





STRUCTURAL CONCRETE NOTES

- A. CONCRETE
- ALL CAST-IN-PLACE CONCRETE SHALL BE OF THE TYPES AND HAVING THE MINIMUM COMPRESSIVE CYLINDER STRENGTHS AS SHOWN ON THE CONCRETE MATERIALS SCHEDULE.
  - ALL CONCRETE SHALL CONTAIN AN APPROVED WATER REDUCING, PLASTICIZING ADMIXTURE, APPROVED, HIGH-RANGE, WATER REDUCING ADMIXTURES MAY BE UTILIZED, FOR ALL THE CONCRETE PERMANENTLY EXPOSED TO WEATHER PROVIDE MAXIMUM 0.40 WATER-CEMENT RATIO, INCLUDING WATER CONTENT OF ADMIXTURE AND MINIMUM 4000PSI COMPRESSIVE STRENGTH AT 28 DAYS WITH USE ONLY IN COMBINATION WITH HIGH-RANGE WATER REDUCING ADMIXTURE, ALL CONCRETE PERMANENTLY EXPOSED TO THE WEATHER SHALL ALSO CONTAIN SPECIFIED AND APPROVED AIR-ENTRAINING ADMIXTURE, CORROSION INHIBITING ADMIXTURE SHALL BE UTILIZED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, BUT IN DOSAGE RATE NOT LESS THAN 2.0 GAL/YARD<sup>3</sup>
  - NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.
  - SEE TECHNICAL SPECIFICATION SECTION 033000 "CAST IN PLACE CONCRETE" FOR ADDITIONAL REQUIREMENTS.
- B. REINFORCING
- ALL REINFORCING BARS SHALL CONFORM TO THE STANDARDS OF ASTM A615, GRADE 60.
  - ALL CONCRETE REINFORCEMENT SHALL BE DETAILED, FABRICATED, LABELED, SUPPORTED, SPACED IN FORMS, AND SECURED IN PLACE IN ACCORDANCE WITH THE PROCEDURES AND REQUIREMENTS OUTLINED IN IBC 2006 AND 2008 NEW YORK BUILDING CODE. FOLLOW THE "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", ACI 315 AND ACI 318-08.
  - THE CONTRACTOR SHALL SUBMIT FOR REVIEW BY THE ARCHITECT / STRUCTURAL ENGINEER FOR APPROVAL, CHECKED SHOP DRAWINGS INDICATING PLACEMENT AND SUPPORT DETAILS INCLUDING THE ADDITIONAL REBAR PROVIDED BY THE CONTRACTOR FOR MAIN REINFORCEMENT SUPPORT FOR REVIEW PRIOR TO INSTALLATION.
  - ALL REINFORCING SPICES SHALL DEVELOP 100% OF THE TENSILE CAPACITY OF THE REINFORCEMENT, (I.N.O.) ALTERNATIVE MECHANICAL SPICES MAY BE CONSIDERED, PROVIDED THAT THEY DEVELOP FULL TENSILE STRENGTH.
  - ALL WIRE MESH REINFORCEMENT SHALL CONFORM TO THE STANDARDS OF ASTM A185 AND SHALL BE GALVANIZED.
  - ALL WIRE MESH REINFORCEMENT SHALL BE LAPPED TWO (2) FULL MESH PANELS AND TIED SECURELY.
  - WHERE REQUIRED, DOVELS SHALL MATCH THE SIZE AND NUMBER OF MAIN REINFORCING, UNLESS NOTED OTHERWISE.
  - ADDITIONAL BARS SHALL BE PROVIDED AROUND ALL FLOOR AND WALL OPENINGS, AS SHOWN ON DETAILS.
  - ALL BAR SUPPORTS SHALL BE GALVANIZED. BAR SUPPORTS IN CONTACT WITH EXPOSED SURFACES SHALL ALSO BE PLASTIC TIPPED.
  - THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT, UNLESS LARGER COVER IS NOTED ELSEWHERE:

CONCRETE SURFACE EXPOSURE		MINIMUM CONCRETE CLEAR COVER (IN)
COLUMNS	SURFACES NOT EXPOSED TO EARTH OR WEATHER SURFACES EXPOSED TO EARTH OR WEATHER	1'- 1/2"
BEAMS	SURFACES NOT EXPOSED TO EARTH OR WEATHER SURFACES EXPOSED TO EARTH OR WEATHER	1'- 1/2"
SLABS (INCLUDING METAL DECK SLABS)	SURFACES NOT EXPOSED TO EARTH OR WEATHER SURFACES EXPOSED TO EARTH OR WEATHER	3/4" 2"
FOUNDATION ELEMENTS (ALL FACES) - CONCRETE CAST AGAINST EARTH		3'
BASEMENT WALLS / SHEAR WALLS / FOUNDATION WALLS	SURFACES NOT EXPOSED TO EARTH OR WEATHER SURFACES EXPOSED TO EARTH OR WEATHER	3/4" 2"
SLAB-ON-GRADE	TOP FACE BOTTOM FACE	1" 2"

- C. CONSTRUCTION JOINTS
- CONSTRUCTION JOINTS IN ALL WALLS, SLABS AND BEAMS SHALL NOT BE FURTHER APART THAN 60'-0" IN ANY DIRECTION. VERTICAL CONSTRUCTION JOINTS IN WALLS SHALL BE LOCATED AT LEAST 5'-0" FROM ANY PILASTERS, CORNERS, OR WALL OPENINGS.
  - ALL CONSTRUCTION JOINTS SHALL BE WIRE BRUSHED, CLEANED AND MOISTENED IMMEDIATELY PRIOR TO PLACING NEW CONCRETE.
  - ALLOW A MINIMUM OF THREE (3) HOURS BETWEEN PLACEMENT OF CONCRETE FOR COLUMNS, WALLS OR PIERS AND PLACEMENT OF CONCRETE ON THE ADJACENT FLOOR.
- D. CURING AND SEALING
- PROVIDE APPROVED CURING COMPOUND AND SEALER FOR THE TOP SURFACE OF ALL SLAB WORK, UNLESS NOTED OTHERWISE.
  - PROVIDE APPROVED CURING COMPOUND, SEALER, AND HARDENER FOR ALL SLABS IN MEP AND STORAGE AREAS, UNLESS NOTED OTHERWISE.
- E. GENERAL
- MINIMUM SLAB-ON-GRADE THICKNESS SHALL BE 8 INCHES, UNLESS NOTED OTHERWISE.
  - CONCRETE BEAMS AND SLABS SHALL NOT BE SLEEVED OR BOXED-OUT OR HAVE THE REINFORCING INTERRUPTED, EXCEPT AS SHOWN ON THE STRUCTURAL DRAWINGS.
  - SEE ARCHITECTURAL DRAWINGS FOR TYPE AND LOCATION OF ALL FLOOR FINISHES, FLOOR DEPRESSIONS AND CURBS.
  - SEE ARCHITECTURAL DRAWINGS FOR GENERAL WATERPROOFING REQUIREMENTS. SPECIFIC DETAILS SHALL BE SUPPLIED BY THE WATERPROOFING CONTRACTOR/MANUFACTURER.
  - SEE ARCHITECTURAL, HVAC, ELECTRICAL AND PLUMBING DRAWINGS FOR ADDITIONAL WALL/SLAB OPENINGS NOT SHOWN ON STRUCTURAL DRAWINGS.
  - THE CONTRACTOR SHALL PERFORM AND SUBMIT INSTRUMENT SURVEYS, DAILY, OF ALL FINISHED REINFORCED CONCRETE AND METAL DECK CONCRETE SLAB SURFACES, BOTH BEFORE AND AFTER REMOVAL OF FORMWORK AND/OR SHORING SYSTEMS.
  - ALL CONCRETE SHALL BE MECHANICALLY VIBRATED, EXCEPT SELF CONSOLIDATING CONCRETE AND TREMIE CONCRETE.
  - THE CONTRACTOR SHALL MEET ALL ADDITIONAL REQUIREMENTS OF LOCAL AND GOVERNMENTAL CODES AND REGULATIONS FOR ALL WORK.
  - ALL ELEVATIONS ARE REFERENCED TO NAVD 1988.
- F. EMBEDDED/ATTACHED INSERTS FOR OTHER TRADES
- ALL EMBEDDED OR ATTACHED INSERTS OR CONNECTORS, FOR THE WORK OF OTHER TRADES, ATTACHED TO ANY STRUCTURAL CONCRETE ELEMENT BEFORE OR AFTER THE PLACEMENT OF CONCRETE, SHALL NOT CUT, MOVE, OR RELOCATE ANY REINFORCING BAR OR REINFORCING BAR SUPPORT. THE LOCATIONS OF ALL SUCH INSERTS AND THE TYPE AND INTENDED LOAD APPLICATION OF EACH SUCH ITEM SHALL BE INDICATED BY THE CONTRACTOR ON A COORDINATED, MULTI-TRADE SHOP DRAWINGS, AND SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF THE INSERTS/CONNECTORS. ANY SUCH EMBEDDED AND/OR ATTACHED ITEM SHALL NOT RESULT IN DAMAGE TO THE CONCRETE FINISH, AND SHALL BE OF A MATERIAL TYPE COMPATIBLE WITH THE CONCRETE MATERIALS, AND ALSO BE NON-CORROSIVE IN MATERIAL TYPE.
  - CONDUIT AND PIPE SHALL NOT BE PLACED IN STRUCTURAL SLABS WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER. THE CONTRACTOR SHALL SUBMIT CONDUIT PLACEMENT DRAWINGS INDICATING LOCATIONS OF CAST-IN-CONCRETS AND PIPES. ALL CONDUITS SHALL BE PLACED IN THE MIDDLE THIRD OF THE SLAB THICKNESS AND SHALL BE SPACED NO CLOSER THAN 3 DIAMETERS OR WIDTHS ON CENTER, NO CONDUIT GREATER THAN 2" MAY BE PLACED IN THE STRUCTURAL SLABS.
- G. DRILLED IN ANCHORS AND REINFORCING BARS
- DRILLED IN EXPANSION ANCHORS, ADHESIVE ANCHORS AND GROUTED BARS MAY BE USED ONLY WHERE SHOWN ON THE DRAWINGS.
  - DRILLED IN BARS SHALL BE ADHESIVE ANCHORED UNLESS NOTED OTHERWISE.
  - CONDUCT A PRECONSTRUCTION CONFERENCE AT LEAST 14 DAYS PRIOR TO INSTALLATION OF ANCHORS TO VERIFY MATERIALS AND PROCEDURES, CONFERENCE SHALL BE ATTENDED BY INSTALLER, CONTRACTOR AND ARCHITECT.
  - ADHESIVE ANCHORED BARS SHALL BE INSTALLED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
  - PROVIDE PERIODIC SPECIAL INSPECTIONS FOR ADHESIVE ANCHORS AS PER IBC 2006 SECTION 1704.1.3/NYCBC 2008.

- SPECIAL ADDITIONAL STRUCTURAL CONCRETE REQUIREMENTS
- A. SPECIAL CONCRETE MATERIAL NOTES
- SEE SPECIFICATIONS FOR SPECIFIC DEFINITIONS AND ADDITIONAL REQUIREMENTS.
  - ALL CONCRETE SHALL BE SPECIFICALLY DESIGNED FOR THE HORIZONTAL AND VERTICAL PUMPING DISTANCES AS REQUIRED BY THE CONSTRUCTION SEQUENCING.
  - ALL CONCRETE SHALL BE SPECIFICALLY DESIGNED FOR THE VIRGINIA REGIONAL ENVIRONMENTAL CONDITIONS, INCLUDING SEASONAL VARIATIONS, THAT WILL SPECIFICALLY OCCUR DURING THE DIFFERENT CONSTRUCTION PHASES.
  - ALL CONCRETE MIXES SHALL CONTAIN APPROVED WATER REDUCING PLASTICIZING ADMIXTURES IN THE APPROPRIATE RANGES FOR PLACEMENT.
  - ALL CONCRETE MAY INCLUDE THE FOLLOWING SUPPLEMENTAL CEMENTITIOUS MATERIALS IN ADDITION TO THE APPROPRIATE TYPE OF PORTLAND CEMENT:
    - GROUND GRANULATED BLAST FURNACE SLAG (GGBS): MAXIMUM 70%
    - FLY ASH (FA): MAXIMUM 30%
    - COMBINATION GGBFS + FA: MAXIMUM GGBFS = 50%, MAXIMUM FA = 20%
  - ALL CONCRETE SHALL HAVE WATER-TO-CEMENTITIOUS MATERIAL RATIO (W/C) BETWEEN 0.30 MINIMUM AND 0.50 MAXIMUM, UNLESS NOTED OTHERWISE. PORTLAND CEMENT / GRANULATED BLAST FURNACE SLAG / FLY ASH SHALL BE CONSIDERED AS CEMENTITIOUS MATERIALS; MICROSILICA SHALL NOT BE CONSIDERED AS A CEMENTITIOUS MATERIAL IN THE W/C RATIO.
- B. SPECIAL FLOOR SLAB LEVELING
- AFTER THE REQUIRED POWER, HARD TROWELING AND CURING OF ALL FLOOR SLAB SURFACES, AND IN ORDER TO ACHIEVE THE APPROPRIATE FLOOR LEVELNESS, THE CONTRACTOR SHALL INSTALL AN ACCEPTABLE LATEX BASED, CEMENTITIOUS FLOWABLE FILL MATERIAL SYSTEM IN ALL INTERIOR FLOOR SLAB AREAS WHICH WILL RECEIVE APPLIED NON-CEMENTITIOUS ARCHITECTURAL FLOOR FINISH INTERIOR SYSTEMS (CARPET, WOOD, THIN SET STONE) AS THE FINAL FINISH SYSTEM. THE LOCATIONS, EXTENT, AND THICKNESS OF THE FLOWABLE FILL WILL BE ESTABLISHED FROM THE REVIEW OF THE CONTRACTORS UNSHORED HARDENED CONCRETE FLOOR SLAB SURVEYS. THESE THIN FLOWABLE CONCRETE FILL MATERIALS SHALL BE PROTECTED FROM DETERIORATION PRIOR TO THE PLACEMENT OF THE FINAL ARCHITECTURAL FLOOR FINISH SYSTEMS.
- C. PROGRESSIVE COLLAPSE SPECIAL INSPECTION
- TO SATISFY PROGRESSIVE COLLAPSE REQUIREMENTS ACCORDING TO SECTION 1717.4 OF UFC 4-023-03 (JULY 2009), CONTINUOUS SPECIAL INSPECTION IS REQUIRED FOR REINFORCING STEEL PLACEMENT IN THE BASEMENT WALL ALONG GRID L, BETWEEN GRID 3.7 AND 6, WITH PARTICULAR EMPHASIS ON REINFORCING STEEL ANCHORAGES AND LAPS.

CONCRETE MATERIALS SCHEDULE				
LOCATION	COMPRESSIVE STRENGTH (28-DAY CYLINDER STRENGTH)	CONCRETE DENSITY (PCF)	MAX. SIZE AGGREGATE	MAXIMUM W/C RATIO
FOOTINGS	8,000 PSI	145	1"	0.40
SHEAR WALLS	6,000 PSI	145	3/4"	0.45
PIT WALLS	4,000 PSI	145	3/4"	0.40
SLABS ON STEEL DECK	4,000 PSI	145	3/4"	0.40
TOPPING/FILL SLABS	3,000 PSI	115	3/4"	0.40

COMPRESSION LAP SPICE LENGTH AND COMPRESSION DEVELOPMENT LENGTH						
BAR SIZE	COMPRESSION LAP SPICE	COMPRESSION DEVELOPMENT LENGTH				
		f <sub>c</sub> = 4000 psi	f <sub>c</sub> = 5000 psi	f <sub>c</sub> = 6000 psi	f <sub>c</sub> = 7000 psi	f <sub>c</sub> = 7000 psi
#3	12	8	8	8	8	8
#4	15	10	9	9	9	9
#5	19	12	12	12	12	12
#6	23	15	14	14	14	14
#7	27	17	16	16	16	16
#8	30	19	18	18	18	18
#9	34	22	21	21	21	21
#10	38	25	23	23	23	23
#11	43	27	26	26	26	26
#14	-	33	31	31	31	31
#18	-	43	41	41	41	41

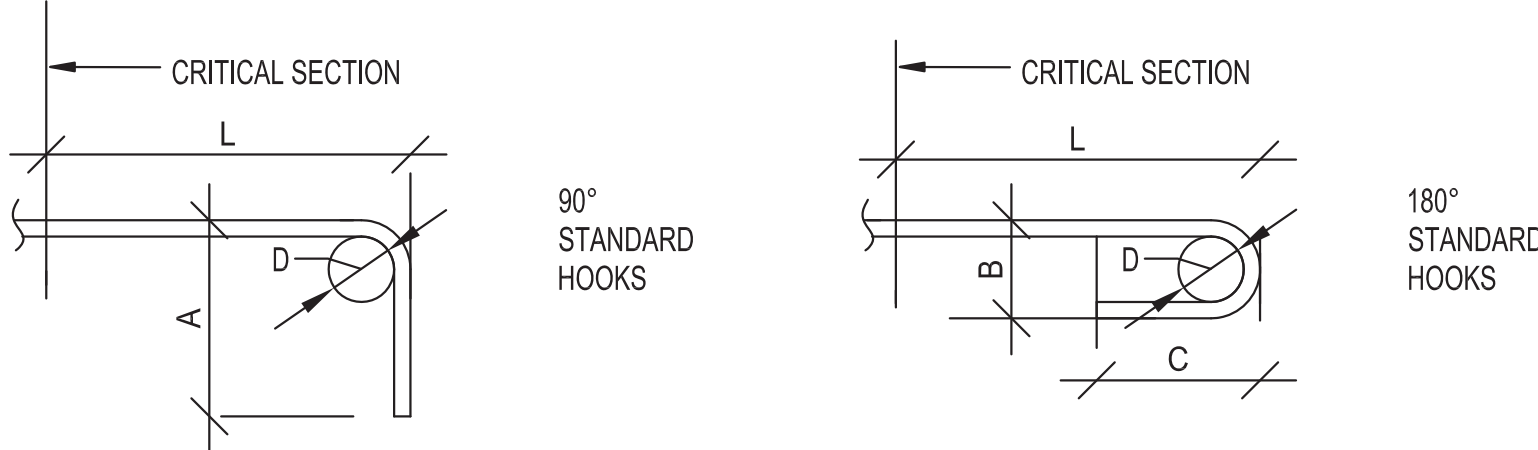
NOTE:  
1. TABULATED COMPRESSION DEVELOPMENT LENGTHS AND COMPRESSION LAP SPICES ARE GIVEN IN INCHES, AND ARE CALCULATED FOR REINFORCEMENT CONFORMING TO ASTM A615 GRADE 60 AS PER THE REQUIREMENTS OF ACI 318 (2005).

TENSION DEVELOPMENT LENGTH																					
BAR SIZE	f <sub>c</sub> = 4000 psi				f <sub>c</sub> = 5000 psi				f <sub>c</sub> = 6000 psi				f <sub>c</sub> = 7000 psi				f <sub>c</sub> = 8000 psi				
	TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		
	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	
#3	19	28	15	22	17	25	13	19	15	23	12	18	14	21	12	16	13	20	12	15	
#4	25	37	19	29	22	33	17	26	20	31	16	24	19	28	15	22	18	26	14	20	
#5	31	47	24	36	28	42	22	32	25	38	20	29	24	35	18	27	22	33	17	25	
#6	37	56	29	43	33	50	26	38	31	46	24	35	28	42	22	33	26	40	20	30	
#7	54	81	42	63	49	73	37	56	44	66	34	51	41	61	32	47	38	58	30	44	
#8	62	93	48	71	55	83	43	64	51	76	39	58	47	70	36	54	44	66	34	51	
#9	70	105	54	81	63	94	48	72	57	85	44	66	53	79	41	61	49	74	38	57	
#10	79	118	61	91	70	105	54	81	64	96	49	74	59	89	46	69	56	83	43	64	
#11	87	131	67	101	78	117	60	90	71	107	55	82	66	99	51	76	62	93	48	71	
#14	105	157	81	121	94	140	72	108	86	128	66	99	79	119	61	91	74	111	57	85	
#18	139	209	107	161	125	187	96	144	114	171	88	131	106	158	81	122	98	148	76	114	

- NOTES : 1. TABULATED TENSION DEVELOPMENT LENGTHS ARE GIVEN IN INCHES, AND ARE CALCULATED FOR REINFORCEMENT CONFORMING TO ASTM A615 GRADE 60 AS PER THE REQUIREMENTS OF ACI 318 (2005).
2. REQUIREMENTS OF ACI 318 (2005). CASES 1 AND 2 DEPEND UPON CONCRETE COVER AND THE CENTER-TO-CENTER SPACING OF THE BARS, DEFINED AS FOLLOWS:
- CASE 1: CLEAR SPACING AT LEAST ONE (1) BAR DIAMETER  
CLEAR COVER AT LEAST ONE (1) BAR DIAMETER  
STIRRUPS OR TIES THROUGHOUT THE DEVELOPMENT LENGTH NOT LESS THAN THE CODE MINIMUM  
OR  
CLEAR SPACING AT LEAST TWO (2) BAR DIAMETERS  
CLEAR COVER AT LEAST ONE (1) BAR DIAMETER
- CASE 2: ALL OTHER CASES
3. TOP BARS ARE DEFINED AS HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.
4. TABULATED TENSION DEVELOPMENT LENGTHS HAVE BEEN CALCULATED WITH RESPECT TO NORMALWEIGHT CONCRETE. FOR LIGHTWEIGHT CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.3.
5. FOR EPOXY COATED BARS, MULTIPLY THE TABULATED VALUES BY ONE OF THE FOLLOWING FACTORS:  
1.5 FOR EPOXY COATED BARS WITH COVER LESS THAN 3 BAR DIAMETERS, OR CLEAR SPACING LESS THAN 6 BAR DIAMETERS  
1.2 FOR ALL OTHER EPOXY COATED BARS

TENSION LAP SPICE LENGTH																					
BAR SIZE	LAP CLASS	f <sub>c</sub> = 4000 psi				f <sub>c</sub> = 5000 psi				f <sub>c</sub> = 6000 psi				f <sub>c</sub> = 7000 psi				f <sub>c</sub> = 8000 psi			
		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS		TOP BARS		OTHER BARS	
		CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2	CASE 1	CASE 2
#3	A	19	28	15	22	17	25	13	19	15	23	12	18	14	21	12	16	13	20	12	15
	B	24	36	19	28	22	33	17	25	20	30	15	23	18	28	14	21	17	26	16	20
#4	A	25	37	19	29	22	33	17	25	20	31	16	24	19	28	15	22	18	26	14	20
	B	32	48	25	37	29	43	22	33	26	40	20	31	25	37	19	28	23	34	18	26
#5	A	31	47	24	36	28	42	22	32	25	38	20	29	24	35	18	27	22	33	17	25
	B	40	60	31	47	36	54	28	41	33	49	25	38	30	46	24	35	29	43	22	33
#6	A	37	56	29	43	33	50	26	38	31	46	24	35	28	42	22	33	26	40	20	30
	B	48	72	37	56	43	65	33	50	40	59	31	46	37	55	28	42	34	51	26	40
#7	A	54	81	42	63	48	72	37	56	44	66	34	51	41	61	32	47	38	58	30	44
	B	70	106	54	81	63	94	49	72	58	86	44	66	53	80	41	61	50	75	38	58
#8	A	62	93	48	71	55	83	43	64	51	76	39	58	47	70	36	54	44	66	34	51
	B	80	121	62	93	72	108	55	83	66	98	51	76	61	91	47	70	57	85	44	66
#9	A	70	105	54	81	63	94	48	72	57	85	44	66	53	79	41	61	49	74	38	57
	B	91	136	70	105	81	122	63	94	74	111	57	85	69	103	53	79	64	96	49	74
#10	A	79	118	61	91	70	105	54	81	64	96	49	74	59	89	46	69	56	83	43	64
	B	102	153	79	118	91	137	70	105	83	125	64	96	77	116	59	89	72	108	56	83
#11	A	87	131	67	101	78	117	60	90	71	107	55	82	66	99	51	76	62	93	48	71
	B	113	170	87	130	101	152	78	117	93	139	71	107	86	128	66	99	80	120	62	93

- NOTES : 1. TABULATED TENSION LAP SPICE LENGTHS ARE GIVEN IN INCHES, AND ARE CALCULATED FOR REINFORCEMENT CONFORMING TO ASTM A615 GRADE 60 AS PER THE REQUIREMENTS OF ACI 318 (2005).
2. CASES 1 AND 2 DEPEND UPON CONCRETE COVER AND THE CENTER-TO-CENTER SPACING OF THE BARS, DEFINED AS FOLLOWS:
- CASE 1: CLEAR SPACING AT LEAST ONE (1) BAR DIAMETER  
CLEAR COVER AT LEAST ONE (1) BAR DIAMETER  
STIRRUPS OR TIES THROUGHOUT THE DEVELOPMENT LENGTH NOT LESS THAN THE CODE MINIMUM  
OR  
CLEAR SPACING AT LEAST TWO (2) BAR DIAMETERS  
CLEAR COVER AT LEAST ONE (1) BAR DIAMETER
- CASE 2: ALL OTHER CASES
3. TOP BARS ARE DEFINED AS HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.
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5. FOR EPOXY COATED BARS, MULTIPLY THE TABULATED VALUES BY ONE OF THE FOLLOWING FACTORS:  
1.5 FOR EPOXY COATED BARS WITH COVER LESS THAN 3 BAR DIAMETERS, OR CLEAR SPACING LESS THAN 6 BAR DIAMETERS  
1.2 FOR ALL OTHER EPOXY COATED BARS
6. PROVIDE CLASS"SP" SPICE UNLESS NOTED OTHERWISE.



STANDARD HOOK DETAILING GEOMETRY AND TENSION DEVELOPMENT LENGTH										
BAR SIZE	D	90° HOOKS		180° HOOKS		TENSION DEVELOPMENT LENGTH				
		A	B	C	fc = 4000 psi	fc = 5000 psi	fc = 6000 psi	fc = 7000 psi	fc = 8000 psi	
#3	2-1/4	6	3	5	7	7	6	5	5	
#4	3	8	4	6	10	9	8	7	6	
#5	3-3/4	10	5	7	12	11	10	9	8	
#6	4-1/2	12	6	8	15	13	12	11	9	
#7	5-1/4	14	7	10	17	15	14	13	11	
#8	6	16	8	11	19	17	16	15	12	
#9	9-1/2	19	11-3/4	15	22	19	18	16	16	
#10	10-3/4	22	13-1/4	17	24	22	20	19	18	
#11	12	24	14-3/4	19	27	24	22	21	20	
#14	18 1/4"	31	21-3/4	27	32	29	27	25	23	
#18	24	41	28-1/2	36	43	39	35	33	31	



STRUCTURAL STEEL NOTES

A. GENERAL

1. ALL DETAILING, FABRICATION AND ERECTION SHALL CONFORM TO AISC (LRFD), 2005, SPECIFICATIONS AND 2009 NEW YORK CITY BUILDING CODE.
2. ALL WELDING WORK SHALL CONFORM TO THE AWS D1.1 "STRUCTURAL WELDING CODE - STEEL," LATEST EDITION, AND SHALL BE PERFORMED BY AWS CERTIFIED WELDERS.
3. ALL STEEL BEAM SIZES FOLLOWED BY A NUMBER IN PARENTHESES, (XX), ARE COMPOSITE BEAMS WITH SHEAR STUDS. SEE "STRUCTURAL METAL DECK NOTES" FOR ADDITIONAL INFORMATION.
4. COMPOSITE BEAMS ARE NOT REQUIRED TO BE SHORED, UNLESS NOTED OTHERWISE.
5. THERE SHALL BE NO FIELD CUTTING OF STRUCTURAL STEEL MEMBERS FOR THE WORK OF OTHER TRADES WITHOUT PRIOR REVIEW BY THE ARCHITECT.
6. ALL STRUCTURAL STEEL AND METAL DECK SLAB SHALL BE FIREPROOFED TO ATTAIN THE APPLICABLE FIRE RATING REQUIRED BY CODE WITH UL APPROVED SPRAYED-ON CEMENTIOUS FIREPROOFING MATERIALS. SEE THE ARCHITECTURAL DRAWINGS FOR SPECIFIC FIREPROOFING REQUIREMENTS. STEEL SURFACES ENCASED IN CONCRETE DOES NOT REQUIRE SPRAY FIREPROOFING.
7. AFTER FABRICATION AND JUST PRIOR TO SITE APPLICATION OF SPRAY-ON FIREPROOFING, ALL STEEL AND METAL DECK SHALL BE CLEANED OF ALL RUST, LOOSE MILL SCALE AND OTHER FOREIGN MATERIALS. PRIMING AND PAINTING OF THE STRUCTURAL STEEL WILL NOT BE REQUIRED EXCEPT FOR STEEL WHICH IS PERMANENTLY EXPOSED.
8. ALL ELEVATIONS ARE REFERENCED TO A LOCAL SITE DATUM.
9. SEE SPECIFICATION SECTION 05120, "STRUCTURAL STEEL FRAMING," FOR ADDITIONAL REQUIREMENTS NOT NOTED HEREIN.

B. MATERIALS

1. STRUCTURAL STEEL GRADES SHALL BE AS FOLLOWS:

STEEL COLUMNS, FLOOR BEAMS: ASTM A992 - GRADE 50  
CONNECTIONS, PLATES: ASTM A572 - GRADE 50  
ANGLES: ASTM A36 GRADE 36 - OR A572 GRADE 50  
BOLTS: ASTM A325, A490, AS INDICATED

2. ALL BOLTS, NUT AND WASHERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325 OR A490.
3. ALL WELDING ELECTRODES SHALL BE E70XX.

C. CONNECTIONS

1. ALL CONNECTIONS, EXCEPT FOR THOSE CONNECTIONS COMPLETELY DESIGNED ON THE DRAWINGS, SHALL BE DESIGNED AND DETAILED BY THE FABRICATOR. DETAILING SHALL BE PERFORMED USING RATIONAL ENGINEERING DESIGN AND STANDARD PRACTICE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE GENERAL DETAILS SHOWN ON THE DRAWINGS ARE CONCEPTUAL ONLY AND DO NOT INDICATE THE REQUIRED NUMBER OF BOLTS OR WELD SIZES, UNLESS SPECIFICALLY NOTED. THE CONTRACTOR SHALL SUBMIT ENGINEERING CALCULATIONS AND CONNECTION DETAIL DRAWINGS FOR EACH CONNECTION TYPE, MEMBER SIZE, AND REACTION INDICATED ON THE DRAWINGS FOR REVIEW BY THE ARCHITECT PRIOR TO THE SUBMITTAL OF THE STRUCTURAL STEEL SHOP DRAWINGS. AFTER REVIEW BY THE ARCHITECT AND ENGINEER, THESE DETAIL DRAWINGS SHALL BE UTILIZED AS THE STANDARD FOR FABRICATION AND SHOP DRAWING DETAILING. THE DESIGN CALCULATIONS SHALL BE PREPARED AND SEALED BY A QUALIFIED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK.
2. ALL CONNECTIONS, UNLESS NOTED OTHERWISE, SHALL BE SIMPLE SHEAR CONNECTIONS UTILIZING "SHORT-SLOTTED" HORIZONTAL HOLES AND HIGH-STRENGTH BOLTS IN BEARING-TYPE CONNECTIONS WITH THREADS EXCLUDED FROM THE SHEAR PLANE. THE CONNECTION CAPACITIES SHALL BE AS SHOWN IN NOTE C5 BELOW, OR AS NOTED ON THE STRUCTURAL FRAMING PLANS.
3. BEAM-TO-COLUMN CONNECTIONS SHALL BE MOMENT CONNECTED WHERE SHOWN ON THE DRAWINGS. ALL BOLTED MOMENT CONNECTIONS SHALL UTILIZE "SLIP-CRITICAL" BOLTS. THE WEB SHEAR CONNECTION FOR THESE MEMBERS SHALL UTILIZE SINGLE SHEAR PLATE SLIP-CRITICAL TYPE CONNECTIONS WITH HIGH-STRENGTH BOLTS. REFER TO THE REQUIRED SHEAR CAPACITIES SHOWN IN NOTE C5 BELOW.
4. ALL BOLTS SHALL BE FULLY TORQUED FOR BOTH SLIP CRITICAL AND BEARING TYPE CONNECTIONS.
5. ULTIMATE END REACTION CAPACITIES (AISC FACTORED LOADS) FOR STANDARD ROLLED SHAPES:

W36 200 kips	W16 55 kips	HSS 16 55 kips
W30 180 kips	W14 45 kips	HSS 14 45 kips
W27 100 kips	W12 40 kips	HSS 12 30 kips
W24 95 kips	W10 35 kips	HSS 10 20 kips
W21 85 kips	W8 35 kips	HSS 8 15 kips
W18 70 kips	W6 15 kips	HSS 6 15 kips

ANY MEMBERS WITH END REACTIONS EXCEEDING THE VALUES LISTED ABOVE ARE INDICATED ON THE PLANS, EITHER WITH BOXED END REACTIONS OR IN TABULAR FORM.

6. THE MINIMUM NUMBER OF BOLTS PER CONNECTION SHALL BE TWO (2) - 3/4" INCH DIAMETER, A325 BOLTS AND (2) - 1/2" INCH DIAMETER FOR W6 AND W8 BEAMS.
7. MINIMUM FILLET WELD SIZES SHALL COMPLY WITH THE AISC SPECIFICATION REQUIREMENTS, BUT SHALL NOT BE LESS THAN 1/4" INCH, UNLESS NOTED OTHERWISE.

D. DETAILING AND FABRICATION

1. THE CONTRACTOR SHALL SUBMIT DETAILED, ENGINEERED, COORDINATED AND CHECKED SHOP DRAWINGS FOR ALL STRUCTURAL STEEL TO THE ARCHITECT FOR REVIEW PRIOR TO THE START OF FABRICATION AND/OR ERECTION.
2. ALL BEAMS SHALL BE FABRICATED WITH THE NATURAL CAMBER UP. PROVIDE ADDITIONAL CAMBERS AS INDICATED IN BRACKETS <XX> ON THE STRUCTURAL DRAWINGS. FOR CANTILEVERS, CAMBER SHALL BE MEASURED AT THE FREE END.
3. ALL SIMPLE SHEAR CONNECTIONS SHALL BE CAPABLE OF END ROTATION AS PER THE REQUIREMENTS OF AISC SPECIFICATION, CHAPTER J1.2, "SIMPLE CONNECTIONS."
4. ALL BEAMS FRAMING INTO NEW CONCRETE WALLS SHALL BE DETAILED TO SUIT THE HORIZONTAL FIELD TOLERANCES

E. ERECTION

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF ALL ERECTION PROCEDURES AND SEQUENCES, ESPECIALLY WITH RELATION TO TEMPERATURE DIFFERENTIALS, ERECTION TOLERANCES, AND WITH RESPECT TO STRUCTURAL STEEL FRAMING INTO REINFORCED CONCRETE WALLS.
2. PRIOR TO CASTING OF SLABS, SURVEY THE TOPS OF ALL COLUMNS AT LEVEL. RECORD X, Y & Z - COORDINATES MEASURED CONSISTENTLY FROM AN ESTABLISHED BENCHMARK. PROVIDE A COPY OF THE SURVEY DATA TO THE ARCHITECT AND STRUCTURAL ENGINEER WITHIN TWO DAYS OF THE COMPLETION OF EACH SURVEY.
3. ALL ERECTION PROCEDURES, DESIGNS AND CALCULATIONS SHALL BE PERFORMED BY THE CONTRACTOR'S QUALIFIED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK. ANY REVIEW OF SUCH CALCULATIONS AND/OR DRAWINGS BY THE ARCHITECT WILL BE SOLELY LIMITED TO ANY EFFECTS ON THE INTEGRITY OF THE PERMANENT PRIMARY STRUCTURE.
4. ALL ADDITIONAL STEEL REQUIRED BY THE CONTRACTOR FOR ERECTION PURPOSES AND SITE ACCESS OF STOCKPILED MATERIALS SHALL BE PROVIDED AT NO COST TO THE OWNER. ALL SUCH ADDITIONAL STEEL SHALL BE REMOVED BY THE CONTRACTOR UNLESS APPROVED BY THE OWNER IN WRITING.
5. THE CONTRACTOR SHALL SUBMIT A METHODS STATEMENT FOR ALL STRUCTURAL STEEL/METAL DECK ERECTION PROGRAMS.

F. NON-SELF-SUPPORTING STEEL FRAMES

THE STEEL STRUCTURE (COMPRISED OF GRAVITY COLUMNS, FLOOR BEAMS AND MOMENT FRAMES) IS A NON-SELF-SUPPORTING FRAME. THE FLOOR DIAPHRAGM (METAL DECK AND FULLY CURED/HARDENED CONCRETE SLAB TOPPING) AND ADJACENT R/C CONCRETE WALLS ARE REQUIRED TO PROVIDE STABILITY AND STRENGTH TO RESIST THE LOADS FOR WHICH THE FRAME IS DESIGNED. THE CONTRACTOR SHALL PROVIDE AND INSTALL TEMPORARY SUPPORT AS NECESSARY UNTIL THE COMPLETE STRUCTURE IS ERECTED. THE STEEL TRUSS AT DYER AVE. OVERBUILD HAS NOT BEEN DESIGNED AS A SELF SUPPORTING STRUCTURE. ALL MEMBERS FRAMING INTO THE STEEL TRUSS ARE REQUIRED TO BE INSTALLED TO PROVIDE STRUCTURAL STABILITY. ANY TEMPORARY SUPPORT SHOULD BE PROVIDED BY THE CONTRACTOR AS NECESSARY UNTIL THE COMPLETE STRUCTURE IS ERECTED.

G. TESTING AND INSPECTION

TESTING AND INSPECTION OF BOTH SHOP AND FIELD STRUCTURAL STEEL FABRICATION AND ERECTION WORK, INCLUDING WELDED AND BOLTED CONNECTIONS, SHALL BE AS FOLLOWS:

1. ALL STRUCTURAL STEEL FABRICATION AND ERECTION SHALL BE VISUALLY INSPECTED.
2. ALL WELDERS SHALL BE AWS CERTIFIED.
3. ALL WELDS SHALL BE AWS/AISC PREQUALIFIED.
4. ALL WELDS SHALL BE VISUALLY INSPECTED PER AWS D1.1. WELD MEASUREMENTS SHALL BE PERFORMED FOR 15% OF ALL WELDS ON A RANDOM BASIS.
5. MAGNETIC PARTICLE TESTING IN ACCORDANCE WITH ASTM E709 SHALL BE PERFORMED FOR A MINIMUM OF:
- a. 10% OF ALL FILLET WELDS CHOSEN AT RANDOM, FINAL PHASE ONLY.
- b. 100% OF TENSION MEMBER CONNECTION WELDS (I.E., HANGER CONNECTION PLATES, ETC.) FOR ROOT AND FINAL PASSES.
6. ULTRASONIC TESTING IN ACCORDANCE WITH AWS D1.1 SHALL BE PERFORMED FOR A MINIMUM OF:
- a. 100% OF ALL FULL PENETRATION WELDS.
- b. 20% OF ALL COLUMN SPLICE WELDS, CHOSEN AT RANDOM.
7. ULTRASONIC TESTING AND VISUAL INSPECTION IN ACCORDANCE WITH ASTM A435, STRAIGHT BEAM ULTRASONIC EXAMINATION OF STEEL PLATES, OR ASTM A898, STRAIGHT BEAM ULTRASONIC EXAMINATION OF ROLLED STEEL STRUCTURAL SHAPES, AS APPLICABLE SHALL BE UTILIZED TO VERIFY BASE MATERIALS FOR LAMINATIONS, INCLUSIONS, AND OTHER DISCONTINUITIES AS FOLLOWS:
- a. ALL STRUCTURAL STEEL PLATES GREATER THAN 1 1/2" THICK USED FOR THE CAISSON CORE STEEL, FOR THE CAISSON CAP TRANSFER GIRDERS, AND FOR THE DIAGONAL JOINT ASSEMBLIES w/ TIE BEAMS IN THE CONTINUOUS CAISSON CAPS PRIOR TO FABRICATION.
- b. ALL ROLLED COLUMN FLANGES AND WEBS THICKER THAN 1 1/2" LOCATED AT MOMENT CONNECTIONS. TEST AREA IS DEFINED AS 6" ABOVE AND BELOW BEAM FLANGE CONNECTION.
- c. ALL GUSSET PLATES USED IN X-BRACED FRAMES GREATER THAN 1 1/2" THICK.
- d. ALL COLUMN FLANGES IN COLUMNS WITH GUSSET PLATES ATTACHED TO BOTH FLANGES. TEST AREA IS DEFINED AS 6" AT 2'-0" INTERVALS.
8. ALL BOLTED CONNECTIONS SHALL BE VISUALLY INSPECTED AND TESTED WITH A CALIBRATED TORQUE WRENCH TO VERIFY A MINIMUM OF 25% OF BOLTS IN EACH CONNECTION (2 BOLTS PER CONNECTION MINIMUM).
9. THE REQUIRED CONTACT SURFACE CONDITIONS OF ALL SHEAR CONNECTIONS SHALL BE VISUALLY INSPECTED IMMEDIATELY PRIOR TO BEAM ERECTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REMEDIAL WORK REQUIRED TO CONTACT SURFACES.
10. THE OWNER'S STRUCTURAL STEEL TESTING SHALL PERFORM ALL FIELD INSPECTION AND TESTING AS OUTLINED ABOVE, AND MONITOR THE CONTRACTOR'S INSPECTION AND TESTING OUTLINE ABOVE FOR ALL SHOP WORK. IF THE CONTRACTOR'S QUALITY CONTROL PROGRAM IS NOT AISC CERTIFIED, THE CONTRACTOR SHALL ENGAGE AN APPROVED STRUCTURAL STEEL TESTING LABORATORY, ACCEPTABLE TO THE OWNER, WHO SHALL PERFORM ALL SHOP TESTING AND INSPECTION.
11. THE STRUCTURAL STEEL FABRICATOR AND ERECTOR SHALL SCHEDULE ALL WORK TO ALLOW THE ABOVE INSPECTION AND TESTING REQUIREMENTS TO BE COMPLETED.

H. GALVANIZED STRUCTURAL STEEL AT DUNNAGE WITHIN FAN ROOMS

1. ALL PRIMARY STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED. PROVIDE HOT-DIP GALVANIZING AND THE CLEANING AND SURFACE PREPARATION OF FABRICATED ASSEMBLAGES AS PER THE SPECIFICATION 051200 AND THE REQUIREMENTS OF ASTM A123.
2. ALL PRIMARY STEEL BOLTED CONNECTIONS SHALL UTILIZE GALVANIZED ASTM A325 SLIP-CRITICAL BOLTS, AS INDICATED IN THE STRUCTURAL DRAWINGS AND DETAILS. ALL BOLTS SHALL BE FULLY TENSIONED AND TESTED AS PER THE SPECIFICATION. ALL PRIMARY STRUCTURAL STEEL FAYING SURFACES SHALL BE "CLASS C" AND SHALL ACHIEVE A MINIMUM SLIP COEFFICIENT OF 0.5
3. THERE SHALL BE NO FIELD-WELDING NOR FIELD CUTTING OF STRUCTURAL STEEL OR ANY OTHER FIELD-MODIFICATIONS THAT COULD DAMAGE THE GALVANIZATION.
4. IF ADDITIONAL FIELD-SPLICES ARE DESIRED (TO ALLOW SMALLER PIECES), CONTACT THE ENGINEER AND ADDITIONAL BOLTED SPLICE CONNECTION DETAILS WILL BE PROVIDED
5. ALL PRIMARY STEEL CONNECTIONS TO THE EXISTING CONCRETE STRUCTURE SHALL UTILIZE HILTI HAS-R SS316 STAINLESS STEEL TIE-BOLTED RODS AND THE HILTI HIT HY 150 ADHESIVE ANCHOR SYSTEM (OR EQUIVALENT, IF APPROVED IN ADVANCE BY THE ENGINEER). ALL ADHESIVE ANCHOR CONNECTIONS SHALL UTILIZE DOUBLE NUTS TO FACILITATE ALIGNMENT AND ADJUSTMENT. SUBSEQUENT TO FINAL ALIGNMENT OF THE STEEL, ALL BASE PLATE CONNECTION SHALL BE FULLY GROUTED WITH HIGH-STRENGTH, NON-SHRINK GROUT.
6. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ALL REQUIRED TEMPORARY SUPPORTS, GUYS, BRACES, AND OTHER ELEMENTS REQUIRED TO ENSURE THE ERECTION STABILITY OF THE STRUCTURE(S) DURING ERECTION AS PER THE AISC CODE OF STANDARD PRACTICE.
7. THE PRIMARY STRUCTURAL STEEL GEOMETRY FOR THE DUNNAGE WITHIN THE FAN ROOM IS BASED ON ASSUMED EXISTING CONDITIONS AND DIMENSIONS. ALL EXISTING CONDITIONS WHICH MAY AFFECT THE STEEL GEOMETRY AND DIMENSIONS SHALL BE VERIFIED BY THE CONTRACTOR AND/OR FABRICATOR PRIOR TO DEVELOPING SHOP DRAWINGS. BRING ANY DISCREPANCIES OR POTENTIAL CONFLICTS WITH EXISTING STRUCTURES OR EQUIPMENT TO THE ATTENTION OF THE ENGINEER AT THE EARLIEST POSSIBLE DATE.

STRUCTURAL STEEL PAINTING

1. ALL STRUCTURAL STEEL SHALL BE CLEANED AND PAINTED AS REQUIRED BY THE TECHNICAL SPECIFICATION SECTION 099100.
2. ALL STRUCTURAL STEEL TO RECEIVE SPRAYED-ON FIREPROOFING AND/OR TO BE ENCASED IN CONCRETE DOES NOT REQUIRE PAINTING UNLESS NOTED OTHERWISE.
3. THE FOLLOWING STRUCTURAL STEEL ELEMENTS ARE AESS. PROVIDE FINISH AND PAINT AS PER ARCHITECTURAL SPECIFICATIONS:
- STAIRS
  - ELEVATOR STRUCTURE

STRUCTURAL METAL DECK NOTES

1. ALL METAL DECK SHALL BE FABRICATED FROM STEEL TYPE ASTM A653, GRADE A, HAVING A MINIMUM YIELD STRENGTH OF 50,000 PSI (MINIMUM YIELD STRENGTH OF 40,000 PSI FOR 16 GAGE METAL DECK). ALL FLOOR DECKING SHALL BE HOT-DIPPED GALVANIZED, OR PHOSPHATIZED AND PAINTED. ALL DECKING AT ROOF LEVELS, PARKING/VEHICULAR LEVELS, LOADING DOCK FREIGHT AREAS, AND SIDEWALK AREAS SHALL BE HOT-DIPPED GALVANIZED.
2. ALL METAL DECK SHALL BE DESIGNED FOR THE SPAN AND LOADING CONDITIONS SHOWN ON THE STRUCTURAL DRAWINGS AND IN THE METAL DECK SCHEDULE. NONCELLULAR METAL DECK SHALL BE PROVIDED IN ALL AREAS, UNLESS NOTED OTHERWISE.
3. METAL DECK SECTION PROPERTIES SHALL BE COMPUTED IN ACCORDANCE WITH THE AISI "SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS", LATEST EDITION, UNLESS NOTED OTHERWISE.
4. THE MINIMUM GAGE OF ALL METAL DECK SHALL BE 18 GAGE WHEN THE CONCRETE TOPPING SLAB THICKNESS (Tc, SEE DETAILS 6/S-501) IS LESS THAN OR EQUAL TO 4 1/2" AND 16 GAGE WHEN CONCRETE TOPPING SLAB THICKNESS IS GREATER THAN 4 1/2".
5. THE METAL DECK CONTRACTOR SHALL SUBMIT, TO THE ARCHITECT FOR REVIEW, STRUCTURAL ENGINEERING CALCULATIONS, PREPARED AND SEALED BY A QUALIFIED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK. PROVIDE PUBLISHED MANUFACTURER'S DATA, AND INDEPENDENTLY CERTIFIED LOAD TEST DATA, VERIFYING THAT THE METAL DECK AND RELATED DECK ACCESSORIES SATISFY THE SPECIFIED LOADING AND DEFLECTION REQUIREMENTS FOR THE SPANS INDICATED ON THE DRAWINGS.
6. THE CONTRACTOR SHALL PROVIDE DETAILED, COORDINATED, AND CHECKED SHOP DRAWINGS INDICATING LOCATION, GAGE AND SIZE OF EACH PIECE OF DECKING AND RELATED ACCESSORIES. THE DRAWINGS SHALL CLEARLY SHOW WELDING DETAILS TO STRUCTURAL FRAMING ELEMENTS, SIDE LAP CONNECTION DETAILS, DECK OPENING/EDGE CLOSURES, AND WHERE REQUIRED, SUPPLEMENTARY DECK AND/OR CLOSURE REINFORCING.
7. ALL NON-CELLULAR COMPOSITE METAL DECK SHALL HAVE WIDE RIBS SUITABLE FOR SHEAR STUD PLACEMENT WHERE STUDS ARE REQUIRED. THE CONFIGURATION OF THE METAL DECK SHALL BE SUCH AS TO DEVELOP THE FULL HORIZONTAL SHEAR VALUE OF THE STUD FOR THE PARTICULAR METAL DECK-SLAB CONFIGURATION PER THE AISC SPECIFICATIONS, LATEST EDITION.
8. ALL DECKING SHALL BE WELDED TO STRUCTURAL STEEL BY QUALIFIED WELDERS USING PRE-QUALIFIED PROCEDURES. THE TECHNICAL SPECIFICATIONS ESTABLISH A PROCEDURE FOR PRE-QUALIFICATION OF THE PLUG WELDING OF THE STEEL DECKING TO THE STRUCTURAL STEEL FOR THE PARTICULAR GAGES USED. PRIOR TO THE START OF ERECTION OF THE STEEL DECK, EACH WELDER SHALL BE QUALIFIED USING THIS PROCEDURE AS WITNESSED BY THE OWNER'S TESTING LABORATORY.
9. ALL METAL DECK SHALL BE WELDED AT 12 INCHES MAXIMUM ON CENTER TO THE SUPPORTING STEEL WITH A 3/4" INCH DIAMETER PLUG WELD. SIDE LAPS SHALL BE FASTENED WITH #10 TEK SCREWS AT 18 INCHES MAXIMUM ON CENTER.
10. THE METAL DECK SHALL BE DESIGNED TO BE UNSHORED AND CONTINUOUS OVER A MINIMUM OF THREE (3) SPANS IN THE DIRECTION INDICATED. METAL DECKING FOR SINGLE AND DOUBLE SPANS, IF REQUIRED, SHALL ALSO SATISFY THE SPECIFIED LOAD AND DEFLECTION REQUIREMENTS, NOTED HEREIN.
11. THE METAL DECK SHALL BE DESIGNED FOR AN ASSUMED SUITABLE CONSTRUCTION LIVE LOAD TAKING INTO CONSIDERATION THE PARTICULAR METHOD OF CONCRETE PLACEMENT TO BE USED ON THE PROJECT, SPAN AND LOAD CONDITIONS INDICATED BY THE SUPPORTING FRAMEWORK, OPENINGS, AND ACTUAL DECK PIECE SIZES UTILIZED. THE ASSUMED CONSTRUCTION LIVE LOAD SHALL NOT BE LESS THAN 20 PSF. THE CONTRACTOR SHALL NOT EXCEED THE ASSUMED CONSTRUCTION DESIGN LIVE LOAD WITHOUT FIRST TAKING ALL NECESSARY SAFETY PRECAUTIONS SUCH AS SHORING, ETC. ADDITIONALLY, FOLLOW ALL APPLICABLE CITY, LOCAL AND AISI REQUIREMENTS FOR TEMPORARY CONSTRUCTION LOADINGS, IF MORE STRINGENT.
12. COMPOSITE METAL DECK DESIGN CRITERIA: (CELLULAR AND NON-CELLULAR DECKS)

A. METAL DECK: (CONSTRUCTION LOADS ONLY)

- a. MAXIMUM DECK DEFLECTION FOR CONCRETE WET WEIGHT SHALL BE LESS THAN OR EQUAL TO L/240, BUT NOT TO EXCEED 1/2"; COMPUTED EITHER ON A SINGLE SPAN BASIS, OR ON LOADING ONLY ONE (1) SPAN FOR MULTIPLE SPAN CONDITIONS.
- b. MAXIMUM STRESS IN DECK FOR CONCRETE WET WEIGHT AND CONSTRUCTION LOADS SHALL BE LESS THAN OR EQUAL TO 0.6 Fy (Fy = YIELD STRESS) COMPUTED ON A SINGLE SPAN BASIS, OR ON LOADING TWO ADJACENT SPANS FOR MULTIPLE SPAN CONDITIONS.
- c. ALLOW FOR AN AVERAGE OF 5 PSF WET CONCRETE WEIGHT FOR CONCRETE LEVELING (AS PER SPECIFICATIONS) IN ADDITION TO THE SPECIFIED SLAB THICKNESS, FOR STRESS AND DEFLECTION CALCULATIONS.
- d. PROVIDE DECK SHORING, IF REQUIRED, TO MEET THE CONDITIONS OF ITEMS NO. a, b, AND c ABOVE.
- e. ALL FORM DECKS, FOR REINFORCED CONCRETE SLABS, SHALL BE DESIGNED FOR THE SAME CRITERIA STATED IN ITEMS NOS. a, b, c, AND d ABOVE.

B. COMPOSITE METAL DECK SLAB: (FINAL DESIGN LOAD)

- a. THE DECK SHALL DEVELOP FULL COMPOSITE ACTION FOR IMPOSED LOADS AS SHOWN IN THE DECK SCHEDULE.
- b. MAXIMUM DEFLECTION UNDER SUPERIMPOSED LOAD SHALL BE LESS THAN OR EQUAL TO L/360.
- c. MAXIMUM STRESS IN DECK FOR TOTAL LOAD USING APPROPRIATE NON-COMPOSITE AND COMPOSITE PROPERTIES SHALL BE LESS THAN OR EQUAL TO 0.75 Fy.
- d. MAXIMUM ALLOWABLE STRESS IN CONCRETE SHALL BE AS PER ACI 318, LATEST EDITION.
- e. THE COMPOSITE DECK SHALL BE DESIGNED ON THE BASIS OF OBTAINING A MINIMUM FACTOR OF SAFETY OF 2 FOR THE TOTAL SUPERIMPOSED LOAD ON A SINGLE SPAN BASIS.

16. SHEAR STUDS:

- a. ALL SHEAR STUD PLACEMENT DIAGRAM SHOWN REPRESENT IDEALIZED CONDITIONS, AND ACTUAL FRAMING CONFIGURATIONS MAY REQUIRE ADDITIONAL MODIFICATIONS AND INTERPRETATIONS.
- b. THE CONTRACTOR SHALL SUBMIT CHECKED SHOP DRAWINGS INDICATING THE SHEAR STUD LAYOUT, INCLUDING SIZE, SPACING AND GROUPING, FOR EACH BEAM.
- c. THE NUMBER OF STUDS PER BEAM AS SHOWN ON THE DRAWINGS INCLUDES REDUCTIONS BASED ON RIB WIDTH, NUMBER OF STUDS PER CELL, DECK-RIB ORIENTATION, AND SLAB THICKNESS AS PER AISC SPECIFICATIONS FOR COMPOSITE CONSTRUCTION, LATEST EDITION. THE ASSUMED ALLOWABLE HORIZONTAL SHEAR DESIGN VALUE (ASD) FOR A NOMINAL 3/4"-DIA. x 6" LONG STUD IS 12.5 KIPS PER STUD FOR NON-CELLULAR DECK WITH NORMAL WEIGHT CONCRETE. THE ASSUMED DECK NOMINAL RIB HEIGHT IS 3", AND THE ASSUMED AVERAGE CONCRETE RIB WIDTH IS 6". THE METAL DECK CONTRACTOR SHALL SUBMIT LOAD TEST DATA VERIFYING THE HORIZONTAL SHEAR CAPACITY OF SHEAR STUDS FOR DIFFERENT DECK TYPES AND CELL CONFIGURATIONS, AS DETAILED ON THE SHOP DRAWINGS. IF ANY OF THE ASSUMPTIONS LISTED ABOVE ARE VIOLATED, THE METAL DECK CONTRACTOR SHALL SUBMIT STRUCTURAL DESIGN CALCULATIONS, PREPARED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK, BASED ON THE DETAILED SHOP DRAWINGS, PROVIDE ALL EXTRA STUDS AS MAY BE REQUIRED TO ACHIEVE THE TOTAL HORIZONTAL SHEAR CAPACITY.
- d. MAXIMUM SPACING OF STUDS SHALL BE 12" ON CENTER.
- e. SHEAR STUDS SHALL BE EITHER WELDED DIRECTLY TO STRUCTURAL STEEL ELEMENTS AT LOCATIONS WITHOUT DECK OR WELDED TYPE THROUGH THE METAL DECK BY PREQUALIFIED METHODS. IF THROUGH DECK WELDING IS UNFEASIBLE, THE STUDS SHALL BE INSTALLED IN PRE-PUNCHED HOLES IN THE METAL DECK. THE CONTRACTOR SHALL ESTABLISH SPECIFIC WELDING REQUIREMENTS FOR EACH THICKNESS OF FRAMING ELEMENT AND/OR GAGE OF METAL DECK.
17. THE OWNER'S TESTING LABORATORY SHALL INSPECT AND TEST ALL METAL DECK AND SHEAR STUD INSTALLATION WORK. SEE TECHNICAL SPECIFICATION SECTION 053100, "STEEL DECKING" FOR ADDITIONAL TESTING AND INSPECTION REQUIREMENTS.
18. CONDUIT SHALL NOT BE PLACED IN STRUCTURAL SLABS.
19. SEE SPECIFICATION SECTION 053100, "STEEL DECKING", FOR ADDITIONAL REQUIREMENTS.

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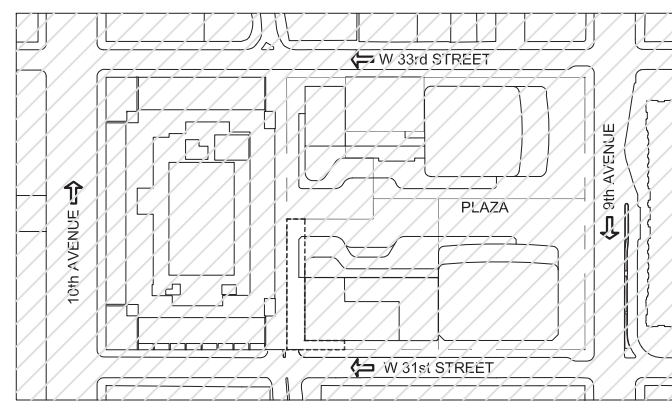
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KEY PLAN

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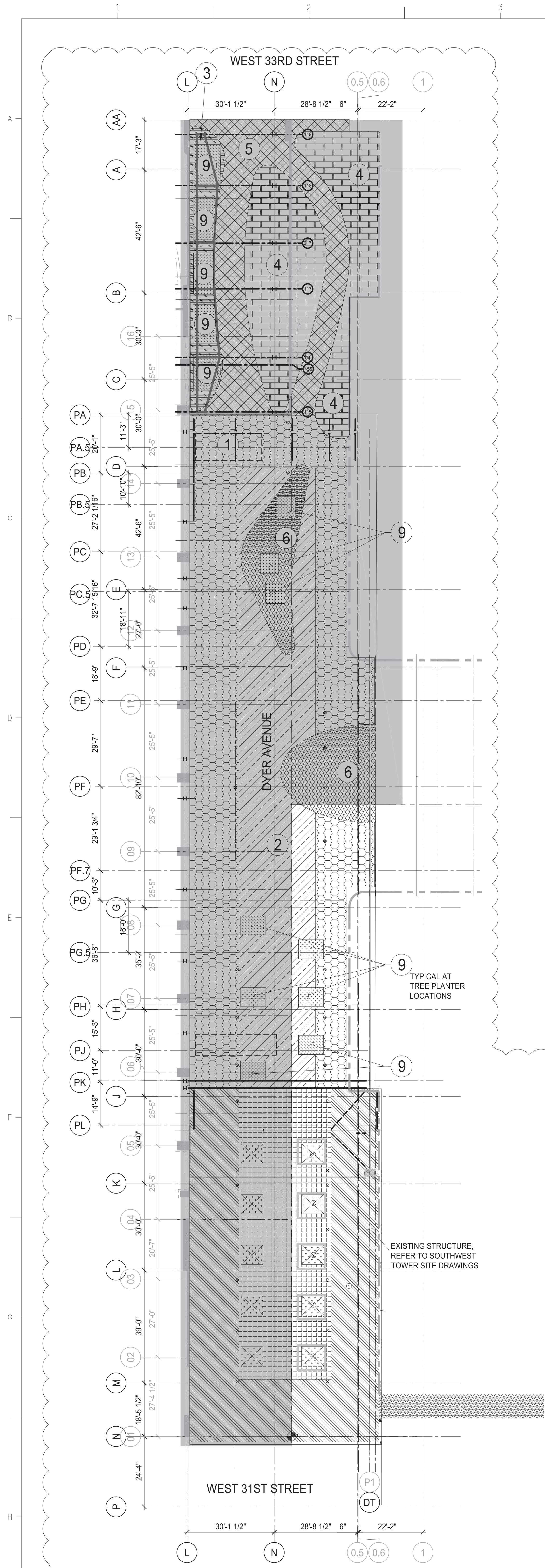
STRUCTURAL STEEL  
NOTES

Seal & Signature:



Date: 02 SEP 2016  
NYC DOB Number:  
Project No: 207120  
Scale: NTS  
DWG No:  
S-005.01  
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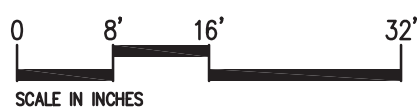




SUPERIMPOSED LOAD TABLE						SNOW LOADS	SEISMIC LOADS
MARK	AREA	SDL psf	LL psf	SL psf	REMARKS	SNOW LOADS WERE DETERMINED IN ACCORDANCE WITH THE CITY OF NEW YORK BUILDING CODE, 2008 AND ASCE 07  STRUCTURAL OCCUPANCY CATEGORY: IV IMPORTANCE FACTOR, I <sub>s</sub> : 1.2 GROUND SNOW LOADS, P <sub>g</sub> : 25 PSF EXPOSURE FACTOR, C <sub>e</sub> : 1.0 THERMAL FACTOR, C <sub>t</sub> : 1.2  SEISMIC LOADS WERE DETERMINED IN ACCORDANCE WITH THE CITY OF NEW YORK BUILDING CODE, 2008 AND ASCE 07  STRUCTURAL OCCUPANCY CATEGORY: IV SEISMIC USE GROUP: III IMPORTANCE FACTOR, I <sub>e</sub> : 1.5 SEISMIC DESIGN CATEGORY: C SOIL CLASS: B DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS: S <sub>ds</sub> = 0.243g, S <sub>d1</sub> = 0.047g SEISMIC FORCE-RESISTING SYSTEM: ORDINARY REINFORCED CONCRETE SHEAR WALLS DESIGN COEFFICIENTS AND FACTORS: R = 4, C <sub>d</sub> = 4	
1	DYER AVE OVERBUILD AREA 'A'	110	100	25			
2	DYER AVE OVERBUILD AREA 'B'	110	100	115	115 psf STOCKPILED SNOW LOAD		
3	LANDSCAPE AREA 'A' OVER EXISTING 450	150	50	25			
4	LANDSCAPE AREA 'B' OVER EXISTING 450	250	50	25			
5	DYER AVE OVERBUILD AREA 'C'	120	100	25	INCLUDES 20 psf SDL FOR RIGID INSULATION TO FILL		
6	LANDSCAPE	370	50	25	TREE WEIGHT NOT INCLUDED		
8	PLAZA	110	100	25			
9	TREE PLANTERS	530	50	25			

NOTES:  
1. STRUCTURAL SYSTEM IS NOT DESIGNED FOR CONSTRUCTION MATERIAL STAGING AREA. ANY ADDITIONAL LOADING SHOULD BE COORDINATED WITH ARCHITECT AND STRUCTURAL ENGINEER FOR REVIEW.  
2. THE STRUCTURAL SLAB IS DESIGNED TO SUPPORT A MAXIMUM CONCENTRATED FORCE OF 6KIPS FOR MAINTENANCE EQUIPMENT. THE STRUCTURAL SYSTEM CAN SUPPORT THE WEIGHT OF ONLY ONE VEHICLE PER STRUCTURAL STEEL BEAM.

1 LOADING DIAGRAM  
SCALE: 1/16" = 1'-0"



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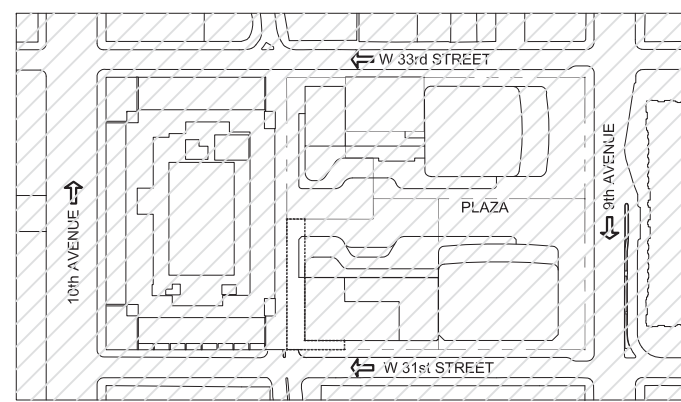
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TOWER  
SITE

West 31st Street  
New York, NY

Client

Brookfield

250 Vesey Street, 15th Floor, New York, NY 10281-1023

Architecture/Structural Engineering

SOM

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Landscape

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475 Tenth Avenue, New York, NY 10018

MEP Engineering

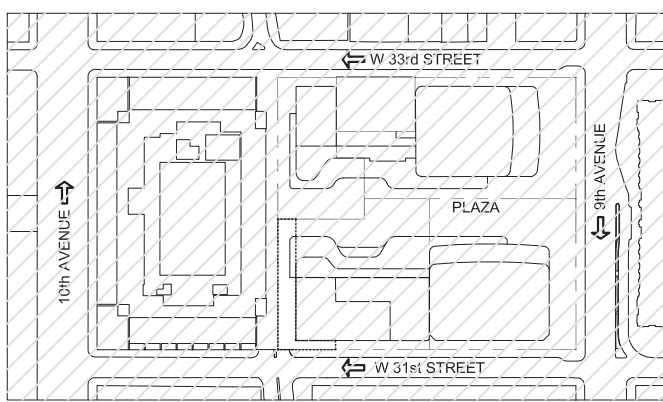
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85 Pine Street, New York, NY 10005

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Electrical Engineering

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KEY PLAN

1 02 SEP 2016 ISSUED FOR PERMIT FILING

No. Date Description

Sheet Name:

STORAGE SHED  
LOADING DIAGRAM AND  
FRAMING PLAN

Seal & Signature:



Date: 02 SEP 2016

NYC DOB Number:

Project No: 207120

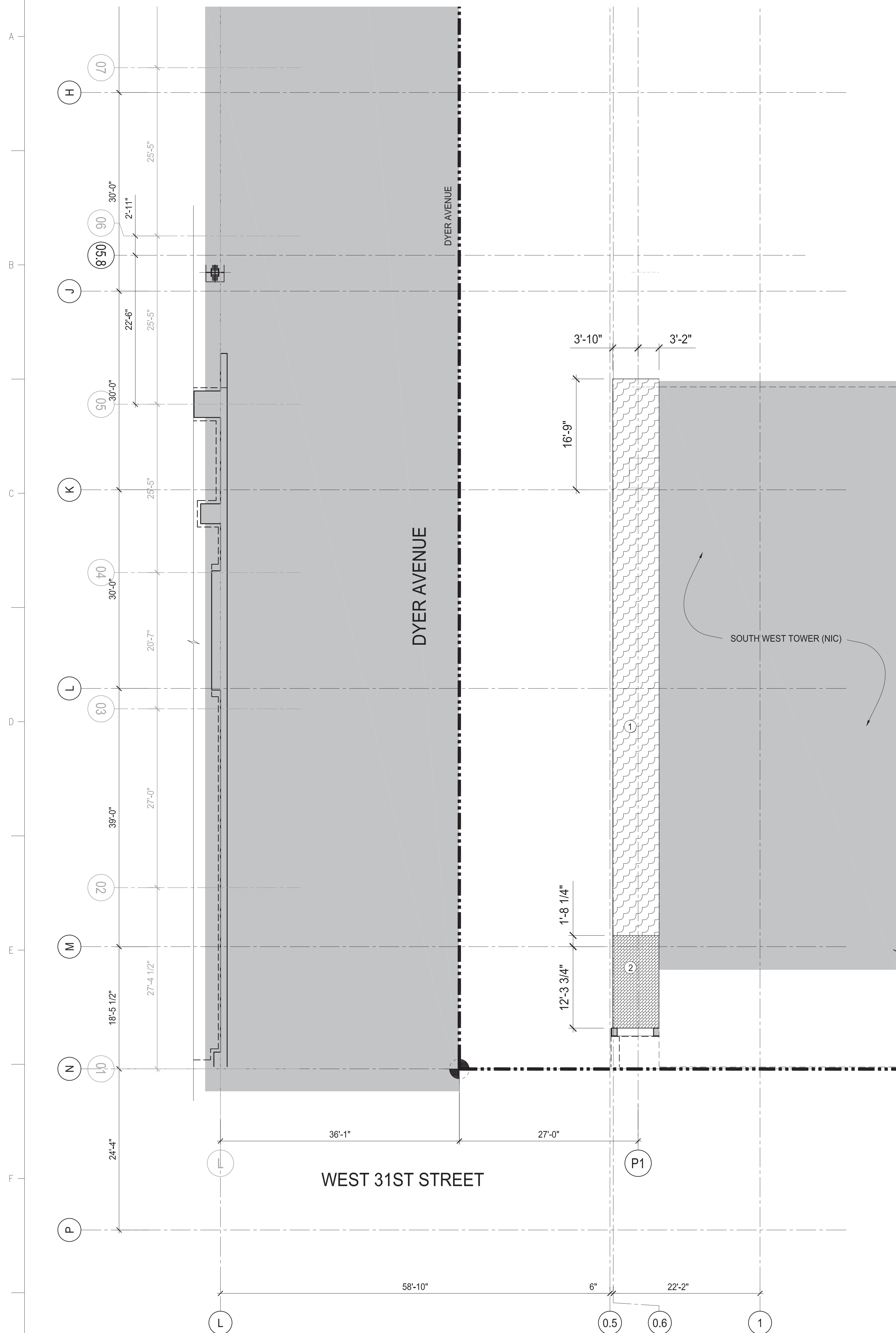
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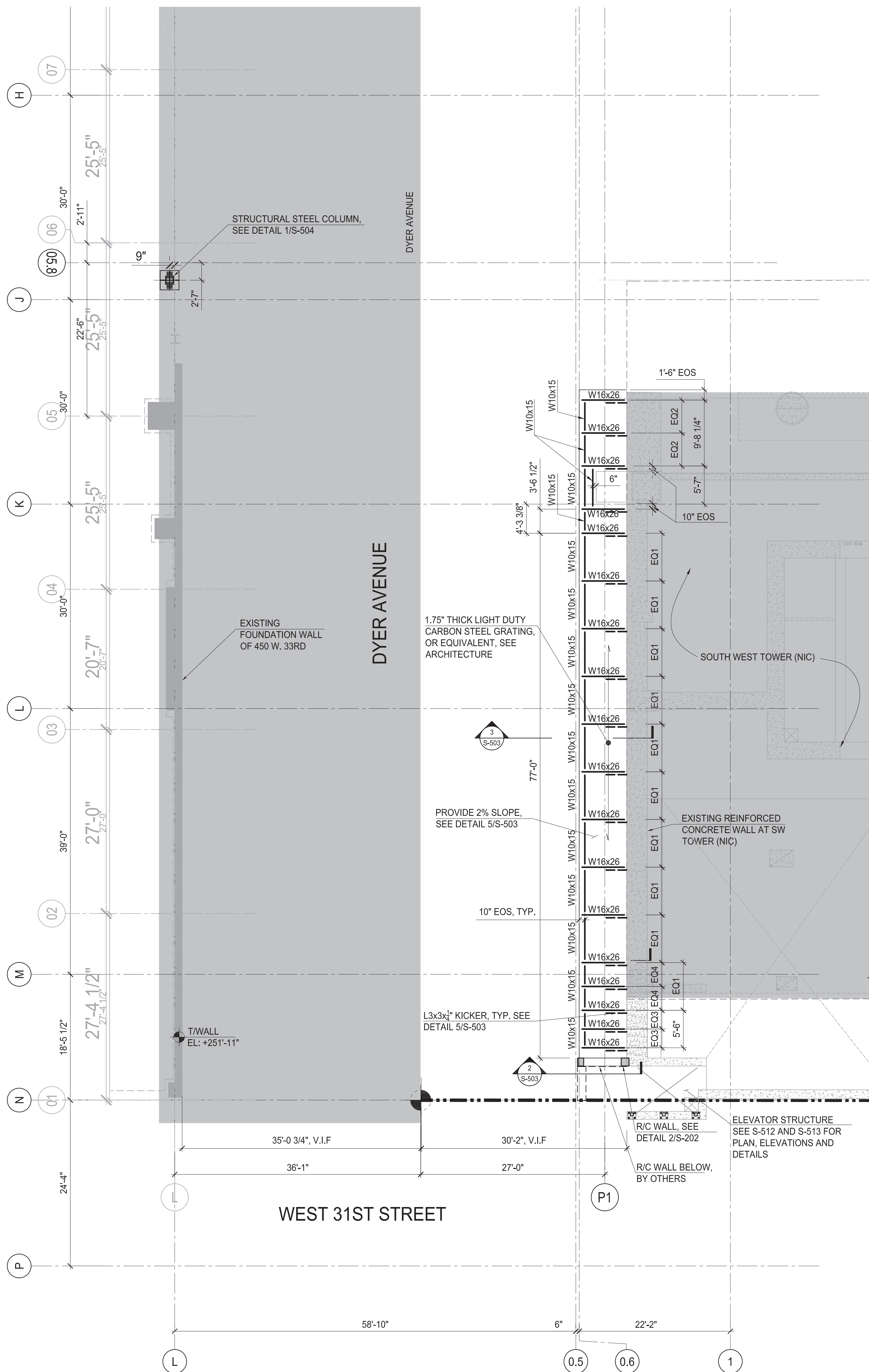


SUPERIMPOSED LOAD TABLE

MARK	AREA	SDL psf	LL psf	SL psf	REMARKS
1	DYER AVE. CANTILEVER SHED	30	100	0	
2	DYER AVE. CANTILEVER SHED AT EQUIPMENT STORAGE	30	300	0	

- NOTES:
- STRUCTURAL SYSTEM IS NOT DESIGNED FOR CONSTRUCTION MATERIAL STAGING AREA. ANY ADDITIONAL LOADING SHOULD BE COORDINATED WITH ARCHITECT AND STRUCTURAL ENGINEER FOR REVIEW.
  - THE STRUCTURAL SLAB IS DESIGNED TO SUPPORT A MAXIMUM CONCENTRATED FORCE OF 6KIPS FOR MAINTENANCE EQUIPMENT. THE STRUCTURAL SYSTEM CAN SUPPORT THE WEIGHT OF ONLY ONE VEHICLE PER STRUCTURAL STEEL BEAM.

1 LOADING DIAGRAM  
SCALE: 1/8" = 1'-0"



- NOTE:
- ALL DIMENSIONS TO EXISTING STRUCTURES ARE APPROXIMATE AND NEED TO BE VERIFIED BY SURVEY PRIOR TO STARTING SHOP DRAWINGS.
  - T/STEEL ELEVATION = [EL: +27'-5.78"], FOR W16 AT WESTERN EDGE, UNLESS NOTED OTHERWISE, SEE DETAIL S/S-503
  - T/STEEL ELEVATION = [EL: +26'-5.58"], FOR W10 EDGE BEAMS, UNLESS NOTED OTHERWISE, SEE DETAIL S/S-503
  - DO NOT ADD ANY NEW LOAD ONTO THE 450W33RD STREET BUILDING UNTIL THE FULL FACADE HAS BEEN FULLY REMOVED
  - ALL STEEL BEAMS EXPOSED TO WEATHER, SHALL BE GALVANIZED

2 GROUND LEVEL FRAMING PLAN  
SCALE: 1/8" = 1'-0"







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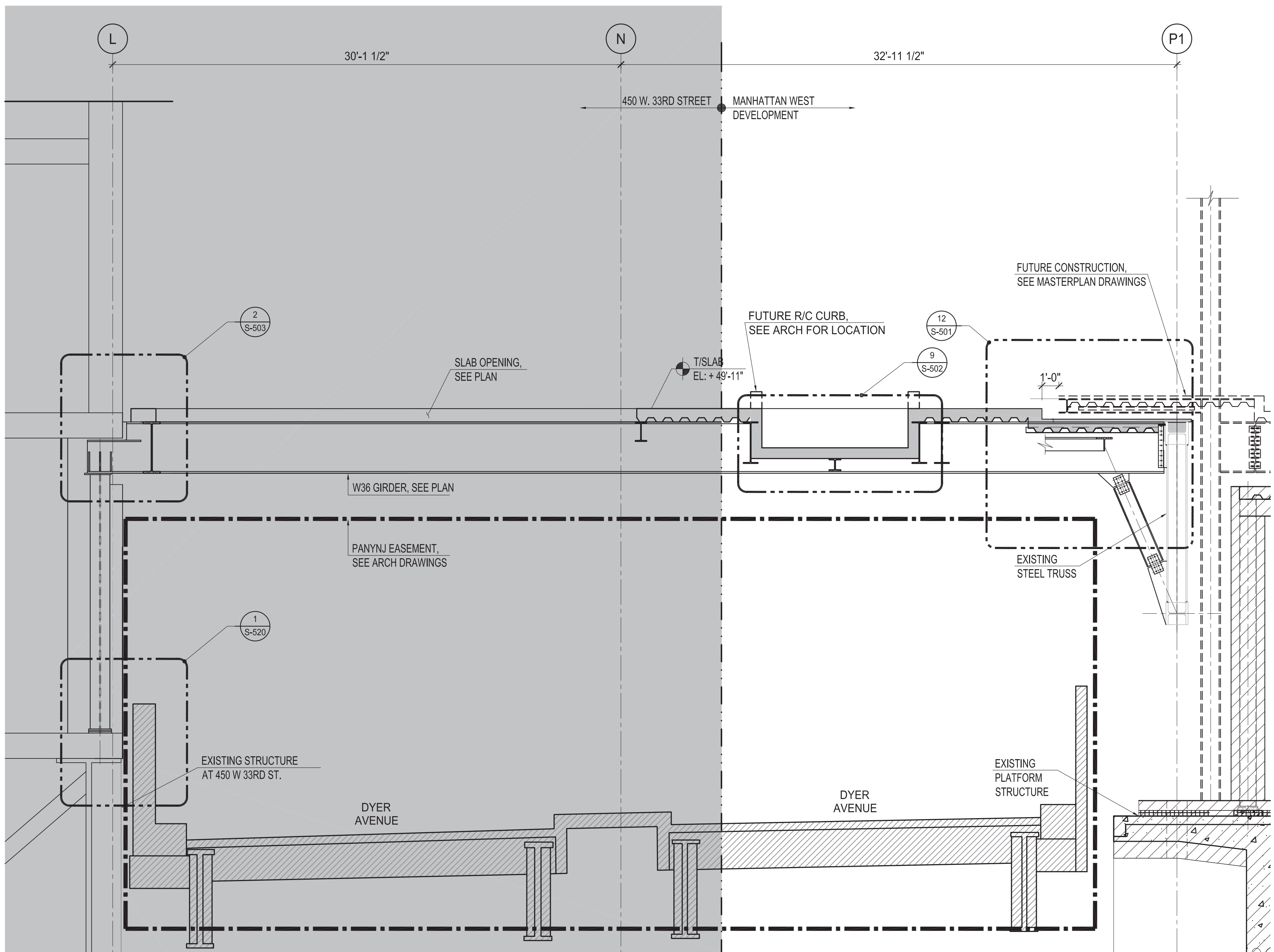
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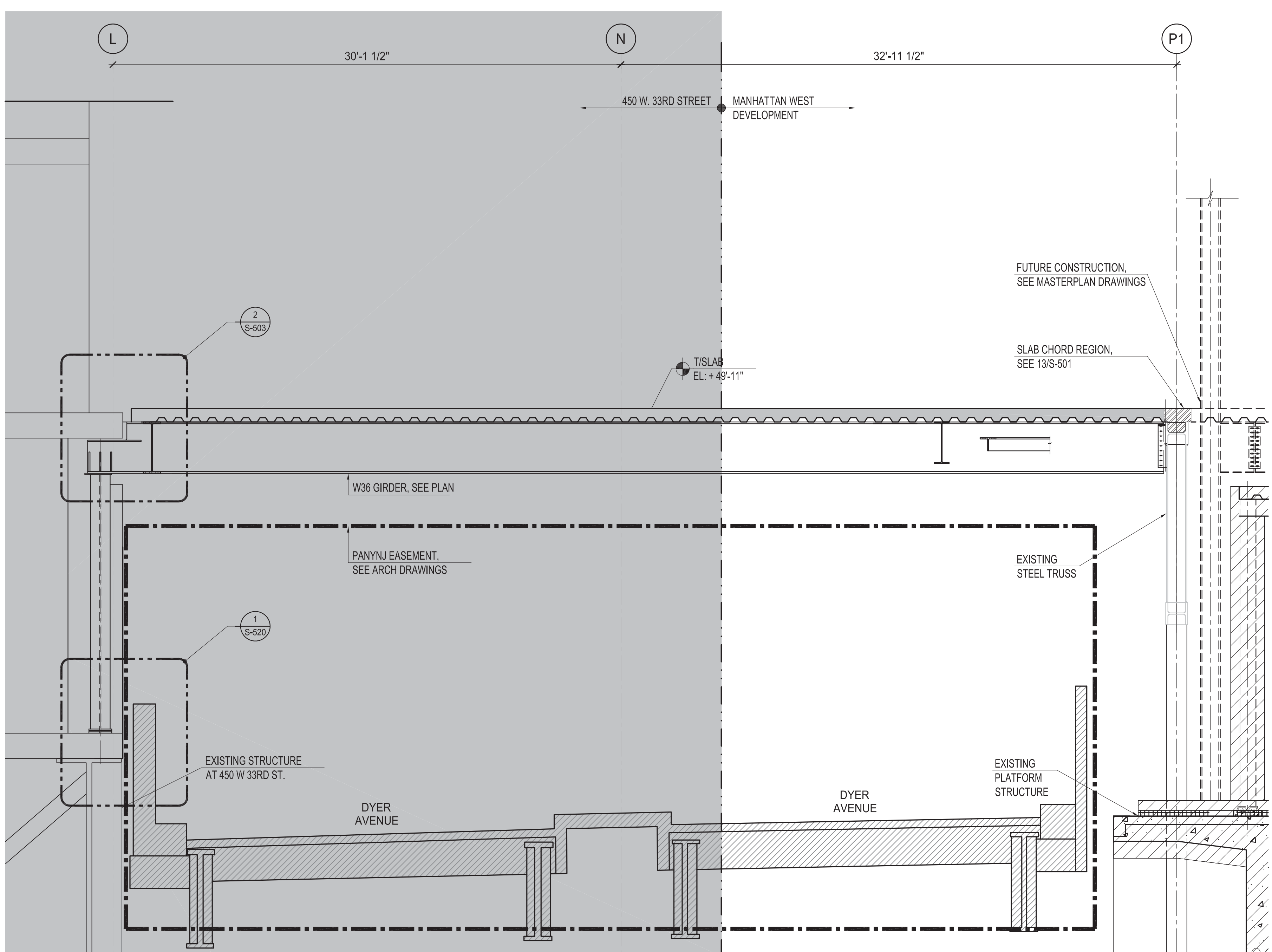
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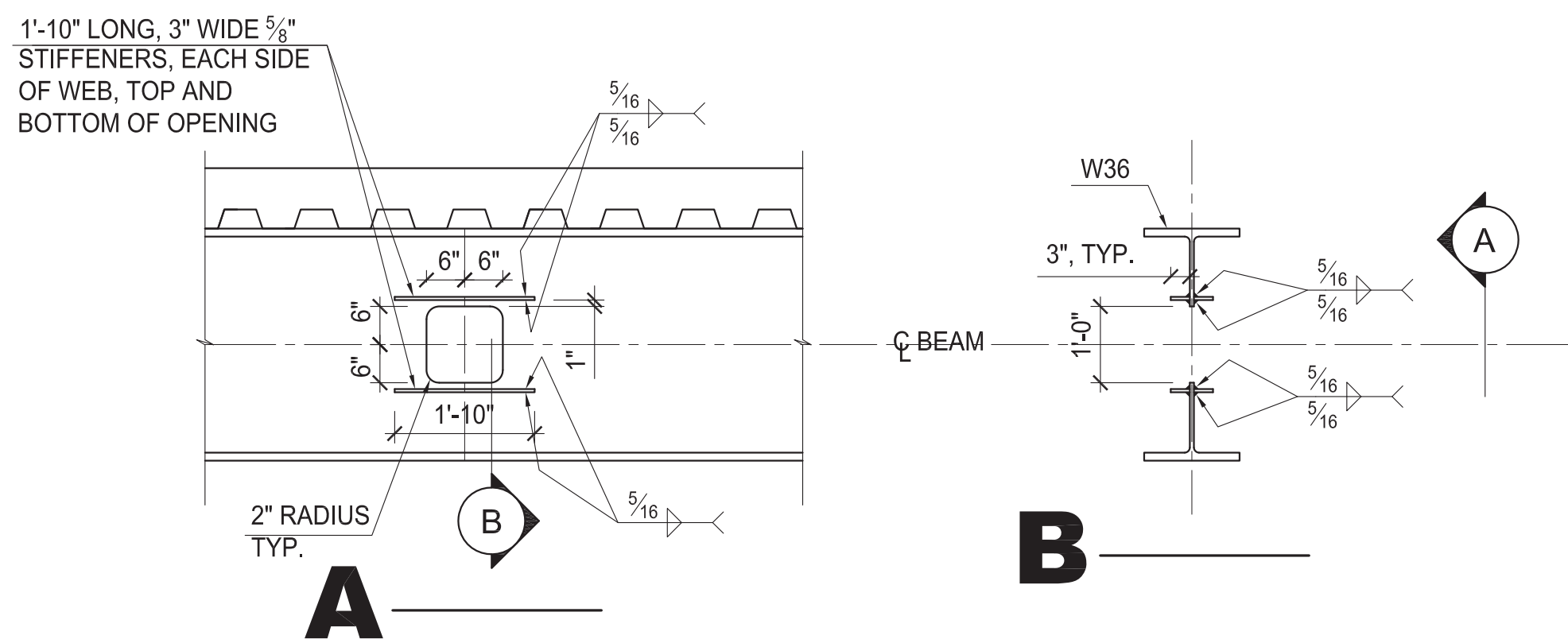
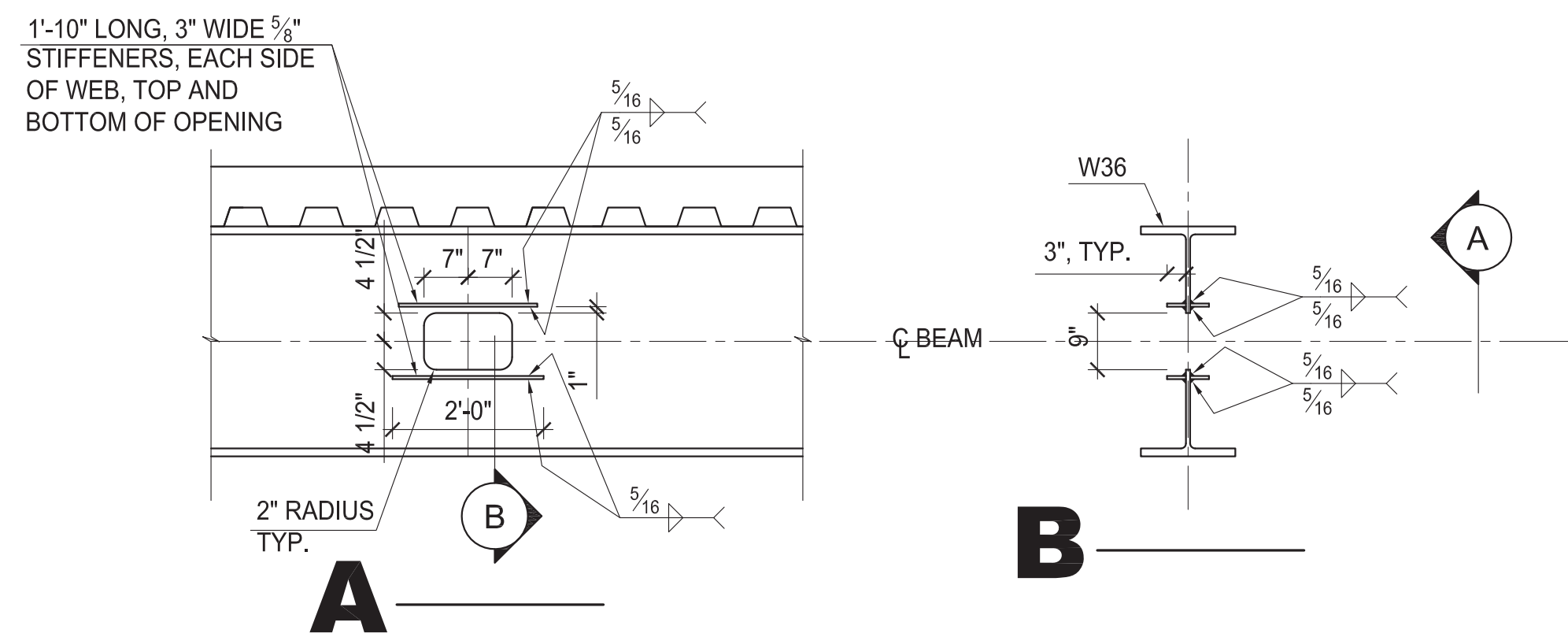
- NOTES:
1. ALL DIMENSIONS TO EXISTING STRUCTURE ARE APPROXIMATE AND NEED TO BE VERIFIED BY SURVEY PRIOR TO STARTING SHOP DRAWINGS.
  2. DO NOT ADD ANY LOAD ONTO THE 450 W 33rd STREET BUILDING UNTIL THE FULL FACADE HAS BEEN FULLY REMOVED.



- NOTES:
1. ALL DIMENSIONS TO EXISTING STRUCTURE ARE APPROXIMATE AND NEED TO BE VERIFIED BY SURVEY PRIOR TO STARTING SHOP DRAWINGS.
  2. DO NOT ADD ANY LOAD ONTO THE 450 W 33rd STREET BUILDING UNTIL THE FULL FACADE HAS BEEN FULLY REMOVED.

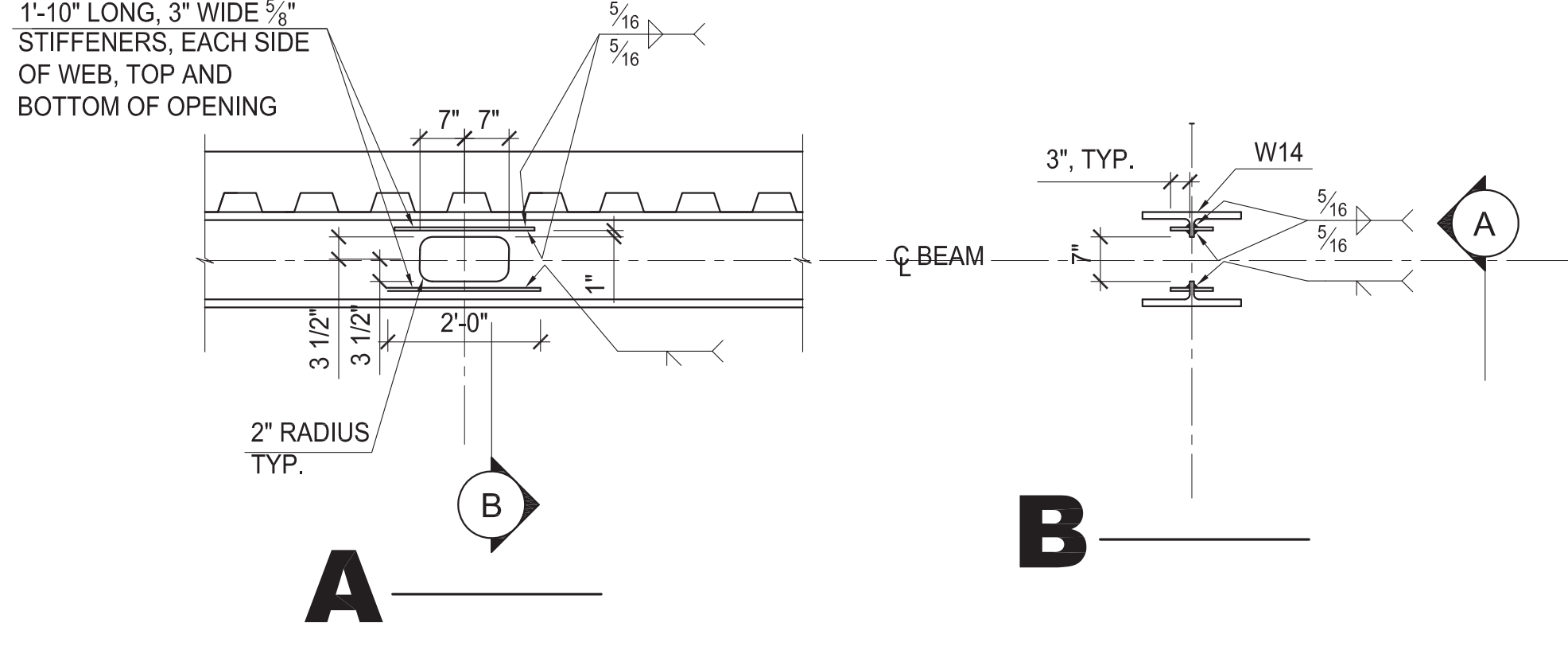
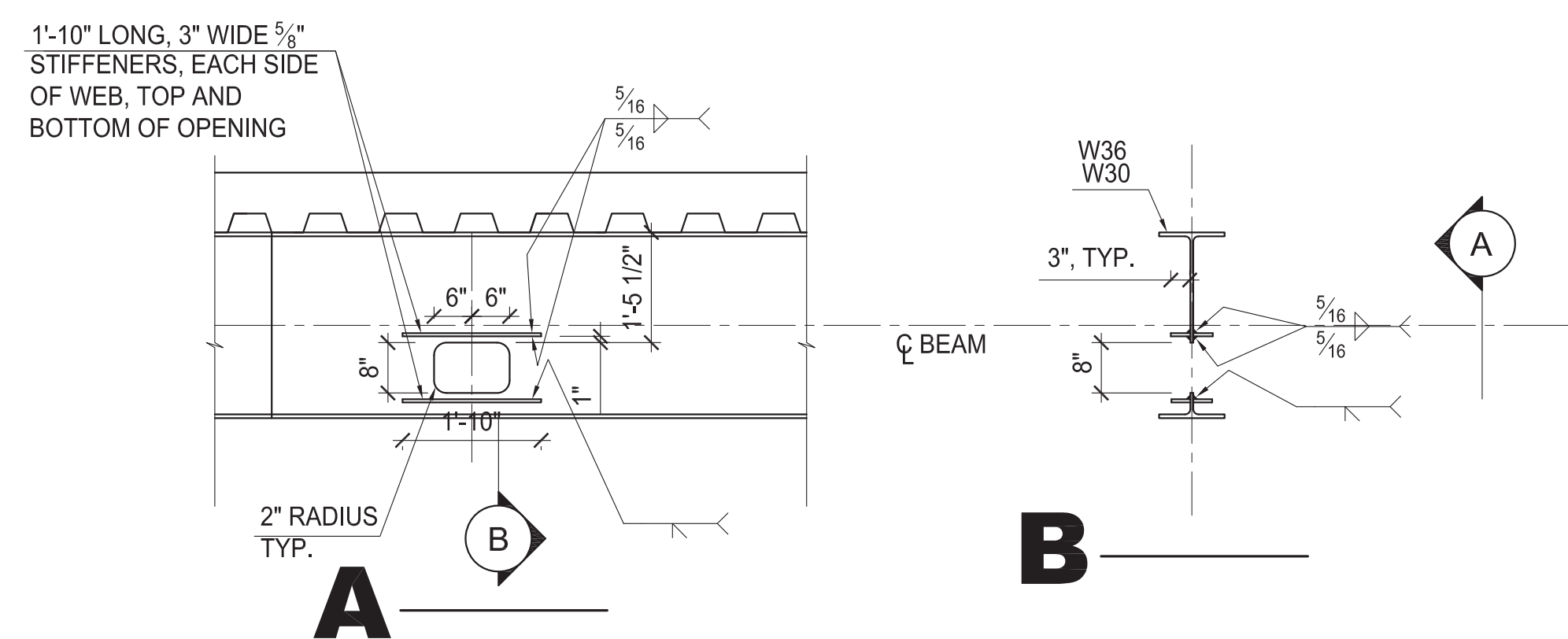
1 SECTION SOUTH OF GRIDLINE H  
SCALE: NOT TO SCALE

2 SECTION SOUTH OF GRIDLINE 10  
SCALE: NOT TO SCALE



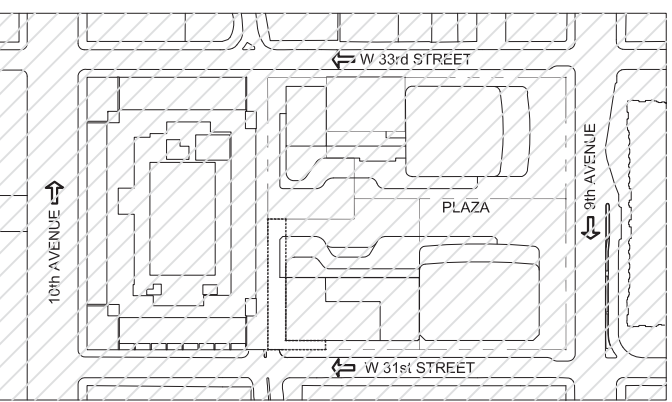
4 DETAIL AT BEAM WEB OPENING (TYPE A)  
SCALE: NOT TO SCALE

5 DETAIL AT BEAM WEB OPENING (TYPE B)  
SCALE: NOT TO SCALE



6 DETAIL AT BEAM WEB OPENING (TYPE C)  
SCALE: NOT TO SCALE

7 DETAIL AT BEAM WEB OPENING (TYPE D)  
SCALE: NOT TO SCALE



KEY PLAN

1 02 SEP 2016 ISSUED FOR PERMIT FILING

No. Date Description

Sheet Name:

DYER AVENUE  
OVERBUILD  
SECTIONS

Seal & Signature:



Date: 02 SEP 2016

NYC DOB Number:

Project No: 207120

Scale: NTS

DYER No:

CAD FILE Name:

S-401.00

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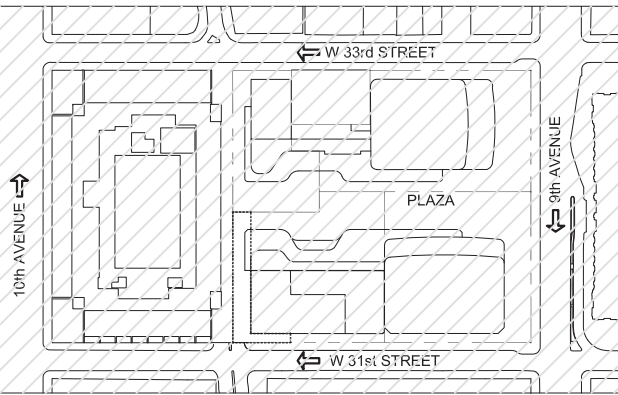
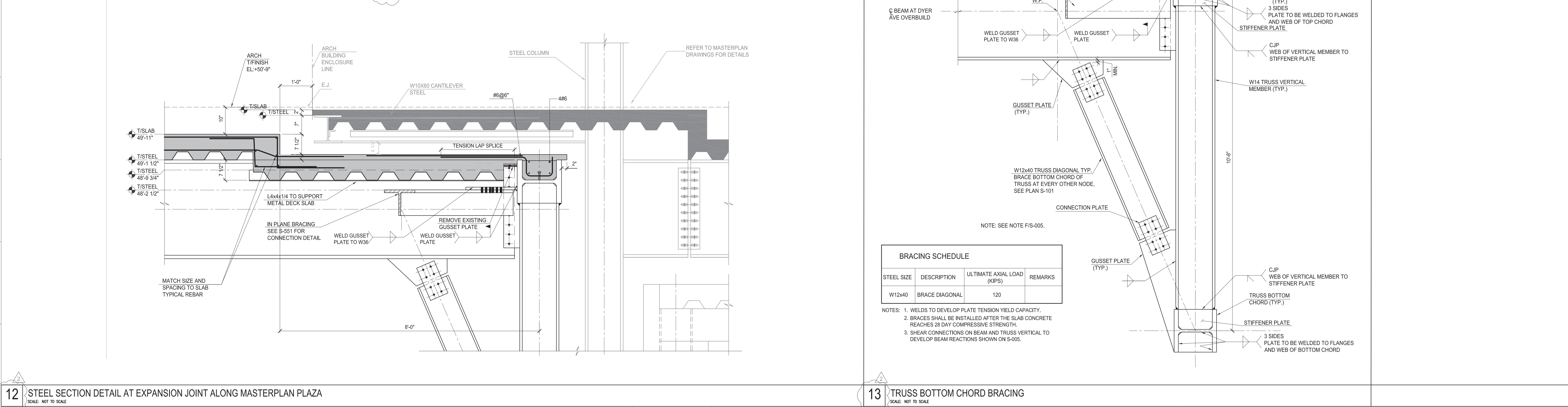
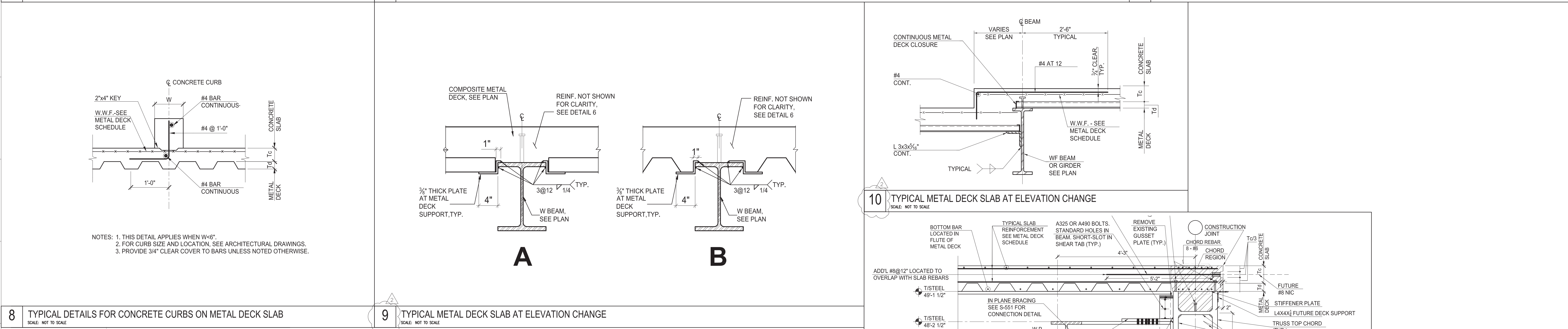
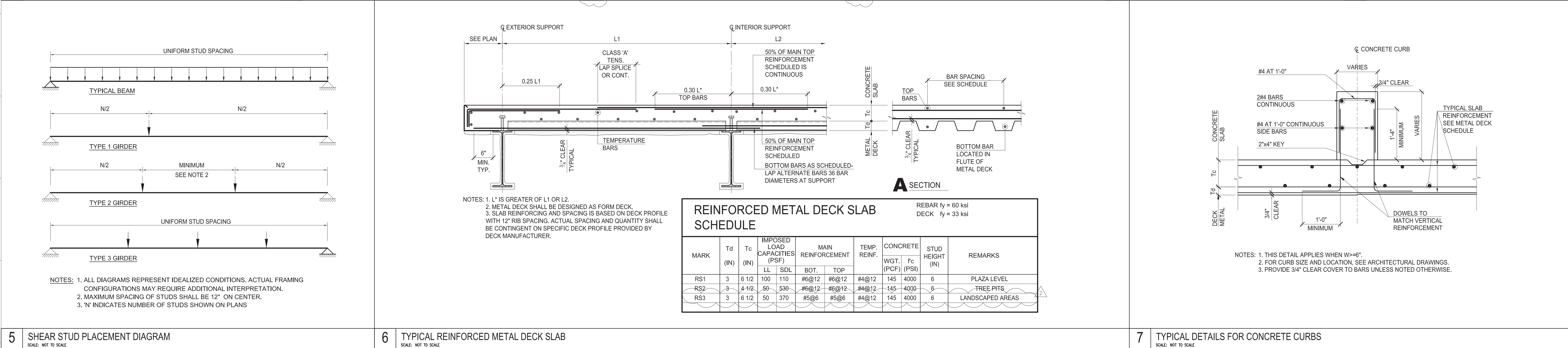
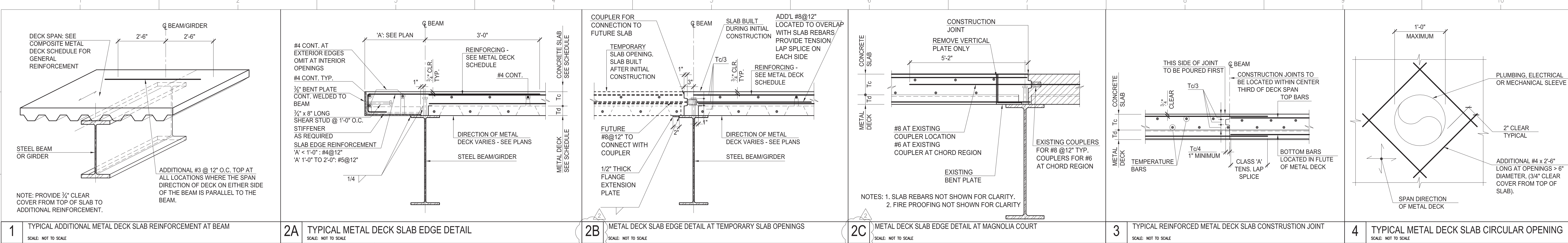
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KEY PLAN

2	02 SEP 2016	ISSUED FOR PERMIT FILING
1	02 MAY 2014	ISSUED FOR PERMIT FILING
No.	Date	Description

Sheet Name:

STRUCTURAL METAL DECK  
SLAB SCHEDULES AND  
TYPICAL DETAILS

Seal & Signature:

Drawn: 02 SEP 2016  
NYC DOB Number:  
Project No: 207120  
Scale: NTS  
DWG No:  
S-501.01  
CAD FILE Name:  
S-501.DWG  
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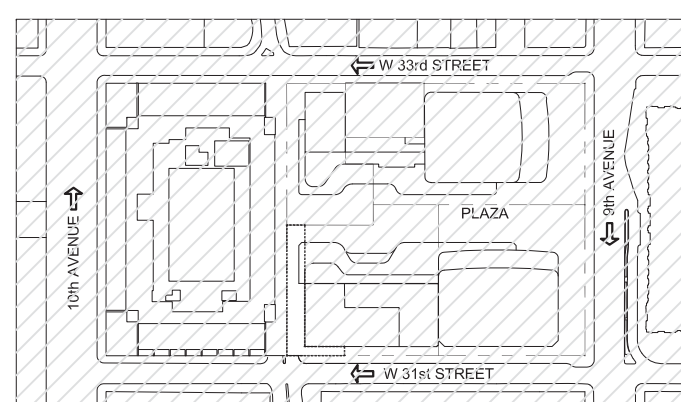
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2	02 SEP 2016	ISSUED FOR PERMIT FILING
1	02 MAY 2014	ISSUED FOR PERMIT FILING

No. Date Description

Sheet Name:

TYPICAL STRUCTURAL  
STEEL SECTIONS  
AND DETAILS

Seal & Signature:



Date: 02 SEP 2016

NYC DOB Number:

Project No: 207120

Scale: NTS

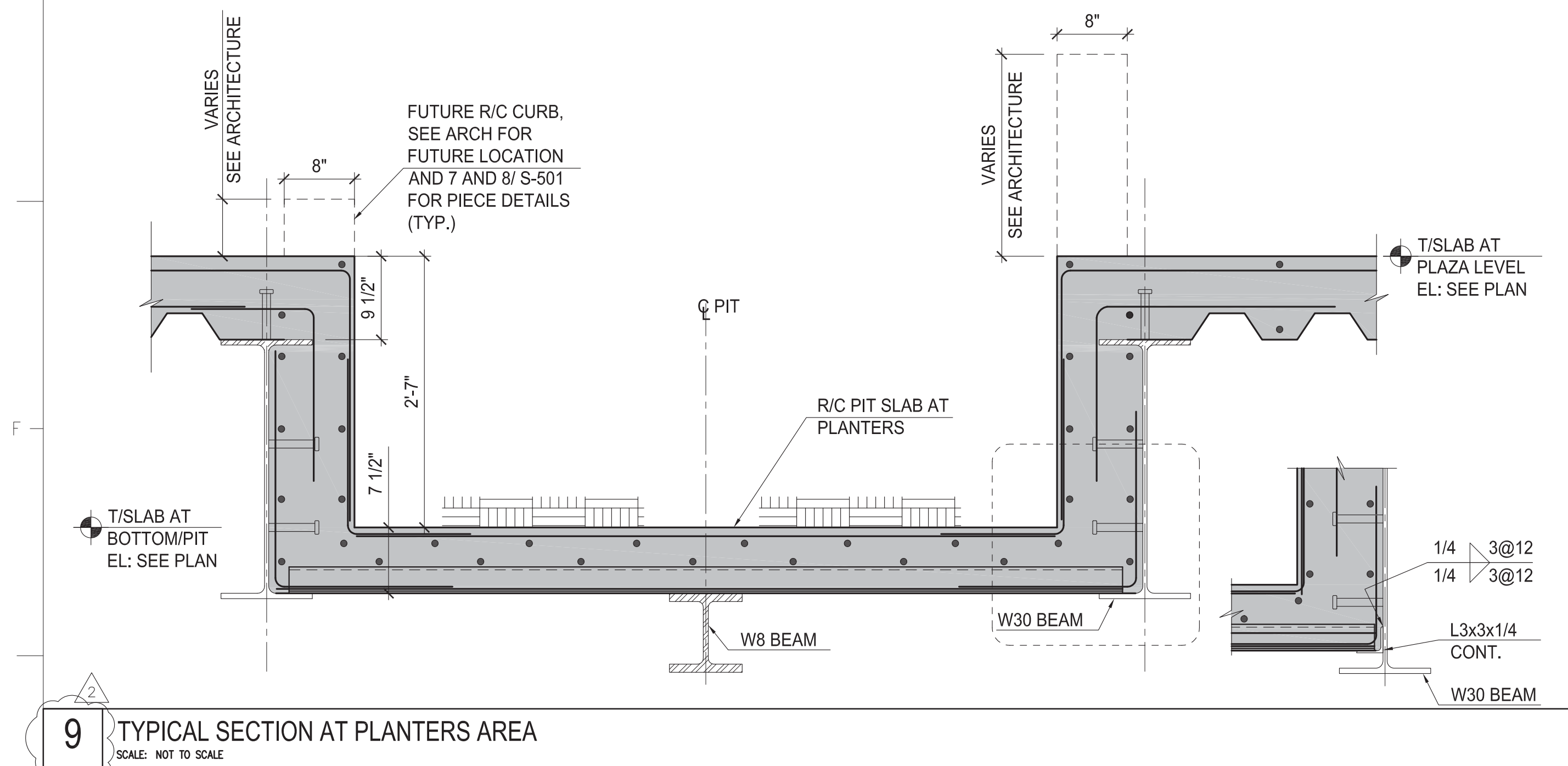
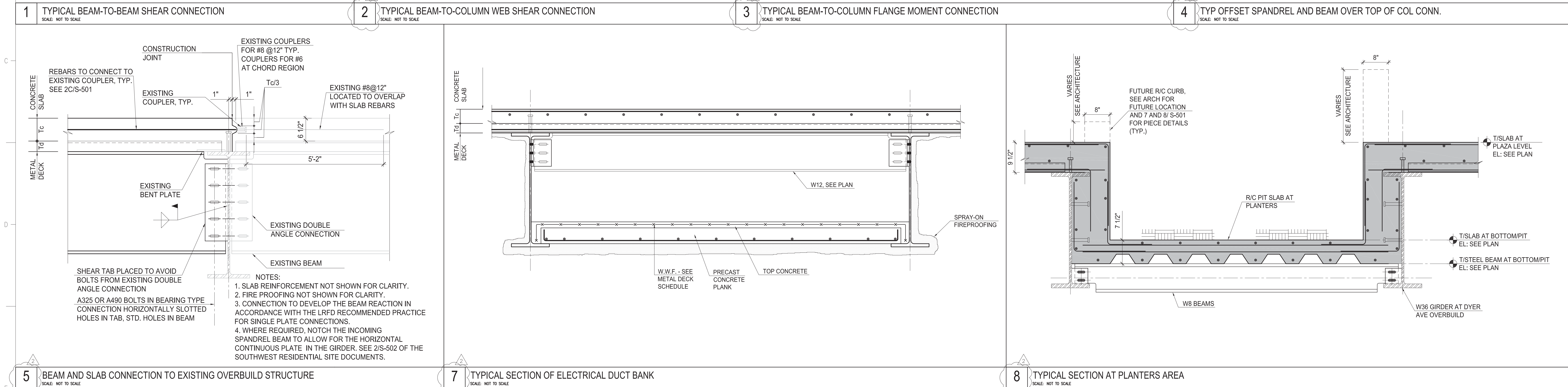
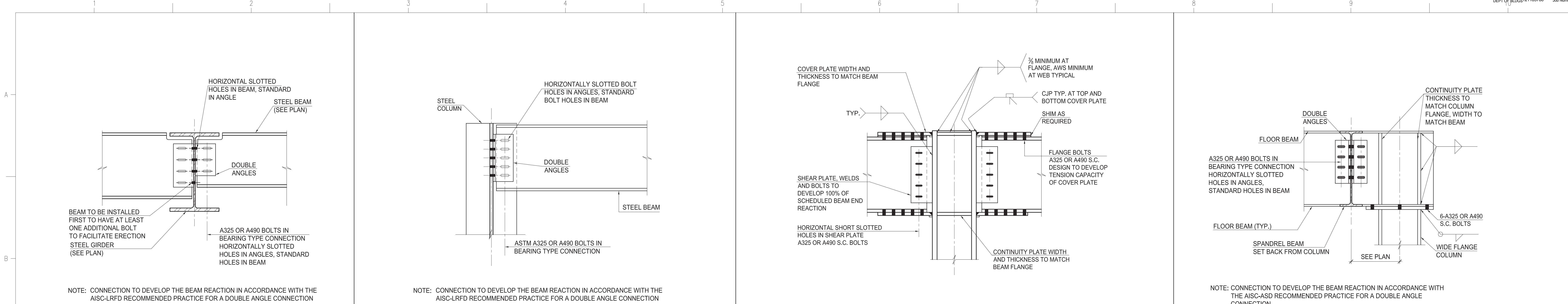
DWG No:

S-502.01

CAD FILE Name:

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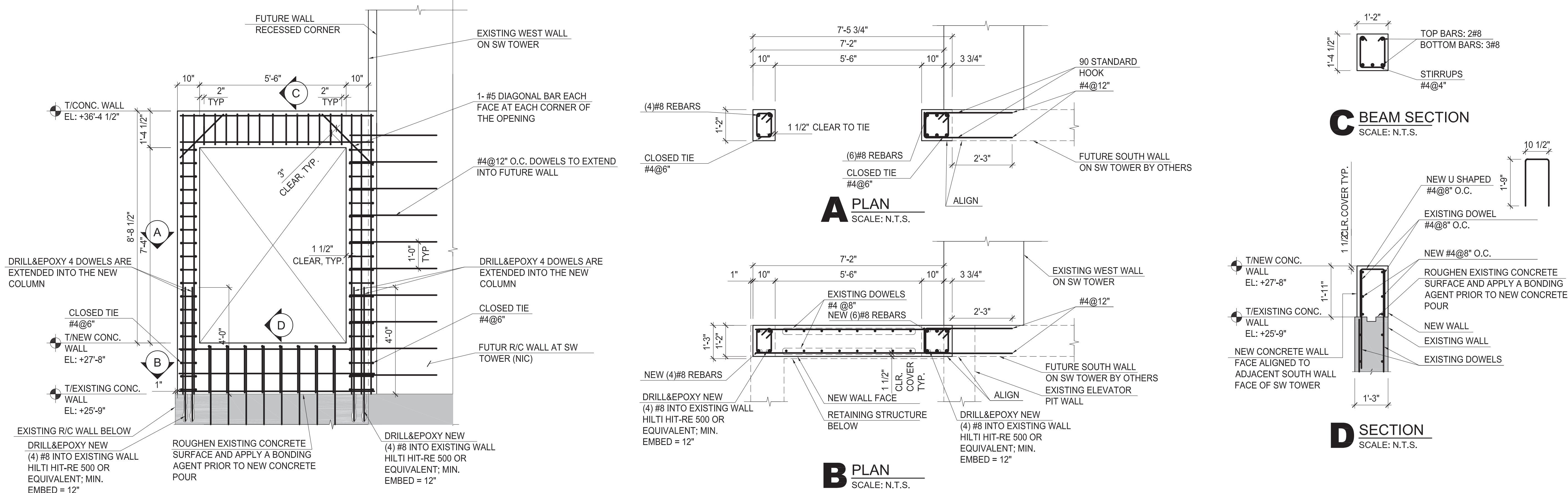
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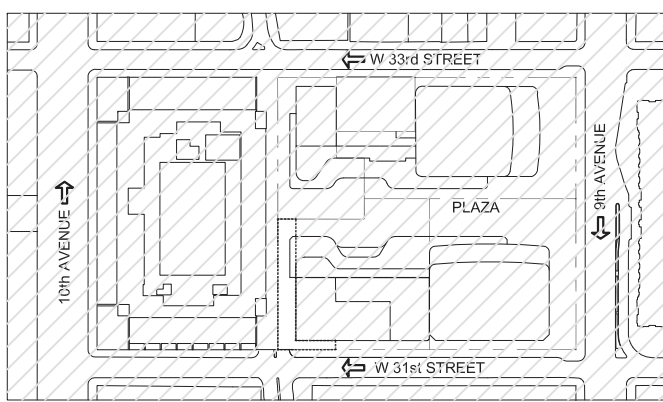
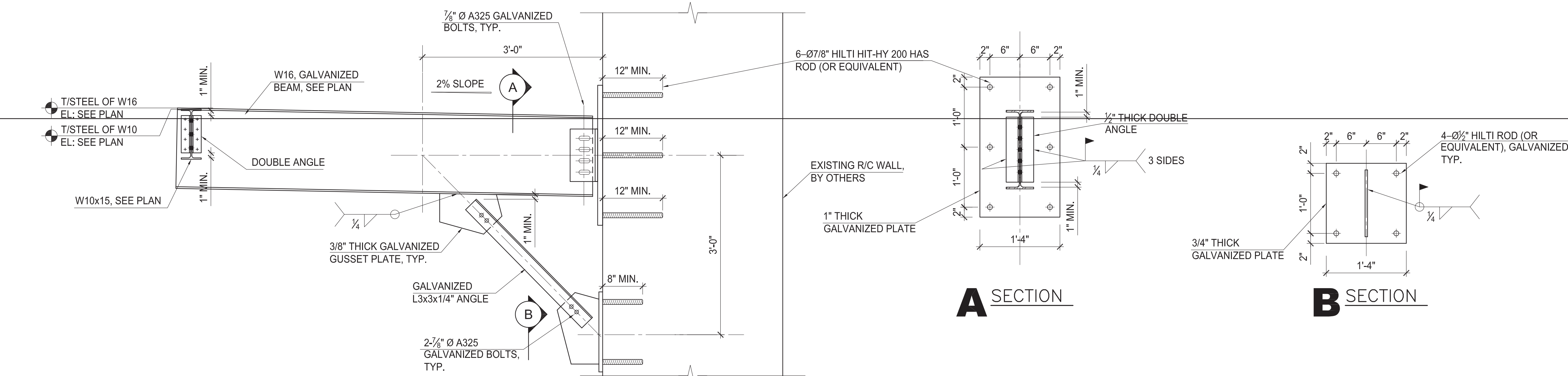
2 REINFORCED CONCRETE WALL DETAIL

SCALE: 1/2"=1'



3 POST-INSTALLED ANCHOR PLATE DETAIL AT EXISTING WALL

SCALE: NOT TO SCALE



KEY PLAN

2	02 SEP 2016	ISSUED FOR PERMIT FILING
1	02 MAY 2014	ISSUED FOR PERMIT FILING

No.	Date	Description
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Sheet Name:

STRUCTURAL METAL DECK  
SLAB SCHEDULES  
AND TYPICAL DETAILS

Seal & Signature:



Date: 02 SEP 2016

NYC DOB Number:

Project No: 207120

Scale: NTS

DWG No:

S-503.01

CAD FILE Name:

S-503.DWG

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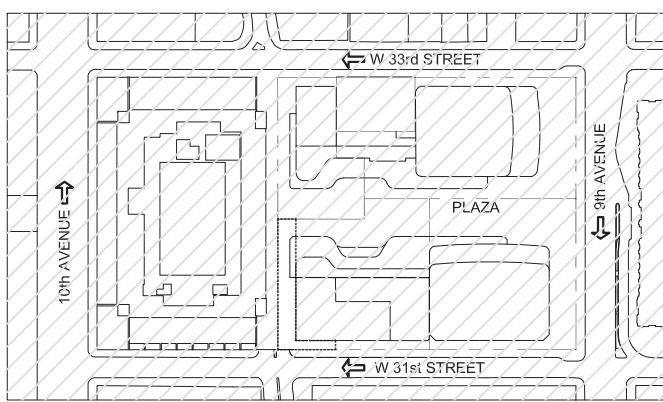
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Sheet Name:

IN-PLANE BRACING  
SECTIONS  
AND DETAILS

Seal & Signature:



Date: 02 SEP 2016

NYC DOB Number:

Project No: 207120

Scale: NTS

Drawn by:

CAD File Name:

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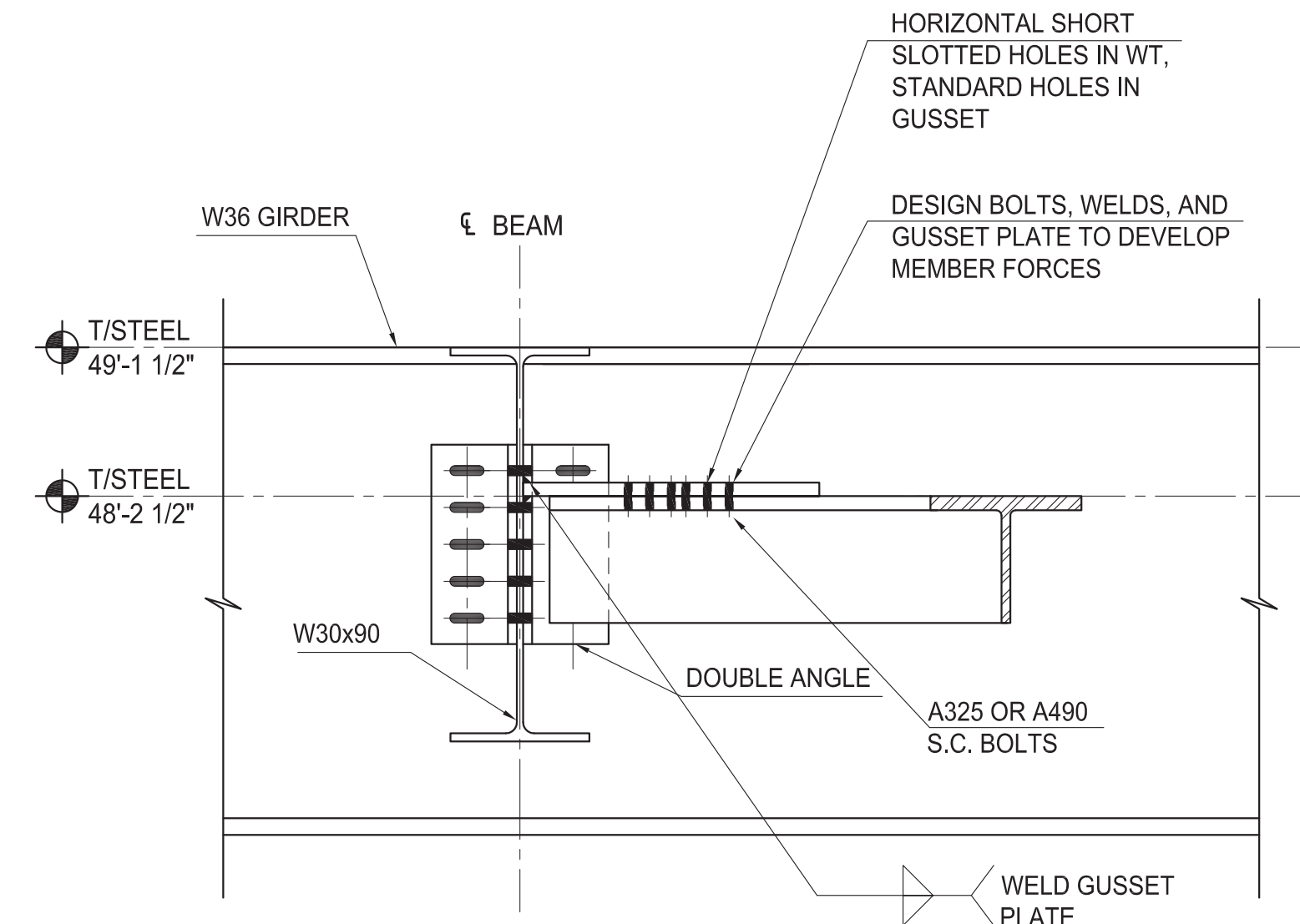
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IN-PLANE BRACING  
CONNECTION TYP. AT  
EXISTING TRUSS  
COLUMN SUPPORT

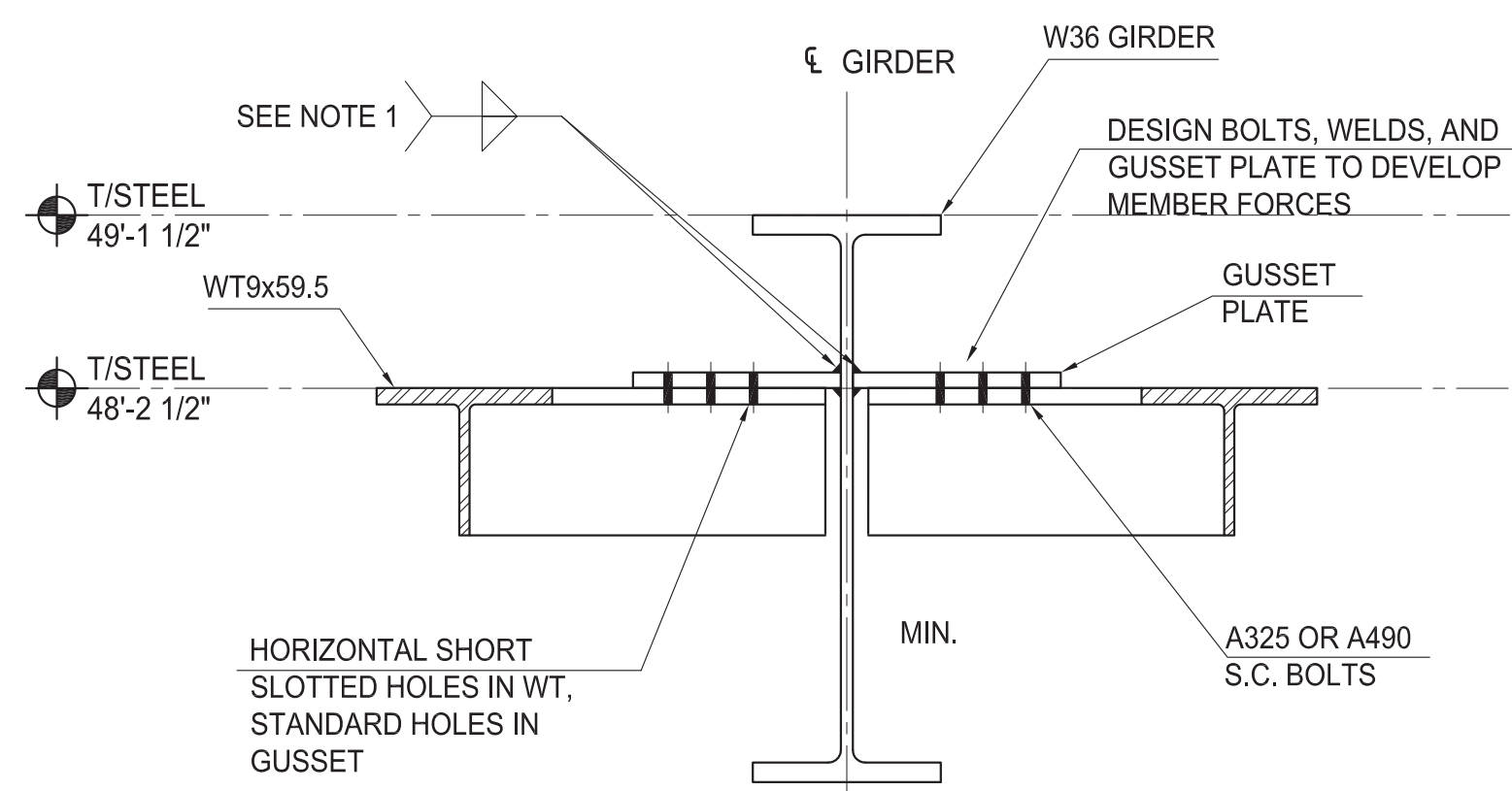
F

FLOOR BRACING SCHEDULE			
		ROLLED SHAPES: ASTM A992 GUSSETS: ASTM A572 GR 50	
STEEL SIZE	DESCRIPTION	ULTIMATE AXIAL LOAD (KIPS)	REMARKS
WT9x59.5	BRACE DIAGONAL	250	
W30x90	BRACE CHORD	420	NOTE 1

NOTES: 1. FOR THE ULTIMATE BEAM END REACTIONS SEE S-005.

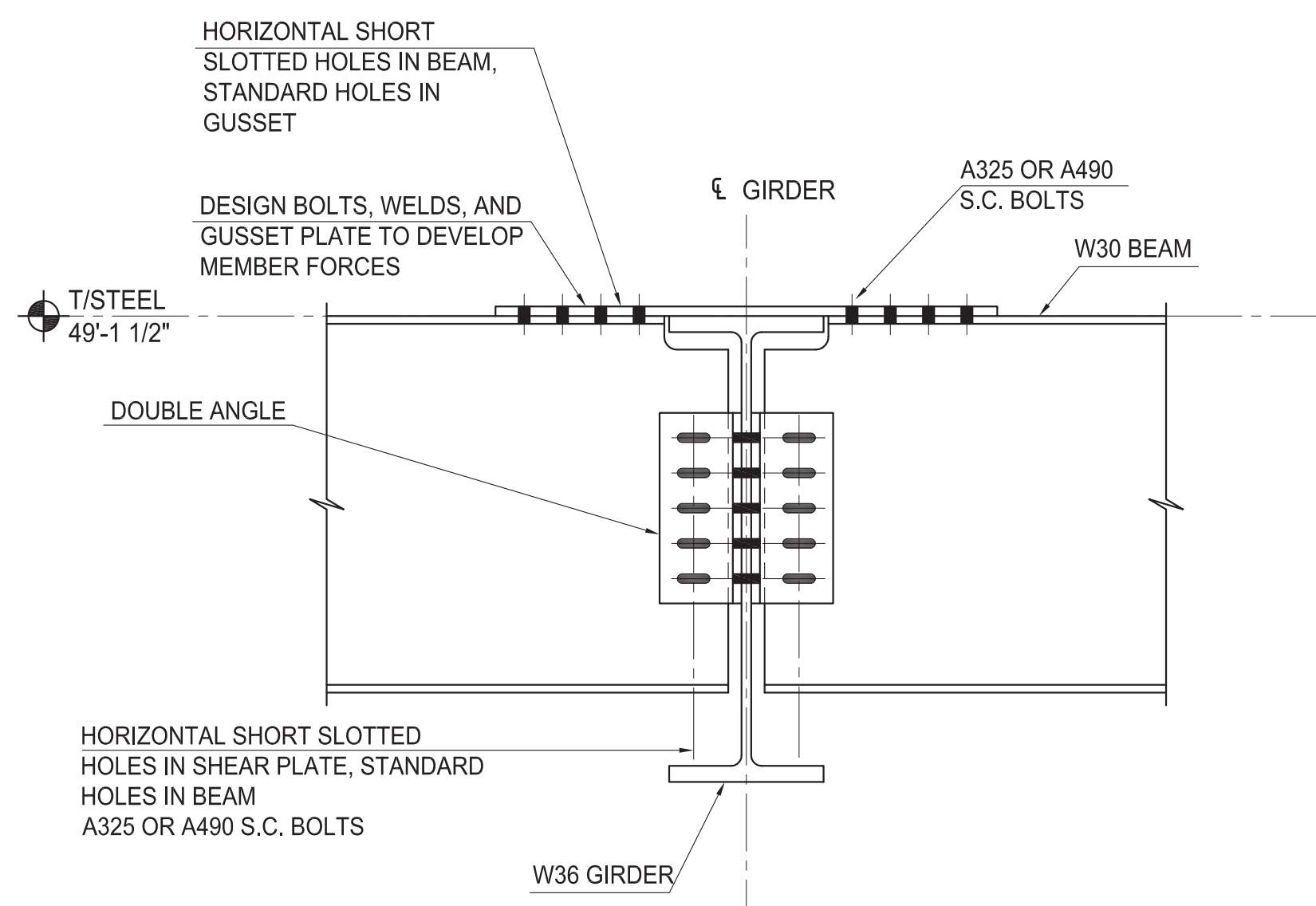


A SECTION



NOTES: 1. DESIGN WELD TO DEVELOP PLATE TENSION YIELD CAPACITY

B SECTION



C SECTION

IN-PLANE BRACING  
CONNECTION TYP.

PG

J

2 BRACE DETAIL CONNECTIONS TO EXISTING GIRDER

SCALE: NOT TO SCALE

1 BRACE DETAIL CONNECTIONS

SCALE: NOT TO SCALE