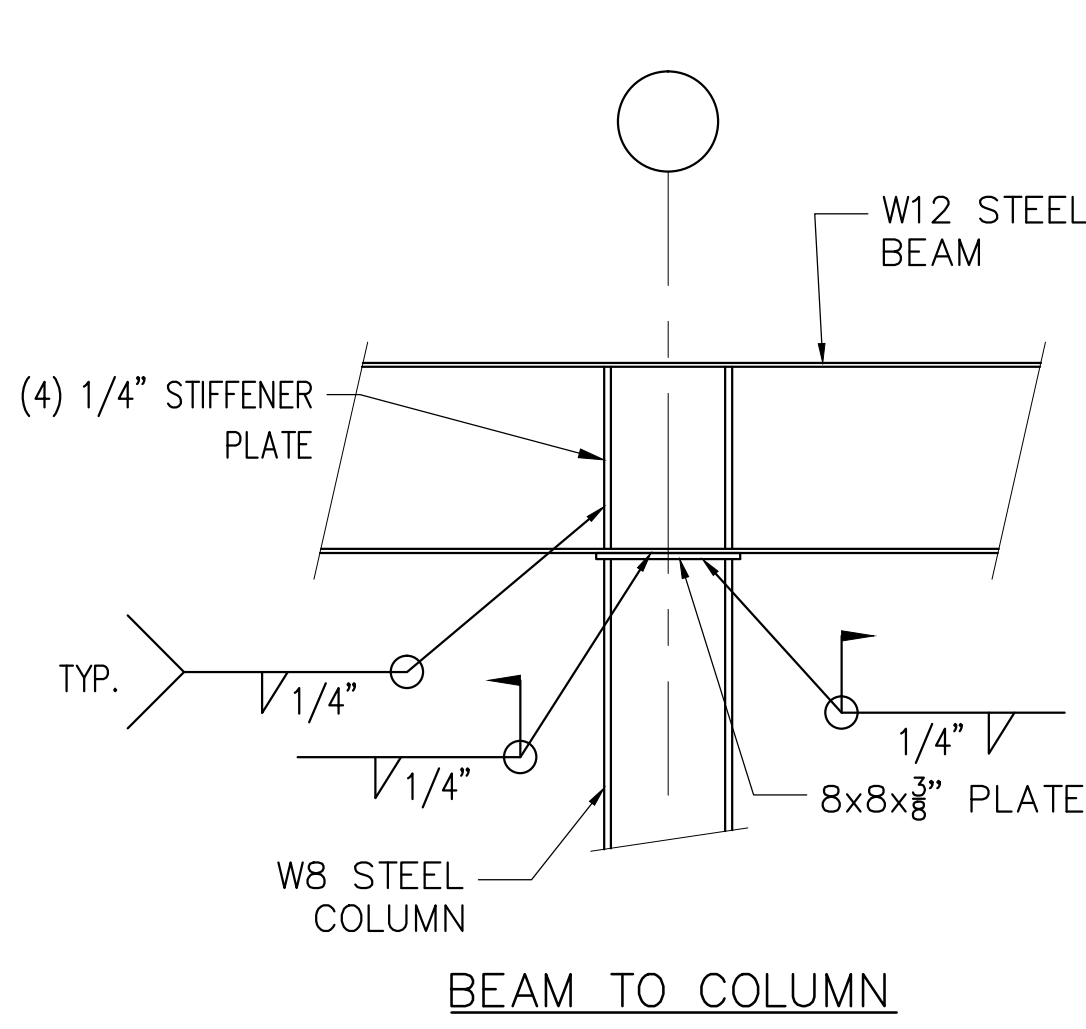
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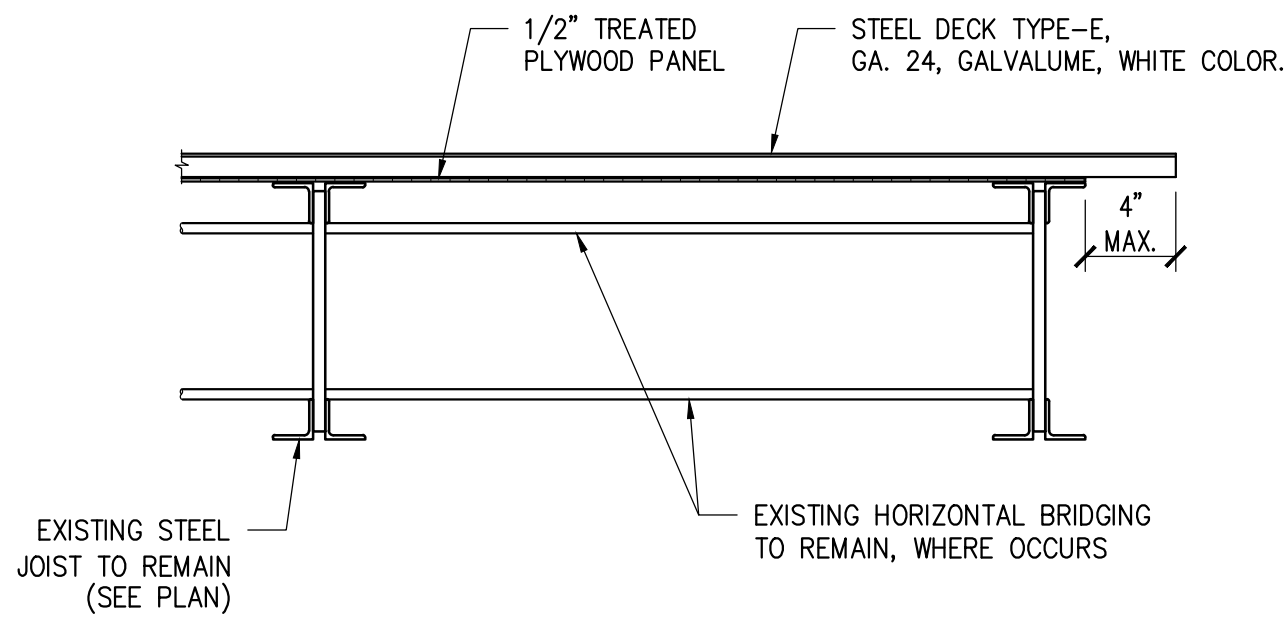
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TYPICAL STEEL COLUMN BASE PLATE DETAILS
SACALE: N.T.S.

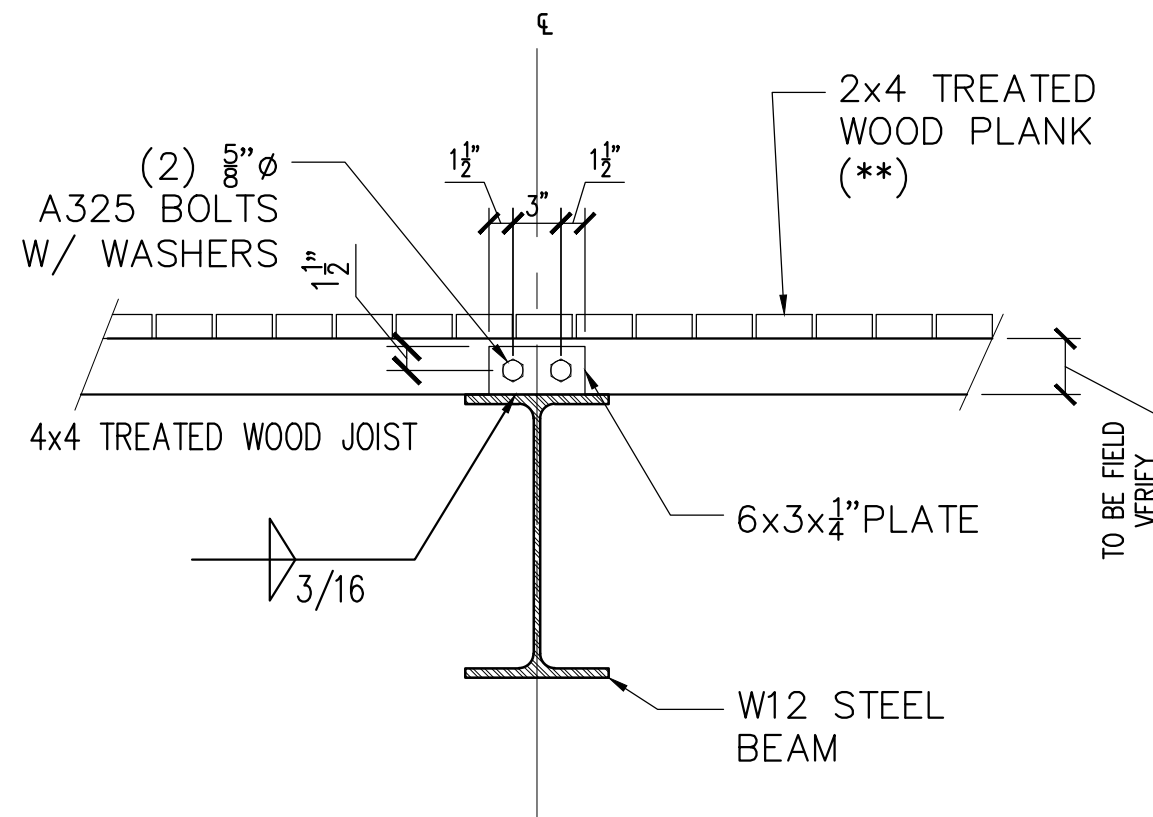


TYPICAL STEEL BEAM CONNECTION DETAILS
SACALE: N.T.S.



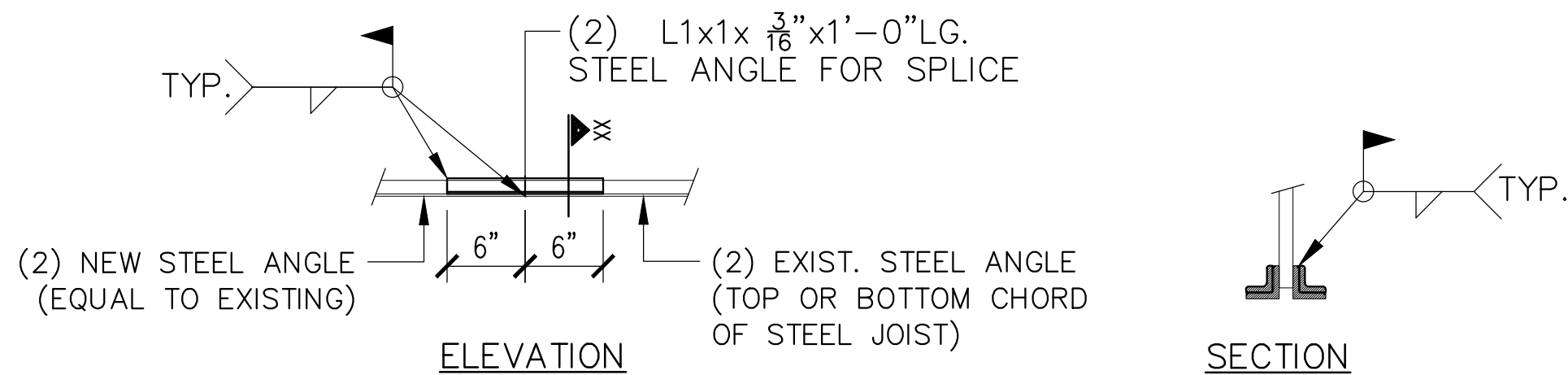
TYPICAL STEEL DECK & PLYWOOD PANEL CONNECTION DETAIL (ROOF LEVEL)
SACALE: N.T.S.

- NOTES:
- STEEL DECK CONNECTION SHALL BE #12 SCREWS ON 36/6 PATTERN, WITH #10 STITCH SCREWS IN SIDELAPS. SCREWS SHALL BE CORROSION RESISTANCE W/ SEALING NEOPRENE WASHER (PRO SELF-DRILLING SCREWS FOR STEEL DECK/TREATED PLYWOOD PANEL/ TOP CHORD STEEL JOIST CONNECTION).
 - APPLY SIDE LAP SEALANT IN ALL SIDE AND END LAPS OF STEEL DECK. SIDE LAP SEALANT SHALL BE MADE OF MICROCELLED POLYMERIZED VINYL CHLORIDE AND SHALL BE PRESSURE SENSITIVE ON BOTH SIDES.
 - MAXIMUM STEEL DECK CANTILEVER SHALL BE 4".

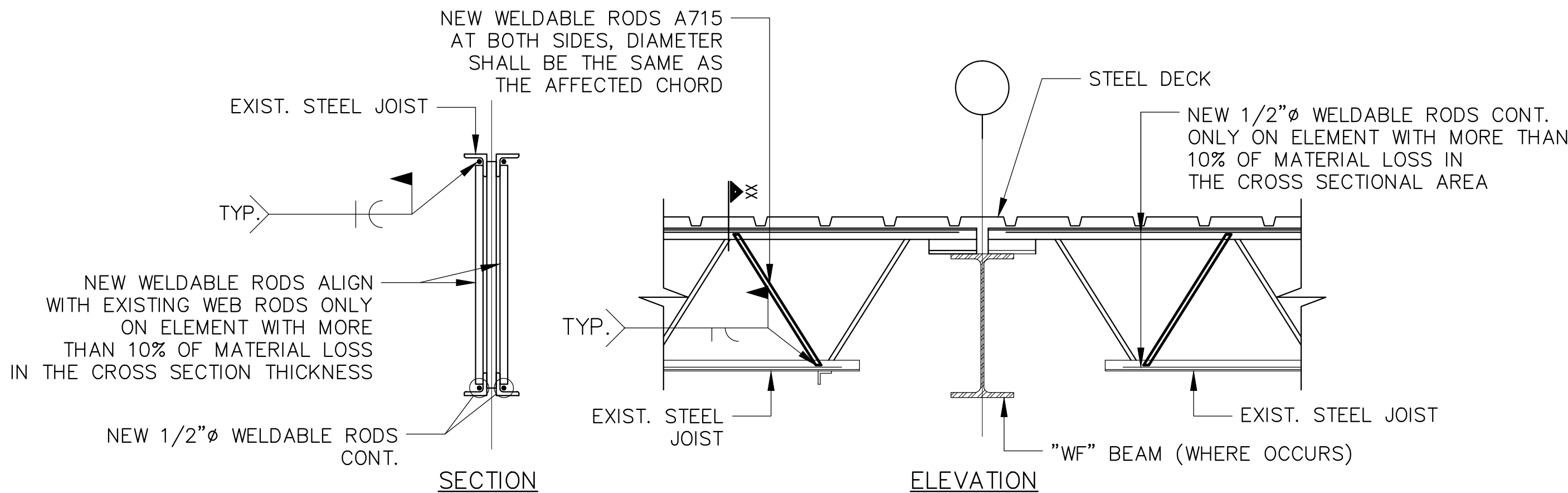


TYPICAL WOOD JOIST CONNECTION DETAIL (FLOOR LEVEL)
SACALE: N.T.S.

** WOOD PLANK TO WOOD JOIST CONNECTION SHALL BE W/ (2) #12 SCREWS. SCREWS SHALL BE CORROSION RESISTANCE & PRO SELF-DRILLING.



TOP & BOTTOM CHORD REPAIR DETAIL



NOTE:
IN CASE OF MATERIAL LOSS OVER 30% OF THE CROSS SECTION THICKNESS IN THE TOP AND BOTTOM CHORD, REPLACE THE JOIST ELEMENTS W/ THE SAME SPEC'S OR APPROVED EQUAL.

TYP. JOIST REPARATION DETAIL

SCALE: N.T.S.

1

NOTES:

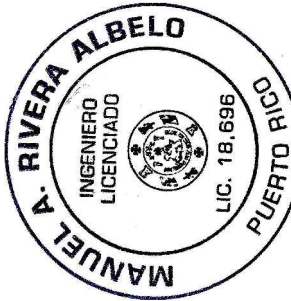
- REPAIR STEEL JOIST ACCORDING TO DETAIL 1/S301
- SEE SHEET S601 FOR THE REQUIRED CORROSION PROTECTION SYSTEM (CSP) OF ALL THE STRUCTURAL STEEL ELEMENTS.

IMPORTANT NOTES:

- ALL DIMENSIONS, EXISTING ELEMENTS & CONDITIONS TO BE FIELD VERIFY PRIOR TO START THE CONSTRUCTION.

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STEEL FRAMES
REPAIR
DETAILS & NOTES

S

S301

GENERAL NOTES:

- THESE GENERAL NOTES SUPPLEMENT THE PROJECT SPECIFICATIONS. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- SPECIFICATIONS NOTED ON THESE DRAWINGS SHALL BE OF THE LATEST REVISION.
- STRUCTURAL DRAWINGS ARE INTENDED TO BE USED WITH ARCHITECTURAL, ELECTRICAL AND MECHANICAL DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR COORDINATING SUCH REQUIREMENTS INTO THEIR SHOP DRAWINGS AND WORK.
- NO OPENINGS, OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS, SHALL BE MADE IN ANY STRUCTURAL MEMBER WITHOUT THE WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER.
- NO CHANGE IN SIZE OR DIMENSION OF STRUCTURAL MEMBERSHIP SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT/ENGINEER.
- OPENINGS "1"-4" AND LESS ON A SIDE ARE GENERALLY NOT SHOWN ON THE STRUCTURAL DRAWINGS. REFER TO ARCHITECTURAL AND MECHANICAL DRAWINGS FOR SUCH OPENINGS.
- THE CONTRACTOR IS RESPONSIBLE FOR LIMITING THE AMOUNT OF CONSTRUCTION LOAD IMPOSED UPON STRUCTURAL FRAMING. CONSTRUCTION LOADS SHALL NOT EXCEED THE DESIGN CAPACITY OF THE FRAMING AT THE TIME THE LOADS ARE IMPOSED.
- HORIZONTAL MOVEMENT OF ANY HEAVY EQUIPMENT OVER STRUCTURAL FLOORS OR ROOF AND ITS TEMPORARY AND/OR DEFINITE LOCATIONS MUST BE PREVIOUSLY APPROVED BY THE ENGINEER SO AS NOT TO OVERLOAD THE STRUCTURE OR IN ANY OTHER WAY IMPAIR THE STRUCTURE. SAME PRECAUTION SHALL BE TAKEN FOR THE PILING OF CONSTRUCTIONS MATERIALS.
- THE STRUCTURE IS DESIGNED TO FUNCTION AS A UNIT UPON COMPLETION. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL TEMPORARY BRACING AND/OR SUPPORT THAT MAY BE REQUIRED AS THE RESULT OF THE CONTRACTOR'S CONSTRUCTION METHODS AND/OR SEQUENCES. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.
- ALL STRUCTURES HAVE BEEN DESIGNED ACCORDING TO FINAL BEHAVIOR AND CONDITIONS. HOWEVER, DURING ERECTION OF SAME, CERTAIN CONDITIONS CAN ARISE FOR WHICH THE BEHAVIOR OF THE STRUCTURE HAS NOT BEEN CONTEMPLATED. THEREFORE, THE CONTRACTOR SHOULD PROVIDE AT ALL TIME ADEQUATE SHORING AND RESTORING UNTIL THE DESIGN CONDITIONS HAVE BEEN MET. IF THERE IS ANY DOUBT DURING ANY PHASE OF THE CONSTRUCTION, PLEASE CONSULT AND/OR NOTIFY THE STRUCTURAL ENGINEER.
- DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALES SHOWN ON DRAWINGS. REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS NOT SHOWN ON STRUCTURAL DRAWINGS.
- NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS.
- CONTRACTOR'S CONSTRUCTION AND/OR ERECTION SEQUENCES SHALL RECOGNIZE AND CONSIDER THE EFFECTS OF THERMAL MOVEMENTS OF STRUCTURAL ELEMENTS DURING THE CONSTRUCTION PERIOD.
- THE CONTRACTOR SHALL INFORM THE ARCHITECT/ENGINEER IN WRITING OF ANY DEVIATION FROM THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL NOT BE RELIEVED OF THE RESPONSIBILITY OF SUCH DEVIATION BY THE PROFESSIONAL OF RECORD REVIEW OF SHOP DRAWINGS, PRODUCT DATA, ETC., UNLESS THE CONTRACTOR HAS SPECIFICALLY INFORMED THE PROFESSIONAL OF RECORD OF SUCH DEVIATION AT THE TIME OF SUBMISSION. THE PROFESSIONAL OF RECORD HAS GIVEN WRITTEN APPROVAL TO THE SPECIFIC DEVIATION.
- WHERE "OWNER" IS MENTIONED IN PLANS IT IS TO BE UNDERSTOOD EITHER OWNER OR HIS AUTHORIZED REPRESENTATIVE.
- CONTRACTOR SHALL SUBMIT FOR OWNERS APPROVAL LOCATION AND DETAILS OF CONSTRUCTION JOINTS IN SLABS AND BEAMS, AND IN ANY OTHER STRUCTURAL MEMBERS.
- CONTRACTOR MUST VERIFY ALL DIMENSIONS ON STRUCTURAL PLANS AGAINST THE DIMENSIONS ON ARCHITECTURAL PLANS BEFORE LAYING OUT THE WORK.
- CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING FIELD CONDITIONS PRIOR TO STARTING CONSTRUCTION. IF ANY DISCREPANCY ARISES IN THE STRUCTURAL AND ARCHITECTURAL PLANS, THE ARCHITECTS AND ENGINEERS SHALL BE NOTIFIED IMMEDIATELY.
- CONTRACTOR MUST PROVIDE, SET AND VERIFY DIMENSIONS AND LOCATION OF ALL ANCHORS, INSERTS BOLTS, SLEEVES, CONDUITS, ETC., SHOWN OR NOTED IN ARCHITECTURAL AND/OR MECHANICAL AND PLUMBING PLANS BEFORE THE CONCRETE IS PLACED.
- PROVISIONS FOR DETAILS NOT SPECIFICALLY DRAWN SHALL BE MADE BY THE CONTRACTOR IN ACCORDANCE WITH THE LATEST VERSION OF THE ACI BUILDING CODE AND/OR AISC SPECIFICATIONS AND CLARIFIED WITH THE STRUCTURAL ENGINEER.
- ALL DETAILS, SECTIONS AND NOTES SHOWN ON DRAWINGS AND INTENDED TO BE BY TYPICAL AND SHALL APPLY TO SIMILAR SITUATIONS ELSEWHERE UNLESS NOTED OTHERWISE.
- IN CASE OF DOUBT IN THE INTERPRETATION OF ANY ASPECT OF THESE STRUCTURAL DRAWINGS AND/OR SPECIFICATIONS, THE STRUCTURAL ENGINEER SHALL BE CONSULTED.
- NOTIFY THE STRUCTURAL ENGINEER IN ADVANCE OF CONDITIONS NOT SHOWN OR OMITTED ON THE DRAWINGS.

REFERENCES:

- DESIGN, FABRICATION & CONSTRUCTION WORK SHALL COMPLY WITH THE REQUIREMENTS AND PROVISIONS OF THE FOLLOWING CODES AND SPECIFICATIONS THEIR COMMENTARIES AND THE STANDARDS REFERENCED THEREIN:
- AMERICAN CONCRETE INSTITUTE (ACI)
 - PUERTO RICO BUILDING CODE, 2018
 - AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
 - CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
 - AMERICAN WELDING SOCIETY (AWS)
 - AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
 - STEEL DECK INSTITUTE (SDI)
 - STEEL JOIST INSTITUTE (SJI)

DESIGN LOADS:

- SEISMIC LOADS: (PRBC-2018)
 - CATEGORY : 0
 - IMPORTANCE : 1.0
- WIND LOADS: (PRBC-2018)
 - VELOCITY : 149 mph
 - EXPOSURE : B
 - RISK CATEGORY : II
- LIVE LOADS:
 - ROOF : 30 psf

MATERIALS:

- ALL CONCRETE SHALL DEVELOP A MINIMUM 28 DAYS COMPRESSIVE STRENGTH AS FOLLOWS:
 - FOUNDATION, SLAB, WALL, COLUMN & BEAMS : 4,000 PSI
- PORTLAND CEMENT SHALL CONFORM TO ASTM C-150, TYPE I.
- WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
- ALL REINFORCING BARS SHALL BE HIGH TENSILE DEFORMED MEETING ASTM A-615 GRADE 60, UNLESS NOTED OTHERWISE ON SPECS AND/OR DRAWINGS.
- CONCRETE MASONRY UNITS SHALL BE NORMAL WEIGHT BLOCK CONFORMING TO ASTM C-90, GRADE N, TYPE 1, AND SHALL HAVE COMPRESSIVE STRENGTH OF 1900 PSI.
- MORTAR SHALL CONFORM TO ASTM C-270.
- MASONRY GROUT SHALL CONFORM TO ASTM C-476.
- CONCRETE WIRE REINFORCING (JOINT REINFORCING) SHALL BE GALVANIZED TRUSS TYPE FABRICATED UNITS WITH A SINGLE PAIR OF 9 GAUGE SIDE RODS AND 9 GAUGE CONTINUOUS DIAGONAL CROSS RODS FABRICATED FROM COLD-DRAWN STEEL WIRE COMPLYING WITH ASTM A-82.

- ROLLED STEEL SHAPES (Fy=50 ksi) : ASTM A-572
- STRUCTURAL TUBE (Fy=46 ksi) : ASTM A-500
- STEEL PIPE (Fy=35 ksi) : ASTM A-53
- ANCHOR RODS AND UNWISHER BOLTS : ASTM A-307
- BOLTS, NUTS AND WASHERS : ASTM A-325
- WELDING ELECTRODES (E333, CLASS E7018XX) : ASTM A-223
- OUTRIGGERS (Fy = 50 ksi) : ASTM A-572
- PLATES AND BARS UNO : ASTM A-36

FOUNDATIONS:

- THE FOUNDATION HAS BEEN DESIGNED WITH AN ASSUMED SOIL BEARING CAPACITY OF 2,000 PSF. THE ASSUMED BEARING CONDITION SHALL BE VERIFIED BY THE SOIL CONSULTANT BEFORE THE CONTRACTOR MAY START PLACING THE FOUNDATION. IN THE EVENT THAT UNUSUAL SOIL CONDITIONS ARE ENCOUNTERED, THE ENGINEER SHALL BE NOTIFIED, AND FOUNDATIONS SHALL NOT BE PLACED UNTIL DIRECTION IS RECEIVED FROM THE ENGINEER.
- FOOTINGS MAY BE POURED INTO AN EARTH-FORMED TRENCH IF SOIL CONDITIONS PERMIT.
- ALL BEARING MATERIAL SHALL BE INSPECTED BY THE ENGINEERING IN INSPECTION PRIOR TO CONCRETE PLACEMENT. THE INDEPENDENT INSPECTOR SHALL BE THE SOLE JUDGE AS TO THE SUITABILITY OF THE BEARING MATERIAL. FOOTING ELEVATIONS SHALL BE ADJUSTED AS REQUIRED. THE INSPECTOR SHALL BE THE OWNER'S REPRESENTATIVE AT THE PROJECT SITE, AND AS SUCH WILL BE RESPONSIBLE TO HIM.
- WHERE FOUNDATION WALLS ARE TO HAVE EARTH PLACED ON EACH SIDE, PLACE FILL SIMULTANEOUSLY SO AS TO MAINTAIN A COMMON ELEVATION ON EACH SIDE OF THE WALL.
- ALL BACKFILL SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY.

CAST IN PLACE REINFORCED CONCRETE:

- CONCRETE ITEMS AND REINFORCEMENT SHALL BE ERECTED IN STRICT ACCORDANCE WITH OWNER APPROVED SHOP AND ERECTION DRAWINGS FOLLOWING THE DETAILS SHOWN ON PLANS.
- THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PRODUCE CORRECTLY ALIGNED CONCRETE CONSIDERING AMONG OTHER THINGS, THE ELASTIC DEFORMATION OF THE STRUCTURAL MEMBERS.
- AT HORIZONTAL JOINTS IN WALLS AND COLUMNS, THE LOWER SURFACE SHALL BE THOROUGHLY CLEARED AND ALL WEAR OR LOOSE CONCRETE REMOVED FROM THERE BEFORE POURING THE UPPER CONCRETE(SEE SPECS. FOR ADDITIONAL REQUIREMENTS). NO JOINT SHALL BE COVERED WITH PLASTER OR OTHERWISE WITHOUT A VISUAL EXAMINATION AND APPROVAL BY THE INSPECTOR.
- NO DEFECTIVE CONCRETE SHALL BE CORRECTED OR COVERED WITH MORTAR, PLASTER ETC. WITHOUT THE INSPECTORS' APPROVAL.
- SUMP OF CONCRETE SHALL NOT EXCEED 4" UNLESS A HIGH-RANGE WATER-REDUCING ADMIXTURE IS USED. THE SLUMP OF CONCRETE PRIOR TO ADDITION OF A HIGH RANGE WATER-REDUCING ADMIXTURE SHALL NOT EXCEED 4". THE SLUMP OF CONCRETE CONTAINING A HIGH RANGE WATER-REDUCING ADMIXTURE SHALL NOT EXCEED 10".
- CONCRETE SHALL BE NON-AIR ENTRAINED. AIR CONTENT SHALL BE BETWEEN 0 AND 2 PERCENT.
- THE NOMINAL MAXIMUM AGGREGATE SIZE SHALL BE OF 3/4".
- MINIMUM CONCRETE COVER, UNLESS NOTED OTHERWISE: UNFORMED SURFACE IN CONTACT WITH THE GROUND 3 IN.

- FORMED SURFACES EXPOSED TO EARTH OR WEATHER:
- #6 BARS AND LARGER : 2 IN.
- #6 BARS AND SMALLER : 1-1/2 IN.
- FORMED SURFACES NOT EXPOSED TO EARTH OR WEATHER: BEAMS, GIRDER, AND COLUMNS : 1-1/2 IN.
- SLABS, WALLS AND JOISTS: #11 BARS AND SMALLER : 3/4 IN.
- CONCRETE REINFORCING STEEL INSTITUTE (CRS) #14 AND #18 BARS : 1-1/2 IN.
- ALL REINFORCING SHALL BE DETAILED, FABRICATED AND PLACED, IN ACCORDANCE WITH ACI DETAILING MANUAL (SP-66) AND THE MANUAL OF STANDARD PRACTICE FOR REINFORCED CONCRETE CONSTRUCTION" BY THE CRSI.

- ALL REINFORCING SHALL BE SUPPORTED IN FORMS USING STEEL CHAIRS, SPACED WITH NECESSARY ACCESSORIES AND SHALL BE SECURELY WIRED TOGETHER, IN ACCORDANCE WITH CRSI "MANUAL OF STANDARD PRACTICE".
- CONCRETE WORK SHALL BE SUBJECT TO QUALITY ASSURANCE TESTING AND INSPECTION. SEE QUALITY ASSURANCE GENERAL NOTES AND PROJECT SPECIFICATIONS.
- ALL SLAB AND CORRESPONDING BEAMS, CURBS, OR APRONS SHALL BE POURED MONOLITHICALLY.
- ALL REINFORCING, SLEEVES, CONDUITS, INSERTS AND BOLTS SHALL BE WELL SECURED AND IN PLACE BEFORE CONCRETE IS POURED.
- ALL OPENINGS IN CONCRETE WALLS SHALL BE REINFORCED AROUND WITH 2 #6 BARS PLACED AT 2 INCHES FROM THE FACE AND EXTENDING 24 INCHES BEYOND CORNERS, UNLESS OTHERWISE SPECIFIED IN PLANS.
- TEMPERATURE REINFORCEMENT SHALL BE PROVIDED IN ALL ONE WAY SLAB NORMAL TO THE PRINCIPAL REINFORCEMENT IN ACCORDANCE WITH LATEST VERSION OF THE ACI BUILDING CODE.
- ALL ONE WAY SLAB TEMPERATURE REINFORCEMENT SHALL BE AS FOLLOWS: (NOTED OTHERWISE) 0.18% OF SECTIONAL AREA (INCLUDING INTEGRAL TOPPING).
- FOR CONSTRUCTION JOINTS IN STRUCTURAL MEMBERS A VERTICAL BULKHEAD AND KEY JOINT MUST BE PROVIDED.
- MINIMUM LAP OF WELDED WIRE FABRIC SHALL BE 6 INCHES OR ONE FULL MESH, WHICHEVER IS GREATER.
- SLAB ON GROUND, AS INDICATED ON DRAWINGS.
- FOR CONCRETE FORMWORK, SURFACE FINISHING, BEVELED CORNERS AND DRIPS, SEE ARCHITECTURAL PLANS.
- ALL SYMBOLS AND STRESSES AS WELL AS CONCRETE WORK SHALL CONFORM TO THE STANDARD OF THE LATEST VERSION OF THE ACI BUILDING CODE.
- PLACEMENT OF CONCRETE SHALL CONFORM TO ACI STANDARD 304 AND PROJECT SPECIFICATIONS.
- LAP SPICES SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE. UNLESS NOTED OTHERWISE, WHERE CLASSES ARE NOT CALLED OUT ON DRAWINGS, USE CLASS "B" SPICE.

TENSION DEVELOPMENT LENGTH (in) Ld									
BAR SIZE	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS
# 3	22	17	18	14	17	13			
# 4	29	22	25	19	22	17			
# 5	36	28	31	24	27	21			
# 6	43	33	38	29	34	26			
# 7	50	40	45	34	41	32			
# 8	72	55	61	47	55	42			
# 9	81	62	69	53	61	47			
# 10	91	70	78	60	69	53			
# 11	101	78	86	66	77	59			

TENSION DEVELOPMENT LENGTH (in) Ld									
BAR SIZE	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS
# 3	29	22	23	18	22	17			
# 4	38	29	33	25	29	22			
# 5	47	36	40	31	35	27			
# 6	56	43	49	38	44	34			
# 7	81	62	69	53	62	48			
# 8	94	72	79	61	72	55			
# 9	105	81	90	69	79	61			
# 10	118	91	101	78	90	69			
# 11	131	101	112	86	100	77			

TENSION DEVELOPMENT LENGTH (in) Ld									
BAR SIZE	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS
# 3	29	22	23	18	22	17			
# 4	38	29	33	25	29	22			
# 5	47	36	40	31	35	27			
# 6	56	43	49	38	44	34			
# 7	81	62	69	53	62	48			
# 8	94	72	79	61	72	55			
# 9	105	81	90	69	79	61			
# 10	118	91	101	78	90	69			
# 11	131	101	112	86	100	77			

- COMPRESSION DOWEL EMBEDMENT: 22 BAR DIAMETERS LAP WELDED WIRE FABRIC ONE SPACING OF CROSS WIRES PLUS 2". THE DEVELOPMENT LENGTH INDICATED ABOVE IS VALID WHEN ONE OF THE FOLLOWING CONDITIONS IS MET:
- CLEAR SPACING OF BARS BEING DEVELOPED OR SPLICED NOT LESS THAN d_b . CLEAR COVER NOT LESS THAN d_b , AND STIRRUPS OR TIES THROUGHOUT l_d NOT LESS THAN THE CODE MINIMUM.
 - CLEAR SPACING OF BARS BEING DEVELOPED OR SPLICED NOT LESS THAN $2d_b$ AND CLEAR COVER NOT LESS THAN d_b .
- PROVIDE DOWELS IN PEDESTAL AND/OR WALL FOOTINGS EQUAL IN GRADE, SPACING, SIZE AND NUMBER TO VERTICAL REINFORCEMENT. EXTENDING A TENSION SPICE LENGTH INTO THE PEDESTAL AND/OR WALL AND 40 BAR DIAMETER INTO FOOTING. (THE LATERAL EMBEDMENT SHALL BE EXTENDED AS NECESSARY TO PROVIDE A MINIMUM HORIZONTAL LEG RESTING ON FOOTING REINFORCEMENT EQUAL TO THE CORRESPONDING "G" LENGTH FOR THE BAR SIZE.)
 - CONCRETE SHALL NOT BE DROPPED THROUGH REINFORCING STEEL SO AS TO CAUSE SEGREGATION OF AGGREGATES IN SUCH CASES, HOOPERS OR VERTICAL CHUTES OR TRUNKS SHALL BE USED. THE FREE UNCONFINED FALL OF CONCRETE SHALL NOT EXCEED THE ABOVE REQUIREMENTS.
 - THE SIZE OF NAILS AND SIMILAR FASTENERS DRIVEN INTO CONCRETE SHALL BE SUCH, AS NOT TO CRACK OR IMPAIR IT. NEVERTHELESS, IF THE CONCRETE IS DAMAGED, IT SHALL BE PROPERLY REPAIRED AFTER REMOVING THE DAMAGED PORTION AND SUITABLE JOINT SURFACE ARE PROVIDED.
 - ALL CAST IN PLACE REINFORCED CONCRETE STRUCTURAL MEMBERS SHALL BE PROPERLY CURED IN ACCORDANCE WITH THE LATEST VERSION OF THE ACI CODE, CHAPTER V AND ACI 308.
 - ALL LAPPING, BENDING AND PLACING OR REINFORCEMENT SHALL BE DONE IN ACCORDANCE WITH THE LATEST VERSION OF THE ACI BUILDING CODE.
 - ALL REINFORCING BAR BENDS SHALL BE MADE COLD.
 - ALL NEGATIVE REINFORCEMENT (TOP REINF.) AND POSITIVE REINFORCEMENT (BOTTOM REINF.) IN SLABS AND BEAMS SHALL BE EXTENDED BEYOND THE CENTER LINE OF THE END SUPPORTS IN ACCORDANCE WITH THE LATEST VERSION OF THE ACI BUILDING CODE, UNLESS OTHERWISE SPECIFIED.

- WELDING OF REINFORCEMENT SHALL BE WITH LOW HYDROGEN ELECTRODES IN CONFORMANCE WITH "REINFORCING STEEL WELDING CODE" AND "RECOMMENDED PRACTICES FOR WELDING REINFORCING STEEL" BOTH BY THE AWS (AWS D12.1 & AWS D1.4 RESPECTIVELY).
- ALL FORMWORK FOR FLEXURAL MEMBERS SHALL BE BUILT WITH A CAMBER CORRESPONDING TO ITS WON DEFORMATION PLUS THE STRUCTURE DEAD LOAD DEFORMATIONS. IN DETERMINING THE AMOUNT OF CAMBER, THE CONTRACTOR SHALL HAVE THE ASSISTANCE OF THE DESIGNER WHERE SO REQUESTED.
- NO JOINT, OPENING, SLOT OR GROOVE OTHER THAN THAT SHOWN ON DRAWINGS SHALL BE PERMITTED WITHOUT PREVIOUS APPROVAL BY THE ENGINEER. ALL CONSTRUCTION JOINT SURFACES SHALL BE CLEANED AND ROUGHENED IMMEDIATELY BEFORE CONCRETING AND TREATED AS INSTRUCTED IN THE "ACI MANUAL OF CONCRETE PRACTICE".
- CONDUIT OF PIPE SIZE (O.D.) SHALL NOT EXCEED 30 PERCENT OF TOTAL SLAB THICKNESS AND SHALL BE PLACED BETWEEN THE TOP & BOTTOM REINFORCEMENT, UNLESS SPECIFICALLY DETAILED OTHERWISE. CONCENTRATIONS OF CONDUITS OR PIPES SHALL BE AVOIDED EXCEPT WHERE DETAILED OPENINGS ARE PROVIDED.
- WATER-CEMENT RATIO REQUIREMENTS FOR DIFFERENT COMPRESSIVE STRENGTHS OF CONCRETE.

COMPRESSIVE STRENGTH AT 28 DAYS, psi	WATER-CEMENT RATIO BY WEIGHT	NON-AIR ENTRAINED AIR ENTRAINED CONCRETE
4,000	0.55	0.45
3,500	0.58	0.50
3,000	0.62	0.56
2,500	0.72	0.66

REINFORCED MASONRY

- REINFORCED CONCRETE MASONRY SHALL HAVE A MINIMUM DESIGN COMPRESSIVE STRENGTH, FM, OF 1500 PSI. VERIFICATION OF THE DESIGN STRENGTH SHALL BE BY THE UNIT TEST METHOD.
- SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF VERTICAL CONTROL JOINTS. HORIZONTAL BOND BEAM AND UNTEL REINFORCING SHALL BE CONTINUOUS ACROSS VERTICAL CONTROL JOINTS. JOINT REINFORCING SHALL BE STOPPED EITHER SIDE OF VERTICAL CONTROL JOINTS.
- ALL REINFORCED CELLS, ALL CELLS BELOW GRADE AND ALL CELLS BELOW FINISH FLOOR SHALL BE GROUTED SOLID.
- WHEN A FOUNDATION DOWEL DOES NOT LINE UP WITH A VERTICAL BLOCK CORE, IT SHALL NOT BE SLOPED MORE THAN ONE (1) HORIZONTAL IN SIX (6) VERTICAL. DOWELS MAY BE GROUTED INTO A CELL IN VERTICAL ALIGNMENT, EVEN THOUGH IT IS IN AN ADJACENT CELL TO THE VERTICAL WALL REINFORCING.
- REINFORCING STEEL SHALL BE SECURED IN PLACE BEFORE GROUTING STARTS.
- SPLICED REINFORCING SHALL BE LAPPED 48 BAR DIAMETERS OR 24 INCHES, WHICHEVER IS GREATER. SPLICED BARS SHALL BE WIRED TOGETHER.
- VERTICAL BARS SHALL BE HELD IN POSITION AT TOP AND BOTTOM AND AT INTERVALS NOT EXCEEDING 192 DIAMETERS OF THE REINFORCING BAR, NOR 10 FEET.
- VERTICAL REINFORCING BARS SHALL HAVE A MINIMUM CLEARANCE OF 3/4 OF AN INCH FROM THE MASONRY AND NOT LESS THAN ONE BAR DIAMETER BETWEEN BARS.
- VERTICAL CELLS THAT WILL BE GROUTED SHALL HAVE A VERTICAL ALIGNMENT TO MAINTAIN A CONTINUOUS UNOBSTRUCTED CELL AREA NOT LESS THAN $2-1/2 \times 3'$.
- GROUTING SHALL BE STOPPED 1-1/2" BELOW THE TOP OF A COURSE SO AS TO FORM A KEY AT THE POUR JOINT.

- GROUTING OF MASONRY BEAMS OVER OPENINGS SHALL BE DONE IN ONE CONTINUOUS OPERATION.
- ALL BOLTS, ANCHORS, ETC., INSERTED IN THE WALLS, SHALL BE GROUTED SOLID INTO POSITION.
- REINFORCED MASONRY HAS BEEN DESIGNED USING VALUES FOR CONSTRUCTION WITH SPECIAL INSPECTION.
- REINFORCED MASONRY WORK SHALL BE SUBJECT TO QUALITY ASSURANCE TESTING AND INSPECTIONS. SEE QUALITY ASSURANCE GENERAL NOTES AND PROJECT SPECIFICATIONS.
- CONCRETE MASONRY UNITS SHALL BE LAID WITH FULL MORTAR BEDDING.
- CONCRETE MASONRY UNITS SHALL BE LAID IN A RUNNING BOND PATTERN.
- ALL BLOCK WALLS SHALL BE ANCHORED TO THE FLOOR GROUND SLAB BY MEANS OF #3 BARS HOOKED A MINIMUM OF 6 INCHES INTO THE SLAB AND SPACED A MINIMUM OF 16 INCHES OR #4 BARS HOOKED A MINIMUM OF 8 INCHES INTO THE SLAB AND SPACED A MINIMUM OF 32 INCHES.
- HORIZONTAL JOINT REINFORCEMENT SHALL BE INSTALLED IN THE TWO JOINTS IMMEDIATELY BELOW AND ABOVE WINDOW AND DOOR OPENING AND EVERY OTHER COURSE SPLICED 1" WITH CORRESPONDING DOWELS INTO THE STRUCTURE.
- FOR STRUCTURAL OR ARCHITECTURAL CONCRETE ELEMENTS WHICH DIMENSIONS OR REINFORCEMENT ARE NOT SHOWN ON STRUCTURAL DRAWINGS, THE CONTRACTOR SHALL ASSUME THE DIMENSIONS SHOWN ON ARCHITECTURAL DRAWINGS FOR THOSE, AND UTILIZE THE MINIMUM REINFORCEMENT REQUIRED BY ACI-318 BUILDING CODE FOR THE TYPE OF ELEMENT CONSIDERED FOR ESTIMATING PURPOSE.

- GROUT SHALL BE PLACED BY THE LOW LIFT METHOD; MAXIMUM HEIGHT OF LIFT WITHOUT CLEANING OUT SHALL BE 4 FEET.
- JOINT REINFORCING SHALL BE SPACED AT 16" O.C. VERTICALLY IN ALL MASONRY WALLS.
- PROVIDE A MINIMUM OF 1/2 IN. GROUT BETWEEN MAIN REINFORCEMENT AND MASONRY UNITS.

GENERAL CONTRACTOR NOTICE:

- THE GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS AND CONDITIONS AT THE SITE PRIOR TO COMMENCEMENT OF THE WORK. ANY DISCREPANCIES, ERRORS OR OMISSIONS IN DIMENSIONS, ASSEMBLIES, CONSTRUCTIVE METHODS, ELECTRICAL, MECHANICAL, PLUMBING, STRUCTURAL, SITE COORDINATION AND/OR BUILDING CODES IN THE PLANS, SHALL BE NOTIFIED TO THE ARCHITECT IN WRITTEN FORM PRIOR TO COMMENCEMENT OF THE WORK SO CORRECTIONS CAN BE MADE. IF FOR ANY REASON THESE SAID ERRORS, AND/OR OMISSIONS ARE NOT NOTIFIED TO THE ARCHITECT, THE GENERAL CONTRACTOR SHALL SOLELY ASSUME RESPONSIBILITY, FOR ANY CONSEQUENCES DERIVED FROM SUCH ERRORS AND/OR OMISSIONS.
- AT NO TIME SHALL CONTRACTOR UTILIZE FOR CONSTRUCTION ANY OTHER DRAWING ISSUED TO HIM/HER PRIOR TO CONSTRUCTION UNLESS SIGNED AND SEALED BY "OOPE" (PERMIT MANAGEMENT OFFICE) AND/OR THE ARCHITECT.

STRUCTURAL STEEL

- ALL STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ALL CONNECTIONS. CONNECTION DETAILS INDICATED ON THE AISC CODE OF STANDARD PRACTICE. EXCEPT AS MODIFIED IN THESE NOTES AND THE PROJECT SPECIFICATIONS AND/OR DRAWINGS.
- THE STEEL STRUCTURE IS A PARTIAL-SELF-SUPPORTING STEEL FRAME AND IS DEPENDENT UPON DIAPHRAGM ACTION OF THE METAL ROUGH DECK AND ATTACHMENT TO THE EXISTING MASONRY AND CONCRETE WALLS FOR STABILITY AND FOR RESISTANCE TO WIND AND SEISMIC FORCES. PROVIDE ALL TEMPORARY SUPPORTS REQUIRED FOR STABILITY AND FOR RESISTANCE TO WIND AND SEISMIC FORCES UNTIL THESE ELEMENTS ARE COMPLETED AND ARE CAPABLE OF PROVIDING THIS SUPPORT.
- THE FABRICATOR IS RESPONSIBLE FOR THE SHOP DRAWINGS OF ALL CONNECTIONS. CONNECTION DETAILS INDICATED ON THE DRAWINGS SHALL BE INCORPORATED INTO FABRICATOR'S CONNECTION SHOP DRAWING. ALL SHOP DRAWINGS SHALL BE SIGNED AND SEALED BY THE FABRICATOR'S ENGINEER WITH THE ENGINEER'S SEAL.
- SPLICING OF STEEL MEMBERS, UNLESS SHOWN ON THE DRAWINGS PROHIBITED WITHOUT WRITTEN APPROVAL OF THE ARCHITECT/ENGINEER.
- UNLESS NOTED OTHERWISE, BEAMS SHALL BEAR 8" MINIMUM ON CONCRETE OR MASONRY, UNLESS NOTED OTHERWISE, ANCHOR BEAMS TO MASONRY WITH TWO (2) 3/4" DIAMETER ANCHOR BOLTS WITH 4" HOOK AND 1'-4" EMBEDMENT.
- STRUCTURAL STEEL WORK SHALL BE SUBJECT TO QUALITY ASSURANCE TESTING AND INSPECTIONS. SEE QUALITY ASSURANCE GENERAL NOTES AND PROJECT SPECIFICATIONS. AISC, ASTM & AWS SPECIFICATIONS WILL GOVERN ALL STRUCTURAL STEEL WORKS.
- DESIGN AND CONSTRUCTION SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION STANDARD PRACTICE.
- STRUCTURAL STEEL WELDING SHALL BE PERFORMED BY A CERTIFIED WELDER AND IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY, (AWS), REQUIREMENTS.
- ALL INSPECTION AND TESTING OF WELDING SHALL BE DONE IN ACCORDANCE TO SECTION 501 THRU 607 OF THE AWS CODE FOR WELDING IN BUILDING CONSTRUCTION.
- ALL CONNECTIONS SHALL BE BEARING TYPE UNLESS OTHERWISE SPECIFIED ON PLANS.
- SHOP DRAWINGS FOR ALL STRUCTURAL STEEL FABRICATION AND ERECTION SHALL BE SUBMITTED TO THE DESIGNER FOR APPROVAL WELL IN ADVANCE OF CONSTRUCTION.
- INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON-CONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE ENGINEER FOR REVIEW AND APPROVAL OR REJECTION, PRIOR TO REMEDIAL OR CORRECTIVE ACTION TO BE IMPLEMENTED.
- UNLESS OTHERWISE NOTED, THE FOLLOWING MINIMUMS SHALL APPLY:

- WELD SIZE : 3/16"
 - BOLT DIAMETER : 3/4"
 - PLATE THICKNESS : 3/8"
 - GULP ANGLE THICKNESS : 5/16"
 - BOLTS/ANGLE LEG : 2"
- ONE BOLT ASSEMBLY SHALL CONSIST OF:
 - A) A HEAVY HEX STRUCTURAL BOLT
 - B) A HEAVY HEX NUT
 - C) A HARDENED STEEL WASHER
 - MOMENT CONNECTIONS SHALL BE DESIGNED TO DEVELOP THE PLASTIC MOMENT CAPACITY OF THE BEAM U.N.O.
 - COLUMN STIFFENERS SHALL BE PROVIDED AS REQUIRED TO DEVELOP THE PLASTIC MOMENT CAPACITY OF THE CONNECTED BEAM U.N.O.
 - FRAMED BEAM CONNECTIONS SHALL BE OF A TYPE SIMILAR TO AND OF EQUAL CAPACITY AS THOSE SHOWN IN TABLES II , III AND IV OF THE AISC MANUAL, AND SHALL DEVELOP THE SHEAR CAPACITY (Wc/2L) GIVEN IN THE UNIFORM LOAD CONSTANTS TABLE.
 - CONNECTIONS SHALL BE DESIGNED AS SLIP CRITICAL, WITH BOLT LENGTH AS PER BEARING TYPE X.
 - VERTICAL BRACING CONNECTIONS SHALL DEVELOP THE TENSION CAPACITY OF THE CONNECTED MEMBER.
 - HORIZONTAL BRACING CONNECTIONS SHALL DEVELOP THE COMPRESSION CAPACITY OF THE CONNECTED MEMBER.

- SSPC-SP11 POWER TOOL CLEANING TO BARE METAL.
- SSPC-SP10 / NACE 2 NEAR-WHITE BLAST CLEANING
- SSPC-SP12 / NACE 5 SURFACE PREPARATION AND CLEANING OF STEEL AND OTHER HARD
- SSPC-SP13 / NACE 8 SURFACE PREPARATION OF CONCRETE
- SSPC-SP14 / NACE 8 INDUSTRIAL BLAST CLEANING
- SSPC-SP15 / NACE 8 INDUSTRIAL BLAST CLEANING
- SSPC-SP16 / NACE 8 INDUSTRIAL BLAST CLEANING
- SSPC-SP17 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP18 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP19 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP20 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP21 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP22 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP23 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP24 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP25 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP26 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP27 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP28 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP29 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP30 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP31 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP32 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP33 / NACE 4 BRUSH-OFF BLAST CLEANING
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- SSPC-SP35 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP36 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP37 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP38 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP39 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP40 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP41 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP42 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP43 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP44 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP45 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP46 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP47 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP48 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP49 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP50 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP51 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP52 / NACE 4 BRUSH-OFF BLAST CLEANING
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- SSPC-SP57 / NACE 4 BRUSH-OFF BLAST CLEANING
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- SSPC-SP60 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP61 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP62 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP63 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP64 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP65 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP66 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP67 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP68 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP69 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP70 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP71 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP72 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP73 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP74 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP75 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP76 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP77 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP78 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP79 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP80 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP81 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP82 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP83 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP84 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP85 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP86 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP87 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP88 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP89 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP90 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP91 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP92 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP93 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC-SP94 / NACE 4 BRUSH-OFF BLAST CLEANING
- SSPC