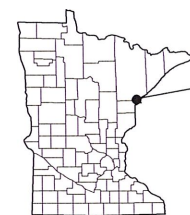
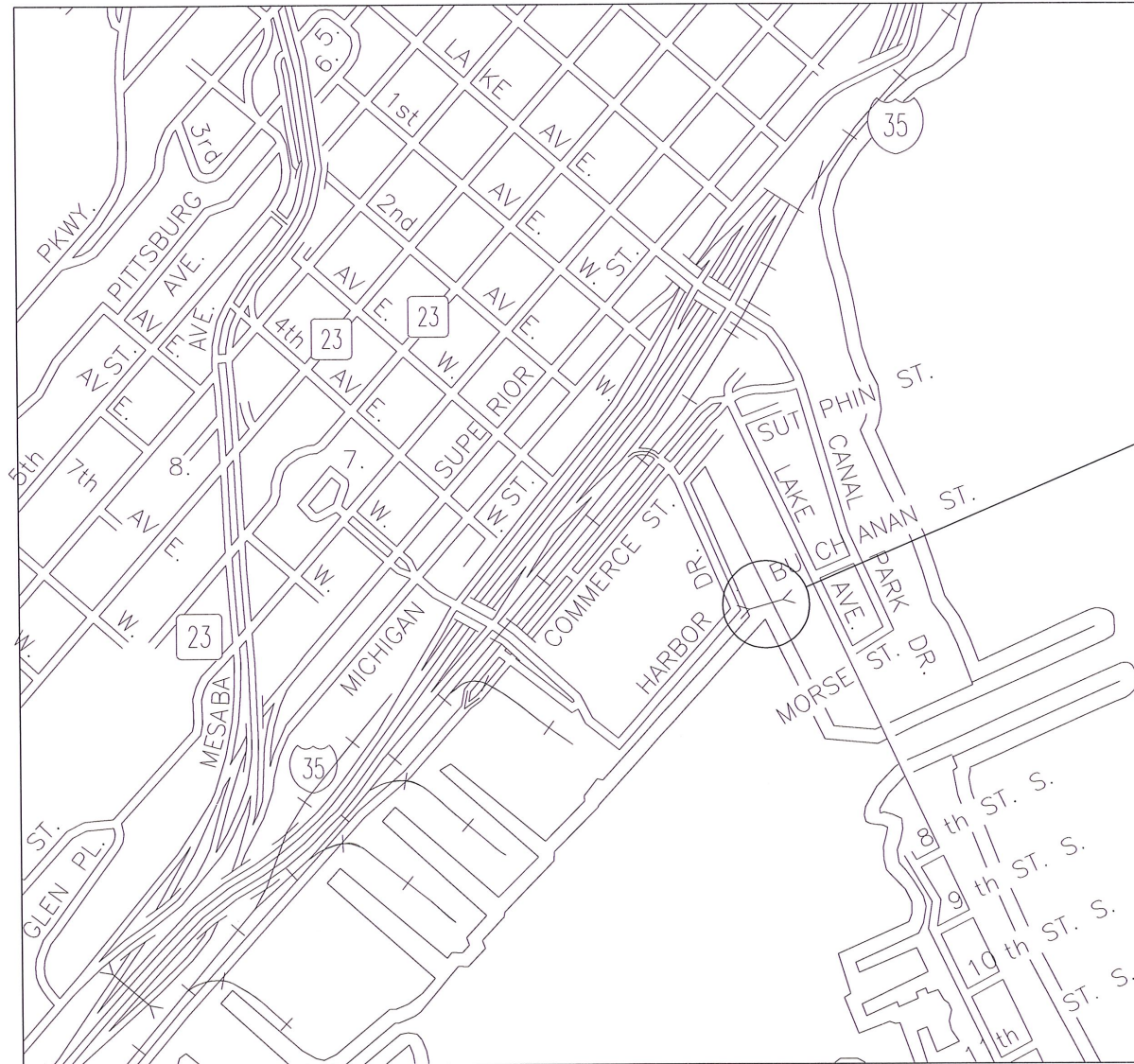


CONSTRUCTION PLANS FOR:  
MINNESOTA SLIP PEDESTRIAN BRIDGE REHABILITATION



PROJECT LOCATION:  
CITY OF DULUTH  
ST. LOUIS COUNTY  
SEC. 27 T50N R14W

WARNING:  
LOCATION OF UNDERGROUND UTILITIES TO BE VERIFIED BY  
CONTRACTOR. CALL BEFORE DIGGING. GOPHER STATE ONE CALL  
1-800-252-1166 REQUIRED BY LAW



**Hardesty  
& Hanover**  
1501 BROADWAY, NY, NY 10036

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21 W. Superior St., Ste. 500 | Duluth, MN 55802 | 218.727.8446

DRAWN BY: SCA	SHEET NO. 1 OF 37
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<http://www.duluthmn.gov/engineering/standard-construction-specifications/>

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	GENERAL PLAN AND ELEVATION
3	WORK ITEMS AND QUANTITIES
4	GENERAL MACHINERY NOTES
5	CENTER LATCH DEMOLITION
6	CENTER BEARING ASSEMBLY
7	CENTER BEARING DETAILS
8	TIE ROD ASSEMBLY
9	RACK AND PINION ASSEMBLY
10	TOWER SUPPORTS DEMOLITION
11	RACK HINGE PIN SUPPORT PEDESTAL
12	RACK HINGE PIN ASSEMBLY DETAILS
13	RACK BEAM ASSEMBLY DETAILS
14	CARRIAGE ASSEMBLY DETAILS
15	PINION ASSEMBLY DETAILS
16	OPERATING MACHINERY ASSEMBLY
17	MACHINERY SUPPORTS DEMOLITION
18	OPERATING MACHINERY SUPPORTS 1
19	OPERATING MACHINERY SUPPORTS 2
20	OPERATING MACHINERY SUPPORTS 3
21	GENERAL ELECTRICAL NOTES
22	CONTROL SYSTEM ARCHITECTURE
23	RELAY CONTROLS SCHEMATIC
24	PLC I/O SHEET 1
25	PLC I/O SHEET 2
26	PLC I/O SHEET 3
27	PLC I/O SHEET 4
28	PLC I/O SHEET 5
29	PLC I/O SHEET 6
30	EAST POWER SCHEMATIC
31	WEST POWER SCHEMATIC
32	CONTROL DESK LAYOUT
33	CONTROL DESK DETAILS
34	CONDUIT BLOCK DIAGRAM
35	EXISTING LIGHTING CIRCUITS
36	BILL OF MATERIALS
37	PAINT PLAN

THIS PLAN CONTAINS 37 SHEETS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PAUL SKELTON

PROJECT ENGINEER (TYPED OR PRINTED NAME)

*Flannery*

10-26-2016

26363

PROJECT ENGINEER

DATE \_\_\_\_\_

LIC. NO.

CITY APPROVAL

APPROVED

CHIEF ENGINEER OF TRANSPORTATION

DATE \_\_\_\_\_

APPROVED

CHIEF ENGINEER OF UTILITIES

DATE \_\_\_\_\_

APPROVED

CITY ENGINEER

DATE \_\_\_\_\_





ITEMS OF WORK:

1. CENTER BEARING ASSEMBLY
  - EXISTING CENTER LATCH ASSEMBLIES SHALL BE REMOVED AND PROPERLY DISPOSED OF. NEW CENTER BEARING ASSEMBLIES SHALL BE PROVIDED. TEMPORARY LOCKS SHALL BE DESIGNED AND INSTALLED AT THE COMPLETION OF THE CENTER BEARING WORK AND BALANCE VERIFICATION WORK. THE PURPOSE IS TO SECURE THE BASCULE LEAVES TOGETHER PRIOR TO THE OPERATING MACHINERY WORK. TEMPORARY LOCKS SHALL BE INSTALLED ON BOTH SIDES OF THE SPAN TO ENSURE BOTH TOP CHORDS STAY MATED.
2. BALANCE VERIFICATION
  - EXISTING COUNTERWEIGHTS SHALL BE MEASURED FOR WEIGHT AND RESULTS REPORTED TO THE ENGINEER. ANY ADJUSTMENTS WILL BE PERFORMED AS ORDERED BY THE ENGINEER. THIS ITEM SHALL BE COORDINATED WITH WORK ITEM NO. 3.
3. TIE-ROD ASSEMBLY
  - EXISTING TIE-ROD ASSEMBLIES SHALL BE REMOVED AND PROPERLY DISPOSED OF. NEW TIE-ROD ASSEMBLIES SHALL BE PROVIDED.
4. OPERATING MACHINERY
  - EXISTING ROPE DRIVEN OPERATING MACHINERY SHALL BE REMOVED AND PROPERLY DISPOSED OF. NEW PIVOTING RACK OPERATING MACHINERY SHALL BE PROVIDED FOR TWO DIRECTIONAL CONTROL OF THE BASCULE SPAN.
5. STRUCTURAL REMOVAL/STRUCTURAL STEEL
  - THE EXISTING ROPE DRIVEN OPERATING MACHINERY SUPPORTS SHALL BE REMOVED AND PROPERLY DISPOSED OF. NEW SUPPORTS TO COMPLEMENT THE NEW PIVOTING RACK OPERATING MACHINERY SHALL BE PROVIDED.
6. ELECTRICAL SERVICE
  - THE EXISTING 480 VAC ELECTRICAL SERVICE SHALL REMAIN AND BE PROTECTED. THE EXISTING 480 VAC PANELBOARD, 480 – 120/240 STEPDOWN TRANSFORMER AND LIGHTING PANELBOARD SHALL REMAIN AND BE PROTECTED. MODIFIED POWER AND CONTROL CIRCUITS SHALL BE CONNECTED TO THESE PANELS.
7. EXISTING VARIABLE FREQUENCY DRIVES
  - THE EXISTING 20 HP INVERTER TYPE DRIVES SHALL REMAIN AND BE PROTECTED ALONG WITH THEIR ASSOCIATED DYNAMIC BRAKING MODULES. THE DRIVES SHALL BE PROVIDED WITH NEW ETHERNET COMMUNICATIONS MODULES, AND NEW CONTROL WIRING SHALL BE PROVIDED TO THE NEW CONTROL SYSTEM.
8. CONTROL CONSOLE
  - THE EXISTING RELAY CONTROL, POWER DISTRIBUTION AND SPAN CONTROL CONSOLE SHALL BE REMOVED AND PROPERLY DISPOSED OF. A NEW PLC BASED CONTROL SYSTEM SHALL BE PROVIDED IN A NEW CONTROL CONSOLE. NEW LINE AND MOTOR SELECTION CONTACTORS SHALL BE PROVIDED WITHIN THE NEW CONTROL CONSOLE.
9. ELECTRICAL MACHINERY
  - THE EXISTING SPAN ELECTRICAL MACHINERY INCLUDING SPAN DRIVE MOTORS AND BRAKES SHALL BE REMOVED AND PROPERLY DISPOSED OF. EACH LEAF SHALL BE PROVIDED WITH TWO NEW INVERTER DUTY 15 HP, 8 POLE, DESIGN B, TENV MOTORS WITH A 1.25 SERVICE FACTOR. EACH LEAF SHALL BE PROVIDED WITH TWO NEW THRUSTOR TYPE 8-INCH DRUM BRAKES WITH DRUMS SHRUNK ONTO THE SPAN GEAR REDUCER EXTENDED INPUT SHAFT.
10. LIMIT SWITCHES
  - THE EXISTING LIMIT SWITCHES ON THE MOVABLE BRIDGE SPANS SHALL BE REMOVED AND PROPERLY DISPOSED OF. THE EXISTING SPAN POSITION LIMIT SWITCHES LOCATED ON THE TOWERS SHALL REMAIN AND BE INCORPORATED INTO THE NEW CONTROL SYSTEM. NEW INCLINOMETERS SHALL BE PROVIDED AND INSTALLED ONTO THE MOVABLE SPANS TO PROVIDE PLC SPAN POSITION FEEDBACK. NEW MATED LIMIT SWITCHES SHALL BE PROVIDED AND INSTALLED ON THE EAST LEAF TO INDICATE THE OPPOSING SPANS ARE PROPERLY INTERLOCKED. NEW PROXIMITY SWITCHES SHALL BE PROVIDED AND INSTALLED TO PROVIDE PLC INDICATION OF THE STATUS OF THE MANUAL COUNTERWEIGHT ARM LOCKING PINS.
11. EXISTING PEDESTRIAN GATES
  - THE EXISTING PEDESTRIAN GATES ARE TO REMAIN AND BE PROTECTED. NEW POWER AND CONTROL SIGNALS SHALL BE ROUTED TO THEM.
12. CONDUIT AND CABLE
  - THE EXISTING CONDUIT AND JUNCTION BOX SYSTEM SHALL REMAIN AND BE PROTECTED. NEW CONDUIT AND JUNCTION SHALL BE PROVIDED AS SHOWN ON THE PLANS. THE CONDUIT AND CONDUCTORS FOR THE EXISTING SPAN LIGHTING CIRCUITS SHALL REMAIN AND BE CONNECTED TO NEW FEEDERS IN THE EXISTING JUNCTION BOXES. NEW CONDUCTORS SHALL BE PROVIDED FOR ALL SPAN ELECTRICAL MACHINERY AND CONTROL EQUIPMENT.

SEQUENCE OF WORK:

1. CENTER BEARING ASSEMBLY WORK
  - THE CURRENT CENTER LATCH PIN ASSEMBLIES LOCATED AT THE CENTER OF THE SPAN AND UPPER CHORD OF THE BRIDGE ARCH, DOES NOT FUNCTION AS INTENDED. THIS RESULTS IN EXCESSIVE DEFLECTIONS EXPERIENCED AT THE TOE JOINT AND OPERATIONAL DIFFICULTIES.
  - IT IS REQUIRED THAT THE CENTER LATCHES ARE TO BE REPLACED AS THE FIRST CONSTRUCTION WORK ITEM FOR A STABLE SPAN UNDER ALL FOLLOWING WORK ITEMS.
2. TIE-ROD WORK
  - IN ORDER FOR THE CURRENT TIE-RODS TO BE REMOVED FOR REPLACEMENT, THE COUNTERWEIGHTS MUST BE SUPPORTED TEMPORARILY. IT IS REQUIRED THAT THE CONTRACTOR JACK THE COUNTERWEIGHT AT REAR OF COUNTERWEIGHT ARMS OR INSTALL A TENSION DEVICE TO CONNECT THE SPAN TO THE COUNTERWEIGHT ARM IN ORDER TO DETENSION THE TIE-RODS FOR REMOVAL.
  - ONCE THE EXISTING TIE-RODS ARE REMOVED, IT IS REQUIRED THAT THE CONTRACTOR MEASURE THE LOAD AT THE TIE RODS. WITH THE NEW CENTER BEARING ASSEMBLY INSTALLED, IN FULL CONTACT AND THE COUNTERWEIGHT ARM FREE, THE RESULTS SHOULD REPRESENT THE IMBALANCE OF THE COUNTERWEIGHT ARM STRUCTURE. MEASUREMENT RESULTS SHALL BE REPORTED TO THE ENGINEER AS PART OF THE CONTRACTORS BALANCE VERIFICATION EFFORT.
  - ONCE THE LOAD MEASUREMENT AT THE TIE-RODS IS COMPLETED, TIE-ROD CONNECTION POINTS SHALL BE THOROUGHLY CLEANED AND INSPECTED. INSPECTION OF CONNECTION POINTS SHALL INCLUDE VISUAL EXAMINATION AND NON-DESTRUCTIVE TESTING. VISUAL EXAMINATION WILL REQUIRE THE TEMPORARY REMOVAL OF DECK PANELS BY THE CONTRACTOR FOR ACCESS TO THE SPAN CONNECTION POINT.
  - THE CITY SHALL PROVIDE TECHNICIANS TO PERFORM THE NON DESTRUCTIVE TESTING REQUIRED AT THE TIE-ROD TERMINATION POINTS. NON-DESTRUCTIVE TESTING OF CONNECTION WELDS SHALL INCLUDE MAGNETIC PARTICLE EXAMINATION. THE CONTRACTOR SHALL PROVIDE FULL ACCESS TO THE INSPECTOR AT THE START OF THIS WORK ITEM.
3. OPERATING MACHINERY WORK
  - THE CONTRACTOR SHALL SUBMIT A DETAILED WORK PLAN FOR THE OPERATING MACHINERY REPLACEMENT WORK. THE WORK PLAN SHALL INCLUDE THE WEIGHTS OF EQUIPMENT, AND THE ANTICIPATED IMBALANCE THROUGH THE DURATION OF CONSTRUCTION AND TEMPORARY COUNTERWEIGHT SHORING DETAILS.
  - SINCE TEMPORARY EQUIPMENT AND MANPOWER WILL BE LOCATED AT THE BACK END OF THE COUNTERWEIGHT ARM, AND THE BRAKES WILL BE DISMANTLED FOR THIS WORK, IT IS REQUIRED THAT THE CONTRACTOR INSTALL TEMPORARY LOCKS BETWEEN THE TWO LEAVES (TO BE INCLUDED UNDER ITEM "CENTER BEARING ASSEMBLY"), IN ORDER TO ENSURE THE SPANS STAY LOCKED DURING THE WORK. TEMPORARY WEIGHT ADDED TO THE SPAN WILL BE ALLOWED, PROVIDED THE CONTRACTOR SUBMIT CALCULATIONS FOR REVIEW BY THE ENGINEER.
4. MAIN PINION SHAFT INSTALLATION
  - THE EXISTING ROPE DRIVEN SYSTEM MUST BY REMOVED IN ITS ENTIRETY BEFORE THE NEW OPERATING MACHINERY IS INSTALLED. IT IS NOTED THAT THE NEW PINION SHAFT ASSEMBLY MUST FIT WITHIN THE COUNTERWEIGHT ARM FRAME. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ACTUAL DIMENSIONS OF THE COUNTERWEIGHT ARM, AND CONFIRMING THE PINION SHAFT ASSEMBLY CAN BE INSTALLED WITHOUT INTERFERENCE, EITHER BY 3D MODELING OR BY A FULL SIZE MOCK-UP ASSEMBLY.

5. RACK BEAM & HINGE PIN INSTALLATION
  - THE HINGE PIN PEDESTAL SHALL BE INSTALLED AND THE HINGE PIN BEARING WELDMENT ALIGNED COLLINEAR TO ONE ANOTHER, AND TO THE ELEVATIONS SHOWN ON THE PLANS
  - THE BEARING WELDMENT SHALL THEN BE REMOVED FROM THE PEDESTAL, SO THAT IT CAN BE COUPLED TO THE RACK BEAM VIA THE HINGE PIN. (THERE IS NOT ENOUGH ACCESS TO INSTALL THE PIN IN THE SPHERICAL BEARING WITHIN THE TOWER)
  - ONCE THE PINION SHAFT ASSEMBLY IS INSTALLED, THE RACK BEAM AND BEARING WELDMENT ASSEMBLY SHALL BE RAISED IN PLACE, AND ENGAGED WITH THE PINION. THE PINION GEAR WILL BE FREE TO ROTATE AT THIS POINT. IT IS ANTICIPATED THAT THE PINION END OF THE RACK BEAM IS INSTALLED FIRST, AND PIVOTING END THEN CONNECTED TO THE HINGE PIN PEDESTAL WITHIN THE TOWER USING THE MOUNTING BOLTS, PREVIOUSLY ALIGNED AND REAMED IN PLACE.
  - A TEMPORARY CHOCKING DEVICE SHALL BE INSTALLED AT THE RACK AND PINION TO SECURE THE RACK BEAM IN PLACE UNTIL THE MACHINERY IS CONNECTED TO THE BRAKES.
6. PRIMARY MOVER INSTALLATION
  - THE MACHINERY PLATFORM, REDUCER, MOTORS, BRAKES AND FLOATING SHAFTS CAN BE INSTALLED, ALWAYS CHECKING THE BALANCE WEIGHTS VERSUS THE SPAN WEIGHT. THE TEMPORARY CHOCKING DEVICE AT THE PINIONS AND TEMPORARY LOCKING DEVICE AT CENTER SPAN CAN ONLY BE REMOVED ONCE THE BRAKES ARE INSTALLED AND FULLY OPERATIONAL.
7. ELECTRICAL CONTROL WORK
  - ONCE THE OPERATING MACHINERY IS INSTALLED AND ALIGNED AT BOTH LEAVES, THE ELECTRICAL CONNECTIONS AT THE MOTORS, BRAKES AND LIMIT SWITCH SENSORS CAN BE INSTALLED AND CONNECTED TO THE BRIDGE CONTROL LOGIC.

STATEMENT OF ESTIMATED QUANTITIES					
BID ITEM	SPEC. NO.	ITEM	UNIT	ESTIMATED QUANTITY	FINAL QUANTITY
1	2013.602	TCLP TEST	EACH	4	
2	2021.501	MOBILIZATION	LUMP SUM	1	
3	2402.521	STRUCTURAL STEEL (3310)	LB	23,000	
4	2402.590	MISC. STRUCTURAL REPAIRS*	EACH	1	
5	2402.601	CENTER BEARING ASSEMBLY	LUMP SUM	1	
6	2402.601	TIE ROD ASSEMBLY	LUMP SUM	1	
7	2433.501	STRUCTURAL REMOVAL	LUMP SUM	1	
8	2433.601	OPERATING MACHINERY	LUMP SUM	1	
9	2476.601	WASTE COLLECTION AND DISPOSAL	LUMP SUM	1	
10	2478.601	ORGANIC ZINC-RICH PAINT SYSTEM (OLD)	LUMP SUM	1	
11	2545.601	BRIDGE ELECTRICAL SYSTEM	LUMP SUM	1	
12	2563.601	TRAFFIC CONTROL	LUMP SUM	1	

\* INCLUDES AN ALLOWANCE FOR STRUCTURAL STRENGTHENING AND REPAIR WORK TO SELECT STEEL MEMBERS OF THE BRIDGE. THIS WORK IS CURRENTLY BEING DEVELOPED AND DETAILED AND DETAILS WILL BE MADE AVAILABLE TO THE CONTRACTOR AFTER THE TIME OF AWARD. THE CONTRACTOR WILL BE REQUESTED TO PERFORM THIS WORK IN ACCORDANCE WITH MNDOT 1402.5 EXTRA WORK. THE AGREED UPON COSTS FOR THIS EXTRA WORK WILL BE PAID FOR FROM THE PRE-SET ALLOWANCE AMOUNT FOR ITEM "MISC STRUCTURAL REPAIRS". THE WORK MAY ALSO BE PERFORMED ON A FORCE ACCOUNT BASIS. THIS WORK IS REQUIRED TO BE PERFORMED PRIOR TO THE INSTALLATION OF NEW MACHINERY.

- NOTES:
1. WITHIN THE PLAN WHEREVER THE WORD INCIDENTAL IS USED IT SHALL MEAN NO DIRECT PAYMENT WILL BE MADE FOR THAT ITEM.
2. WITHIN THE PLAN WHEREVER A SCALE IS SHOWN IT IS INTENDED TO COMPLIMENT ANSI D SIZING (22 X 34 INCH).



GENERAL MACHINERY NOTES:

1. THESE PLANS ARE BASED ON THE ORIGINAL CONTRACT PLANS (CIRCA 1991), WHICH ARE INCLUDED FOR REFERENCE. THE ORIGINAL CONTRACT PLANS HAVE NOT BEEN VERIFIED. THE CONTRACTOR SHALL PERFORM ACCURATE FIELD MEASUREMENTS TO VERIFY ACTUAL SIZES OF EXISTING COMPONENTS, MEMBERS AND ALL DIMENSIONS SHOWN ON THE PLANS. ADDITIONAL FIELD MEASUREMENTS TO ACCURATELY LOCATE THE OPTIMAL POSITIONS AND/OR ALIGNMENTS OF ALL MACHINERY AND MACHINERY SUPPORTS SHALL BE PERFORMED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER. ANY DEVIATIONS FROM THE ORIGINAL AND/OR REHABILITATION CONTRACT PLANS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER. RECORD ALL DEVIATIONS ON THE SUBMITTED SHOP DRAWINGS WHEN THEY ARE REQUIRED.
2. BASED ON THE VINTAGE OF THE EXISTING COMPONENTS, DESIGN OF MACHINERY SHALL CONFORM TO THE 1988 STANDARD SPECIFICATIONS FOR MOVABLE HIGHWAY BRIDGES PUBLISHED BY AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1992 AND 1993 REVISIONS, UNLESS OTHERWISE SHOWN ON THE PLANS, OR PROVIDED FOR IN THE SPECIFICATIONS.
3. ALL DIMENSIONS FOR MACHINE FINISHED SURFACES SHALL BE HELD TO 0.010 INCH, EXCEPT AS OTHERWISE REQUIRED BY THE PLANS OR SPECIFICATIONS.
4. PROVIDE ASTM A449 H.S. BOLTS, AS REQUIRED, TO CONNECT MACHINERY TO STRUCTURAL STEEL, UNLESS OTHERWISE NOTED. ALL ASTM A449 H.S. BOLTS CONNECTING MACHINERY TO STRUCTURAL STEEL SHALL HAVE A CLEARANCE OF NOT MORE THAN 0.010 INCH BETWEEN THE BOLT SHANK AND THE HOLE.
5. EACH BOLT SHALL HAVE A PLAIN HARDENED WASHER UNDER THE HEAD AND THE NUT. PLAIN HARDENED WASHERS SHALL CONFIRM TO ASTM F436 AND NUTS SHALL CONFORM TO ASTM A563.
6. PROVIDE ALL NEW STAINLESS STEEL SHIM PACKS FOR LEVELING AND ALIGNING OF ALL MACHINERY COMPONENTS. SHIM PACKS SHALL BE 1/2 INCH NOMINAL THICKNESS, UNLESS OTHERWISE SPECIFIED, WITH ADJUSTMENT VARIATIONS AS DESCRIBED IN THE SPECIFICATION.
7. FITS AND FINISHES FOR THE MACHINERY SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:

SURFACE	FIT (ANSI)	FINISH (MICROINCHES)
MACHINERY BASE ON STEEL	–	250
MACHINERY PARTS IN FIXED CONTACT	–	125
SHAFTS (EXPOSED SURFACES)	–	63
SHAFTS (JOURNAL SURFACES)	RC6	8
BUSHINGS (JOURNAL SURFACES)	RC6	16
SPLIT BUSHING IN BASE	LC1	125
SOLID BUSHING IN BASE (TO 1/4" WALL)	FN1	63
SOLID BUSHING IN BASE (OVER 1/4" WALL)	FN2	63
HUBS ON SHAFTS (TO 2" BORE)	FN2	32
HUBS ON SHAFTS (OVER 2" BORE)	FN2	63
TURNED BOLTS IN FINISHED HOLES	LC6	63
SLIDING BEARINGS	RC6	32
KEYS AND KEYSEATS	CLASS 2	63
TEETH OF OPEN GEARING	–	125

8. FITS FOR CYLINDRICAL PARTS SHOWN ABOVE SHALL ALSO APPLY TO THE MAJOR DIMENSIONS OF NON–CYLINDRICAL PARTS.
9. CLEANING, PAINTING AND, AS APPLICABLE, LUBRICATING SHALL BE INCLUDED UNDER EACH MACHINERY ITEM.
10. MODEL NUMBERS AND DETAILS FOR MOTORS, COUPLINGS, BEARINGS AND OTHER STANDARD COMPONENTS ARE BASED ON MANUFACTURER S CATALOG DATA CURRENT AT THE TIME THE PLANS WERE PREPARED. EQUIVALENT MODELS FROM OTHER MANUFACTURERS MAY BE PROPOSED FOR SUBSTITUTION BY THE CONTRACTOR AND FOR APPROVAL BY THE ENGINEER. ALL RELATED STRUCTURAL, MECHANICAL, ARCHITECTURAL AND ELECTRICAL DETAILS SHALL BE REVISED BY THE CONTRACTOR TO SUIT THE CERTIFIED DIMENSIONS OF THE COMPONENTS ACTUALLY FURNISHED AT NO ADDITIONAL COST.
11. ALL NEW MOUNTING SURFACES USED TO SUPPORT MACHINERY COMPONENTS SHALL BE VERIFIED AS BEING FLAT. FLAT SHALL BE DEFINED AS MEASURING WITHIN 0.010 OF AN INCH ACROSS THE LENGTH AND WIDTH OF THE SURFACE. ALL EXISTING MOUNTING SURFACES FOR NEW EQUIPMENT SHALL BE PREPARED BY REMOVAL OF PAINT AND APPLYING THIN COAT OF EPOXY FILLER TO FILL UNEVEN STEEL PITS OR CORROSION LOSS. SURFACE SHALL THEN BE PRIMED FOR CONNECTION TO NEW STEEL.
12. WHERE PERMANENT MACHINERY REMOVAL OR CLEANING/REHABILITATION IS REQUIRED, ALL ITEMS SHALL BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH ALL ENVIRONMENTAL REGULATIONS AND LOCAL AND STATE LAW. THESE ITEMS SHALL INCLUDE BUT NOT BE LIMITED TO COMPONENTS CONTAINING LEAD PAINT, ASBESTOS, LUBRICANTS AND ANY OTHER ENVIRONMENTALLY SENSITIVE MATERIAL.
13. ELECTRICAL ITEMS SUCH AS MOTORS AND BRAKES ARE TO BE FURNISHED UNDER THE ELECTRICAL WORK ITEM, HOWEVER THESE ITEMS ARE TO BE INSTALLED AND ALIGNED AS PART OF THE MACHINERY WORK.

SHOP DRAWINGS AND SUBMITTALS:

1. THE CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS AND FIELD ASSEMBLY DRAWINGS. SHOP DRAWING DETAILS FOR NEW COMPONENTS SHALL BE BASED ON THESE CONTRACT PLANS AND SPECIFICATIONS.
2. PRIOR TO SUBMITTING SHOP DRAWINGS AND FIELD ASSEMBLY DRAWINGS, THE CONTRACTOR SHALL VERIFY ALL CRITICAL DIMENSIONS IN THE FIELD. PRIOR TO MANUFACTURING NEW PARTS, THE CONTRACTOR SHALL SUBMIT, FOR REVIEW AND APPROVAL BY THE ENGINEER, SHOP AND ASSEMBLY DRAWING DETAILS INDICATING ALL DIMENSIONS AND DETAILS THAT HAVE BEEN FIELD VERIFIED.
3. IT WILL BE THE CONTRACTORS RESPONSIBILITY TO DETAIL, COORDINATE AND VERIFY THE RELATIONSHIP AND ASSEMBLY OF ALL PARTS FOR A COMPLETE WORKING SYSTEM. ALL REQUIRED MACHINING, RIGGING, SPECIAL SHIMMING, LUBRICATION, PAINTING, TESTING AND ASSEMBLY SHALL BE CONSIDERED PART OF THE WORK.
4. THE CONTRACTOR SHALL PROVIDE AND SUBMIT PROPOSED CONSTRUCTION METHODS/PROCEDURE, SCHEDULE, INSPECTION PLAN, TESTING PLAN AND QUALITY CONTROL/QUALITY ASSURANCE PLAN TO THE ENGINEER FOR REVIEW PRIOR TO STARTING SHOP AND FIELD WORK.

FABRICATION:

1. THE EDGES AND CORNERS OF ALL MACHINERY PARTS SHALL BE DETAILED AND MACHINED WITH SUITABLE FILLETS AND CHAMFERS. IN GENERAL THE MINIMUM EDGE OR CORNER RADIUS OR CHAMFER SHALL BE 1/4 INCH IF THE PART THICKNESS IS GREATER THAN 1 INCH AND 1/8 INCH IF EQUAL TO OR LESS THAN 1 INCH, UNLESS OTHERWISE NOTED. IN THE CASE OF MATING PARTS, ALLOWANCE SHALL BE MADE FOR THE PROPER FIT AND ASSEMBLY. SUCH DETAILS SHALL BE SHOWN ON SHOP DRAWINGS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPILING CERTIFICATIONS AND TEST DATA, AND SHALL VERIFY AND DOCUMENT THAT ALL MACHINERY MEETS THE CONTRACT REQUIREMENTS. MATERIAL CERTIFICATIONS AND TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO SHIPMENT.
3. ALL NEW BEARING BUSHINGS SHALL BE PROVIDED WITH SPIRAL GREASE GROOVES, UNLESS OTHERWISE NOTED. INSTALLATION OF NEW BUSHINGS SHALL INCLUDE NEW ADAPTERS, PIPING AND/OR GREASE FITTINGS, AS NECESSARY, TO FACILITATE PROPER MAINTENANCE.
4. ALL SURFACES OF NEW FORGINGS AND BRONZE CASTINGS SHALL BE MACHINED, UNLESS OTHERWISE NOTED.
5. ALL TRANSITIONS OF SURFACES OF MACHINERY PARTS SHALL BE BLENDED IN SMOOTH.
6. THE GENERAL DIMENSIONAL TOLERANCE IS +/- 1/64 INCH, UNLESS OTHERWISE NOTED

FIELD WORK:

1. SEE SPECIAL PROVISIONS FOR PEDESTRIAN AND MARINE BRIDGE OPERATIONAL REQUIREMENTS AND WORK PERIODS.
2. ALL REQUIRED TEMPORARY REMOVAL OF COVERS AND TEMPORARY DISASSEMBLY OF STRUCTURAL, MECHANICAL AND ELECTRICAL COMPONENTS TO PERFORM THE WORK FOR THIS PROJECT SHALL BE INCLUDED AS PART OF THE WORK.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ALL NEW MACHINERY AND MACHINERY SUPPORTS IN THEIR PROPER LOCATION AND ALIGNMENT.
4. ALL REASSEMBLY OF ANY ITEM THAT NEEDED TO BE TEMPORARILY DISASSEMBLED DURING/FOR THE COURSE OF THE WORK FOR THIS PROJECT SHALL BE INCLUDED AS PART OF THE WORK. REASSEMBLY OF ITEMS SHALL BE REINSTALLED TO A CONDITION EQUAL TO OR BETTER THAN THAT PRIOR TO DISASSEMBLY.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS IN ORDER TO ACHIEVE THE REQUIRED FITS AND ASSEMBLY.
6. SPARE PARTS FOR NEW MACHINERY AND ELECTRICAL COMPONENTS ARE AS OUTLINED IN THE SPECIAL PROVISIONS FOR WORK.

FIELD ALIGNMENT REQUIREMENTS:

1. ALL NEW MACHINERY SHALL BE FIELD ALIGNED BY QUALIFIED MILLWRIGHTS TO WITHIN 1/32 INCH OF THE CORRECT THEORETICAL POSITION, UNLESS OTHERWISE NOTED. FOR COLLINEARITY OF SHAFT/PIN ALIGNMENT, THE CONTRACTOR SHALL USE HOLLOW BORE TEMPORARY SHAFTS, TOLERANCE OF <0.010 INCH SHALL BE MEASURED AT THE INNER BORE DIAMETER WITH RESPECT TO THE SHAFT CENTERLINE.
2. SURVEY INSTRUMENTATION USED TO CHECK ALIGNMENT SHALL BE ACCURATE TO WITHIN 1/64 INCH OVER THE FULL RANGE OF MEASURED POINTS ON ONE BRIDGE LEAF. (NOTE: STANDARD EQUIPMENT USED FOR STRUCTURAL STEEL ERECTION OR GENERAL CONSTRUCTION SURVEYING WILL NOT BE PERMITTED FOR THE PURPOSE OF VERIFYING FINAL MACHINERY ALIGNMENT).
3. CONTRACTOR SHALL SUBMIT DETAILED INSTALLATION AND ALIGNMENT PROCEDURE TO THE ENGINEER FOR REVIEW AT LEAST 30 DAYS PRIOR TO THE START OF FIELD WORK.
4. INSTRUCTIONS FOR INSTALLING CENTER BEARING ASSEMBLY.
  - a. THE CENTER BEARINGS ASSEMBLY SHALL BE INSTALLED IN A MANNER SUCH THAT THE BRIDGE LEAVES WILL SEAT AT THE CORRECT ELEVATION BASED ON 60° TEMPERATURE. THE CORRECT HEIGHT WILL BE THAT SHOWN ON THE ORIGINAL DESIGN DRAWINGS
  - b. SPECIFIC INSTALLATION INSTRUCTIONS CAN BE FOUND ON SHEET 6.
5. INSTRUCTIONS FOR INSTALLING COUNTERWEIGHT TIE RODS:
  - a. ACCURATELY MEASURE LENGTH OF FOUR EXISTING TIE RODS FROM CENTERLINE OF PIN TO CENTERLINE OF PIN TO 1/32 INCH ACCURACY. SUBMIT MEASUREMENTS TO ENGINEER.
  - b. FABRICATE NEW COUNTERWEIGHT TIE RODS TO MATCH LENGTH OF EXISTING TIE RODS UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER AFTER REVIEWING MEASUREMENTS.
  - c. JACK COUNTERWEIGHT AT REAR OF COUNTERWEIGHT ARMS TO RELIEVE LOAD ON COUNTERWEIGHT TIE RODS THEN REMOVE AND REPLACE TIE RODS. AS AN ALTERNATIVE THE CONTRACTOR MAY ARRANGE TO INSTALL A TEMPORARY TENSION DEVICE TO CONNECT THE SPAN TO THE COUNTERWEIGHT ARM IN ORDER TO RELIEVE THE LOAD ON THE TIE RODS.
  - d. ONCE THE EXISTING TIE RODS ARE REMOVED, THE CONTRACTOR SHALL MEASURE THE LOAD AT THE TIE RODS USING A DYNAMOMETER OR SIMILAR DEVICE MOUNTED BETWEEN THE TIE ROD PINS. THE LOAD MEASURING DEVICE SHALL BE ACCURATE TO WITHIN 100 LBF. THE COUNTERWEIGHT ARMS SHALL BE AT THE SAME ELEVATION WHEN THE LOADS ARE MEASURED TO ASSURE THAT THE COUNTERWEIGHT ARM STRUCTURE IS NOT TWISTED OR DISTORTED.
  - e. INSTALL NEW COUNTERWEIGHT TIE RODS AS SHOWN ON DRAWINGS. INSTALL TEMPORARY LOCKS TO ENSURE BOTH TOP CHORDS STAY MATED. THE TEMPORARY LOCKS BETWEEN THE BASCULE LEAVES SHALL REMAIN THROUGH CONSTRUCTION UNTIL THE TESTING STAGE, AND SHALL BE INSTALLED AT BOTH SIDES OF THE SPAN.
  - f. UPON ACCEPTANCE OF THE TIE ROD INSTALLATION, THE CONTRACTOR SHALL SECURE THE ROD ASSEMBY LENGTHS BY TORQUING ROD END JAM NUTS.
6. INSTRUCTIONS FOR INSTALLING PINION SHAFTS AND RACK SUPPORTS:
  - a. PINION SHAFTS FOR EACH LEAF SHALL BE INSTALLED COLLINEAR TO EACH OTHER (TOLERANCE IS <0.010 INCH BETWEEN CENTERLINE OF SHAFT PAIRS), AND ALIGNED WITH THE CENTERLINE OF THE HINGE PIN BEARING WELDMENT (TOLERANCE IS <0.010 INCH BETWEEN THE CENTERLINE OF THE BEARING WELDMENT BORES) AND SHALL BE MEASURED WITH THE SPAN RAISED IN ORDER TO LOCATE COMPONENTS WHILE AT THEIR CLOSEST POSITIONS IN THE RANGE OF MOTION. ADDITIONALLY, THE PINION AXIS SHALL BE ESTABLISHED PARALLEL TO EXISTING COUNTERWEIGHT ARM PIVOT AXIS AT THE CORRECT LONGITUDINAL AND VERTICAL SPACING AND AT THE CORRECT TRANSVERSE SPACING FROM LONGITUDINAL CENTERLINE OF COUNTERWEIGHT ARM STRUCTURE (TOLERANCE IS TO BE WITHIN 1/32 INCH FROM THE CENTERLINE OF EXISTING PLANES). MACHINERY SUPPORT FRAME WITH MOTORS, BRAKES AND GEAR REDUCER SHALL BE INSTALLED AFTER THE PINION SHAFTS ARE INSTALLED.

- b. PINION SHAFT BEARING MOUNTING BOLTS SHALL BE DRILLED AND REAMED FULL SIZE TO THEIR SUPPORTS IN THE SHOP. ADJUSTMENTS DURING PINION ALIGNMENT AS DESCRIBED ABOVE, WILL OCCUR WHEN BOLTING THE PINION SUPPORT TO THE TOP FLANGE AND SIDE LEGS OF THE COUNTERWEIGHT ARM. THE PINION SUPPORT HAS BEEN DETAILED WITH SHIMS FOR ADJUSTMENT. HAND HOLES HAVE BEEN PROVIDED TO ACCESS THE BOLTS WITHIN THE HSS12X6 TUBE.
  - c. RACK HINGE PINS FOR EACH LEAF SHALL BE INSTALLED COLLINEAR AND PARALLEL TO COUNTERWEIGHT ARM PIVOT AXIS AT THE CORRECT LONGITUDINAL AND VERTICAL SPACING AND AT THE CORRECT TRANSVERSE SPACING FROM LONGITUDINAL CENTERLINE OF COUNTERWEIGHT ARM STRUCTURE.
  - d. PRECISELY SURVEY (TO WITHIN 1/32 INCH) EACH COUNTERWEIGHT ARM PIVOT SHAFT AT BOTH ENDS OF BOTH SHAFTS. DATA WILL BE USED TO DETERMINE DEGREE TO WHICH SHAFTS ARE OUT OF PARALLEL TO EACH OTHER AND TO DETERMINE BEST FIT PIVOT AXIS. A BEST FIT THEORETICAL PIVOT AXIS SHALL BE CONSIDERED TO BE A LINE BETWEEN POINTS AT THE INTERSECTION OF EACH SHAFT AXIS WITH THE VERTICAL CENTERLINE OF ITS RESPECTIVE TOWER. THIS LINE SHALL BE USED FOR THE PURPOSE OF ALIGNING THE PINION SHAFTS AND RACK SUPPORT PINS.
  - e. THE FINAL LOCATION OF THE PINION SHAFT BEARING SUPPORTS AND RACK HINGE PIN SUPPORTS SHALL BE DETERMINED BASED ON THE RESULTS OF THE SURVEY MEASUREMENTS AND OPTIMIZING TO MEET THE TOLERANCES OUTLINED ABOVE.
  - f. THE HINGE PIN SUPPORT PEDESTALS SHALL BE INSTALLED, AND BEARING WELDMENTS ALIGNED USING THE SAME COLLINEAR METHODS USED TO ALIGN THE PINION SHAFTS (TOLERANCE IS <0.010 INCH BETWEEN THE CENTERLINE OF THE PIN PAIRS).
  - g. AFTER FINALIZING THE LOCATION OF THE BEARING WELDMENTS WITH RESPECT TO THE SUPPORT PEDESTALS, THE MOUNTING BOLTS SHALL BE DRILLED AND REAMED TO FINAL SIZE. IN ORDER TO INSTALL THE RACK BEAM ASSEMBLY, THE BEARING WELDMENT WILL BE REMOVED AT THIS POINT.
  - h. ATTACH THE BEARING WELDMENT TO THE RACK BEAM ASSEMBLY BY INSTALLING THE PIN CONNECTION THROUGH THE SPHERICAL BEARING.
  - i. LIFT THE RACK BEAM PIVOT END BACK IN LINE WITH THE SUPPORT PEDESTAL, AND FASTEN THE BEARING WELDMENT USING THE NEW MOUNTING BOLTS.
7. INSTRUCTIONS FOR INSTALLING MACHINERY BASE FRAME WITH MOTORS, BRAKES AND GEAR REDUCER:

- a. INSTALLATION SHALL NOT BEGIN UNTIL PINION SHAFTS WITH THEIR BEARINGS ARE INSTALLED AND ALIGNED AS DESCRIBED ABOVE. IT IS ASSUMED MACHINERY IS MOUNTED TO FRAME WHEN INSTALLED USING TEMPORARY UNDERSIZED BOLTS AND NOMINAL SHIM THICKNESS.
  - b. USING TEMPORARY SHORING, CHAIN FALLS, ETC., ALIGN THE FRAME ALONG THE LONGITUDINAL CENTERLINE OF THE COUNTERWEIGHT ARM STRUCTURE AND SUCH THAT THE AXIS OF THE GEAR REDUCER OUTPUT SHAFT IS COLLINEAR WITH THE PINION SHAFT AXES. NOTE THAT FINAL COUPLING ALIGNMENT SHALL BE CHECKED ON BOTH FLOATING SHAFT COUPLINGS TO VERIFY THE AS INSTALLED ANGULAR AND PARALLEL ALIGNMENT IS WITHIN THE MANUFACTURERS' RECOMMENDATIONS.
  - c. ONCE FRAME IS SET TO PROPER POSITION, WELD BOLT ANGLES TO EXISTING COUNTERWEIGHT ARM STRUCTURE WITH BOLTS INSTALLED WRENCH TIGHT.
  - d. AFTER WELDING IS COMPLETE, THE MOUNTING BOLTS SHALL BE TORQUED TO THEIR PROPER VALUE.
  - e. VERIFY ALIGNMENT OF FLOATING SHAFT COUPLINGS AS OUTLINED ABOVE. IF ADJUSTMENTS ARE REQUIRED THE MACHINERY ON THE BASE FRAME SHALL BE ADJUSTED WITHOUT DISTURBING THE PINION SHAFT ALIGNMENT. FOR THIS REASON – FINAL REAMING OF FEET AND INSTALLATION OF PERMANENT BOLTS FOR REDUCERS, BRAKES AND MOTORS SHALL NOT BE PERFORMED UNTIL FINAL ALIGNMENT HAS BEEN VERIFIED.
  - f. VERIFY THAT BRAKES ARE ALIGNED AS PER THE MANUFACTURERS' INSTALLATION INSTRUCTIONS.
  - g. VERIFY THAT MOTOR COUPLING ALIGNMENT MEETS THE MANUFACTURERS' REQUIREMENT FOR INITIAL PARALLEL AND ANGULAR OFFSET ALIGNMENT.
  - h. PERFORM FINAL REAMING OF REDUCER, BRAKE AND MOTOR FEET AND INSTALL PERMANENT FULL SIZE A449 FINISHED BODY BOLTS.
8. ONCE MACHINERY IS COMPLETELY INSTALLED USING TEMPORARY UNDERSIZE A325 STRUCTURAL BOLTS, THE HINGE PIN BEARING WELDMENT AND MAIN PINION BEARINGS INSTALLED WITH PERMANENT FULL SIZE A449 FINISHED BODY BOLTS, AND THE ELECTRICAL INSTALLATION IS COMPLETE, THE BRIDGE CAN BE OPERATED AT SLOW SPEED UNDER LIGHT WIND CONDITIONS. THE FOLLOWING CHECKS SHALL BE PERFORMED:
- a. VERIFY THAT ALL EQUIPMENT OPERATES OVER THE FULL RANGE OF MOTION WITHOUT INTERFERENCE OR EXCESSIVE VIBRATION OR NOISE. FULL RANGE OF MOTION IS CONSIDERED THE DISTANCE TRAVELED BY THE SPAN BETWEEN FULLY SEATED (CENTER BEARING ASSEMBLIES IN FULL CONTACT) AND FULLY RAISED (EXISTING LOCK PINS ENGAGED) OR APPROXIMATELY 81 DEGREES.
  - b. THE FLOATING SHAFT COUPLING ALIGNMENT SHALL ALSO BE CHECKED AND POSITION OF REDUCER AND ALL OTHER MACHINERY ADJUSTED AS REQUIRED TO ACHIEVE FINAL ALIGNMENT. ONCE FINAL ALIGNMENT IS ACCEPTED BY THE ENGINEER, THE MOUNTING BOLTS FOR THE REDUCER, AND ELECTRICAL MACHINERY CAN BE REAMED TO FULL SIZE AND INSTALLED.

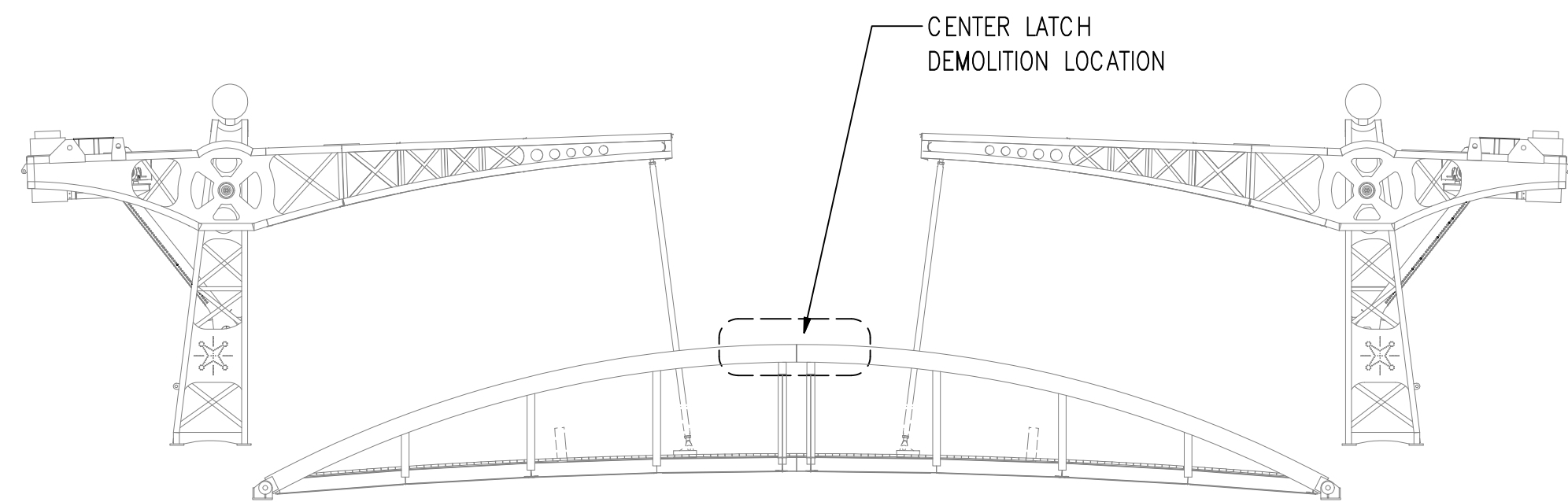
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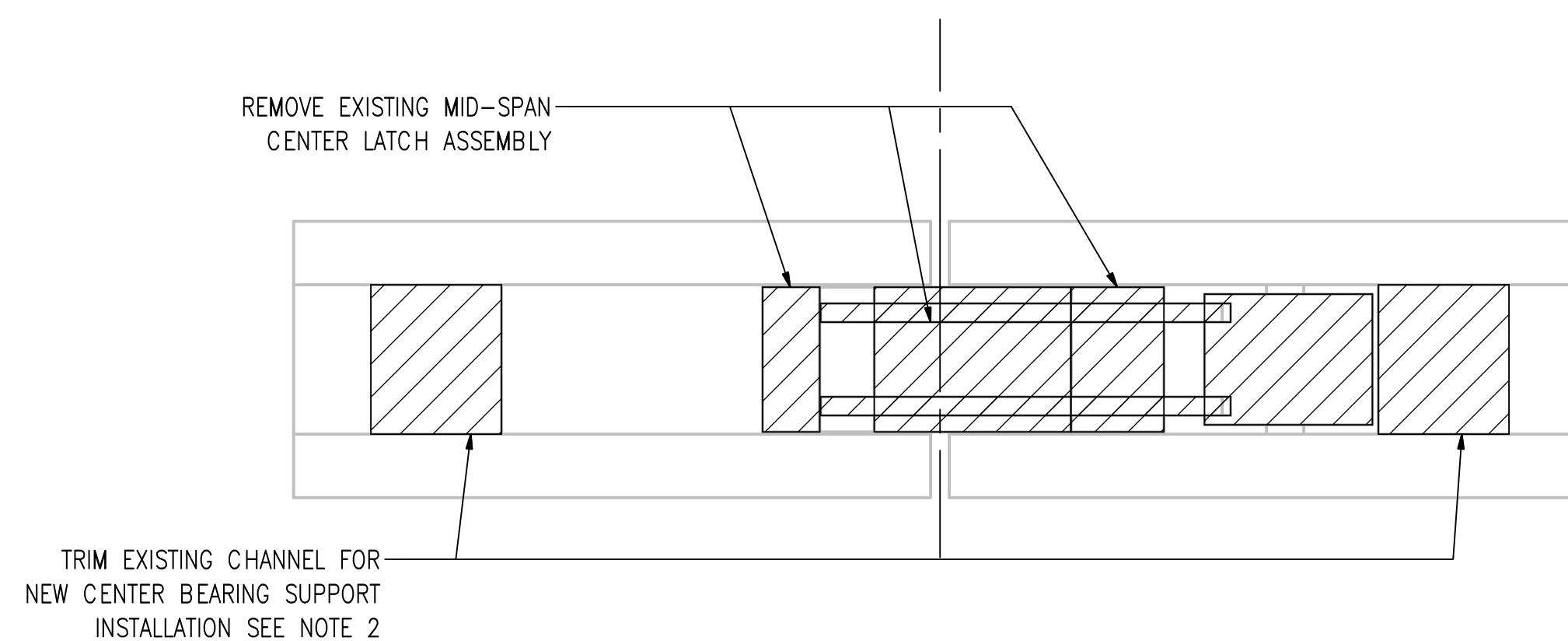
GENERAL MACHINERY NOTES

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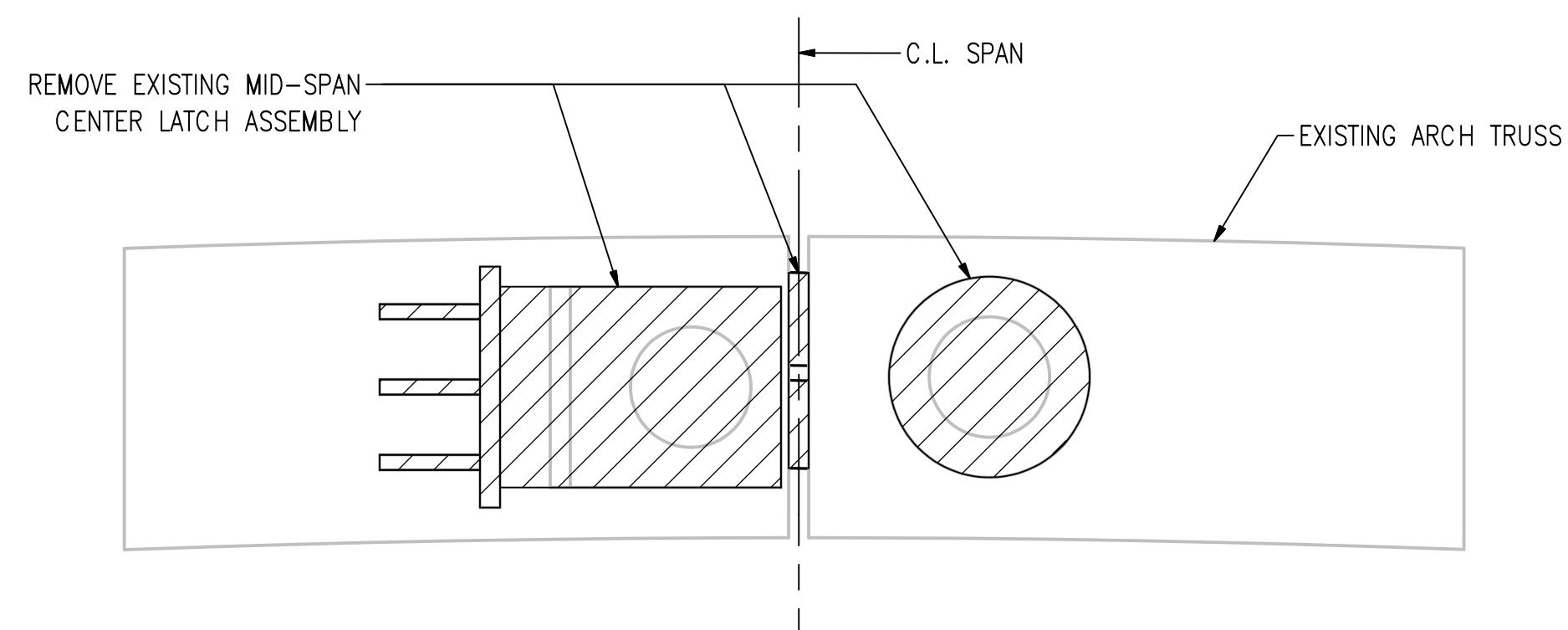
### KEY ELEVATION

SCALE  $\frac{3}{32}" = 1'-0"$   
TWO (2) LOCATIONS



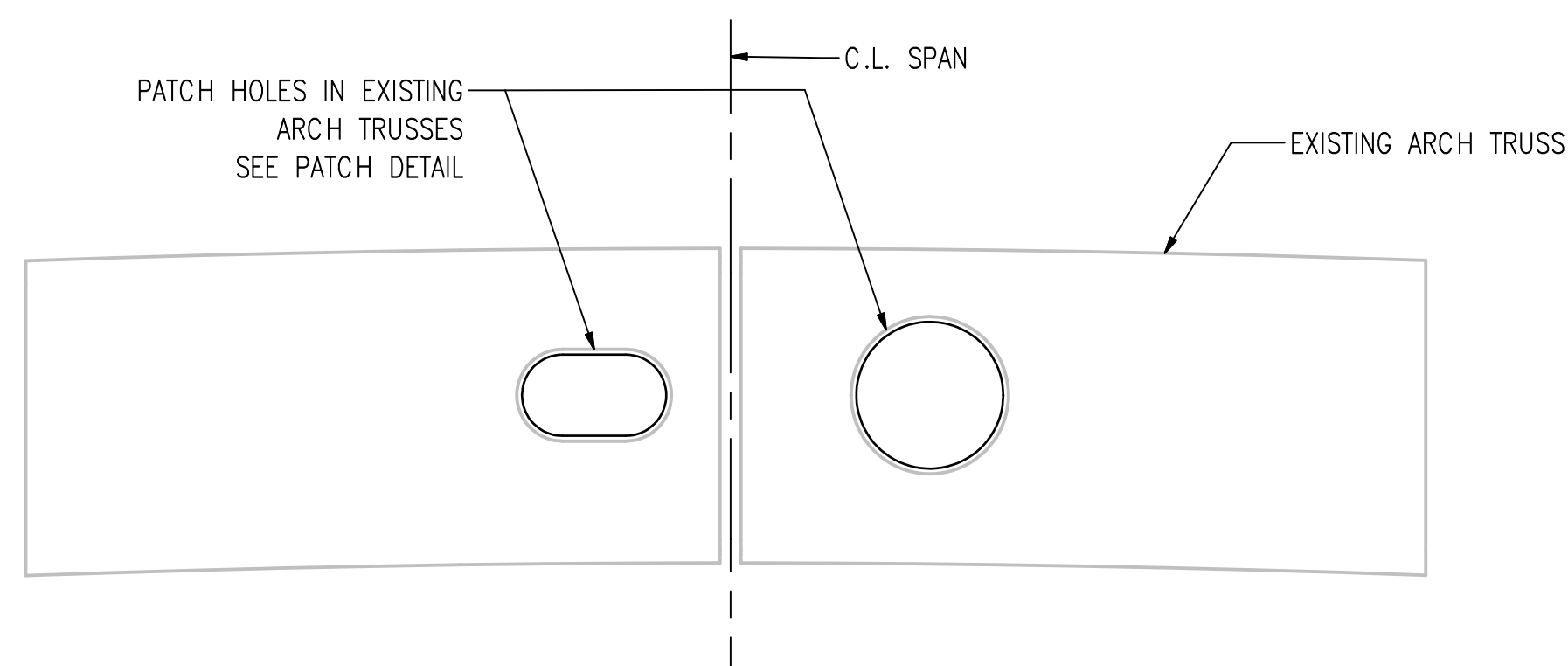
### MID-SPAN CENTER LATCH DEMOLITION PLAN

SCALE  $1 \frac{1}{2}" = 1'-0"$



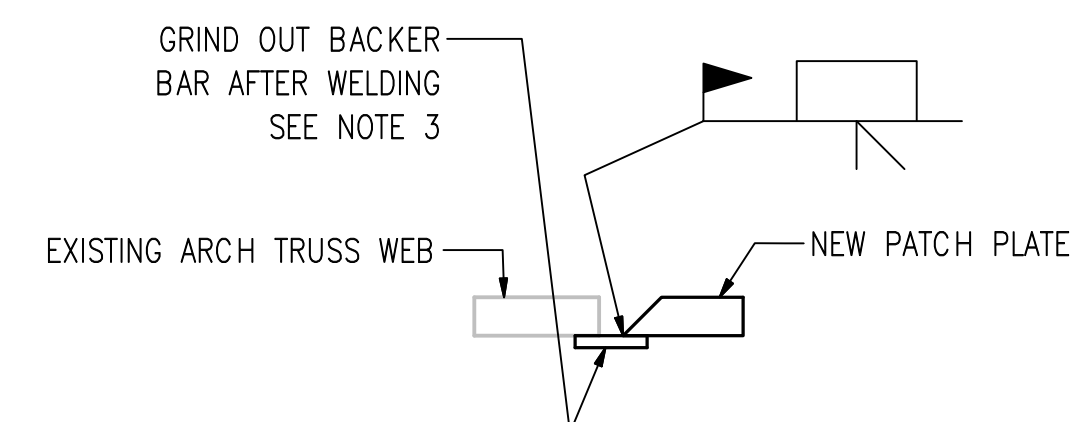
### MID-SPAN CENTER LATCH DEMOLITION ELEVATION

SCALE  $1 \frac{1}{2}" = 1'-0"$



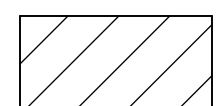
### EXISTING ARCH TRUSS ELEVATION

SCALE  $1 \frac{1}{2}" = 1'-0"$



### HOLE PATCH WELD DETAIL

SCALE  $6" = 1'-0"$



DENOTES REMOVAL

#### NOTES:

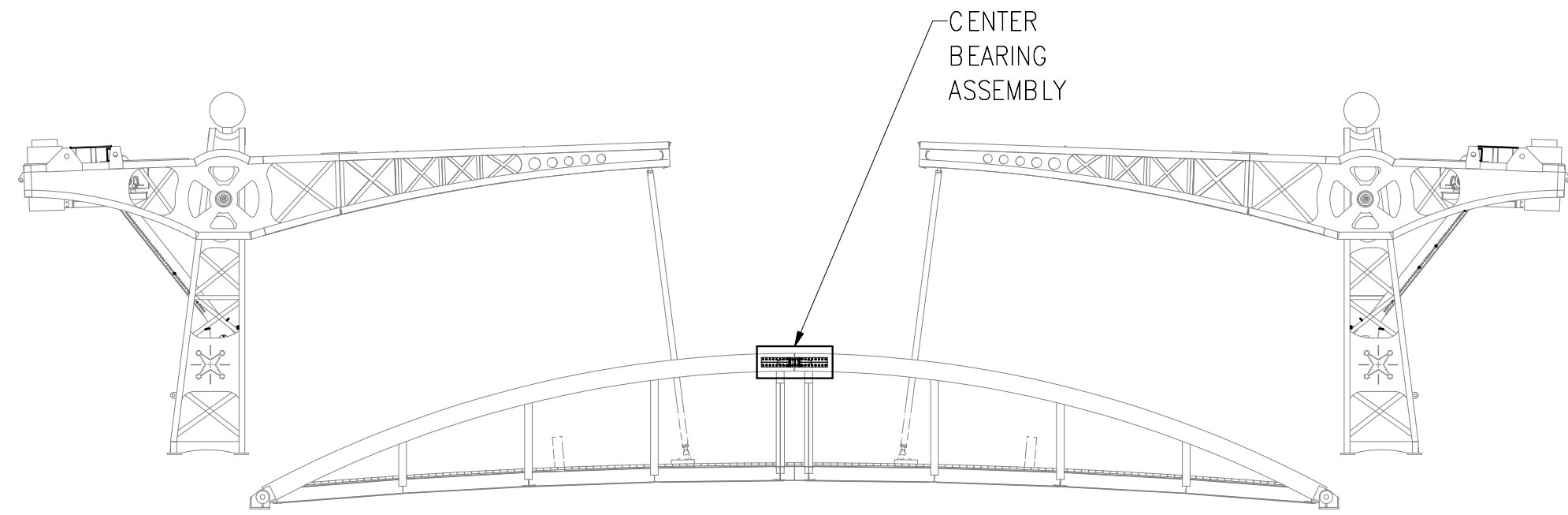
1. REFER TO ORIGINAL CONTRACT PLANS FOR DETAILS OF EXISTING CENTER LATCH AND ARCH TRUSS.
2. REFER TO SHEET 6 FOR NEW CENTER BEARING ASSEMBLY DETAILS.
3. GRIND AND CLEAN WELD SURFACES TO ACCEPT NEW CENTER BEARING SUPPORT.
4. REFER TO SHEET NO. 17 FOR DEMOLITION NOTES.

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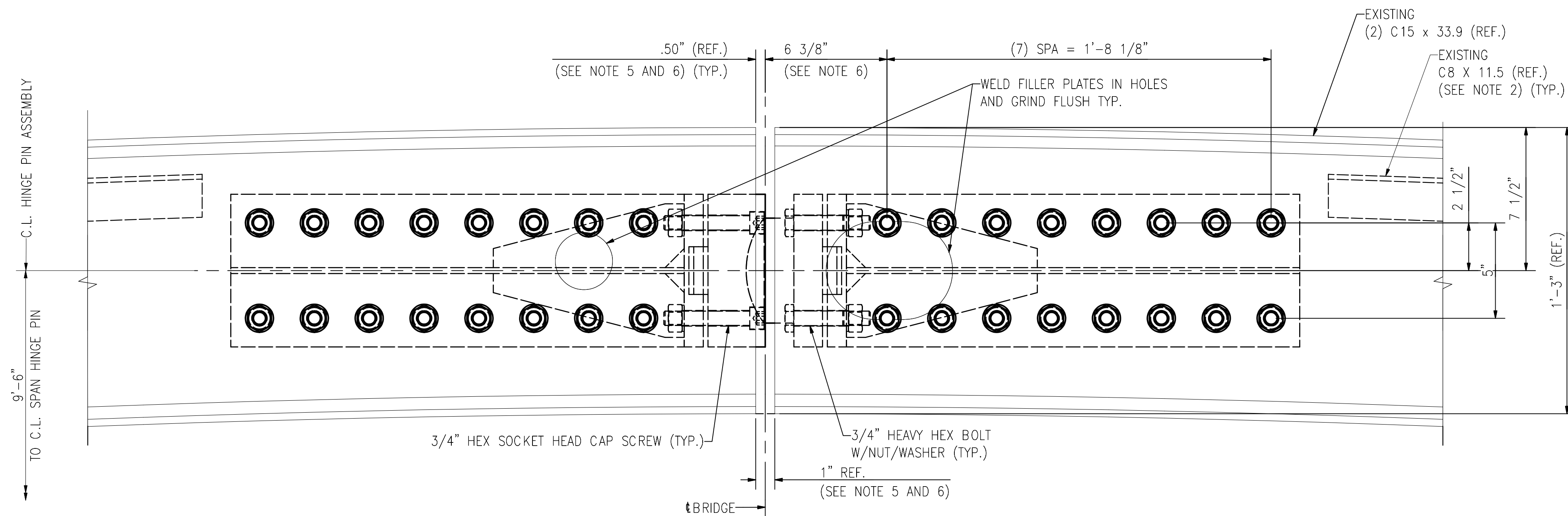
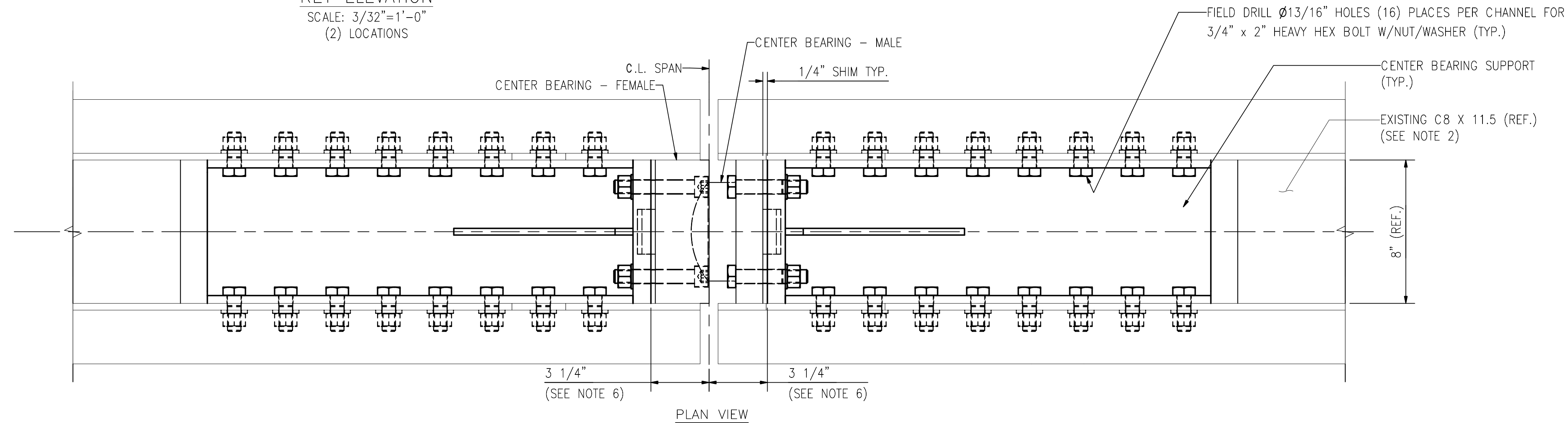
CENTER LATCH DEMOLITION

Sheet No. 5 of 37 Sheets



# KEY ELEVATION

SCALE: 3/32"=1'-0"  
(2) LOCATIONS



## ELEVATION VIEW

## CENTER BEARING ASSEMBLY

CONDITION SHOWN WITH BRIDGE AT CORRECT ELEVATION AT 60°F

SCALE: 3" = 1' - 0"

(2) ASSEMBLIES REQUIRED

## INSTALLATION NOTES:

1. REMOVE ALL WELDED PLATES AND EQUIPMENT ASSOCIATED WITH EXISTING CENTER LATCHES.
2. TRIM BACK EXISTING C8 X 11.5 CHANNELS TO PROVIDE 1 inch CLEARANCE WITH NEW CENTER BEARING SUPPORTS.
3. WELD FILLER PLATES IN HOLES IN EXISTING C15 X 33.9 CHANNEL WEBS AND GRIND FLUSH BOTH SIDES.
4. SURVEY BRIDGE SEATED POSITION ELEVATIONS AND ADJUST SPAN TIP ELEVATION USING OPERATING MACHINERY TO MATCH ORIGINAL DRAWING ELEVATIONS.
5. MEASURE GAP BETWEEN END OF ARCH CHANNELS IN EARLY MORNING AND NOTE TEMPERATURE OF BRIDGE. (NOTE - GAP SHOWN ON DRAWING IS BASED ON 60°F TEMPERATURE OF BRIDGE). ADVISE ENGINEER OF MEASUREMENT.
6. LAY OUT AND DRILL (16) HOLES PER CHANNEL AS SHOWN BASED ON ESTABLISHED BRIDGE AND ADJUSTING FOR TEMPERATURE. ADD 0.03" TO 6 3/8" DIMENSION SHOWN ON DRAWING FOR EVERY 10°F COLDER THAN 60°F. SUBTRACT 0.03" FROM 6 3/8" DIMENSION SHOWN ON DRAWING FOR EVERY 10°F HOTTER THAN 60°F.
7. INSTALL W8 X 31 CENTER BEARING SUPPORT USING 3/4" A325 BOLTS. SUPPORTS SHALL BE INSTALLED LEVEL.
8. INSTALL MALE AND FEMALE CENTER BEARINGS WITH NOMINAL 1/4" SHIMS AS SHOWN.
9. VERIFY THAT BRIDGE WILL SEAT AT CORRECT ELEVATION WHEN AT 60°F. ADJUST SHIMS AS REQUIRED.
10. LUBRICATE INTERFACE BETWEEN MALE AND FEMALE CENTER BEARING PRIOR TO SPAN OPERATION.

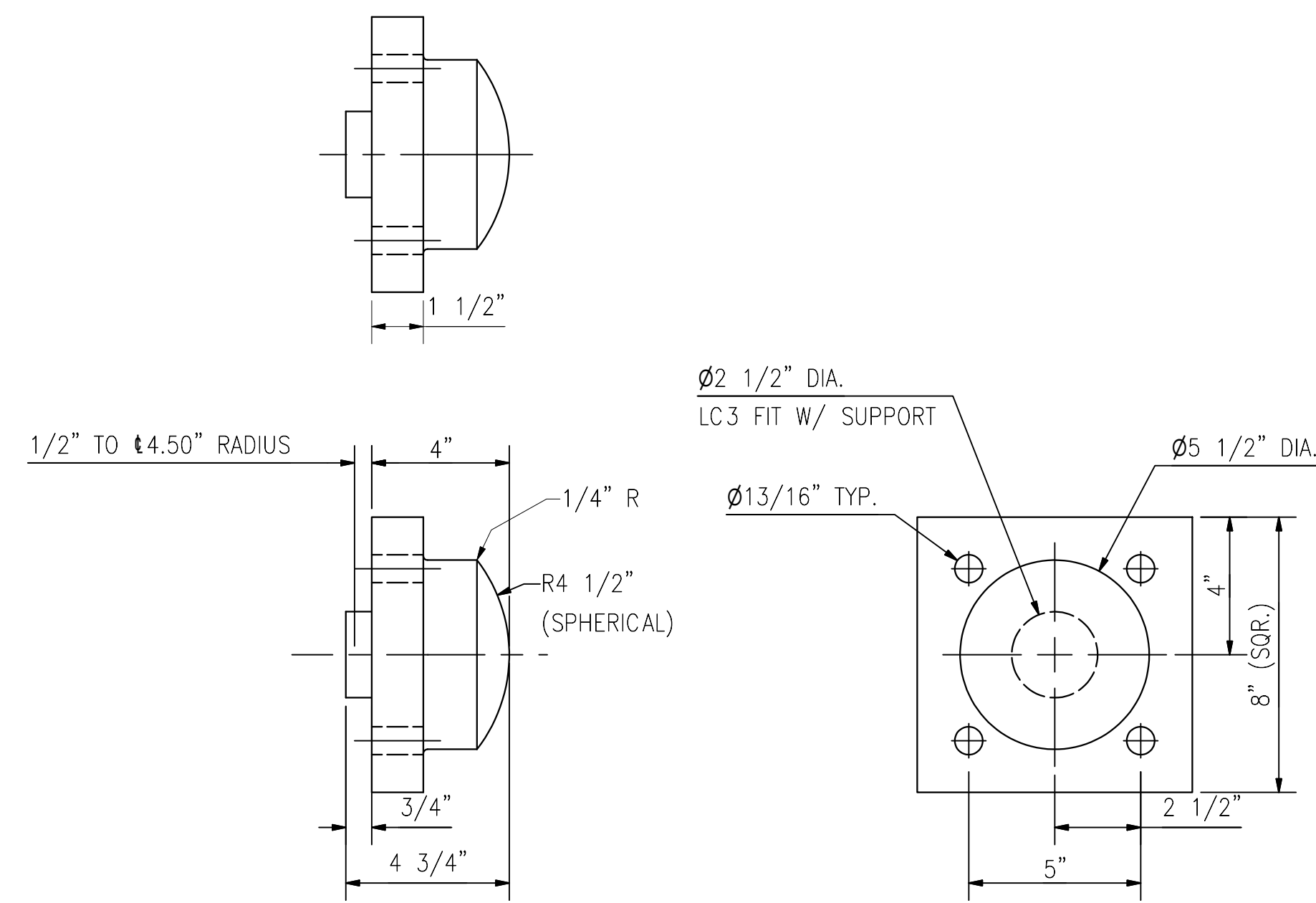
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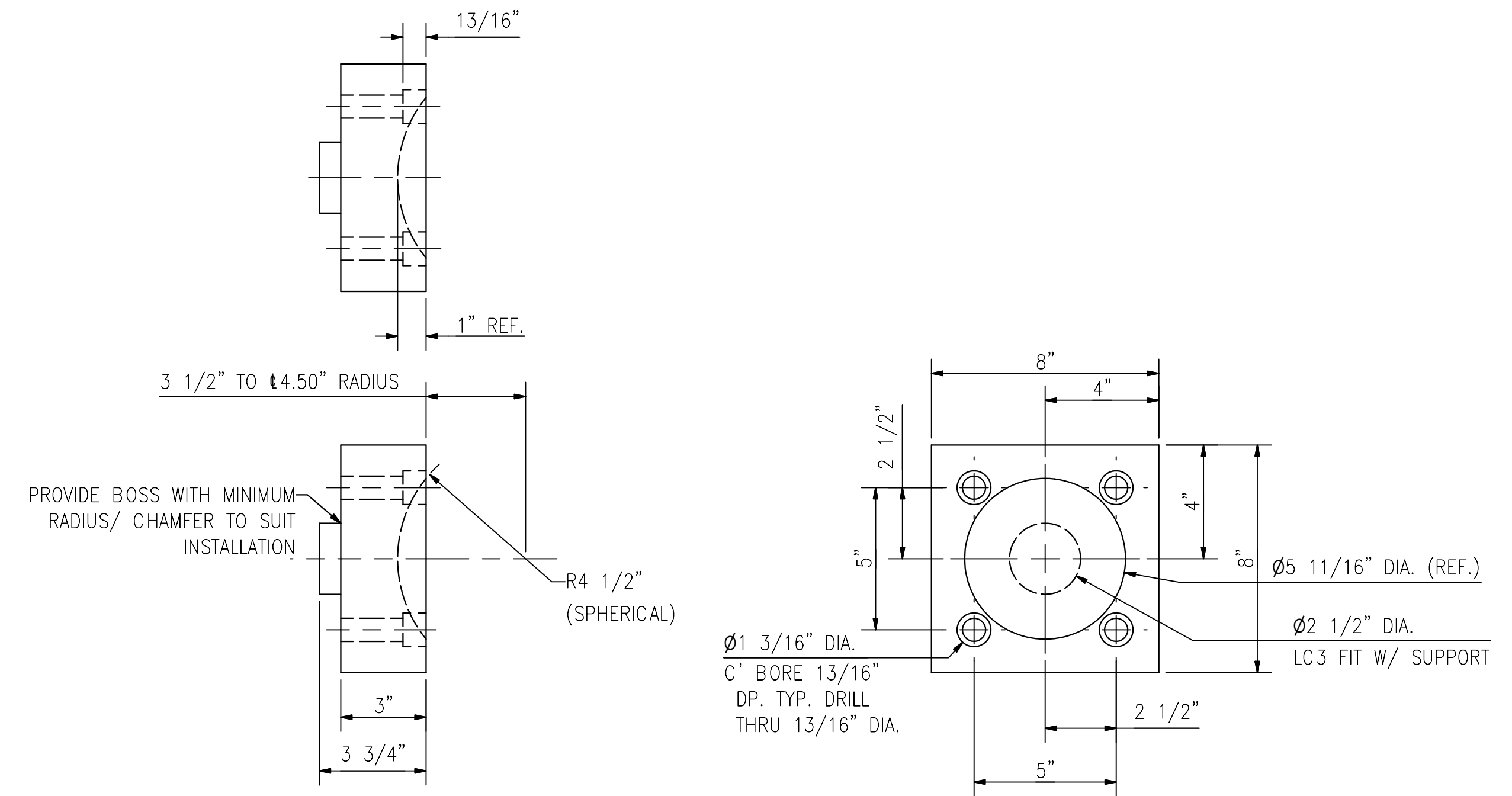
CENTER BEARING ASSEMBLY

Sheet No. 6 of 37 Sheets



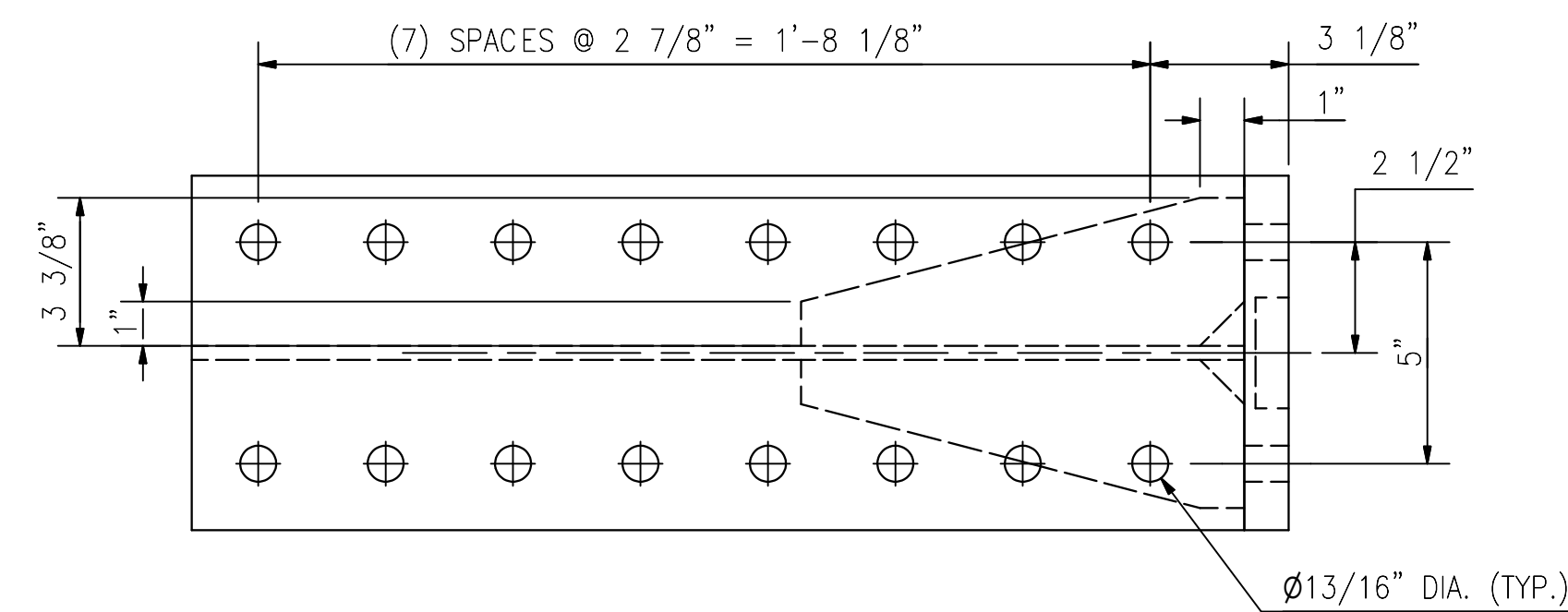
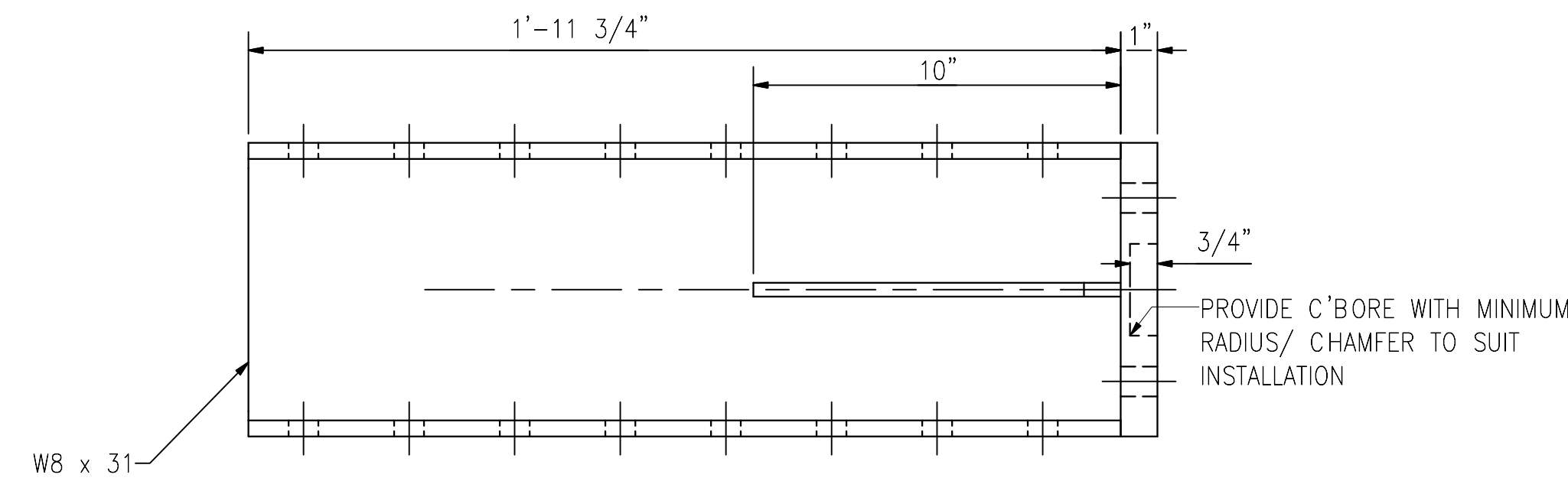
### CENTER BEARING — MALE

SCALE: 3" = 1' - 0"  
MATL: ASTM A668 CL. K  
MACHINE 125 RMS ALL OVER  
(2) REQUIRED



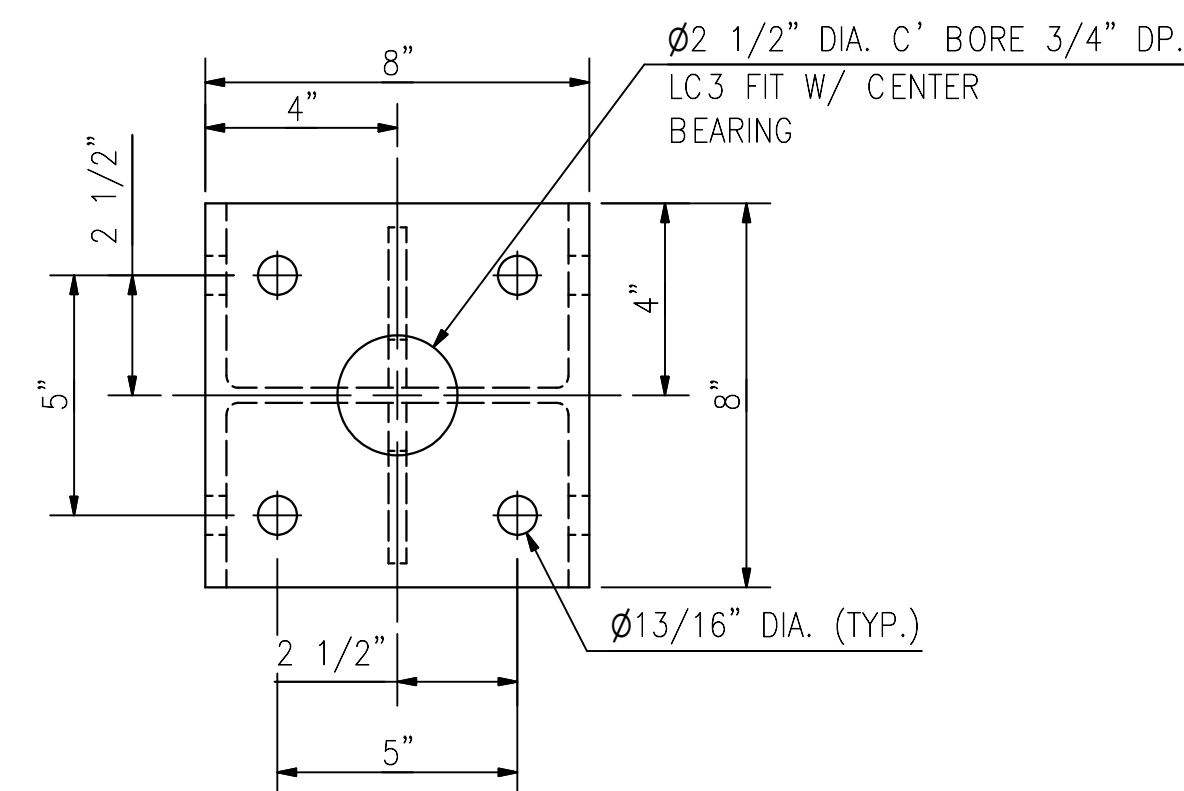
### CENTER BEARING — FEMALE

SCALE: 3" = 1' - 0"  
MATL: ASTM B22 UNS NO. C86300  
MACHINE 125 RMS ALL OVER  
(2) REQUIRED



### CENTER BEARING SUPPORT

SCALE: 3" = 1' - 0"  
MATL: ASTM A709 GR. 50  
ALL WELDS CPGW  
(4) REQUIRED



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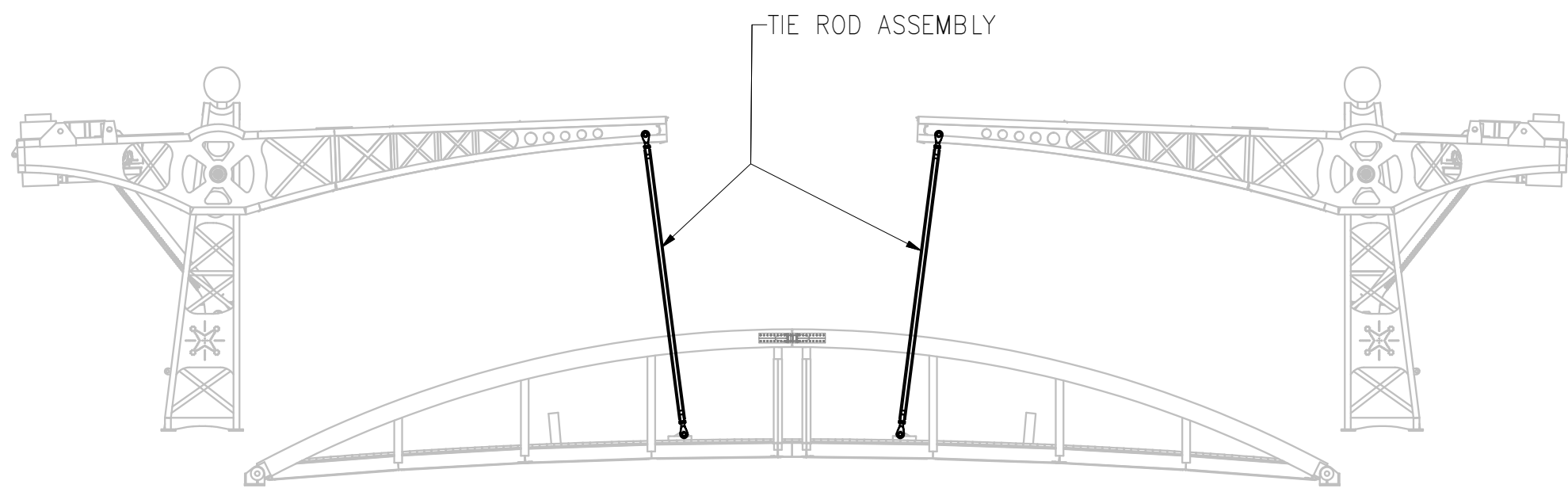
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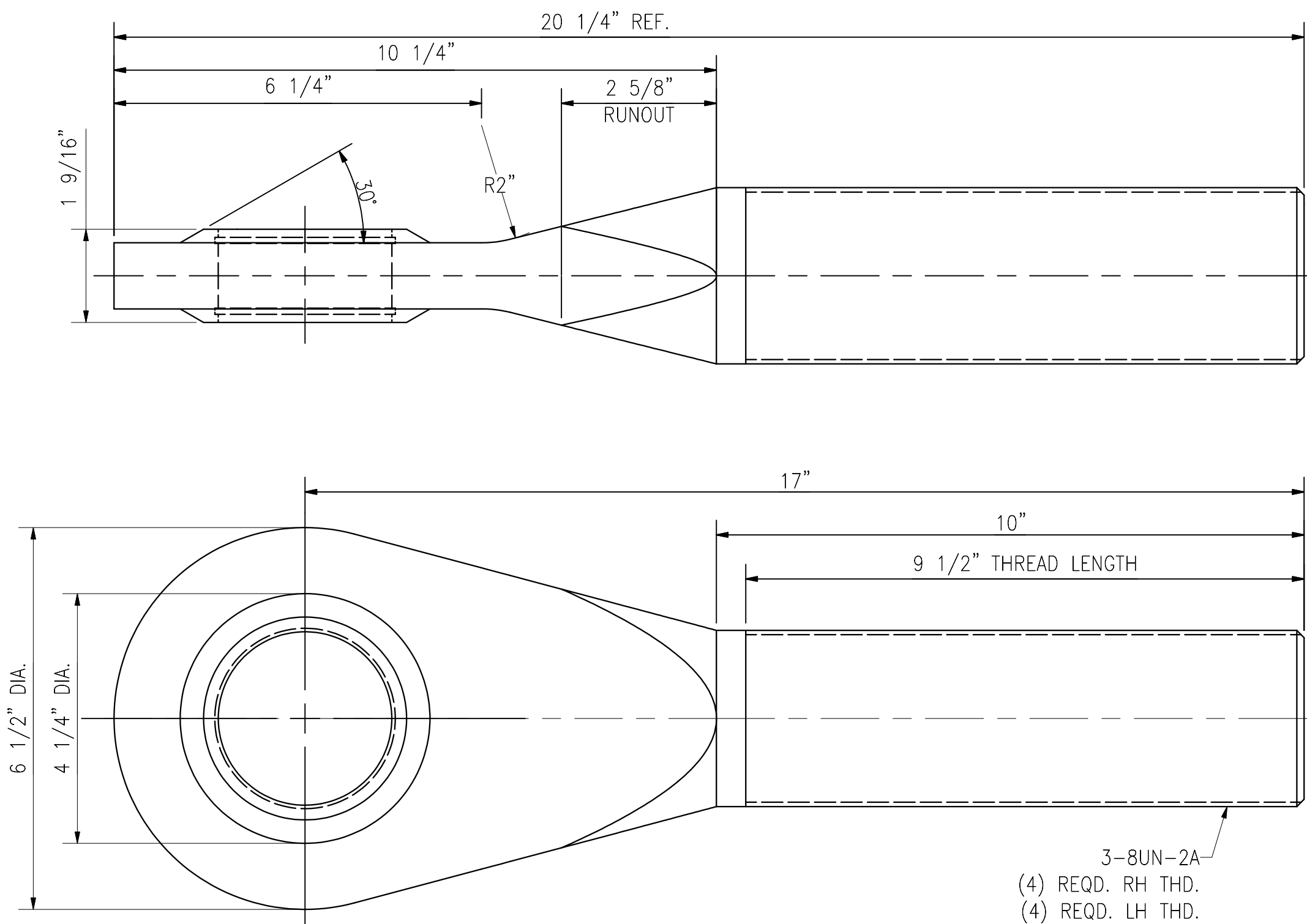
CENTER BEARING DETAILS

Sheet No. 7 of 37 Sheets



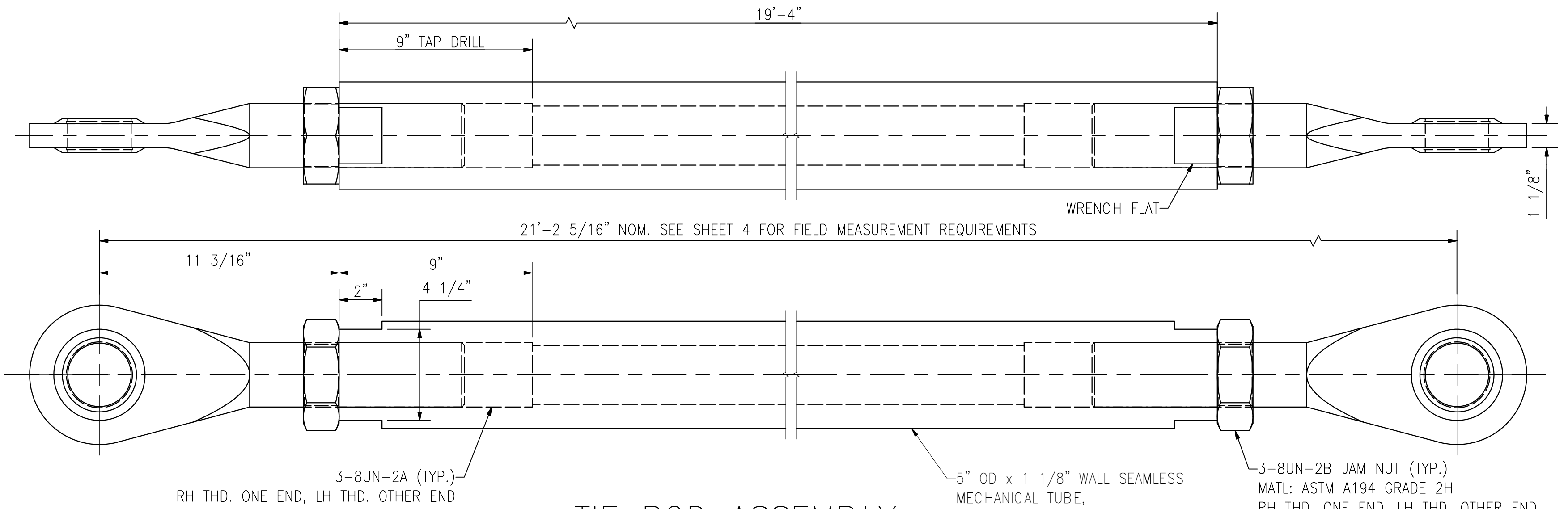


KEY ELEVATION  
SCALE: 3/32"=1'-0"  
(4) LOCATIONS



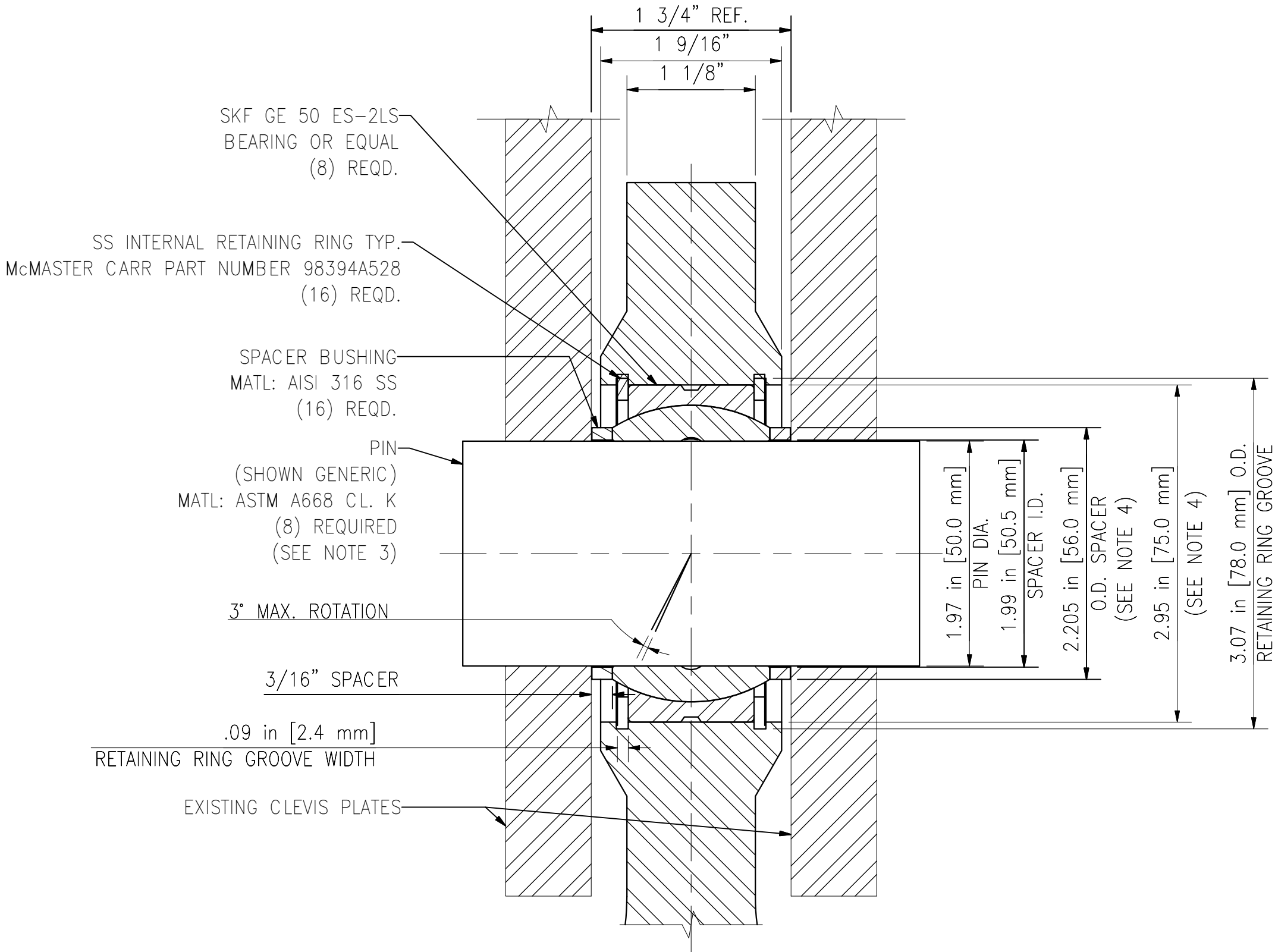
**TIE ROD END**

MATL: ASTM A668 CLASS G  
SCALE: 6" = 1' - 0"  
(8) REQUIRED



**TIE ROD ASSEMBLY**

SCALE: 3" = 1' - 0"  
(4) ASSEMBLIES REQUIRED



**TIE ROD END ASSEMBLY – DEVELOPED VIEW**

SCALE: FULL

NOTES:

1. THE ORIGINAL CONTRACT PLANS (SHEET S17 OF 20) INDICATE THAT THE EXISTING TIE ROD ASSEMBLIES UTILIZE RADIAL SPHERICAL PLAIN BEARINGS AT EACH END TO ATTACH THE TOP CONNECTION TO THE COUNTERWEIGHT ARM AND BOTTOM CONNECTION TO THE SPAN. THE EXISTING BEARINGS ARE NOTED AS HAVING A 1.969" (50MM) BORE AND 2.953" (75MM) OUTER DIAMETER.
2. NEW TIE ROD ASSEMBLIES SHALL BE PROVIDED WITH NEW RADIAL SPHERICAL PLAIN BEARINGS AND NEW ATTACHMENT PINS.
3. THE CONTRACTOR SHALL REMOVE AND THOROUGHLY INSPECT THE EXISTING TIE ROD ENDS TO CONFIRM THE EXISTING BEARING AND PIN CONNECTION DETAILS PRIOR TO SUBMITTING SHOP DRAWINGS FOR THE NEW TIE ROD ASSEMBLIES. NEW TIE ROD ENDS SHALL BE DETAILED TO COMPLEMENT EXISTING CONNECTION POINTS. NEW BEARINGS SHALL BE SECURED WITH NEW S.S. SPACERS AND INTERNAL RETAINING RINGS AS SHOWN AND NEW PINS SHALL BE SECURED WITH NEW H.S. CAP SCREWS AND HELICAL LOCKWASHERS AS FIELD VERIFIED. SIMILAR TO THE EXISTING PINS, THE NEW PINS SHALL OFFER A MEANS TO FACILITATE GREASING THE NEW BEARINGS.
4. ALL BEARING, RETAINER RING AND SPACER BUSHING RELATED DIMENSIONS, TOLERANCES AND SURFACE FINISHES SHALL BE AS PER THE MANUFACTURERS RECOMMENDATION.
5. FOR INSTRUCTIONS ON INSTALLING COUNTERWEIGHT TIE RODS SEE SHEET 4.

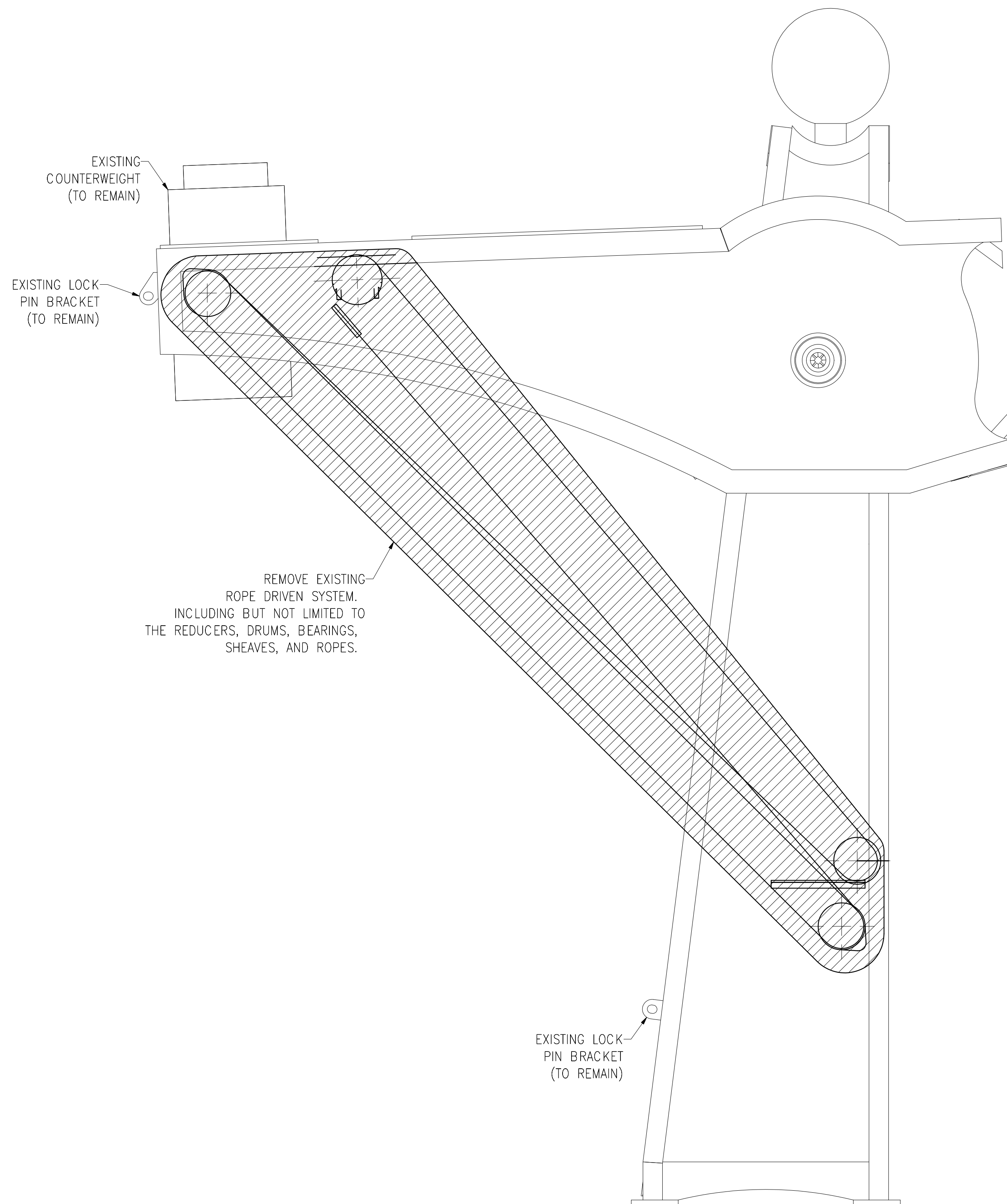
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TIE ROD ASSEMBLY

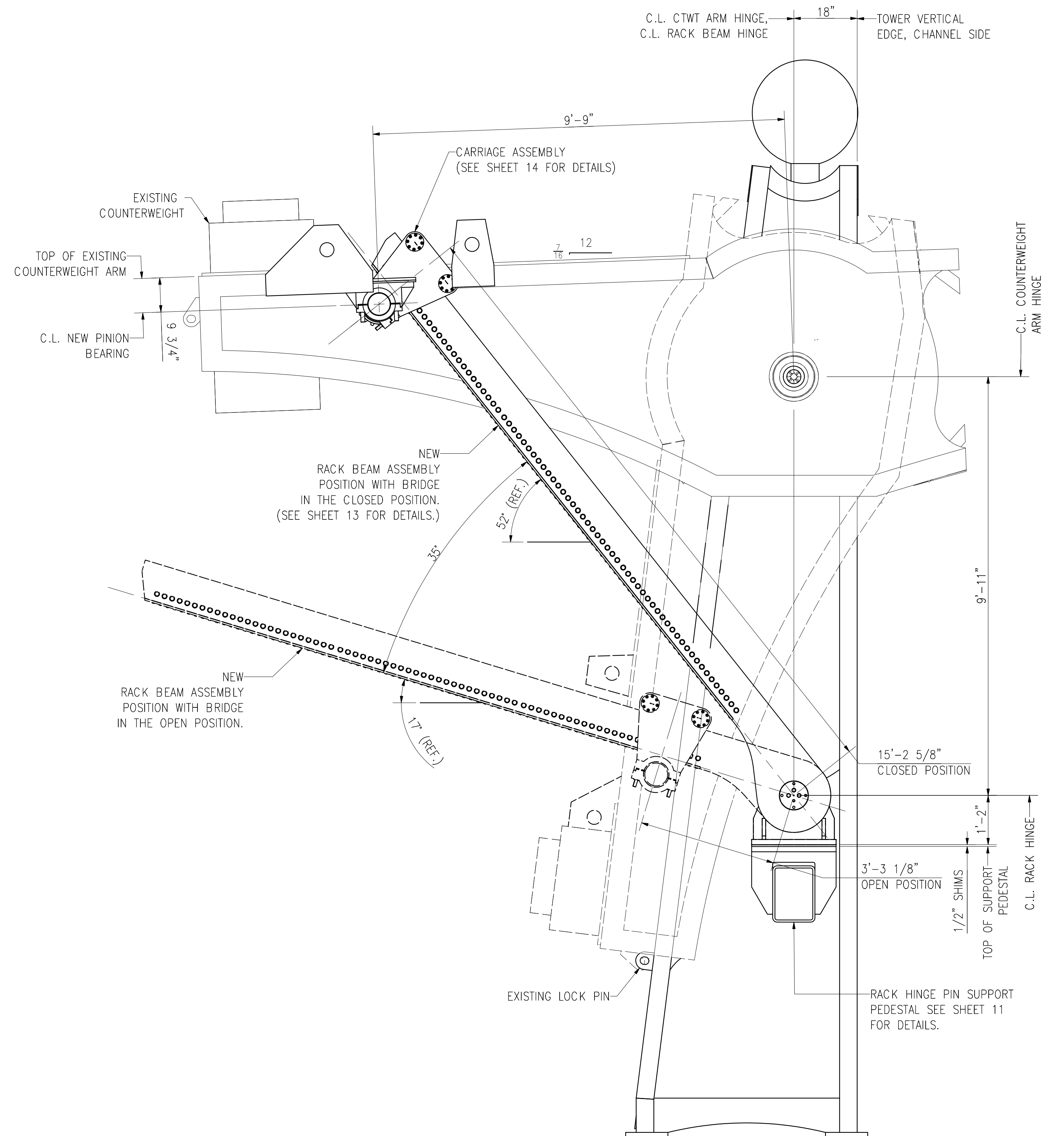
Sheet No. 8 of 37 Sheets





EXISTING ROPE DRIVEN OPERATING SYSTEM – TOWER ELEVATION

SCALE: 5/8"=1'-0"



RACK DRIVEN OPERATING SYSTEM – TOWER ELEVATION

SCALE: 5/8"=1'-0"

NOTES:

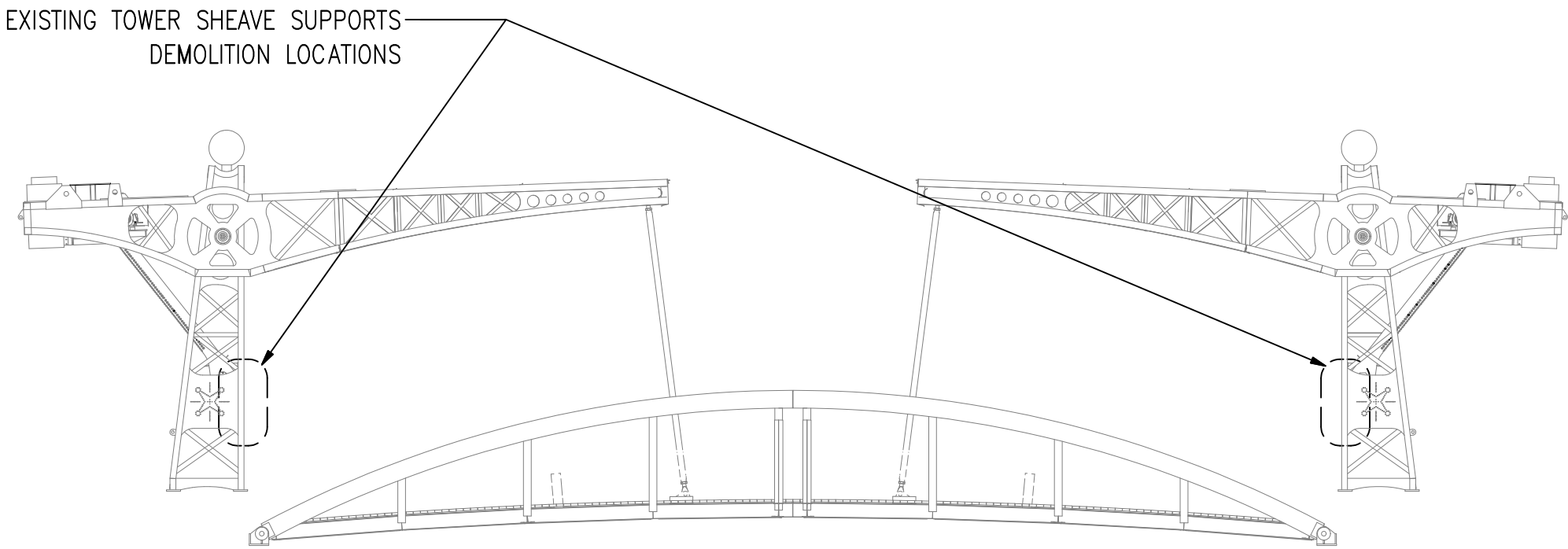
1. FIELD VERIFY ALL DIMENSIONS.
2. DETAILS ARE PROVIDED FOR BIDDING PURPOSES ONLY AND SHOULD BE CONSIDERED APPROXIMATE, EXISTING ROPE DRIVEN SYSTEM ARE TO BE REMOVED IN ENTIRETY UNLESS OTHERWISE NOTED.
3. REMOVAL OF EXISTING ROPE DRIVEN SYSTEM IS PAID FOR UNDER OPERATING MACHINERY PAY ITEM. REFERENCE SPECIFICATION FOR ADDITIONAL REQUIREMENTS.

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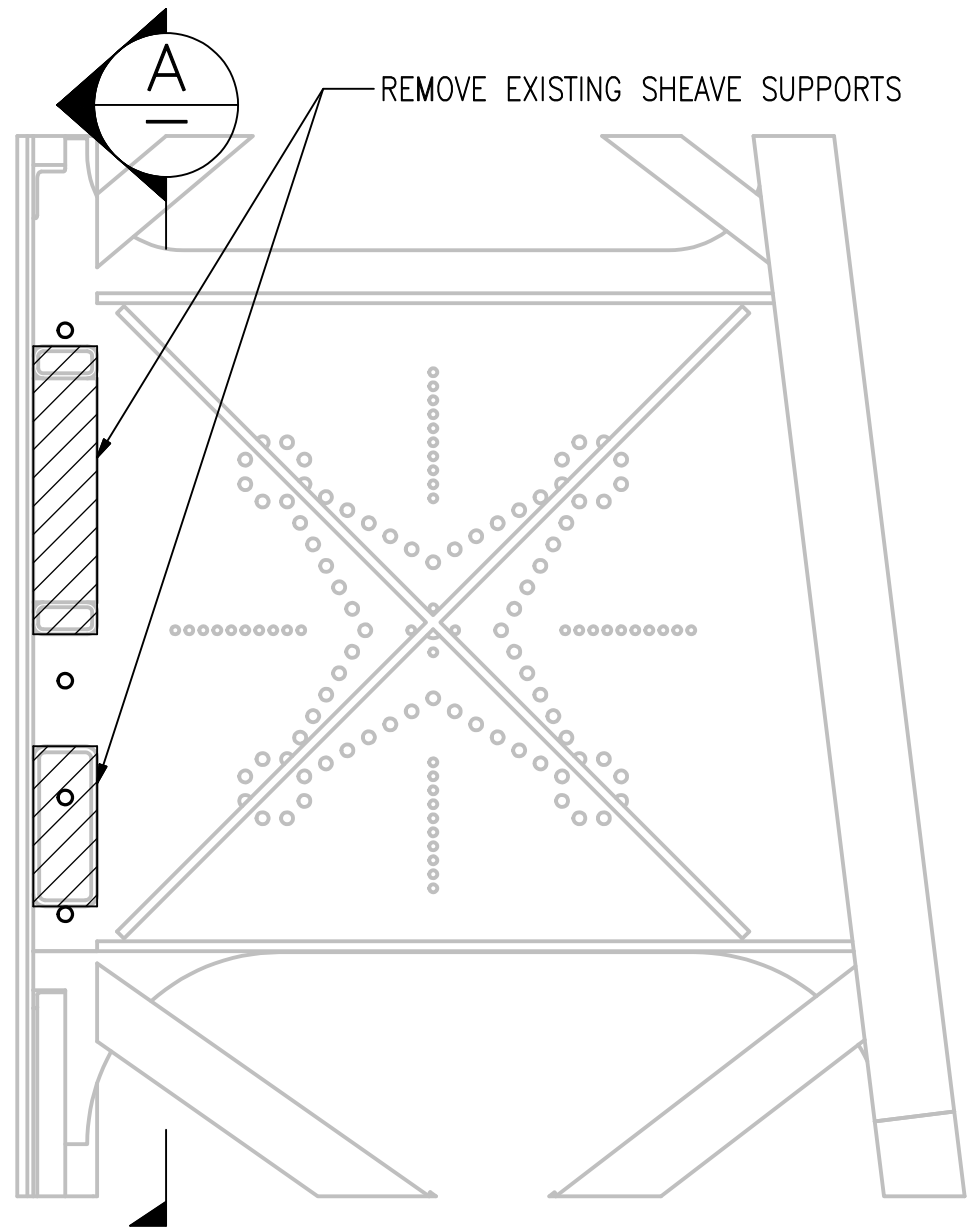
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RACK AND PINION ASSEMBLY

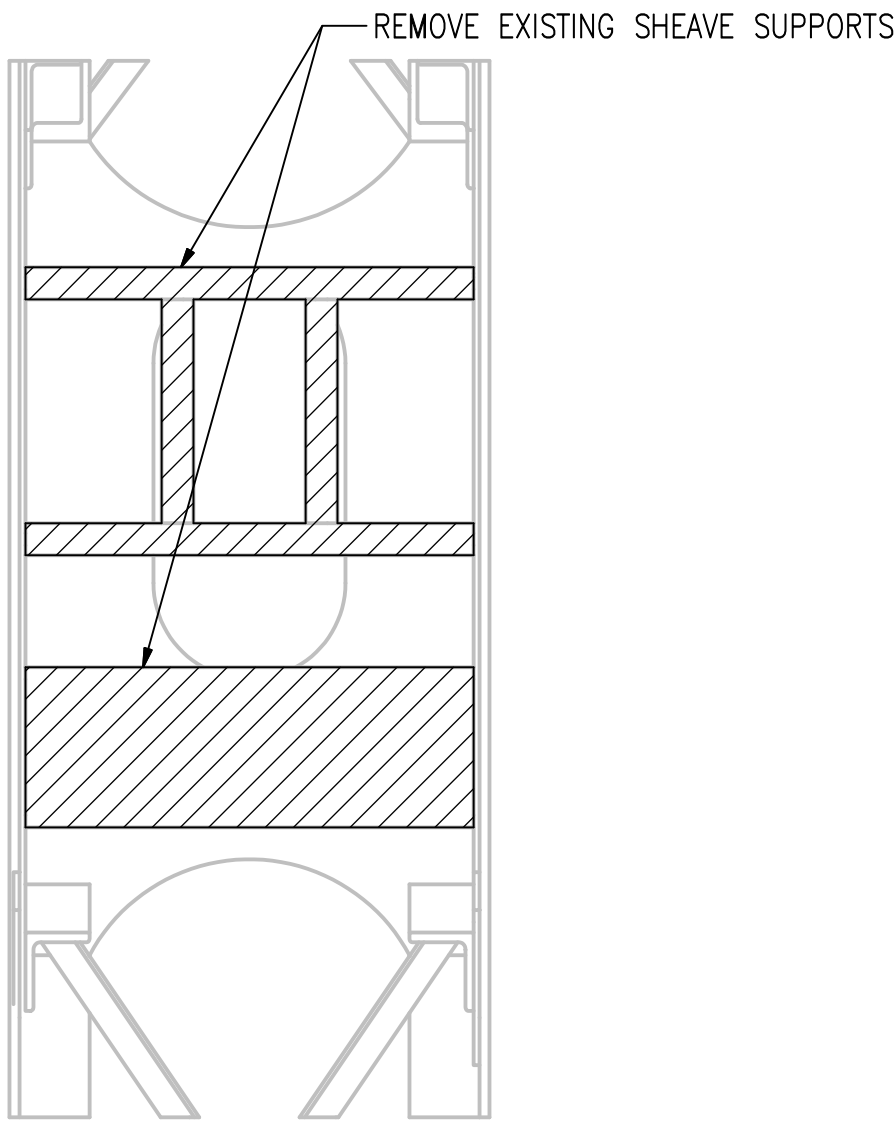
Sheet No. 9 of 37 Sheets



**KEY ELEVATION**  
SCALE  $\frac{3}{32}" = 1'-0"$   
FOUR (4) LOCATIONS



**EXISTING TOWER SHEAVE SUPPORTS DEMOLITION**  
SCALE  $1" = 1'-0"$   
NOTE: NEAR SIDE GUSSET PL. AND TOWER LEG NOT SHOWN FOR CLARITY




**SECTION**  
SCALE:  $1" = 1'-0"$

 DENOTES REMOVAL

- NOTES:
1. REFER TO ORIGINAL CONTRACT PLANS FOR DETAILS OF EXISTING CABLE DRIVEN OPERATING MACHINERY TOWER MOUNTED TO SHEAVE SUPPORTS.
  2. REFER TO SHEET 17 FOR DEMOLITION NOTES.

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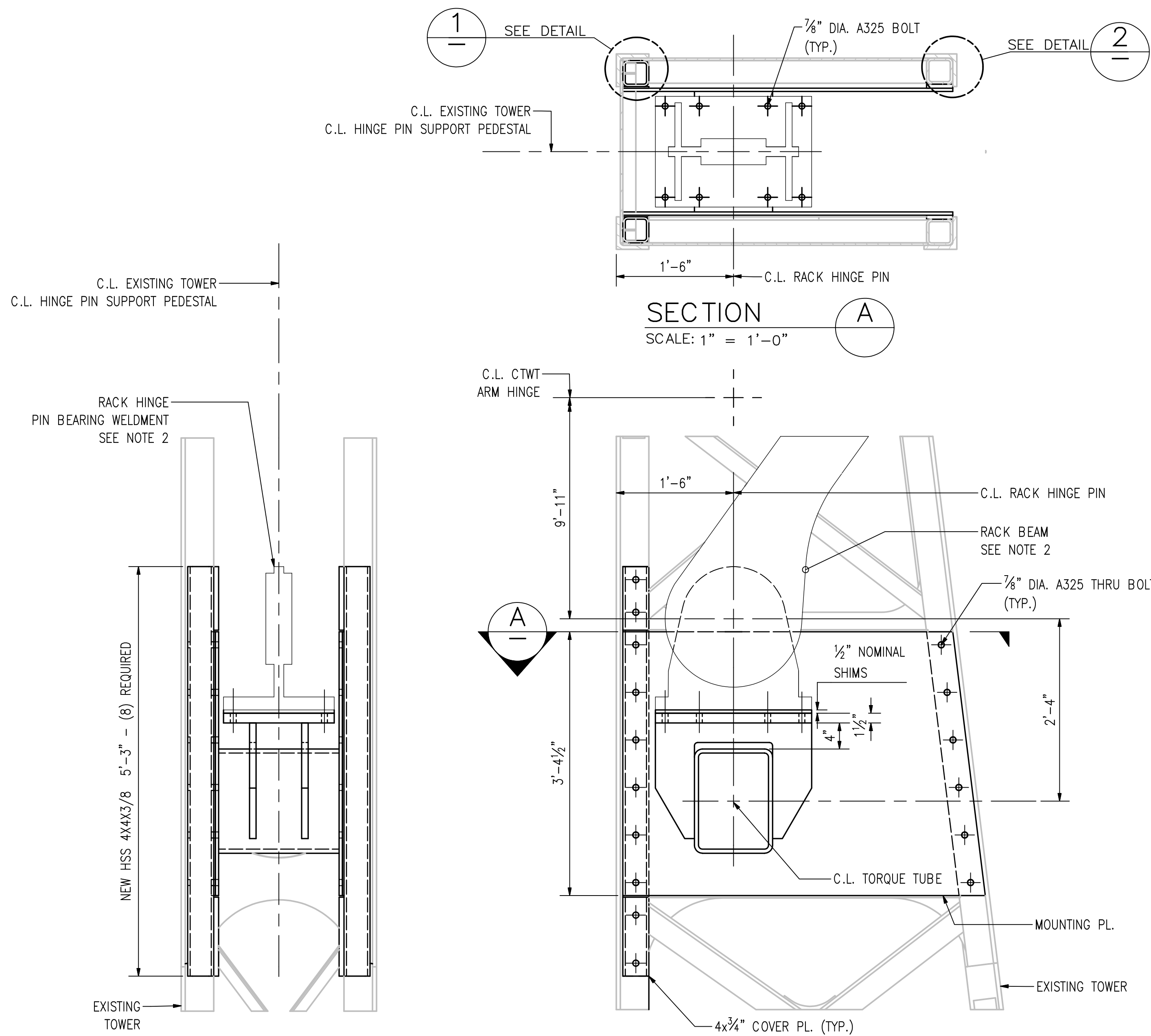
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TOWER SUPPORTS DEMOLITION

Sheet No. 10 of 37 Sheets

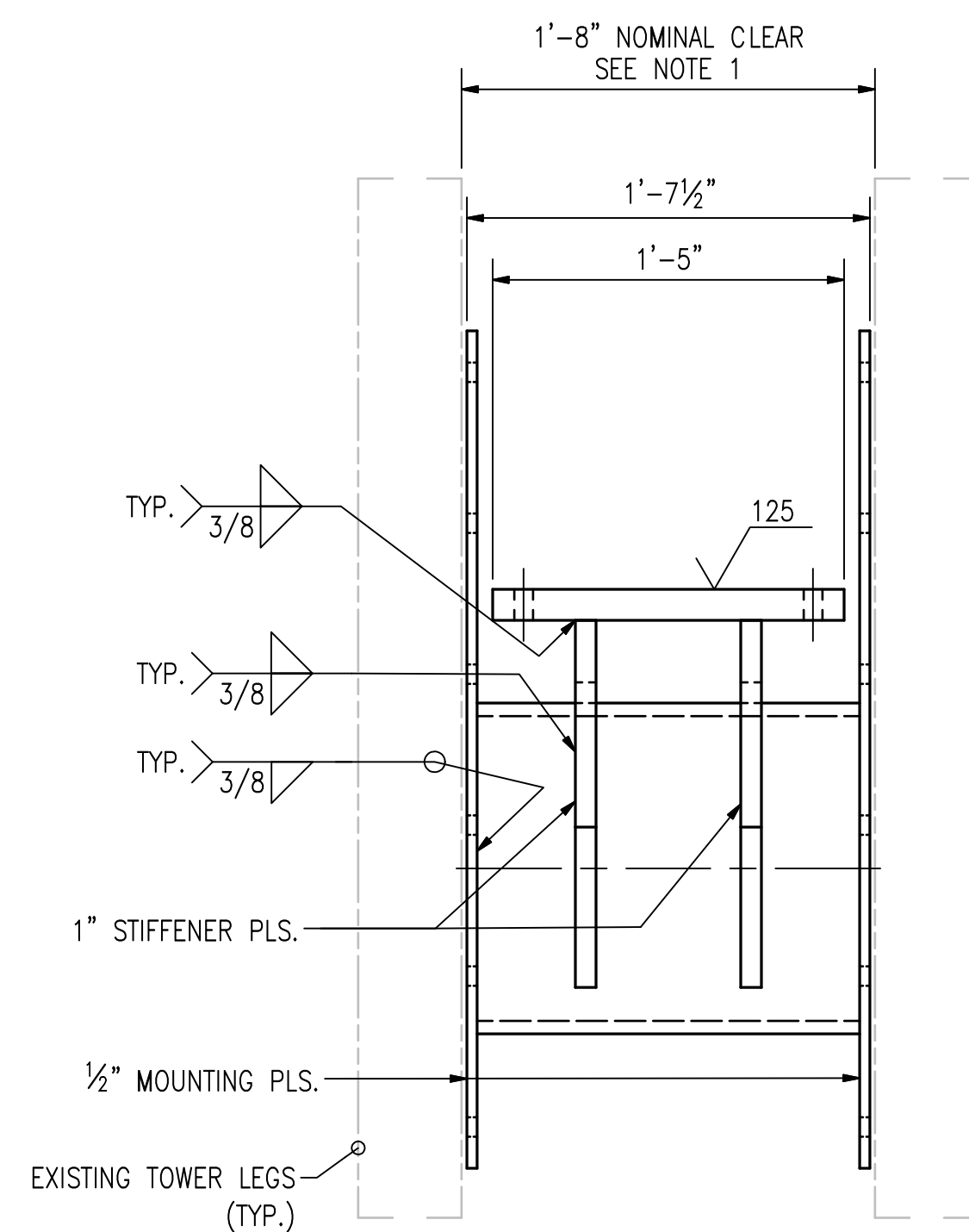


### HINGE PIN SUPPORT PEDESTAL FRONT ELEVATION

SCALE 1" = 1'-0"  
NOTE: FRONT TOWER LEGS NOT SHOWN FOR CLARITY

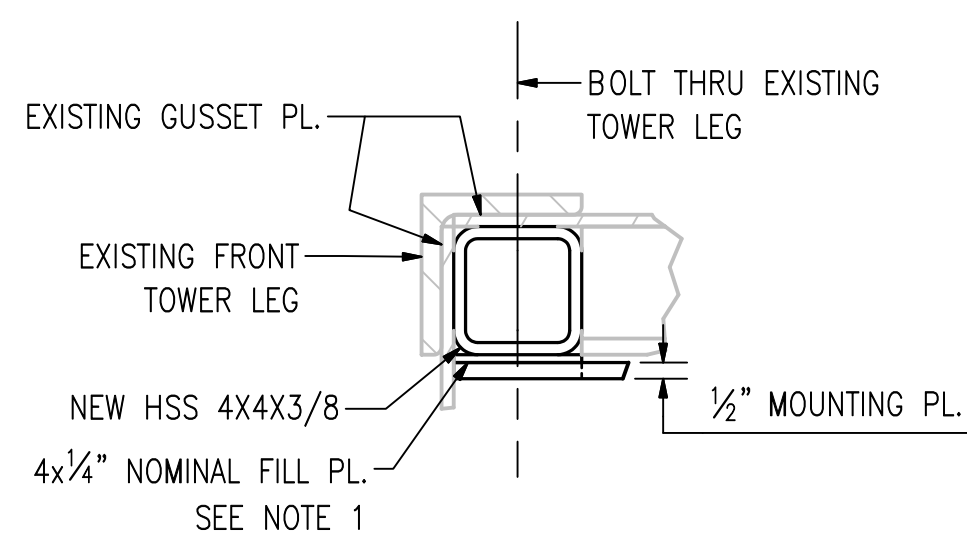
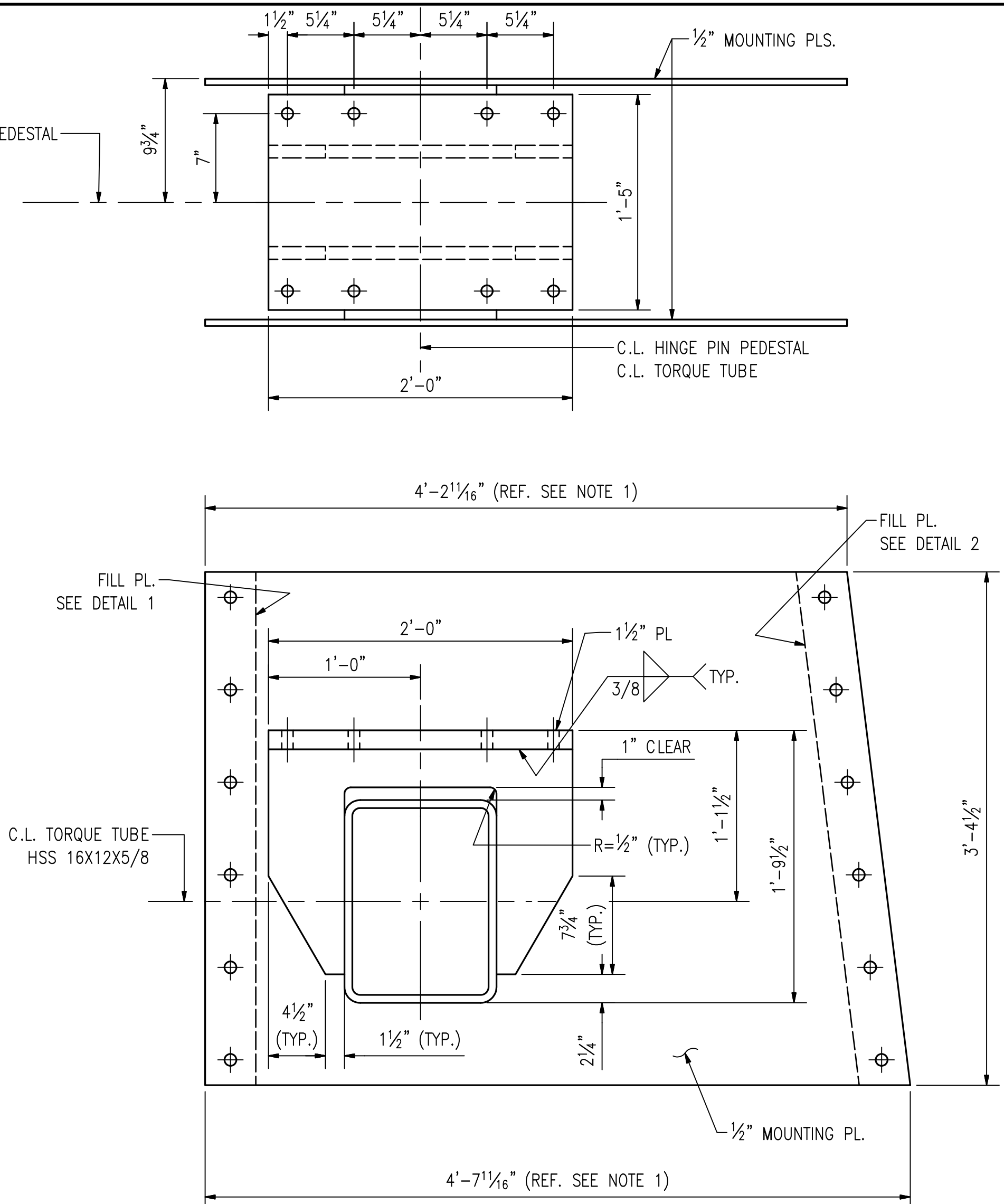
### HINGE PIN SUPPORT PEDESTAL SIDE ELEVATION

SCALE 1" = 1'-0"  
NOTE: NEAR SIDE TOWER LEGS NOT SHOWN FOR CLARITY

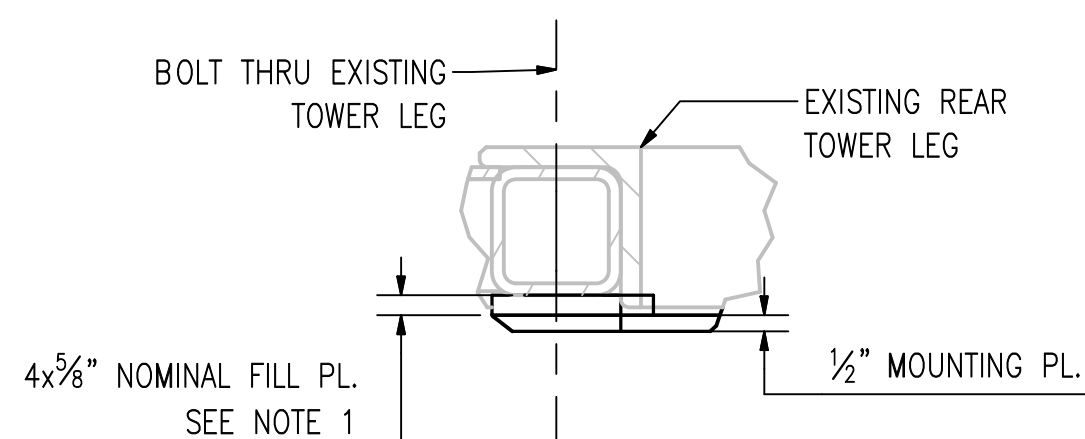


### RACK HINGE PIN SUPPORT PEDESTAL DETAIL

SCALE 1 1/2" = 1'-0"  
(4) REQUIRED  
NOTE: NEAR SIDE MOUNTING PL. NOT SHOWN FOR CLARITY



DETAIL 1  
SCALE: 2" = 1'-0"  
(TYP. FRONT LEGS 8 LOCATIONS)



DETAIL 2  
SCALE: 2" = 1'-0"  
(TYP. REAR LEGS 8 LOCATIONS)

- NOTES:
1. REFER TO EXISTING DRAWINGS FOR EXISTING TOWER DIMENSIONS. CONTRACTOR TO VERIFY MEASUREMENTS IN FIELD PRIOR TO WORK.
  2. FOR RACK HINGE PIN ASSEMBLY DETAILS SEE SHEET 12.
  3. SEE SHEET 3 FOR SEQUENCE OF WORK AND SHEET 4 FIELD ALIGNMENT REQUIREMENTS.
  4. HINGE PIN SUPPORT PEDESTAL WILL BE MEASURED AND PAID UNDER STRUCTURAL STEEL (3310) PAY ITEM. SHIMS ARE INCLUDED UNDER MACHINERY ITEMS. SEE MACHINERY DRAWINGS AND SPECIAL PROVISIONS FOR REQUIREMENTS.

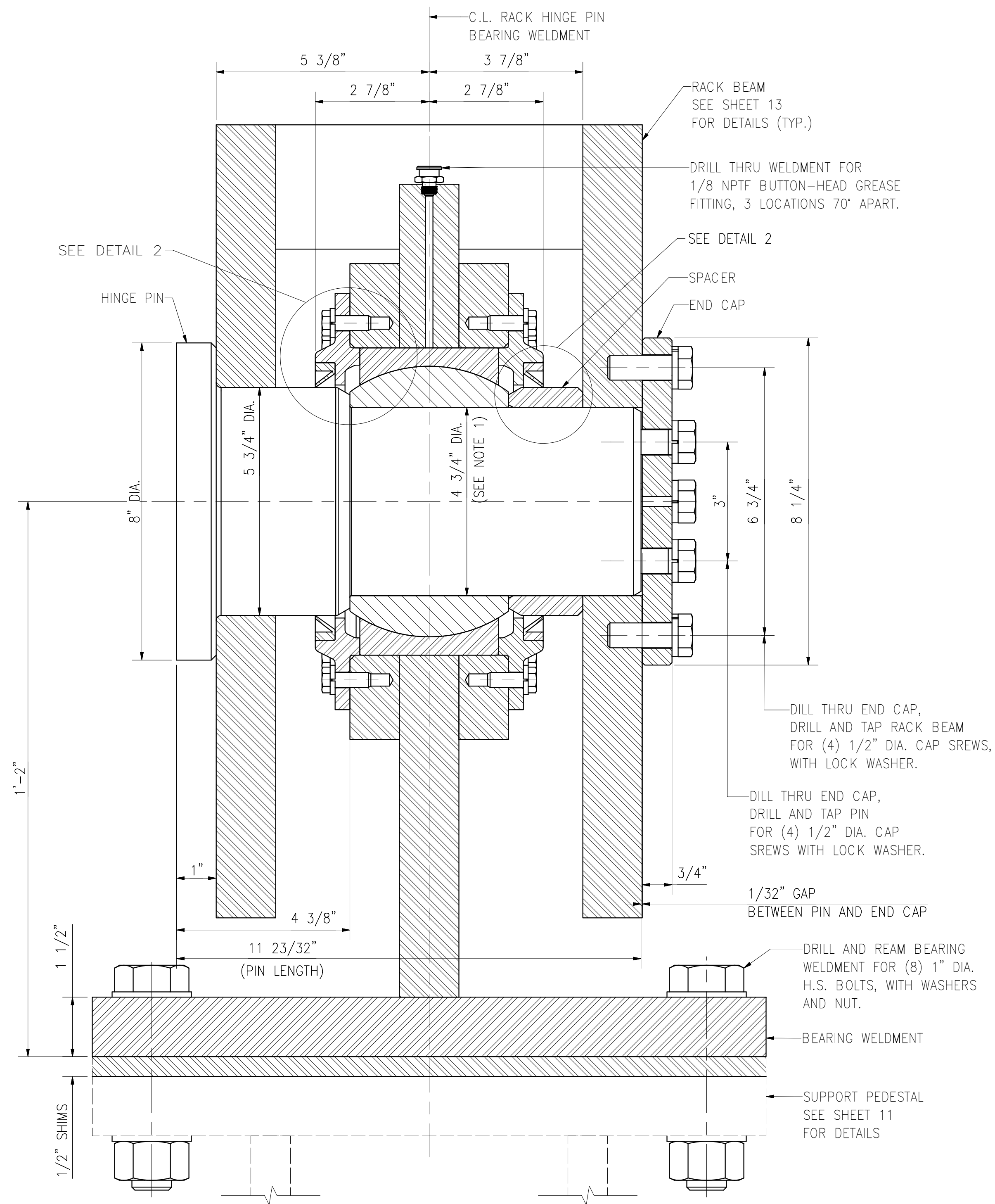
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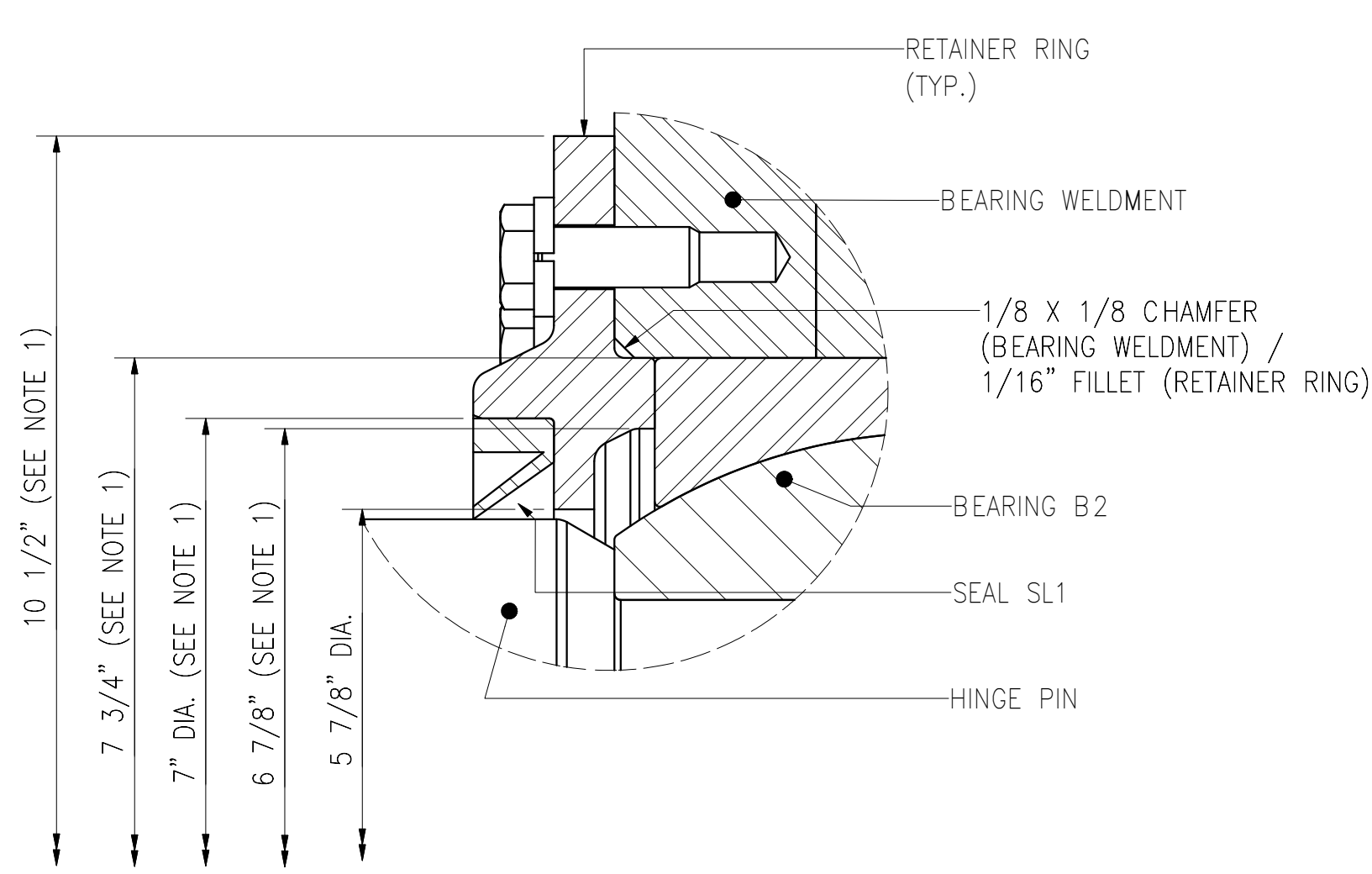
RACK HINGE PIN SUPPORT PEDESTAL

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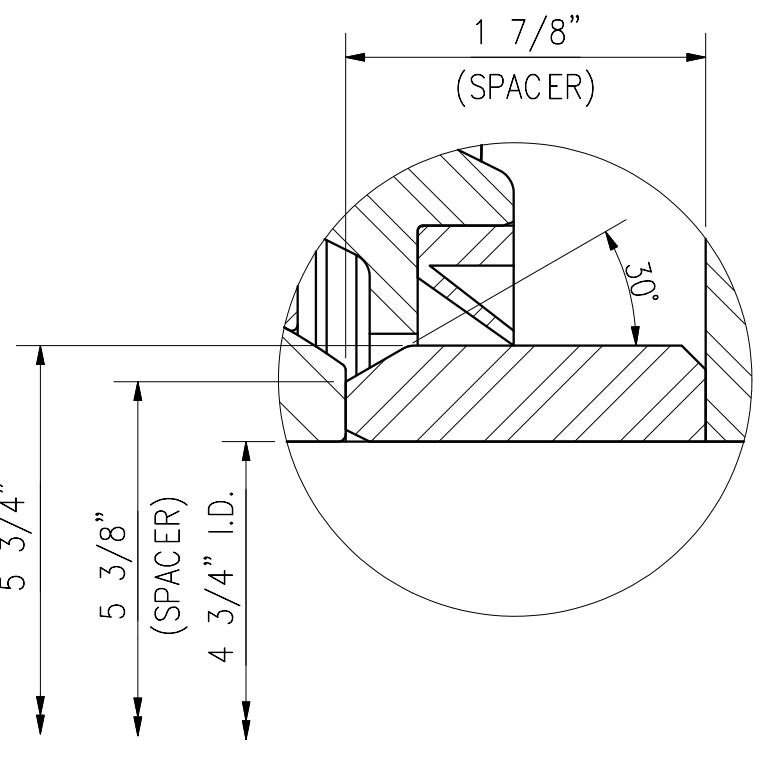




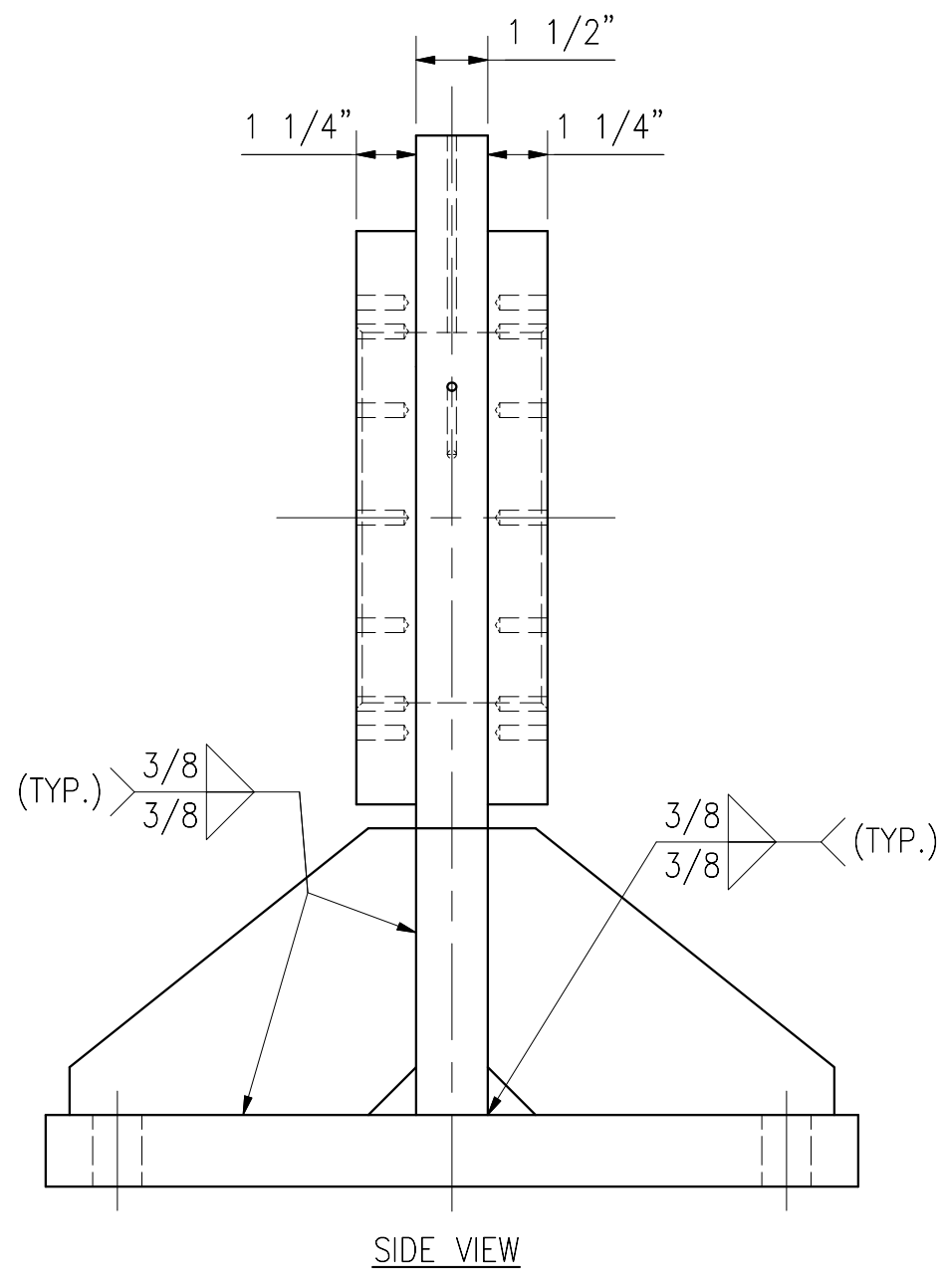
RACK HINGE PIN ASSEMBLY – DEVELOPED VIEW  
SCALE: 6"=1'-0"  
(4) ASSEMBLIES REQUIRED



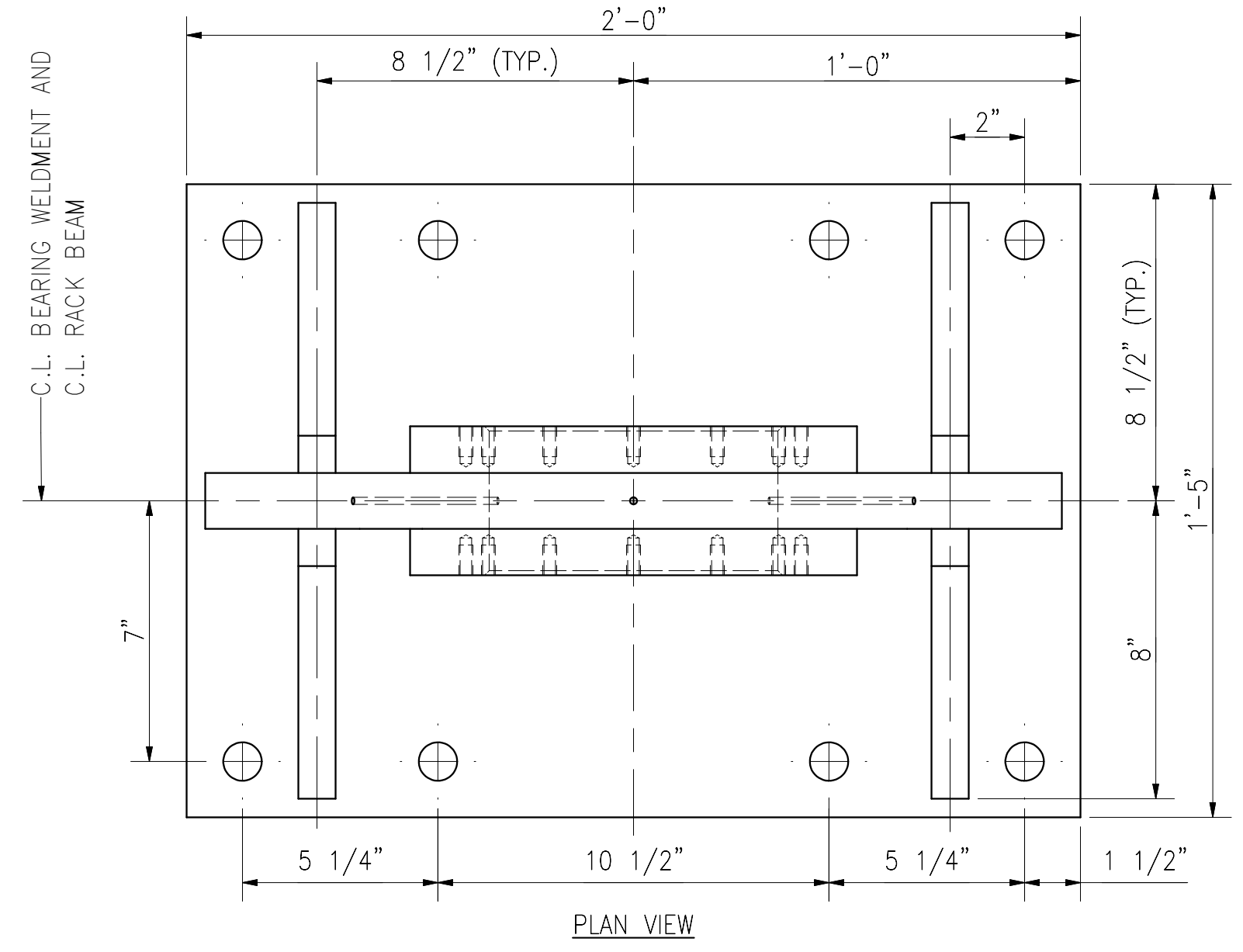
DETAIL 1  
SCALE: FULL



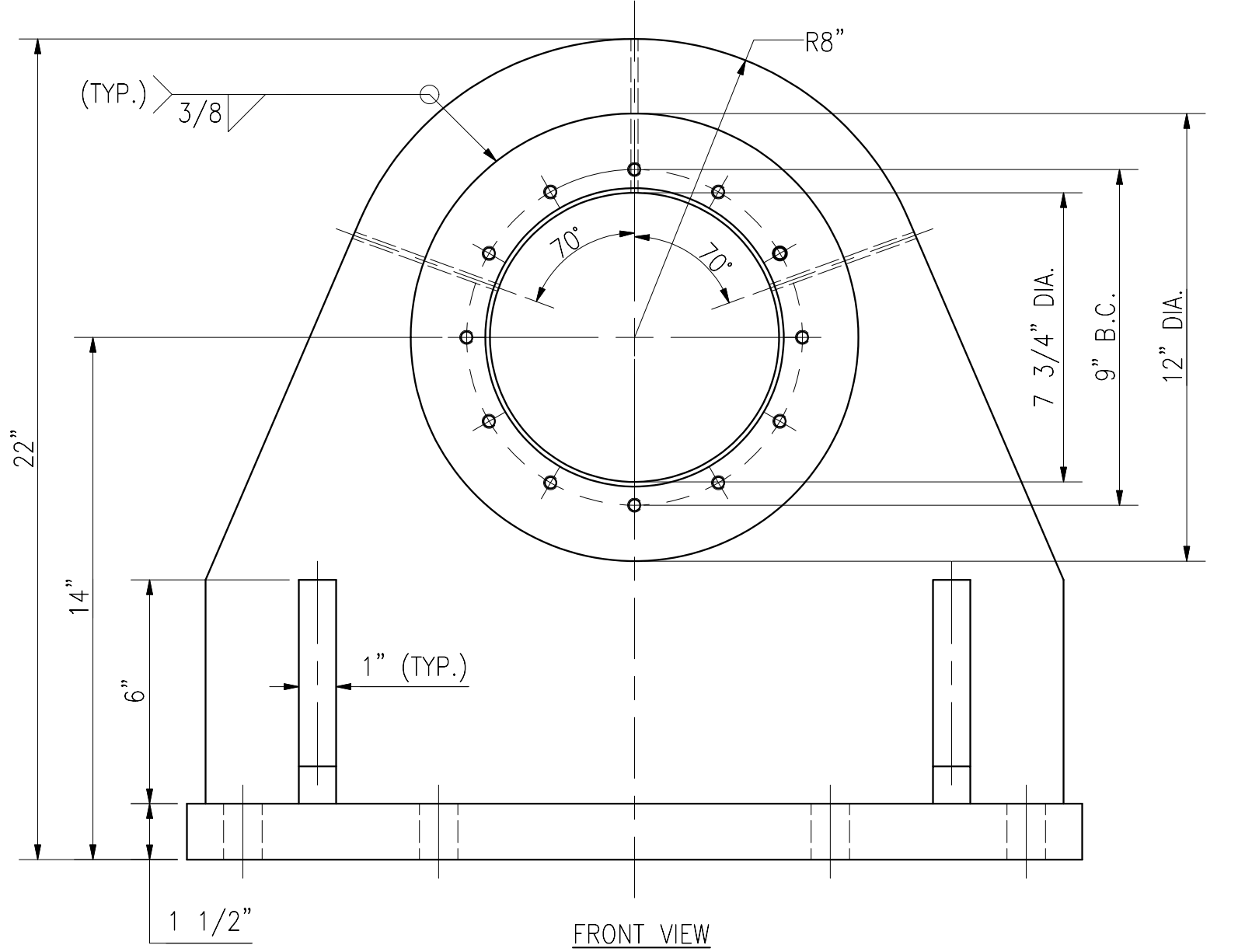
DETAIL 2  
SCALE: FULL



SIDE VIEW



PLAN VIEW



FRONT VIEW

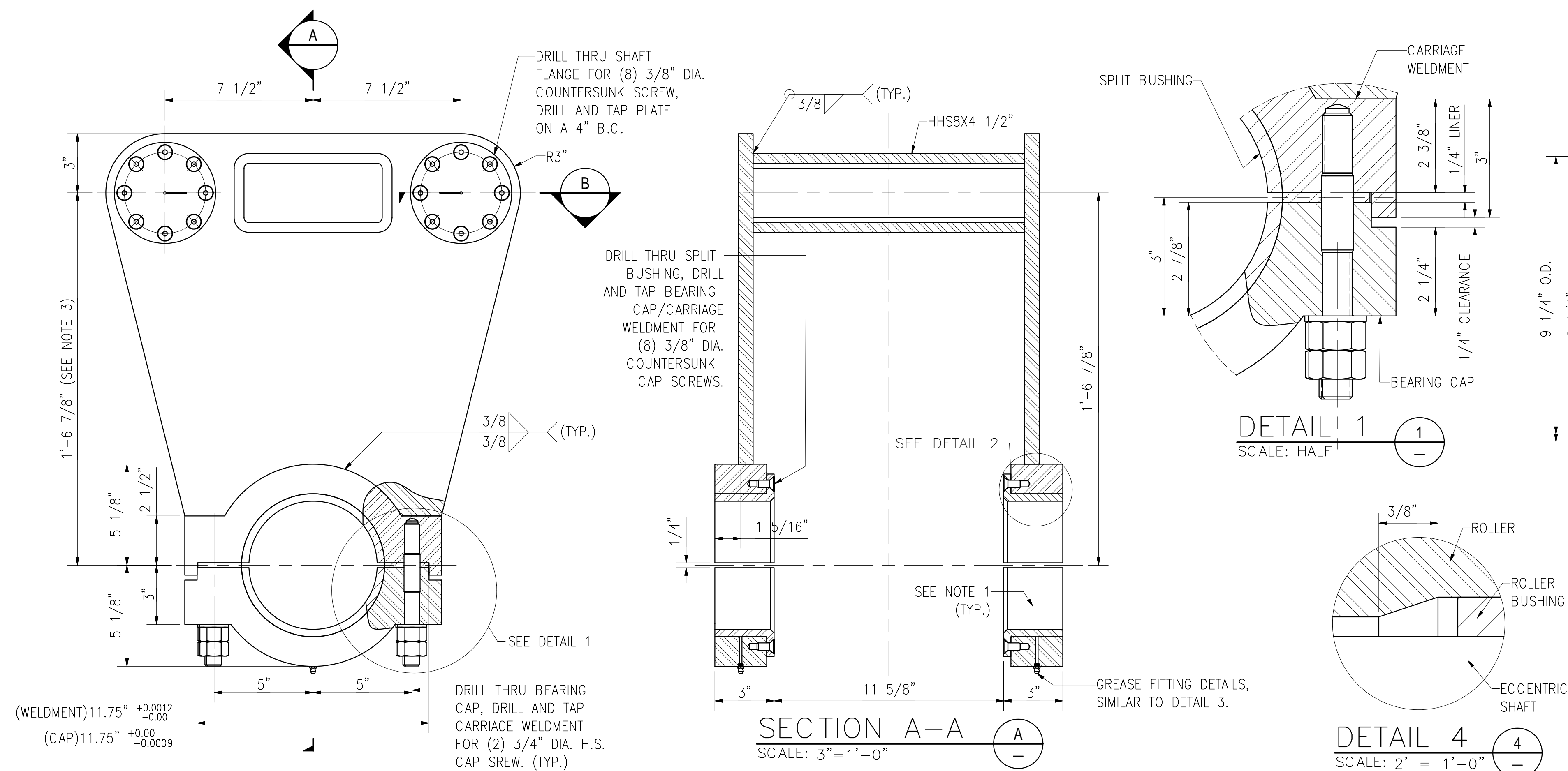
BEARING WELDMENT – ELEVATION VIEW  
SCALE: 3"=1'-0"  
(4) REQUIRED

TABLE OF HINGE PIN BEARING COMPONENTS				
MARK	QTY.	SHAFT DIAMETER (in.)	DESCRIPTION	MANUFACTURER AND/OR MODEL
B2	4	4 3/4"	SPHERICAL PLAIN BEARING, SELF-LUBRICATING BEARING WITH GREASE GROOVE, BRONZE ON STEEL ASSEMBLY, A MINIMUM OF 150,000 LIFE CYCLES AT DYNAMIC LOAD RATING OF 172 KIPS, ROTATING 45-DEGREE LONGITUDINALLY AND 2-DEGREE TRANSVERSELY. OR APPROVED EQUAL	RBC-LUBRON CORPORATION
SL1	8	5 3/4"	SINGLE LIP SPRING LOADED OIL SEAL, MILL-RIGHT DUTY WITH SELF CONTAINING CAPABILITIES OR APPROVED EQUAL	GARLOCK MODEL 53

TABLE OF RACK HINGE PIN ASSEMBLY MATERIALS			
PART	MATERIAL	DESIGNATION	SUPPLEMENTAL REQUIREMENTS
HINGE PIN	ALLOY STEEL FORGING	ASTM A290 GR.4 CL. H	N/A
SPACER	STRUCTURAL STEEL	ASTM A709 GR.50	N/A
END CAP	STRUCTURAL STEEL	ASTM A709 GR.50	N/A
BEARING WELDMENT	STRUCTURAL STEEL	ASTM A709 GR.50	N/A

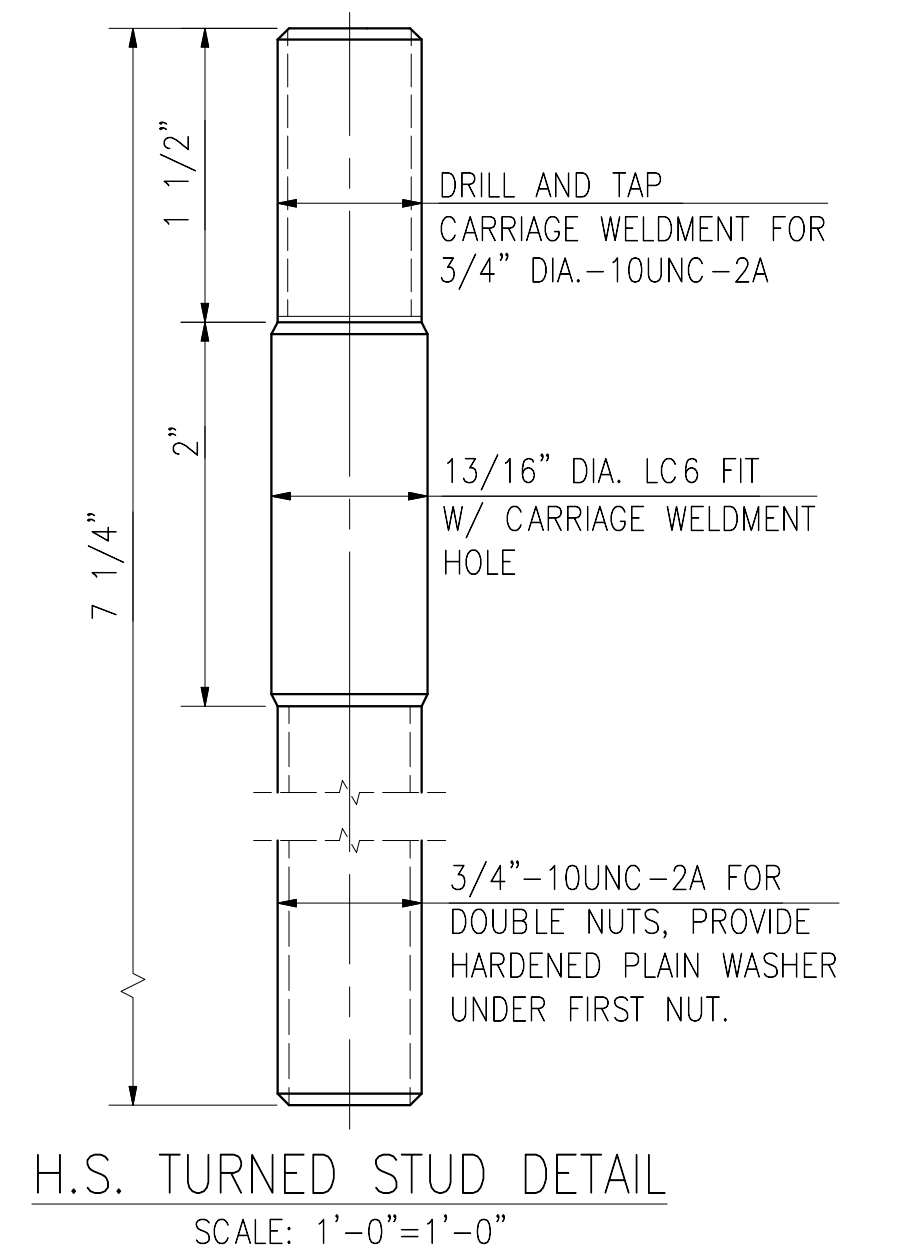
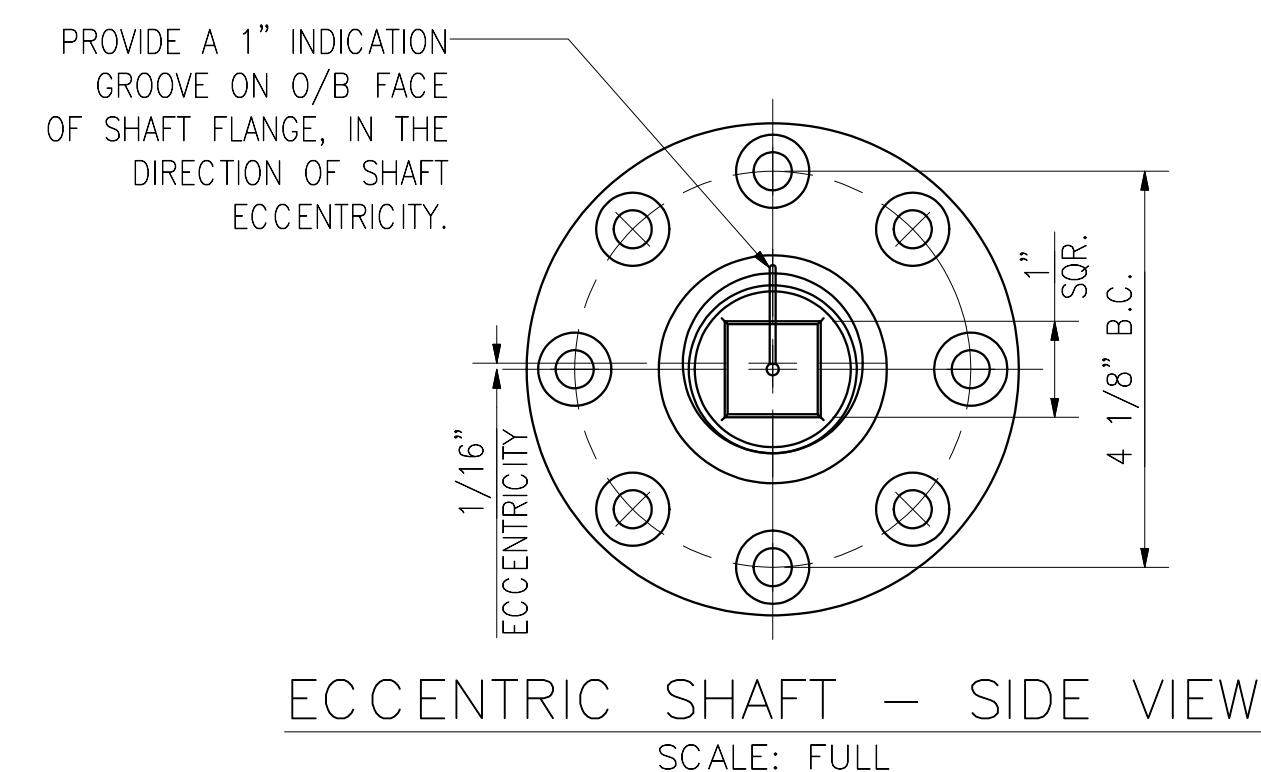
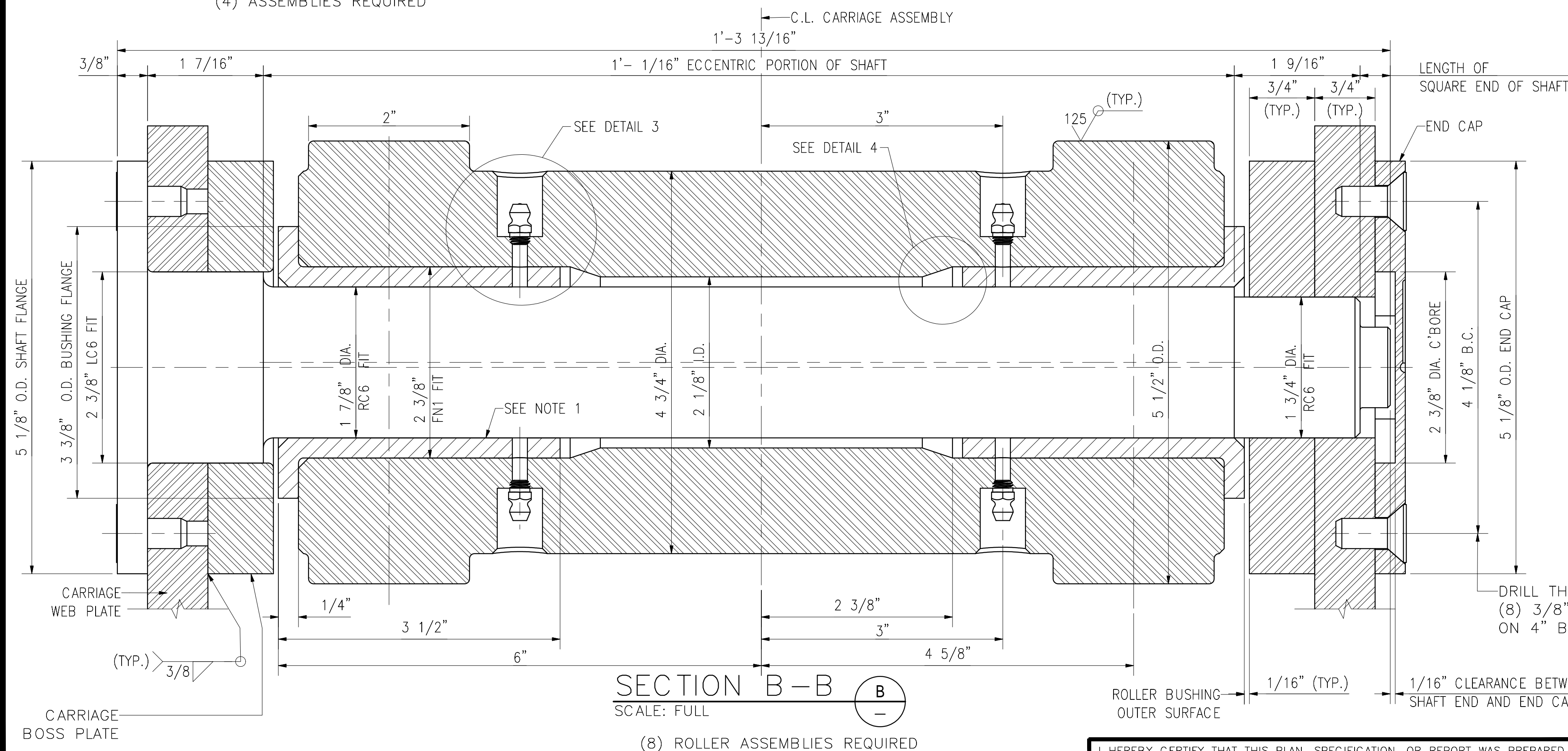
- NOTES:
- DIMENSIONS ARE NOMINAL, EXACT DIMENSIONS TO BE DETERMINED IN COORDINATION WITH BEARING/SEAL AND APPROVED BY BEARING/SEAL MANUFACTURER AND THE ENGINEER.
  - ALL FILLETS AND RADII TO BE 1/8". FOR SURFACE FINISH SEE GENERAL MACHINERY NOTES AND SPECIFICATIONS, UNLESS OTHERWISE NOTED.
  - AFTER COMPLETION OF WELDMENT AND BEFORE FINAL MACHINING, THE BEARING WELDMENT SHALL BE STRESS RELIEVED BY HEAT TREATMENT PRIOR TO FINAL MACHINING.





- NOTES:
1. PROVIDE DOUBLE OVAL GREASE GROOVE PATTERN ON THE INSIDE SURFACE OF THE BUSHING.
  2. GREASE GROOVE EDGES TO ALIGN WITH GREASE PORT FOR LUBRICATION.
  3. ALL DIMENSIONS ARE BASED ON THE ECCENTRIC SHAFT IN THE NEUTRAL POSITION.
  4. ALL FILLETS AND RADII TO BE 1/8". FOR SURFACE FINISHES SEE GENERAL MACHINERY NOTES AND SPECIFICATION, UNLESS OTHERWISE NOTED.
  5. AFTER COMPLETION OF WELDMENT AND BEFORE FINAL MACHINING, THE CARRIAGE WELDMENT FRAME SHALL BE STRESS RELIEVED BY HEAT TREATMENT PRIOR TO FINAL MACHINING.

PART	MATERIAL	DESIGNATION	SUPPLEMENTAL REQUIREMENTS
ROLLER	ALLOY STEEL FORGING	ASTM A291 GR.7 CL. H	N/A
ECCENTRIC SHAFT	ALLOY STEEL FORGING	ASTM A291 GR.7 CL. H	N/A
ROLLER BUSHING	BRONZE CASTING	ASTM B22 UNS NO. C91100	N/A
SLIT BUSHING	BRONZE CASTING	ASTM B22 UNS NO. C91100	N/A
CARRIAGE FRAME	STRUCTURAL STEEL	ASTM A709 GR.50	N/A
BEARING CAP	STRUCTURAL STEEL	ASTM A709 GR.50	N/A
END CAP	STRUCTURAL STEEL	ASTM A709 GR.50	N/A



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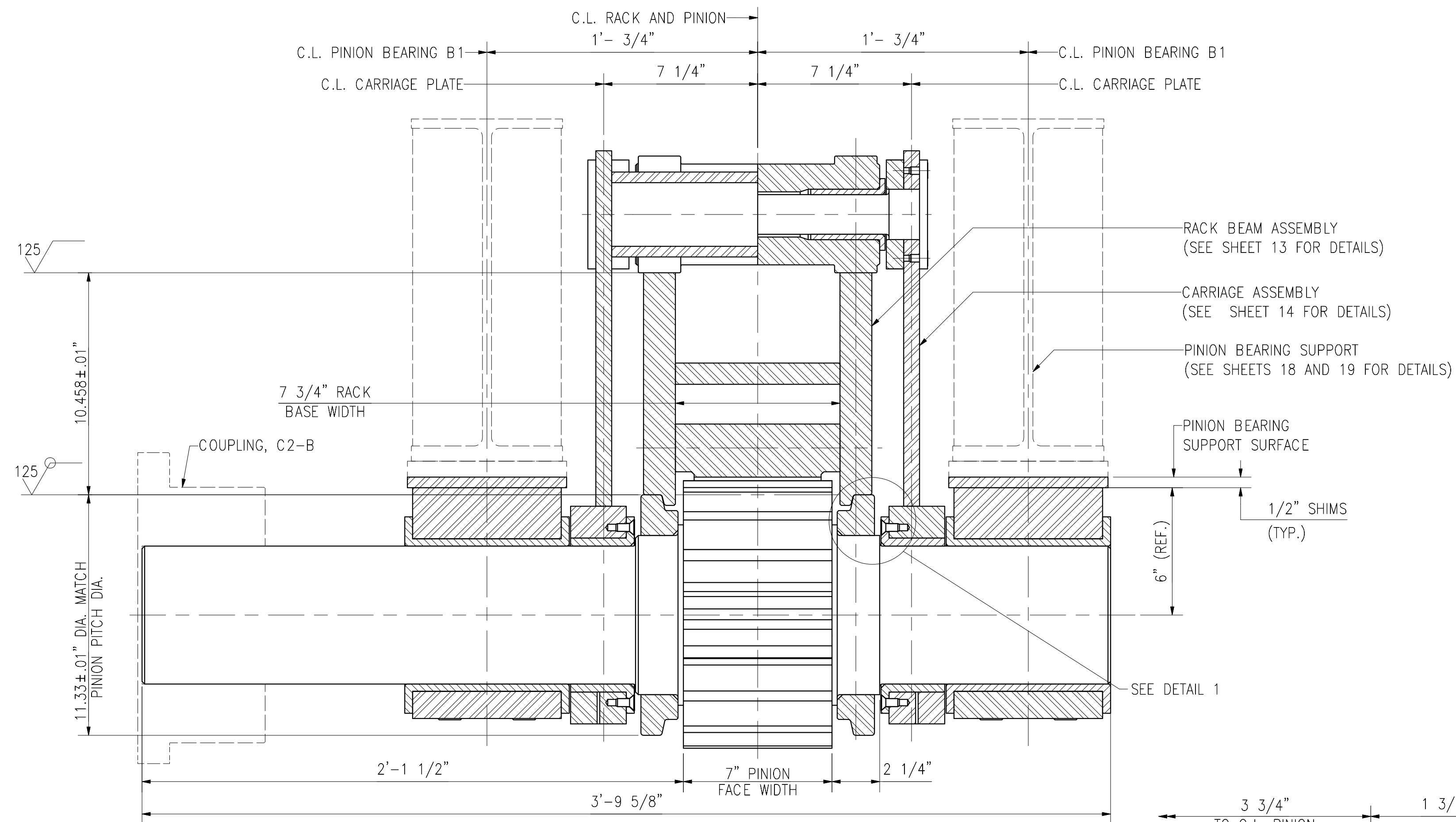
NAME: PAUL SKELTON LIC. NO. 26363 DATE 10/26/16

City of Duluth Proj. No. 1554

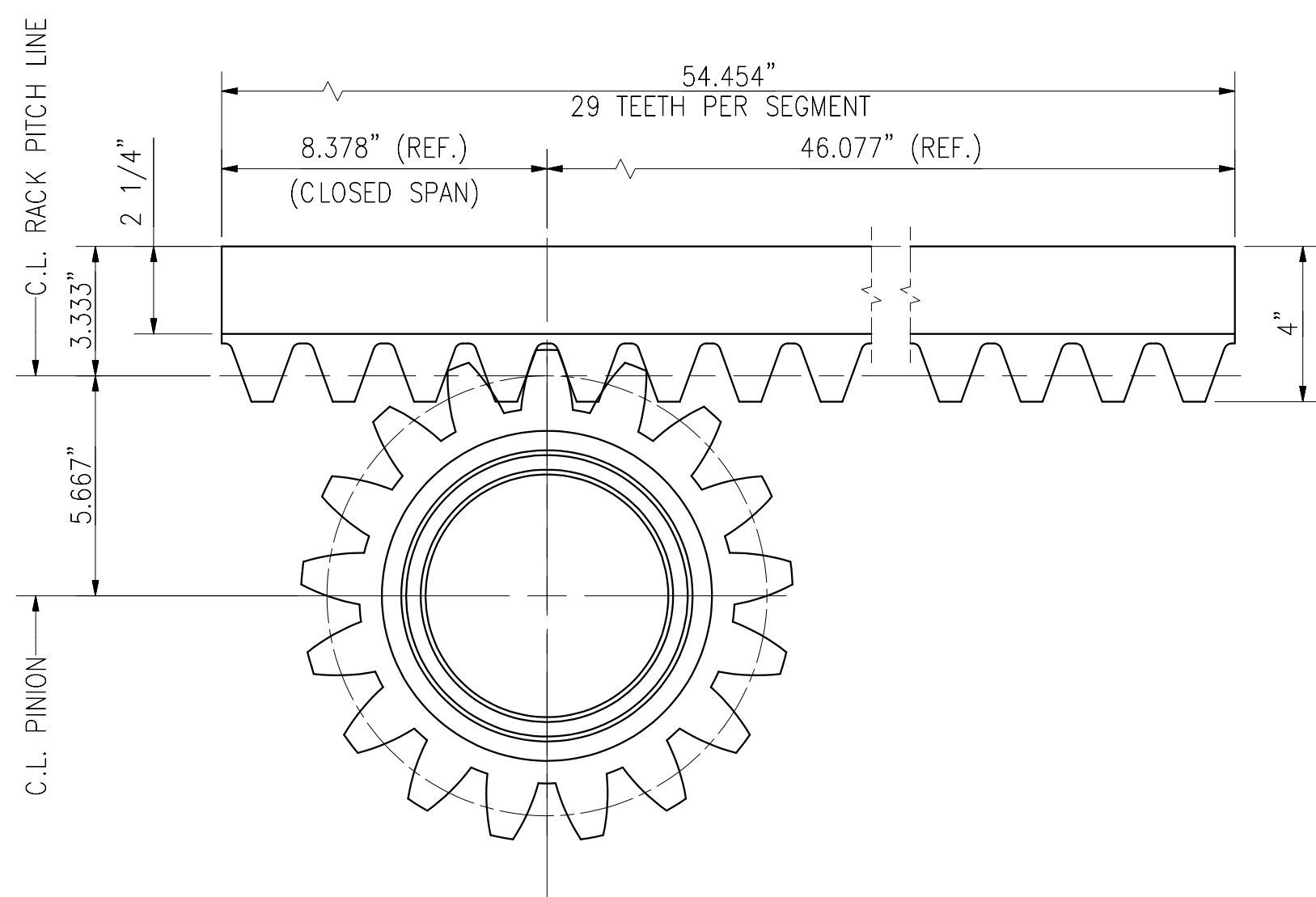
CARRIAGE ASSEMBLY DETAILS

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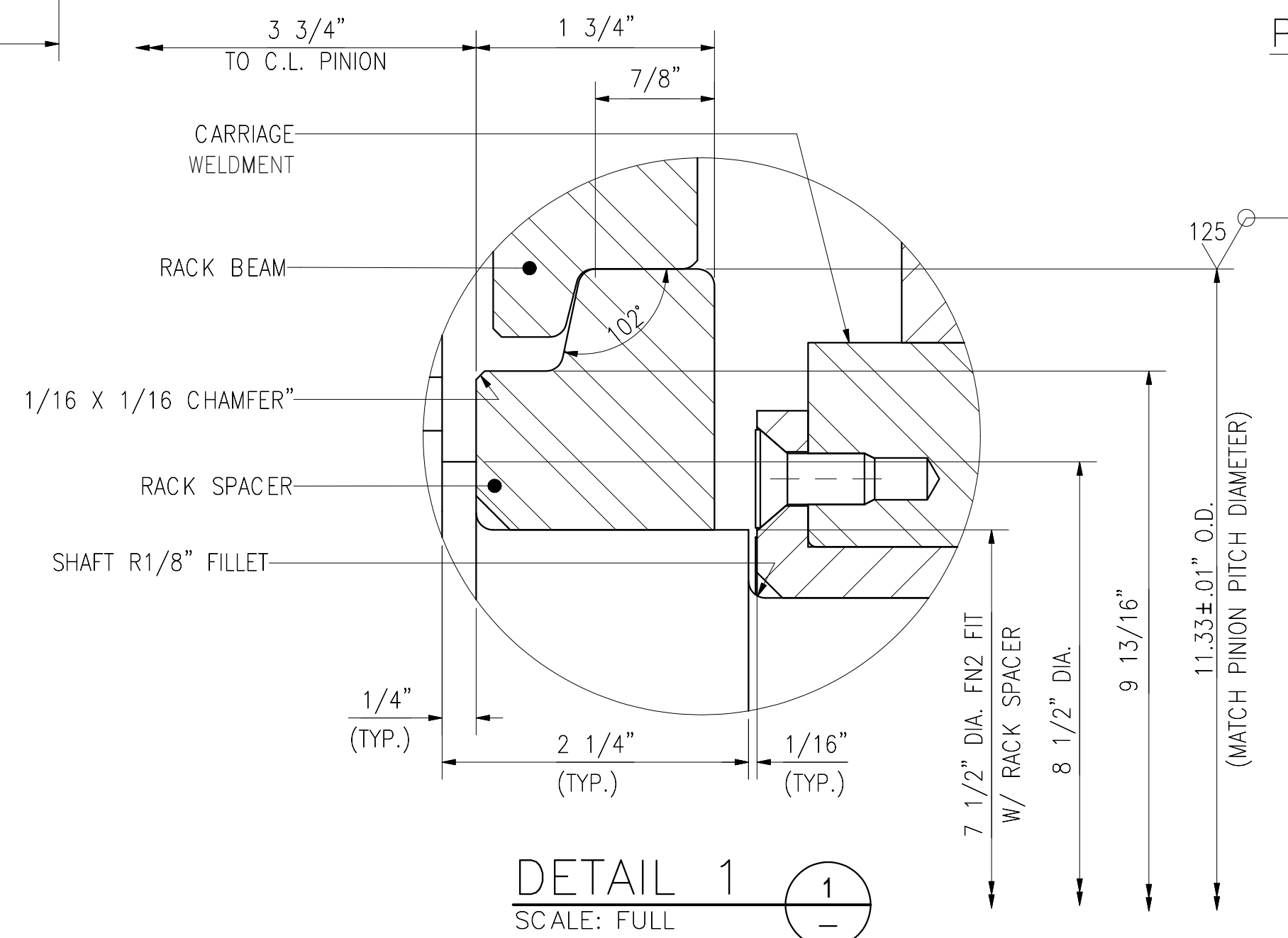




PINION ASSEMBLY — DEVELOPED VIEW  
SCALE: 3"=1'-0"

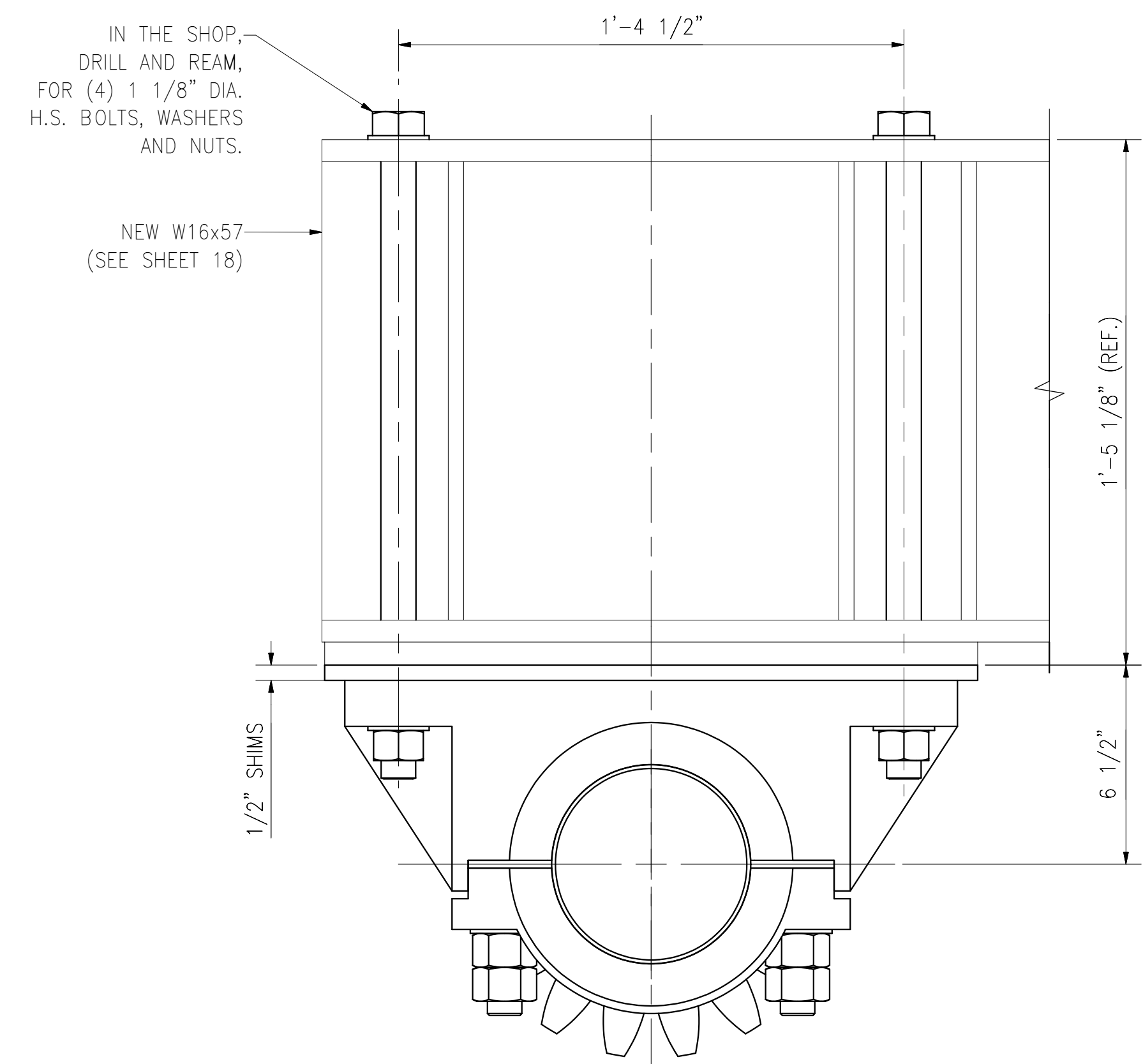


RACK AND PINION MESH VIEW  
SCALE: 3"=1'-0"  
(4) PINIONS REQUIRED  
(12) RACK SEGMENTS REQUIRED



DETAIL 1  
SCALE: FULL

TABLE OF RACK AND PINION MATERIALS			
PART	MATERIAL	DESIGNATION	SUPPLEMENTAL REQUIREMENTS
RACK SEGMENT	ALLOY STEEL FORGING	ASTM A290 GR.4 CL. I	MAX 350 BHN
PINION	ALLOY STEEL FORGING	ASTM A291 GR.7 CL. H	MIN 375 BHN
RACK SPACER	ALLOY STEEL FORGING	ASTM A668 CL. G	N/A



PINION ASSEMBLY — SIDE VIEW  
SCALE: 3"=1'-0"  
(RACK BEAM NOT SHOWN FOR CLARITY)

- NOTES:
- ALL FILLETS AND RADII TO BE 1/8". FOR SURFACE FINISHES SEE GENERAL MACHINERY NOTES AND SPECIFICATION, UNLESS OTHERWISE NOTED.
  - CARRIAGE ASSEMBLY SHALL BE TESTED WITH RACK AND PINION FOR SMOOTH OPERATION UNDER NO LOAD CONDITION IN THE SHOP.

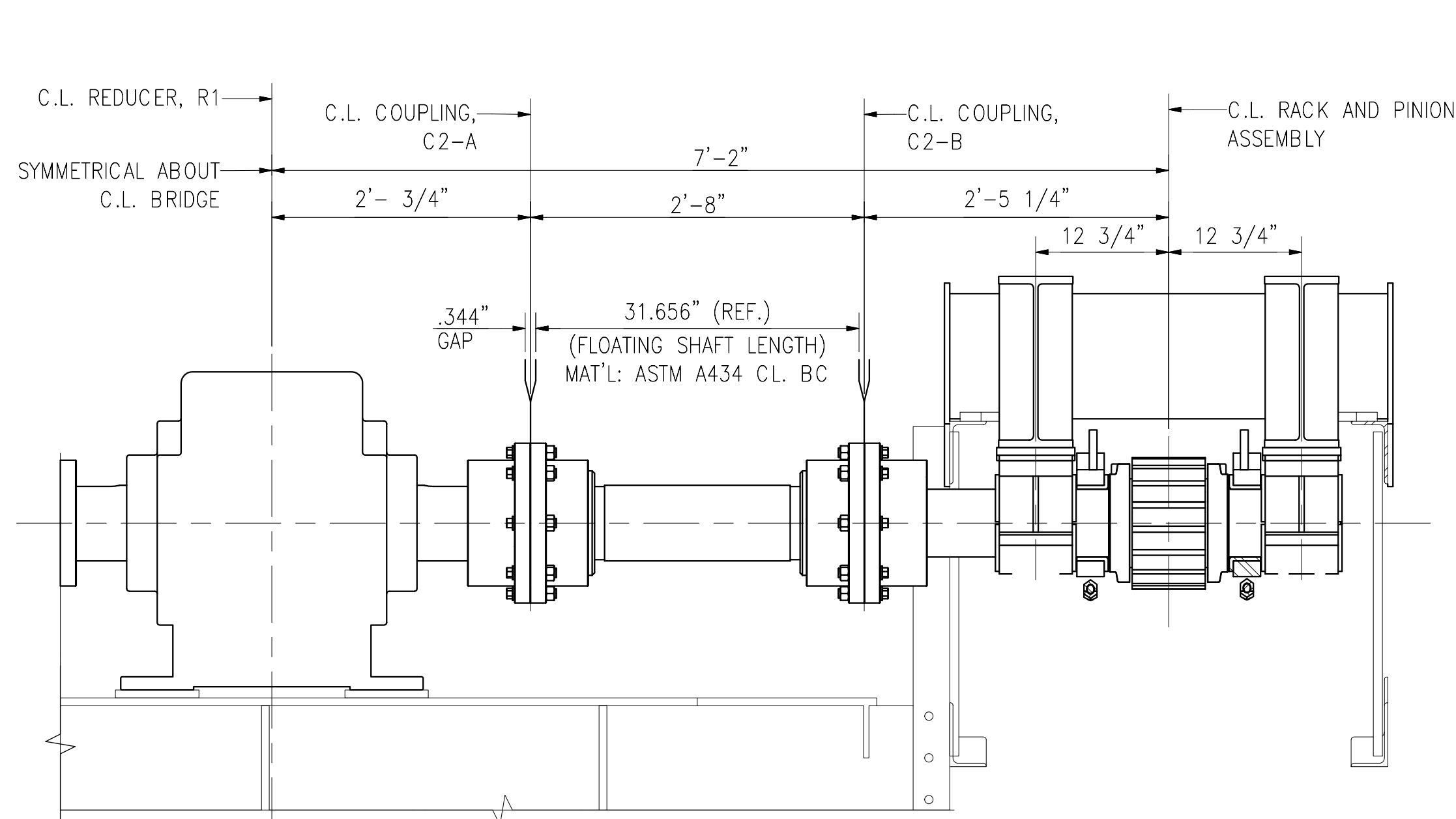
RACK AND PINION DATA		
	RACK	PINION
PRESSURE ANGLE	20° STUB INVOLUTE TEETH	
NUMBER OF TEETH	26 TEETH PER SEGMENT	17 TEETH
DIAMETRAL PITCH	1.500	1.500
CIRCULAR PITCH	2.094"	2.094"
PITCH DIAMETER	—	11.333"
FACE WIDTH	6"	7"
BACKLASH	0.020"—0.030"	0.020"—0.030"

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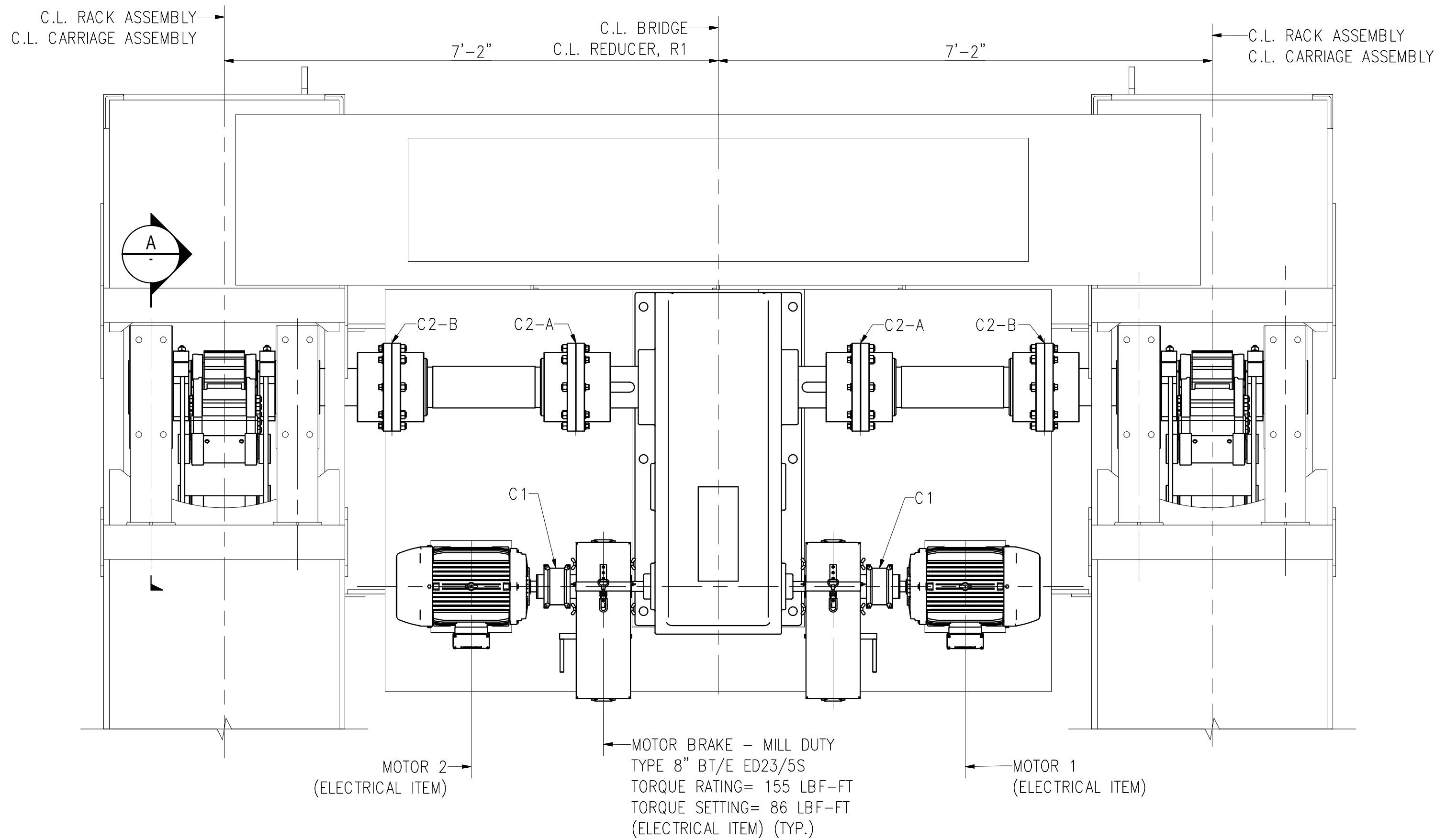
PINION ASSEMBLY DETAIL

Sheet No. 15 of 37 Sheets



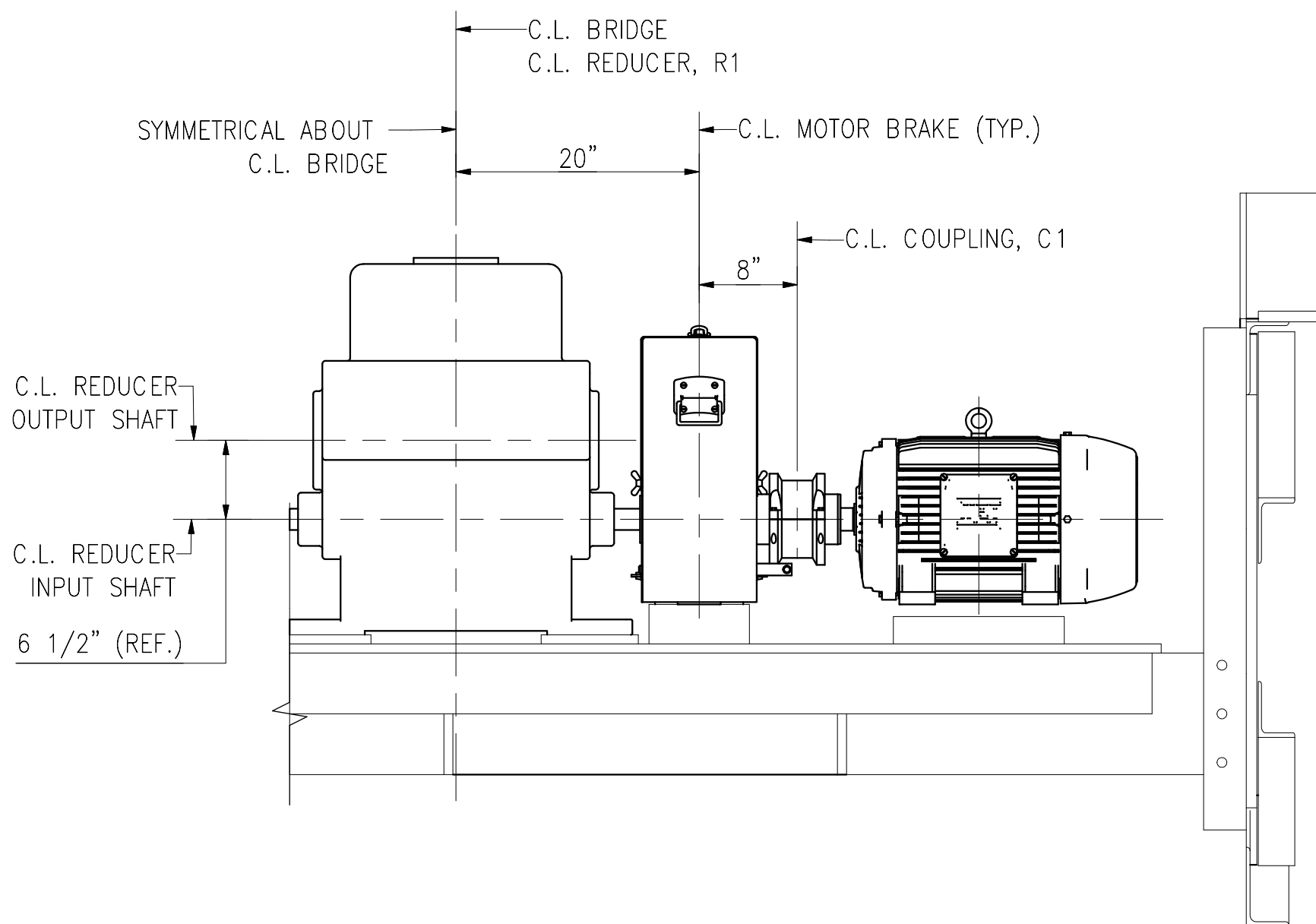
OPERATING MACHINERY OUTPUT SHAFT ASSEMBLY – ELEVATION VIEW

SCALE: 1"=1'-0"  
RACK NOT SHOWN FOR CLARITY



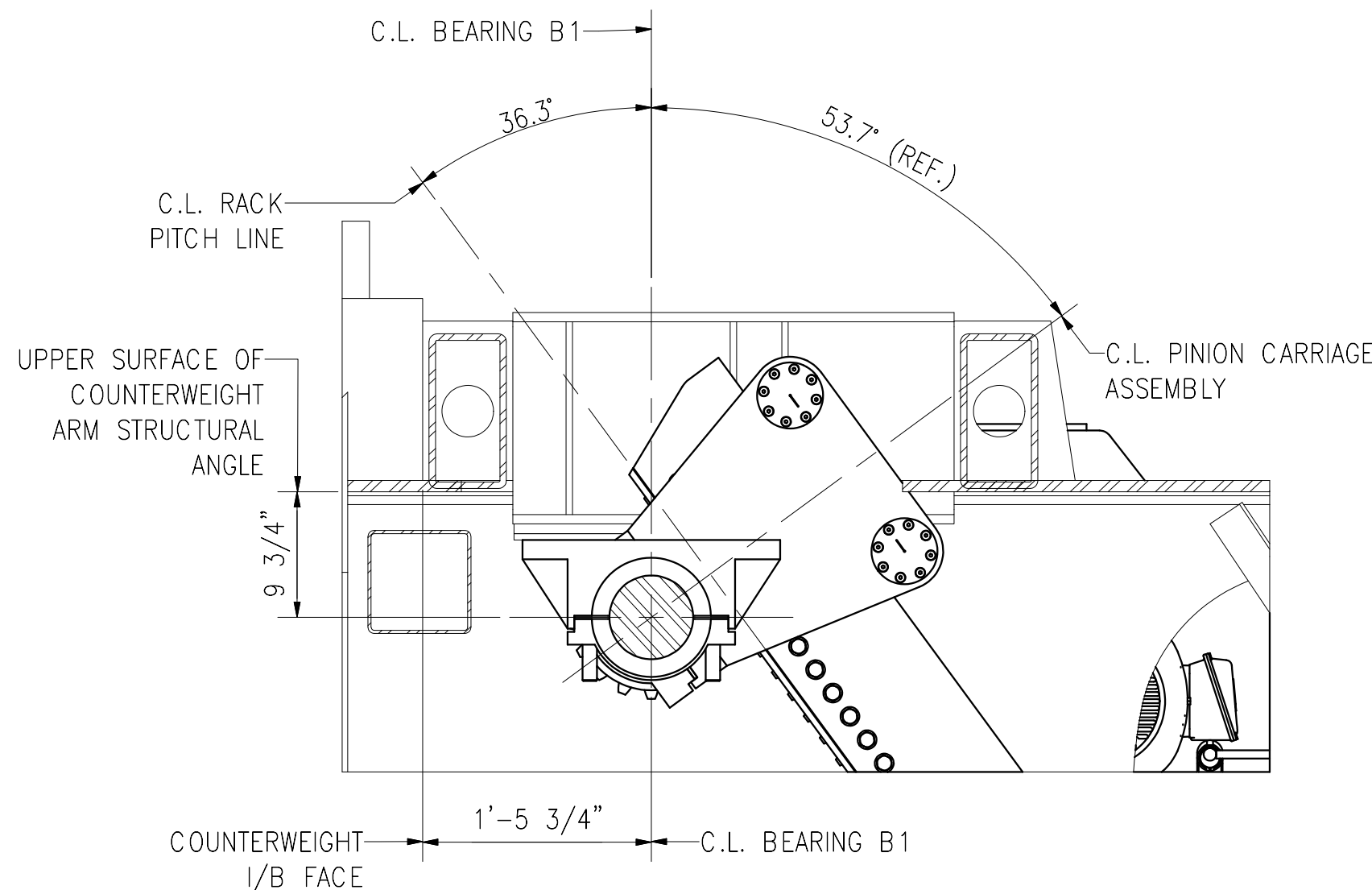
OPERATING MACHINERY ASSEMBLY – PLAN VIEW

SCALE: 3/4"=1'-0"  
(2) ASSEMBLIES REQUIRED



OPERATING MACHINERY INPUT SHAFT – ELEVATION VIEW

SCALE: 1"=1'-0"  
OUTPUT MACHINERY NOT SHOWN



SECTION A-A  
SCALE: 1"=1'-0"

NOTE: RACK, PINION BEARING, AND PINION CARRIAGE ARE SHOWN WITH THE BRIDGE IN THE CLOSED POSITION, RELATIVE DIMENSIONS VARY WITH RESPECT TO COUNTWEIGHT ARM POSITION AND RACK POSITION.

CONTRACTOR TO BE ADVISED TO EXCLUDE THE PURCHASE COST OF (2) REDUCERS IN THEIR BID SET. THE CITY OF DULUTH WILL FURNISH TWO (2) REDUCERS. REDUCER MANUFACTURER IS FOR REFERENCE PURPOSE ONLY.

TABLE OF OPERATING MACHINERY BEARINGS				
MARK	QTY.	SHAFT DIAMETER (in.)	DESCRIPTION	MANUFACTURER AND/OR MODEL
B1	8	6 1/2"	STEEL TWO PIECE PILLOW BLOCK CYLINDRICAL BRONZE BUSHED BEARING, AASHTO LOAD RATING 48,750 LBS, FOUR BOLTS , HIGH STRENGTH CAP AND BASE BOLTS OR APPROVED EQUAL	EARLE PILLOW BLOCK MODEL EPB-42

TABLE OF OPERATING MACHINERY GEARING				
MARK	QTY.	RATIO	DESCRIPTION	MANUFACTURER
R1	2	428.6:1	SPECIAL FLOOR MOUNTED – TYPE A-PLUS PARALLEL SHAFT REDUCER, 25.1 HP AT 870 RPM, SERVICE FACTOR 1.0 EXTENDED INPUT SHAFT THRU MOTOR BRAKE, OR APPROVED EQUAL	FALK CORPORATION TYPE A, SIZE 465

TABLE OF OPERATING MACHINERY COUPLINGS										
MARK	QTY.	SIZE	TORQUE RATING Kip-in	TYPE	DRIVING HALF		DRIVEN HALF		NOMINAL BORE, in.	MANUFACTURER
					NOMINAL BORE, in.	KEY in. x in.	R = RIGID F=FLEX	KEY in. x in.		
C1	4	1060 T	6.05	STEEL FLEX	**	**	F	F	**	FALK CORPORATION, OR APPROVED EQUAL
C2-A	4	1050 G52	500.9	SINGLE ENGAGEMENT GEAR	**	**	R	F	1.75 X 1.50	FALK CORPORATION, OR APPROVED EQUAL
C2-B	4	1050 G52	500.9	SINGLE ENGAGEMENT GEAR	7	1.75 X 1.50	F	R	1.75 X 1.50	FALK CORPORATION, OR APPROVED EQUAL

\*\* DESIGNATES SIZE TO MATCH COMMERCIAL COMPONENT SHAFT

NOTES:

- QUANTITIES SHOWN WITHIN OPERATING MACHINERY TABLES ARE INTENDED TO REPRESENT TOTAL QUANTITIES FOR ALL ASSEMBLIES. SPARE QUANTITIES SHALL BE PROVIDED AS NOTED WITHIN THE MACHINERY SPECIAL PROVISIONS.
- THE CONTRACTOR SHALL COORDINATE WITH THE REDUCER, COUPLING AND PINION MANUFACTURER AND PROVIDE A COLLINEAR ALIGNMENT BETWEEN PINION SHAFT PAIRS.
- PROVIDE 1/2 INCH NOMINAL SHIM PACKS AT MOUNTING BASE OF ALL OPERATING MACHINERY EQUIPMENT
- ALL MACHINERY SUPPORT SURFACES TO BE FLAT AND LEVEL AND PARALLEL TO EACH OTHER.
- FOR OPERATING MACHINERY SUPPORTS SEE SHEETS 18 THRU 20.
- FOR ELECTRICAL DETAILS SEE SHEETS 21 THRU 36.

INSTALLATION NOTES:

- FINAL CONNECT THE C2 COUPLINGS AFTER THE PINION ASSEMBLIES HAVE BEEN INSTALLED AND AFTER BACKLASH CLEARANCE HAS BEEN REMOVED FROM THE SHAFT ASSEMBLIES AND REDUCER IN THE DIRECTION OF PINION TOOTH LOADING. CONNECTION AT C2 COUPLING SHALL BE ACHIEVED BY ADJUSTING POSITION OF ITS SLEEVE.

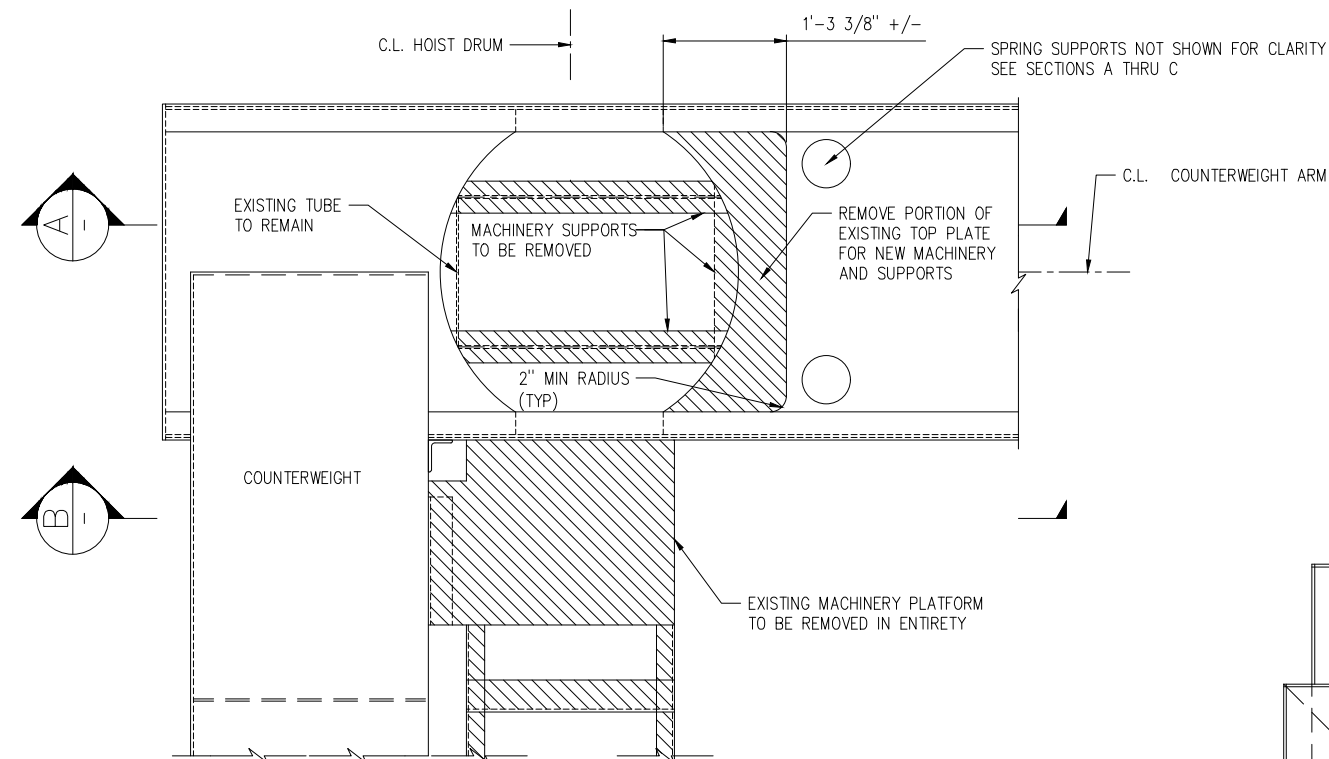
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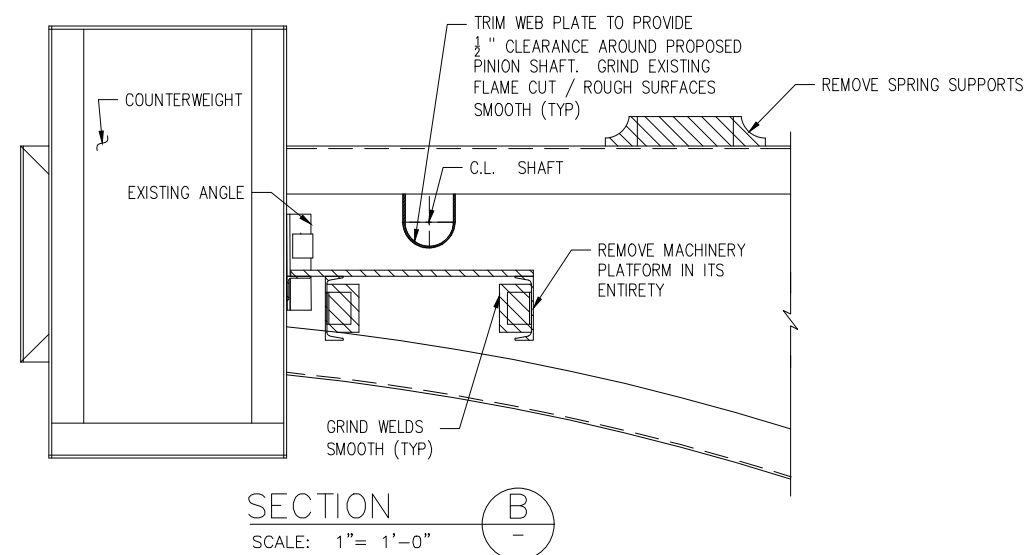
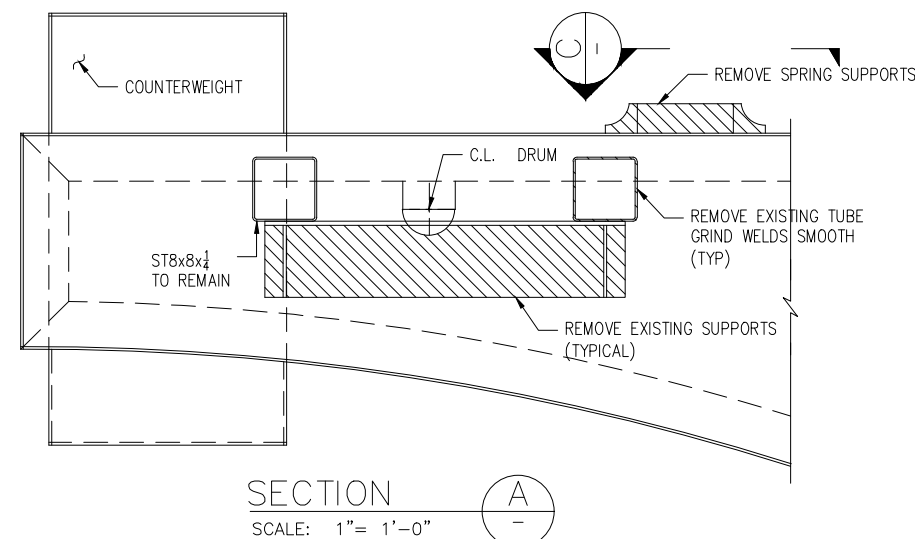
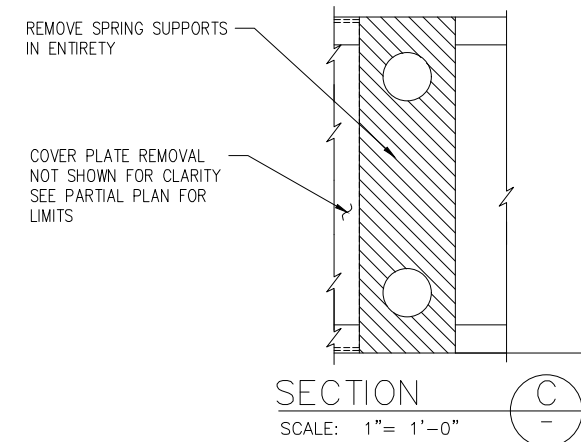
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OPERATING MACHINERY ASSEMBLY

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TYPICAL MACHINERY PLATFORM PARTIAL PLAN  
SCALE: 1" = 1'-0"  
(TYPICAL AT FOUR LOCATIONS)



NOTES:

1. FIELD VERIFY ALL DIMENSIONS.
2. DETAILS ARE PROVIDED FOR BIDDING PURPOSES ONLY AND SHOULD BE CONSIDERED APPROXIMATE, EXISTING MACHINERY SUPPORTS ARE TO BE REMOVED IN ENTIRETY UNLESS OTHERWISE NOTED.
3. EXISTING SUPPORT CONNECTION WELDS ARE TO BE GROUND OFF SMOOTH.
4. COORDINATE COUNTERWEIGHT TOP PLATE REMOVAL LIMITS WITH REQUIRED OPERATING CLEARANCES FOR PROPOSED MACHINERY AND SUPPORTS. REPORT ANY DISCREPANCIES TO ENGINEER.
5. WHERE COMPONENTS ARE REMOVED, SPOT PAINT AS NECESSARY IN ACCORDANCE WITH SPECIFICATIONS.
6. MACHINERY IS NOT SHOWN FOR CLARITY. EXISTING MACHINERY IS TO BE REMOVED AS DESCRIBED IN MECHANICAL DRAWINGS AND SPECIFICATIONS.
7. DEMOLITION IS PAID FOR UNDER STRUCTURAL REMOVALS PAY ITEM. REFERENCE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
8. THE CONTRACTOR SHALL PROVIDE FOR THE STABILITY OF THE STRUCTURE DURING ALL PHASES OF DEMOLITION AND ERECTION. THE METHODS USED BY THE CONTRACTOR SHALL BE DOCUMENTED ON ERECTION DRAWINGS. ALL SUPPORTING STABILITY CALCULATIONS SHALL BE STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF MINNESOTA AND SUBMITTED TO THE ENGINEER OF RECORD FOR APPROVAL.

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NAME: PAUL SKELTON LIC. NO. 26363 DATE 10/26/2016

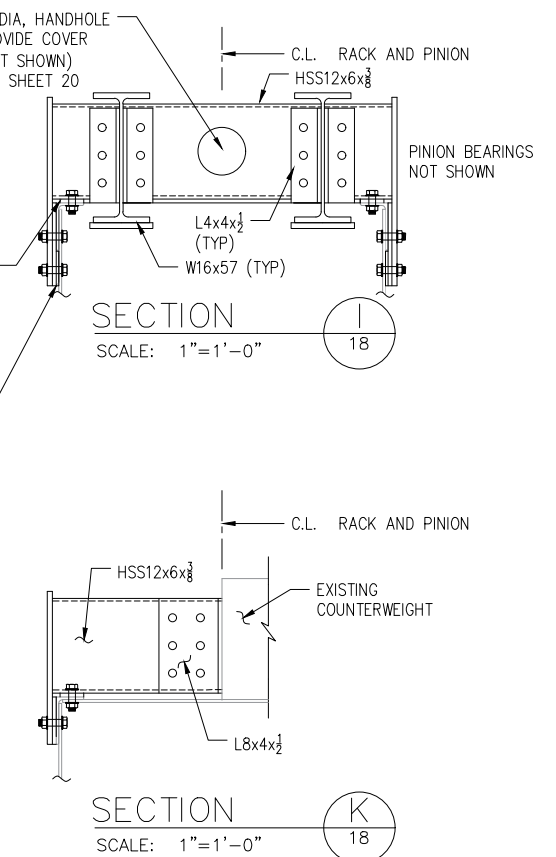
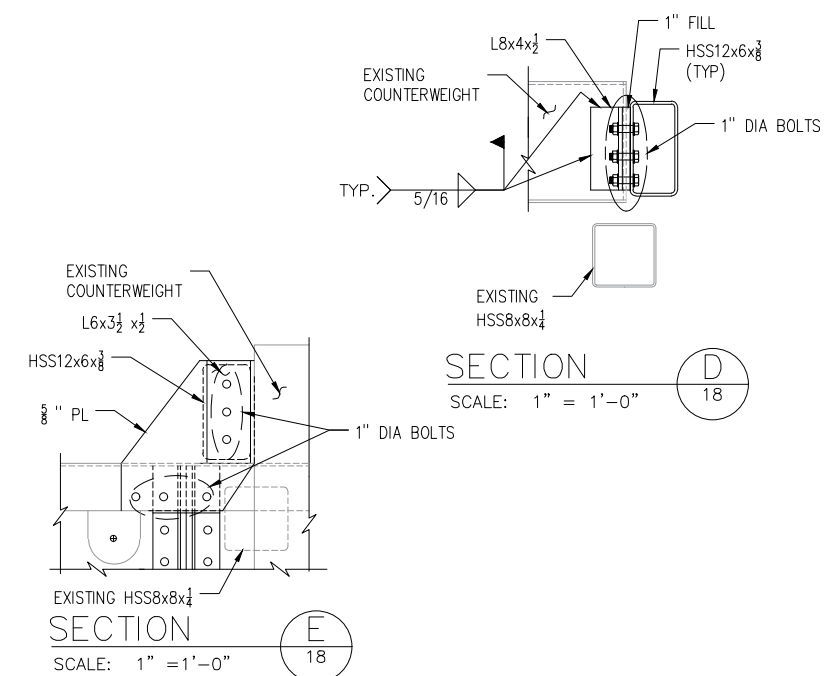
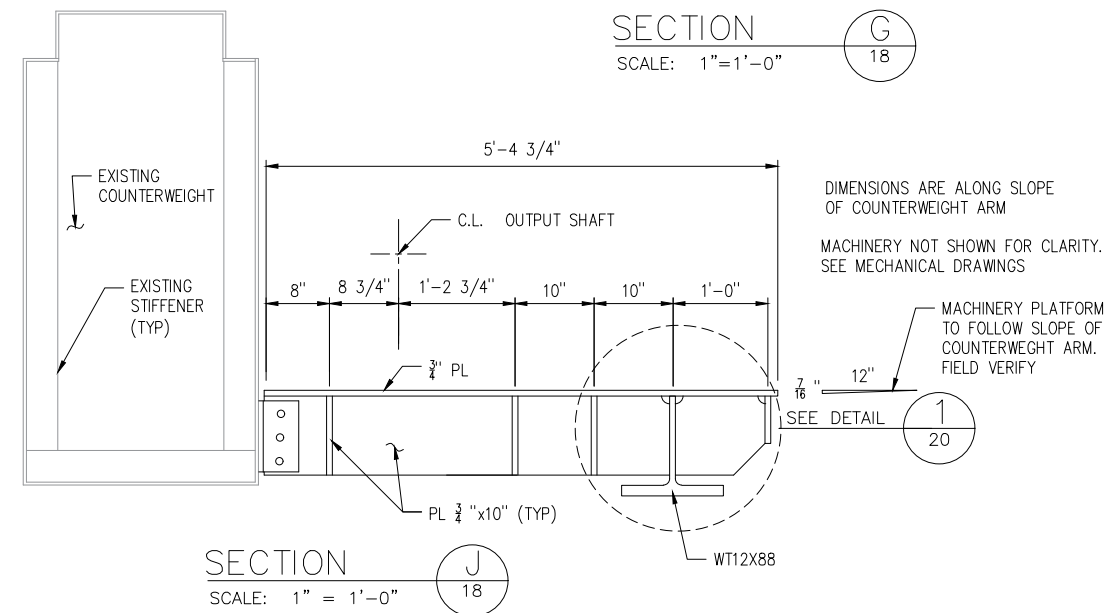
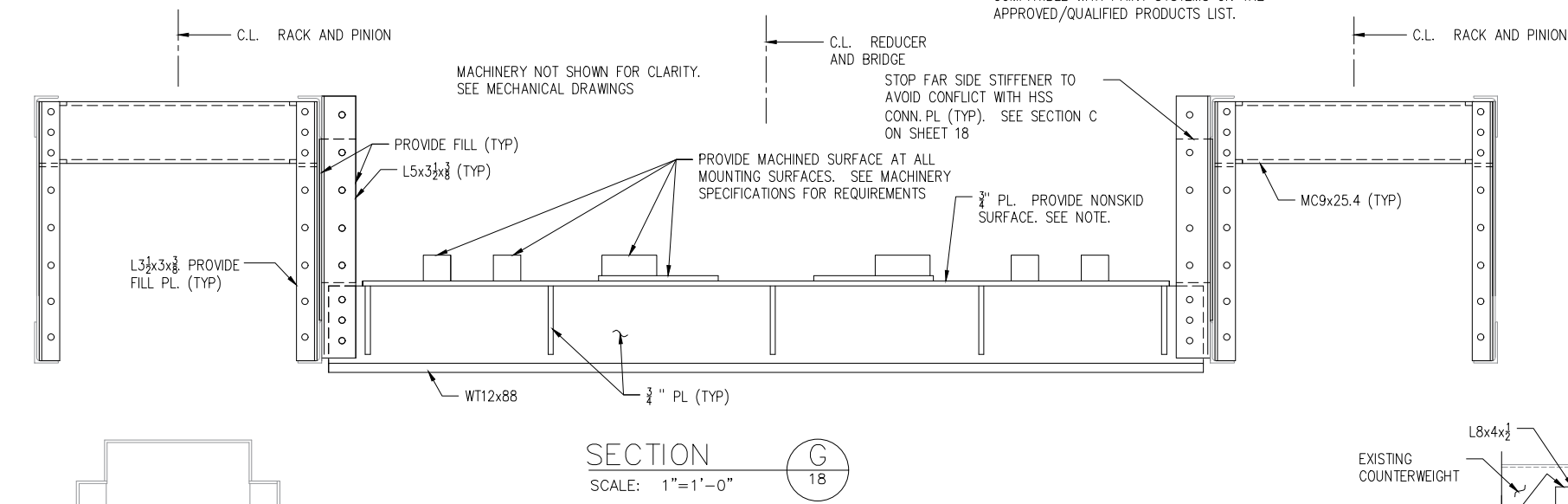
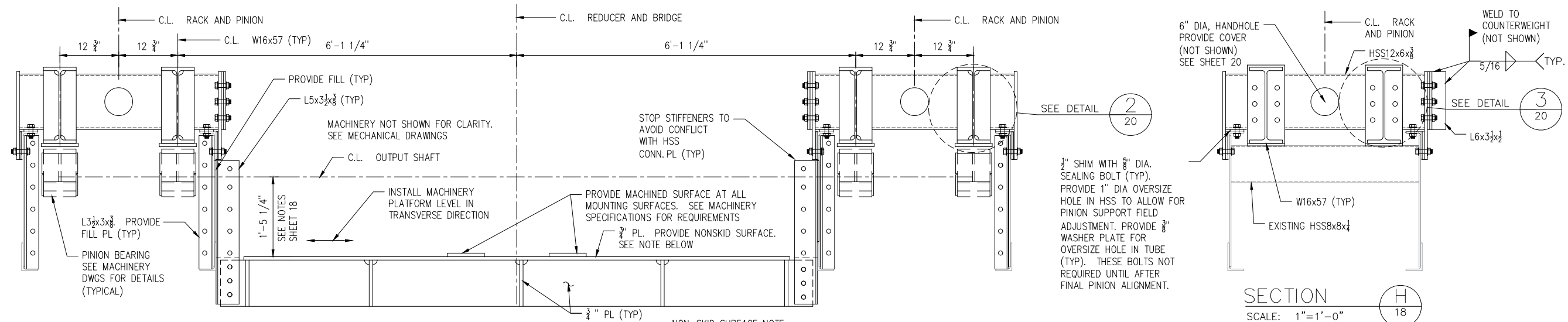
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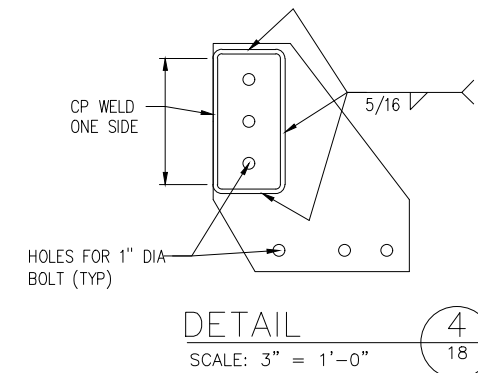
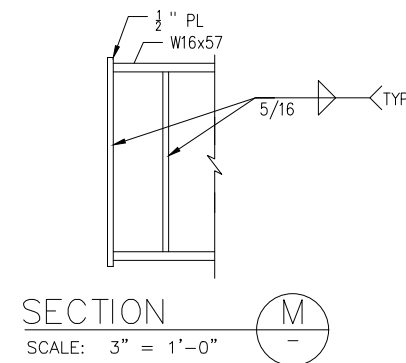
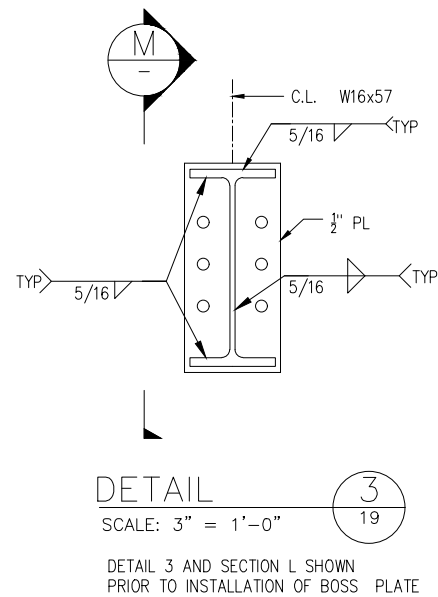
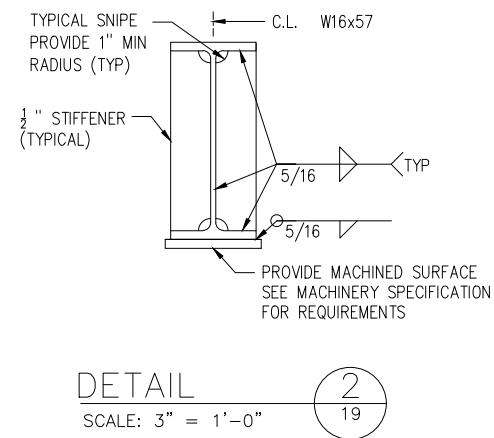
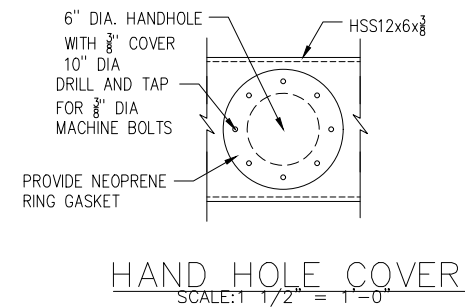
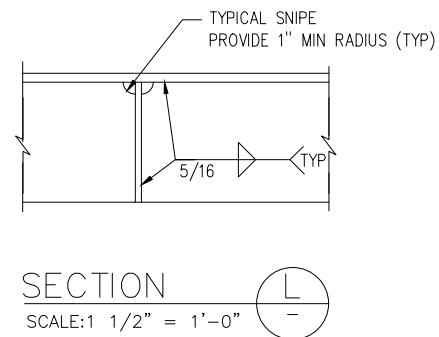
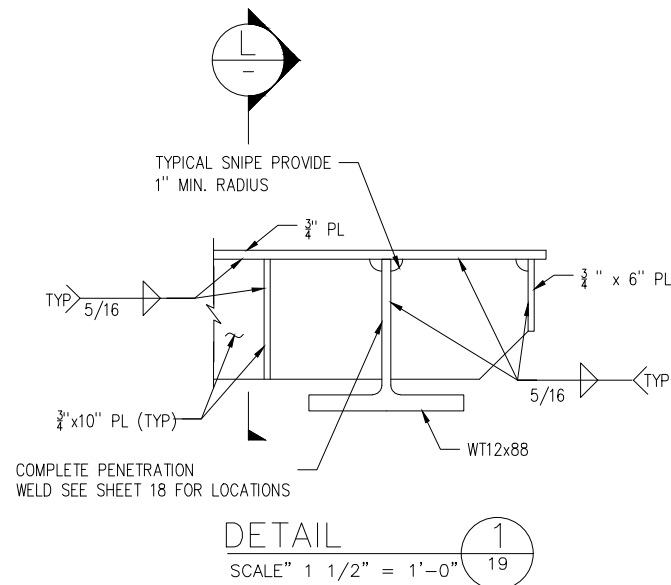
MACHINERY SUPPORTS DEMOLITION

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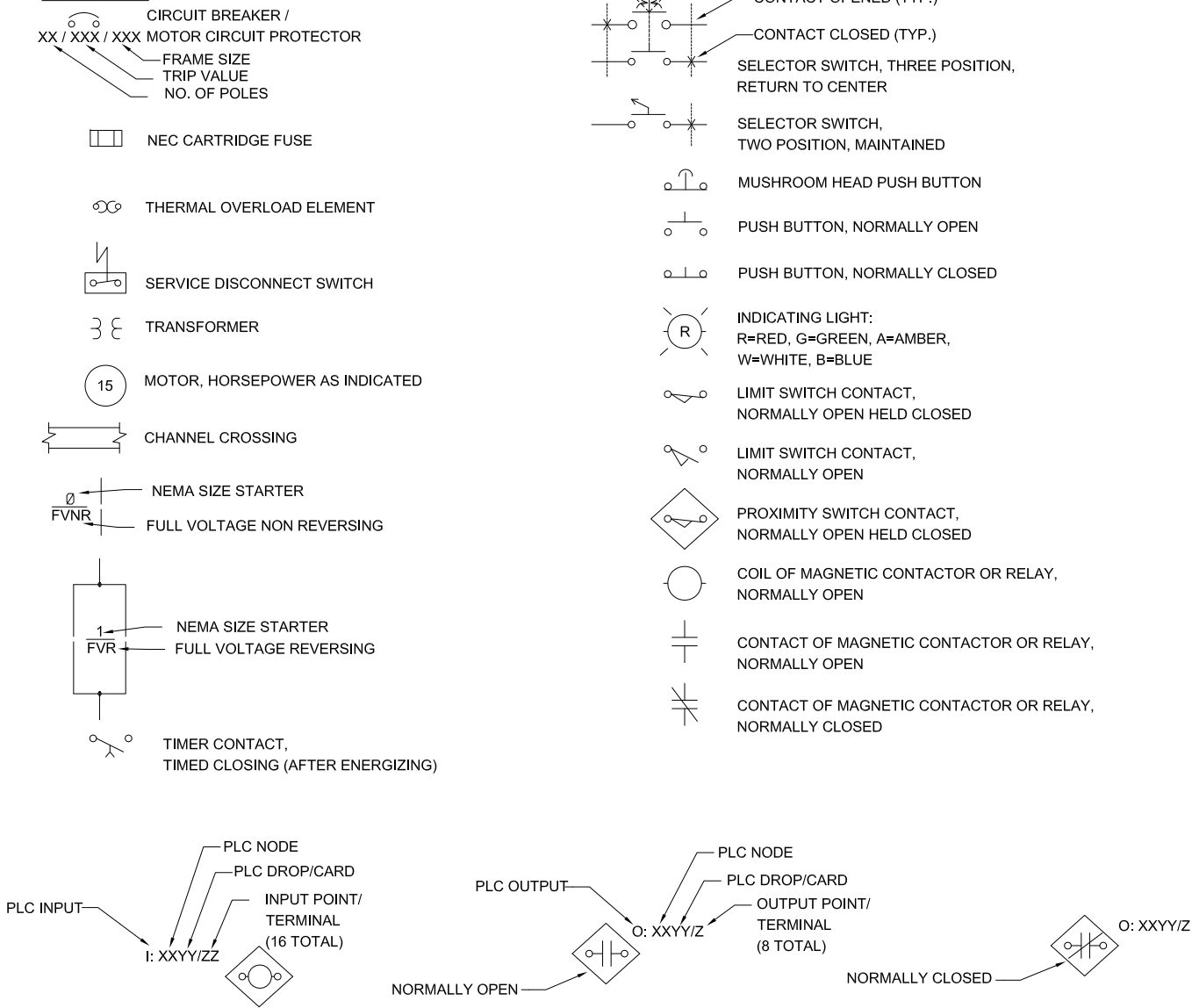
ABBREVIATIONS

AH	AIR HORN	JB	JUNCTION BOX	PL	PILOT LIGHT
AUX	AUXILIARY	KS	KEY SWITCH	PLC	PROGRAMMABLE LOGIC CONTROLLER
BCP	BRIDGE CONTROL POWER	L	LOWER, LOWERED	R	RAISE, RAISED
BR	BRAKE	LP	LIGHTING PANELBOARD	RDY	READY
C	COMMON	LS	LIMIT SWITCH	REL	RELEASE, RELEASED
CB	CIRCUIT BREAKER	M	MAGNETIC CONTACTOR	S	SPAN
CHANCHANNEL		MCP	MOTOR CIRCUIT PROTECTOR	SE	SOUTHEAST
CR	CONTROL RELAY	NAV	NAVIGATION LIGHT	SL	SPAN LOCK
DRV	DRIVE	NE	NORTHEAST	SR	SAFETY RELAY
DS	DISCONNECT SWITCH	NW	NORTHWEST	SS	SELECTOR SWITCH
E	EAST	OL	OVERLOAD RELAY	STD	SEATED
FS	FULLY SEATED	OT	OVERTRAVEL	SW	SWITCH
FU	FUSE	P	PULL, PULLED	TR	TIMING RELAY, TRANSFORMER
FVD	FLUX VECTOR DRIVE	PB	PUSHBUTTON	UPS	UNINTERRUPTIBLE POWER SUPPLY
FVNR	FULL VOLTAGE NON REVERSING	PED	PEDESTRIAN	V	VOLTS
FVR	FULL VOLTAGE REVERSING	PFR	PHASE FAILURE/ REVERSAL	W	WEST
HR	HAND RELEASE, HAND RELEASED	RELAY		XFMR	TRANSFORMER
HTR	HEATER	PG	PEDESTRIAN GATE		

GENERAL ELECTRICAL NOTES

- ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH STATE STANDARD SPECIFICATIONS, THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE, AND THE ELECTRICAL REQUIREMENTS OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (AASHTO) STANDARD SPECIFICATIONS, EXCEPT AS OTHERWISE NOTED.
- ALL ELECTRICAL WORK SHALL BE COORDINATED WITH THE WORK OF OTHER TRADES AND SHALL BE SCHEDULED CONSISTENT WITH THE OVERALL CONSTRUCTION STAGING SEQUENCE.
- THE PLANS ARE DIAGRAMMATIC AND ARE NOT TO BE SCALED. THE LOCATIONS OF EQUIPMENT AND ROUTING OF CONDUITS SHOWN ON THE CONTRACT DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS IN THE FIELD AND PREPARING SCALED SHOP DRAWING.
- ALL ELECTRICAL COMPONENTS AND MATERIAL SHOWN ON THE CONTRACT DRAWINGS ARE NEW UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING AS REQUIRED FOR THE REMOVAL AND INSTALLATION OF ELECTRICAL COMPONENTS, HANGERS, SUPPORTS, ETC. ALL PATCHING SHALL BE DONE SO AS TO LEAVE THE AREA IN ITS ORIGINAL CONDITION AS A MINIMUM OR AS OTHERWISE REQUIRED BY THE ENGINEER.
- EXISTING ELECTRICAL CABLE, WIRES, CONDUIT, CONDUIT HANGERS, SUPPORTS, CLAMPS, ETC, WHICH ARE BEING REPLACED SHALL NOT BE REUSED. ALL SUCH PARTS SHALL BE REMOVED AND PROPERLY DISPOSED OF OFF SITE BY CONTRACTOR.
- ALL NEW CONDUIT AND FITTINGS SHALL BE ¾" MINIMUM PVC COATED HOT DIPPED GALVANIZED RIGID STEEL UNLESS OTHERWISE NOTED, AND SHALL MEET ALL THE ADDITIONAL REQUIREMENTS FOR MATERIAL, CONSTRUCTION, AND INSTALLATION CONTAINED IN THE SPECIFICATION.
- THE CONTRACTOR SHALL FURNISH AND INSTALL ALL REQUIRED BOXES, CONDUIT FITTINGS, ELBOWS, AND HARDWARE FOR A COMPLETE INSTALLATION, WHETHER OR NOT THEY ARE EXPLICITLY SHOWN OR INDICATED ON THE CONTRACT DRAWINGS.
- NEW ELECTRICAL CONDUCTORS SHALL BE MINIMUM SIZE NO. 14 AWG STRANDED TYPE XHHW, EXCEPT FOR INTERNAL WIRING IN CONTROL CABINETS AND CONTROL DESK WHICH SHALL BE MINIMUM SIZE NO.16 AWG TYPE SIS. ALL WIRES AND CABLES SHALL MEET ALL THE ADDITIONAL REQUIREMENTS FOR MATERIAL, CONSTRUCTION AND INSTALLATION CONTAINED IN THE RELEVANT SPECIFICATIONS.
- ALL SWITCHES, RELAYS, CONTACTORS AND STARTERS ARE SHOWN ON THE DRAWINGS AS DE-ENERGIZED AND WITH THE SPAN FULLY CLOSED, AND GATES RAISED, OPEN TO PEDESTRIAN TRAFFIC.
- ALL NEW CONDUCTORS INSTALLED IN CONDUIT SHALL BE INSTALLED WITH GROUND CONDUCTORS. GROUND CONDUCTORS SHALL BE PROVIDED IN ALL NEW FLEXIBLE CABLES. MINIMUM SIZE GROUND CONDUCTOR SHALL BE NO. 12 AWG. ALL CABINETS, TERMINAL AND JUNCTION BOXES SHALL BE GROUNDED IN ACCORDANCE WITH THE NEC.
- ALL CONDUCTORS SHALL BE CONNECTED TO TERMINAL BLOCKS OR DEVICES. SPLICES SHALL NOT BE PERMITTED WITHIN EQUIPMENT ENCLOSURES, BOXES, OR CONDUIT FITTINGS.
- CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO ANY REMOVALS AND REPORT INCOSISTENCIES TO THE ENGINEER AND TO ALLOW FOR THE GENERATION OF A COMPLETE SET OF AFTER CONSTRUCTION AS BUILTS.

SYMBOLS



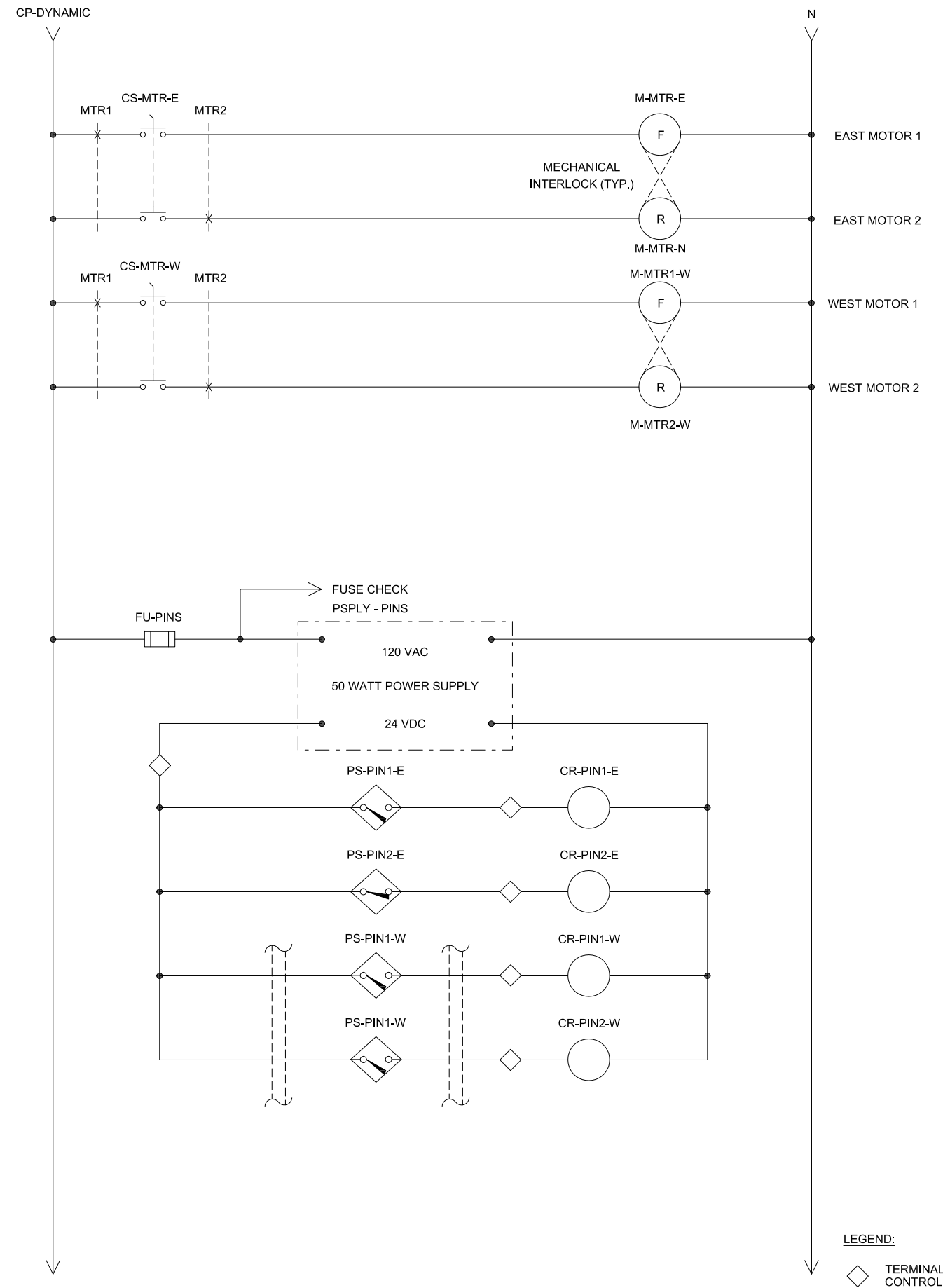
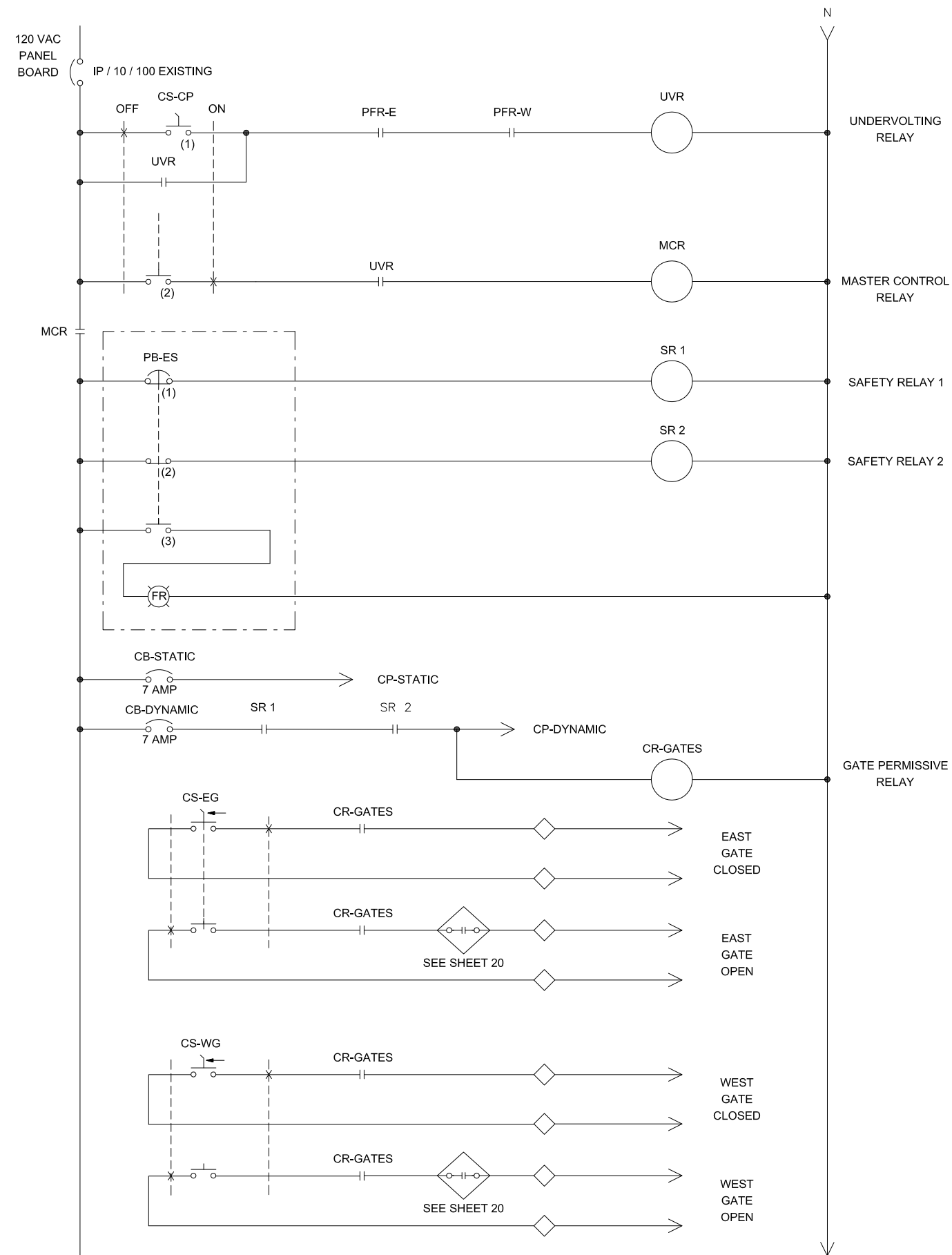
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NAME: \_\_\_\_\_ LIC. NO. 26363 DATE 06/30/2018  
PAUL SKELTON

City of Duluth Proj. No. 1554

GENERAL ELECTRICAL NOTES

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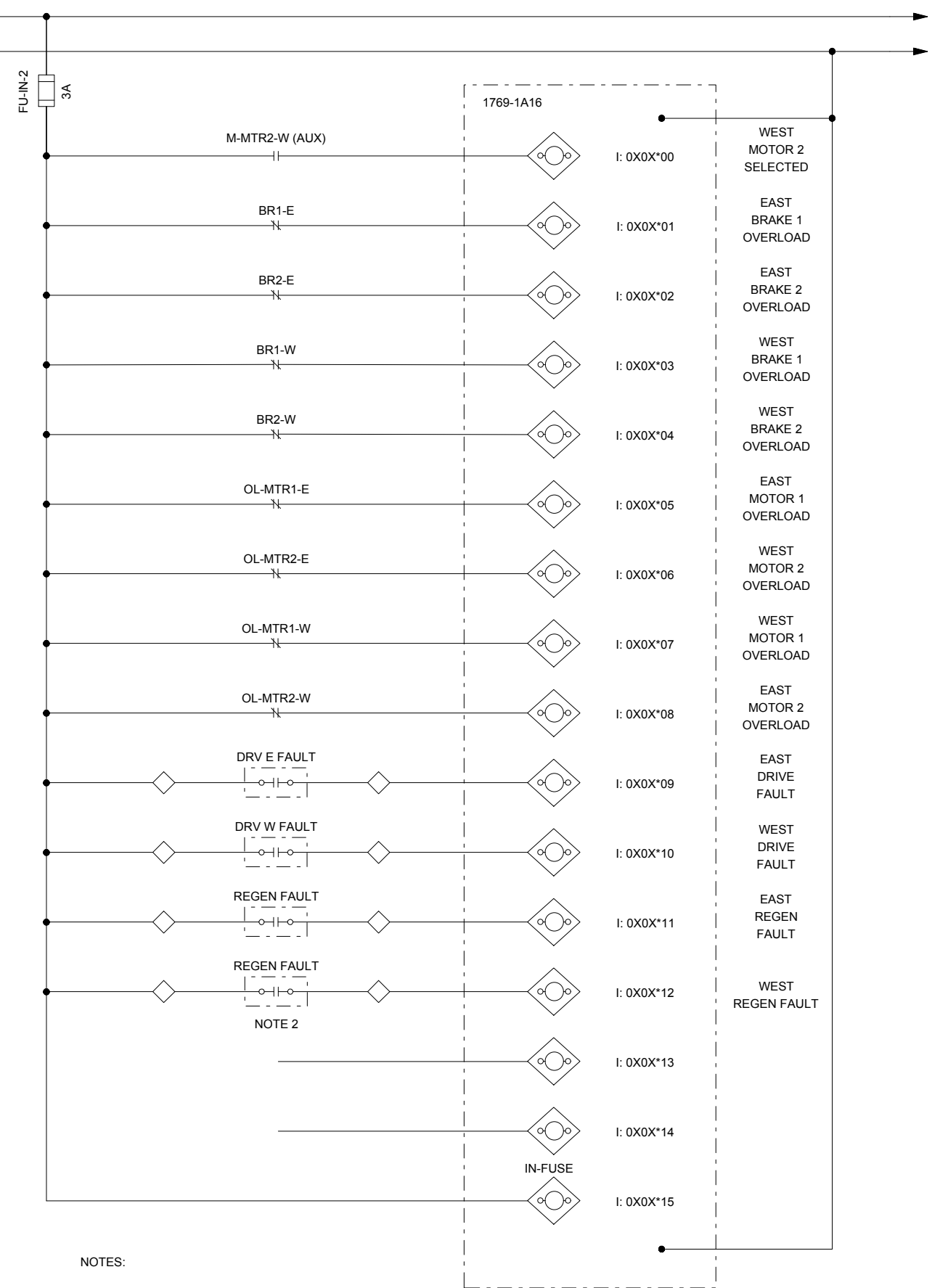
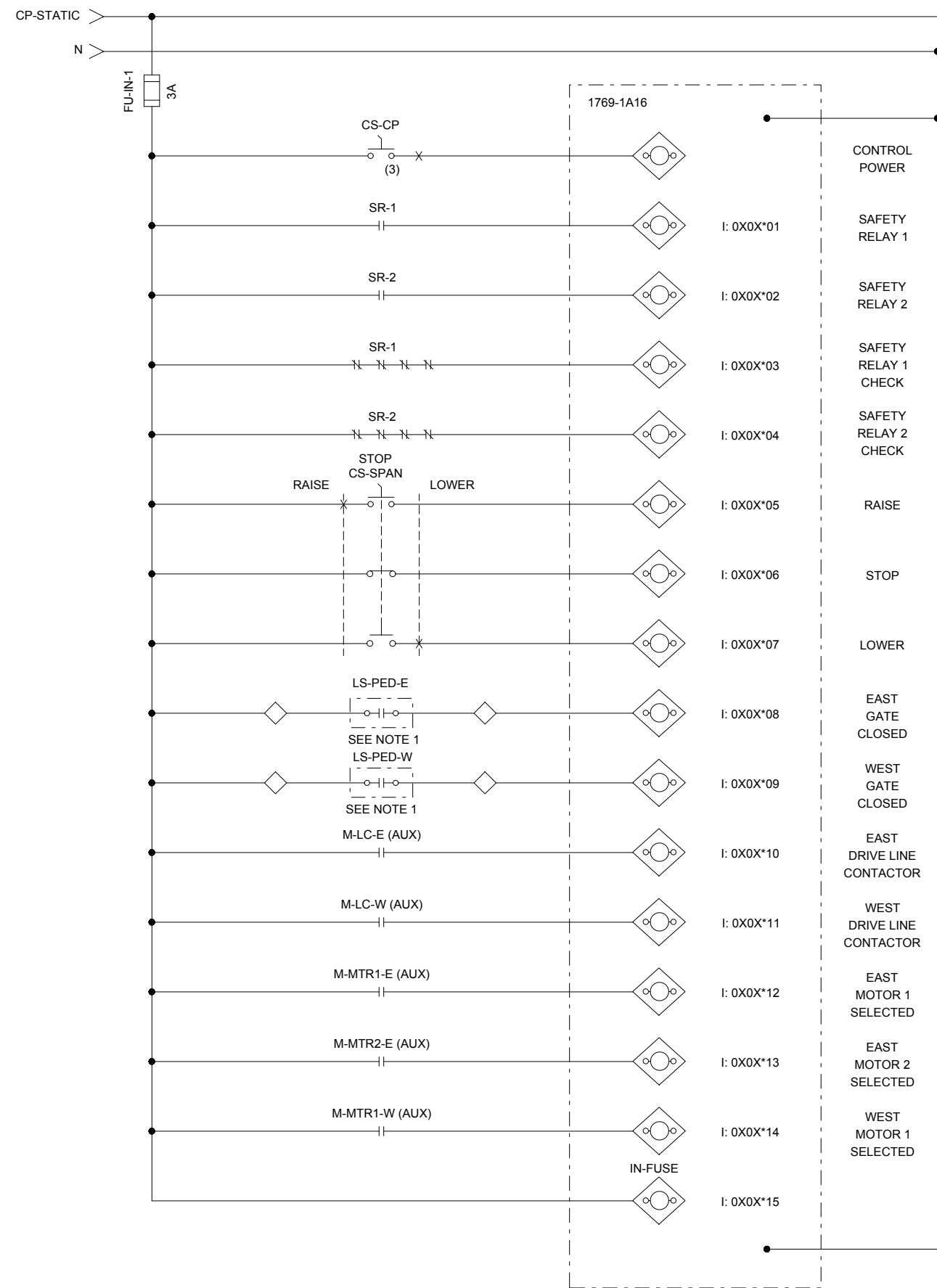
NAME: PAUL SKELTON LIC. NO. 26363 DATE 06/30/2018

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RELAY CONTROLS SCHEMATIC

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NOTES:

1. GATE INTERNAL "CLOSED" CONTACT.
2. DRIVE & REGEN MODULE FAULT CONTACTS TO BE ENERGIZED WHEN DRIVE/REGEN NOT FAULTED.

LEGEND:

◇ TERMINAL IN CONTROL PANEL

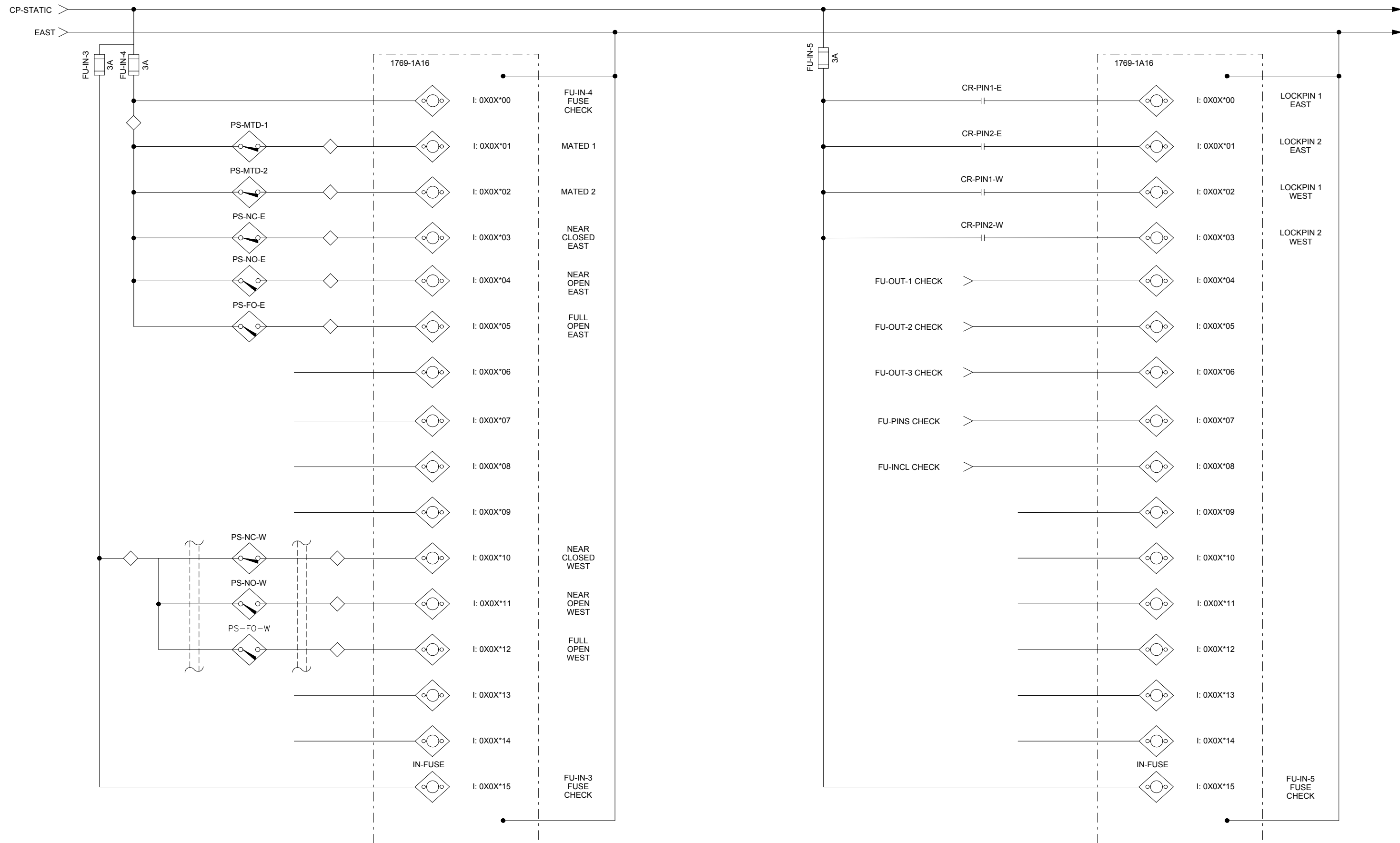
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PLC I/O SHEET 1

Sheet No. 24 of 37 Sheets



NOTE:  
NEW POSITION PROXIMITY SWITCHES  
TO REPLACE EXISTING PROXIMITY  
SWITCHES IN EXISTING LOCATIONS.

LEGEND:

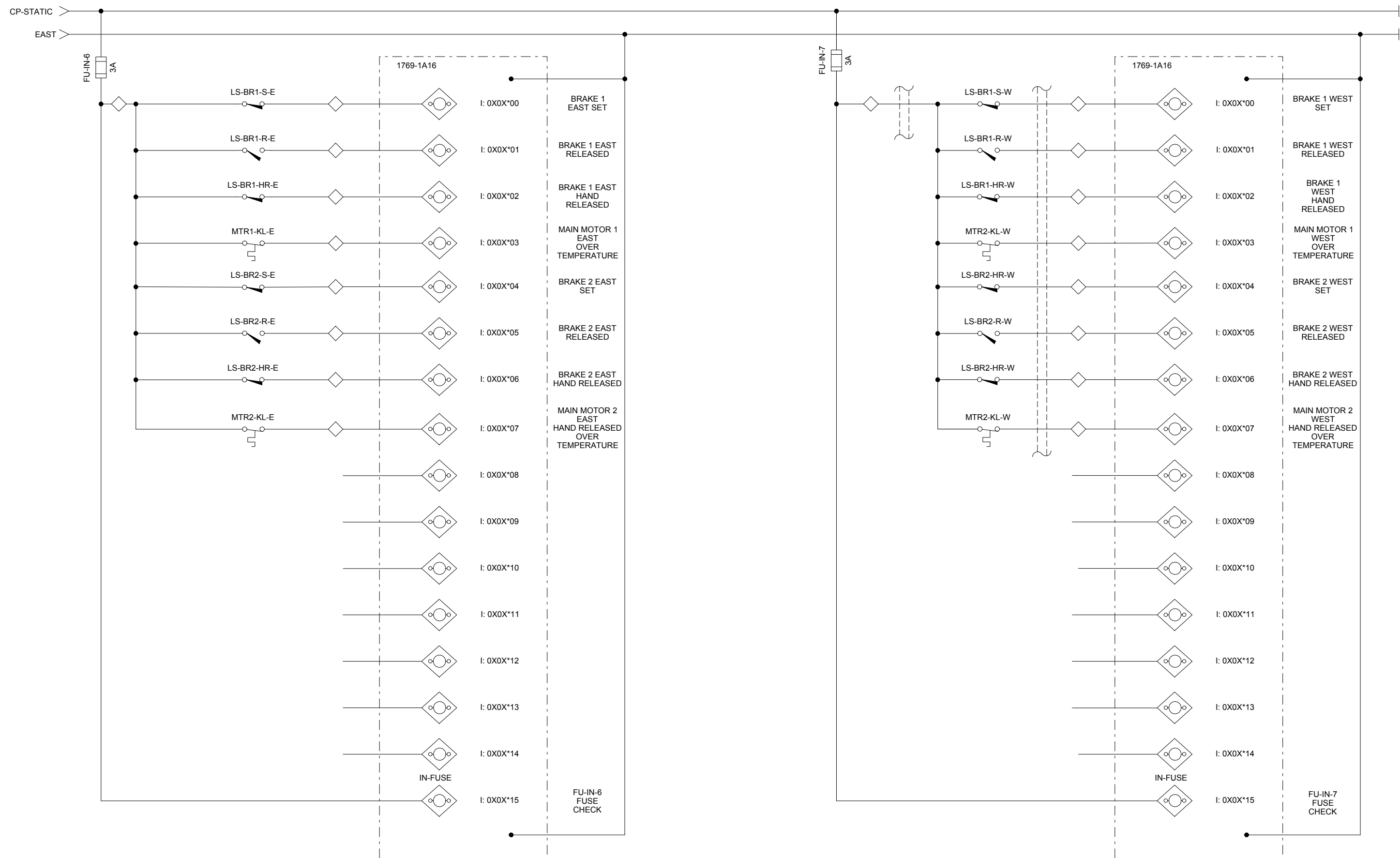
◇ TERMINAL IN  
CONTROL PANEL

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PLC I/O SHEET 2

Sheet No. 25 of 37 Sheets



LEGEND:

◇ TERMINAL IN CONTROL PANEL

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PLC I/O SHEET 3

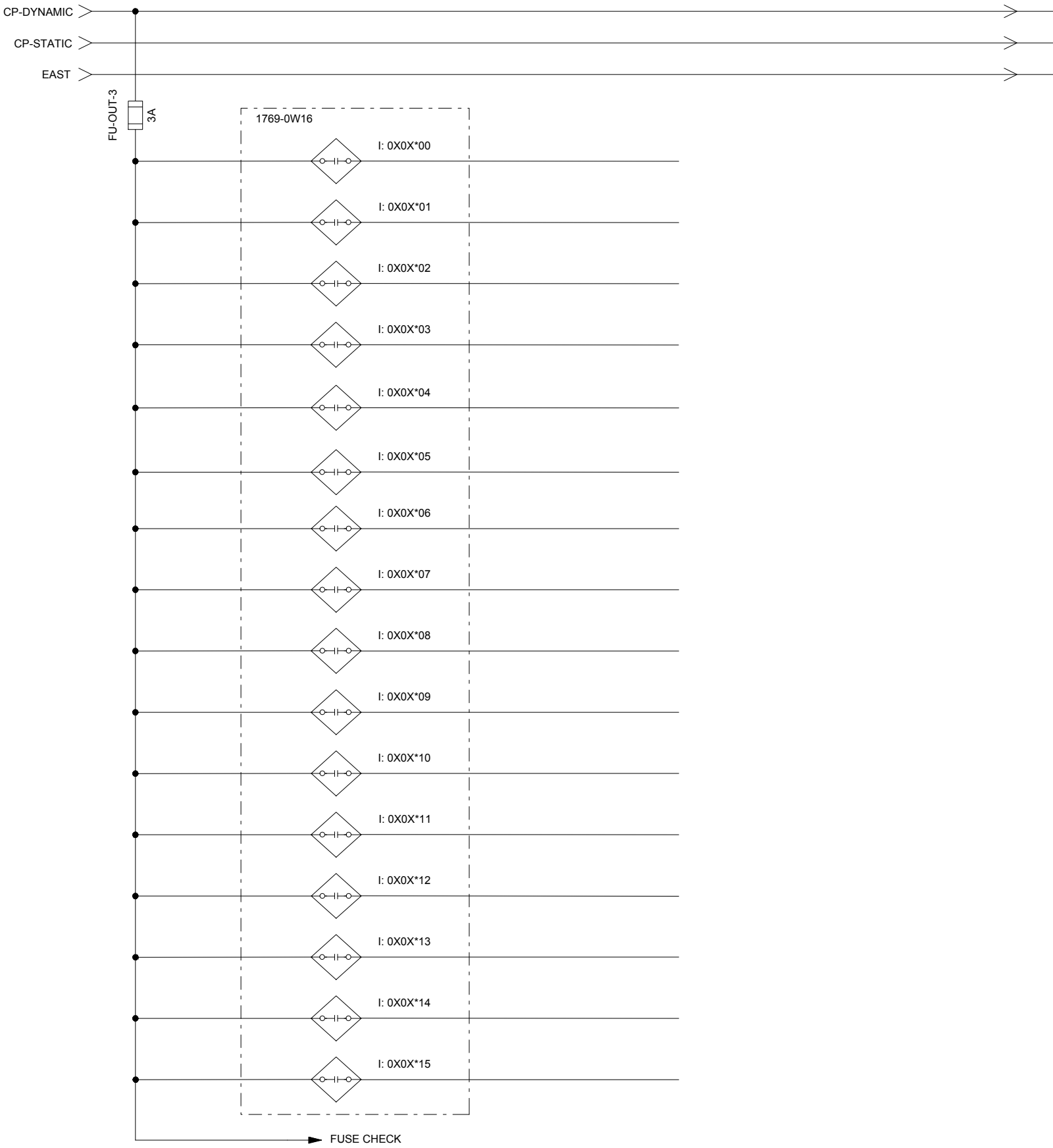
Sheet No. 26 of 37 Sheets





Sheet No. 27 of 37 Sheets





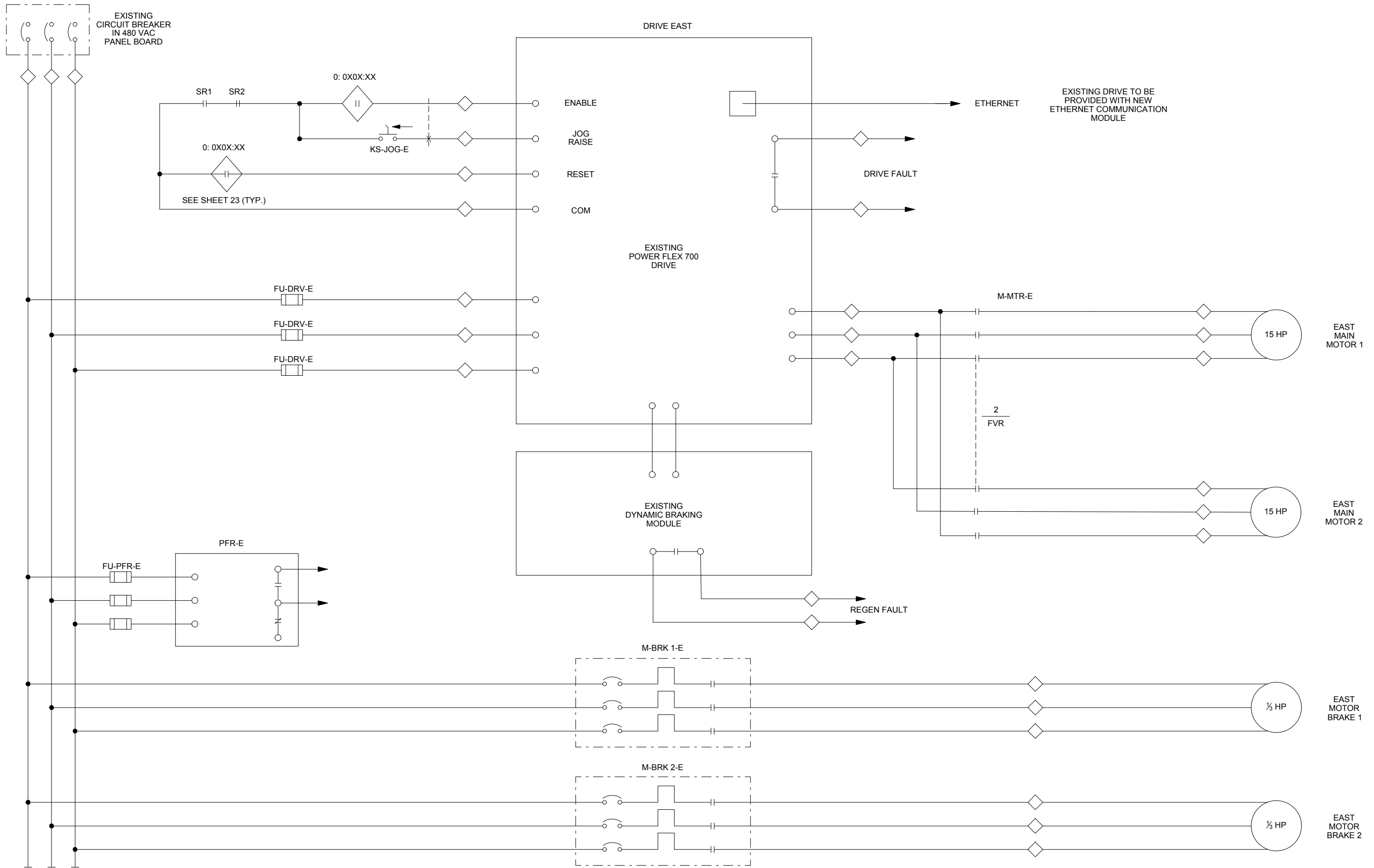
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PLC I/O SHEET 6

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LEGEND:

◇ TERMINAL IN CONTROL PANEL

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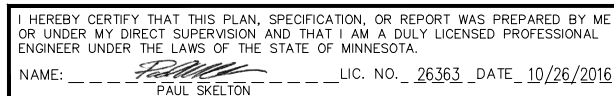
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EAST POWER SCHEMATIC

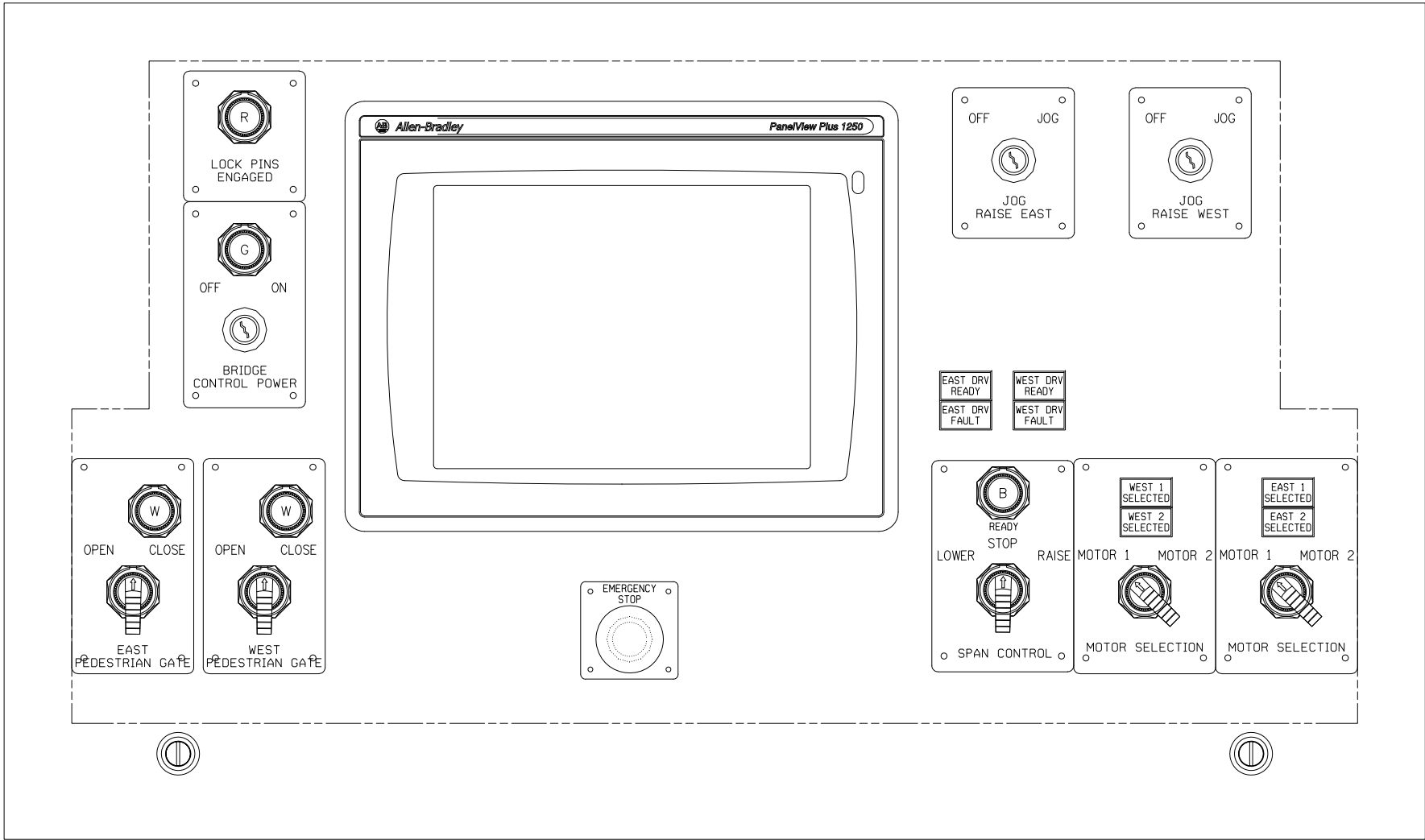
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WEST POWER SCHEMATIC

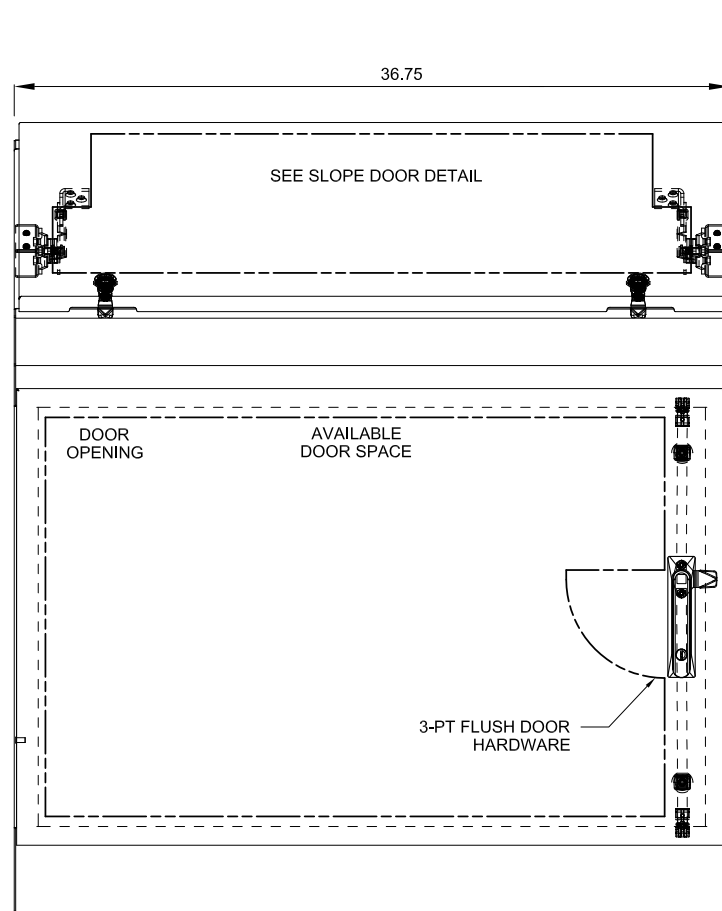
Sheet No. 31 of 37 Sheets



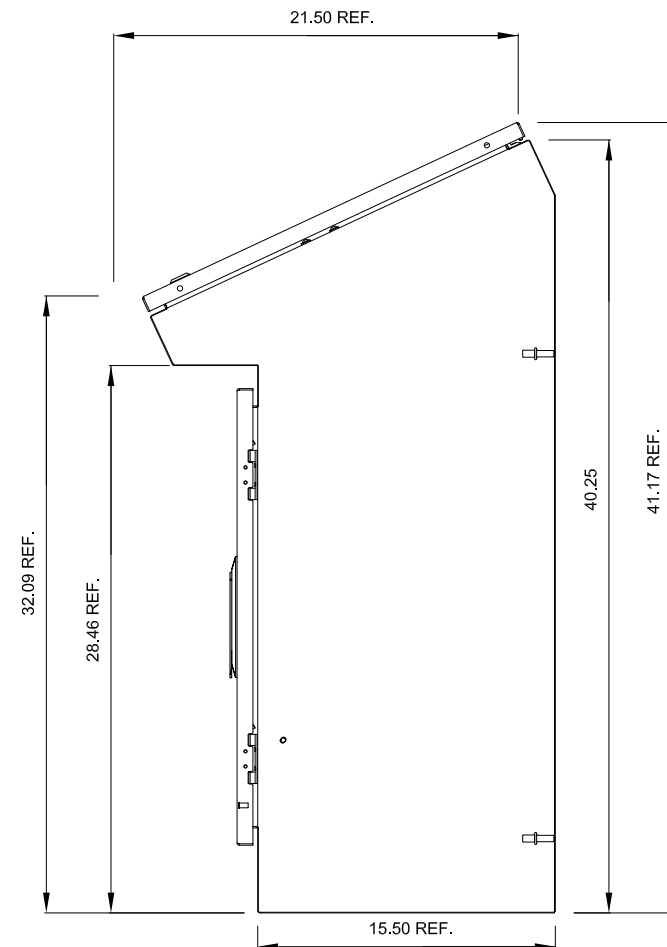
CONTROL DESK

NOTES FOR CONTROL DESK CONSTRUCTION:

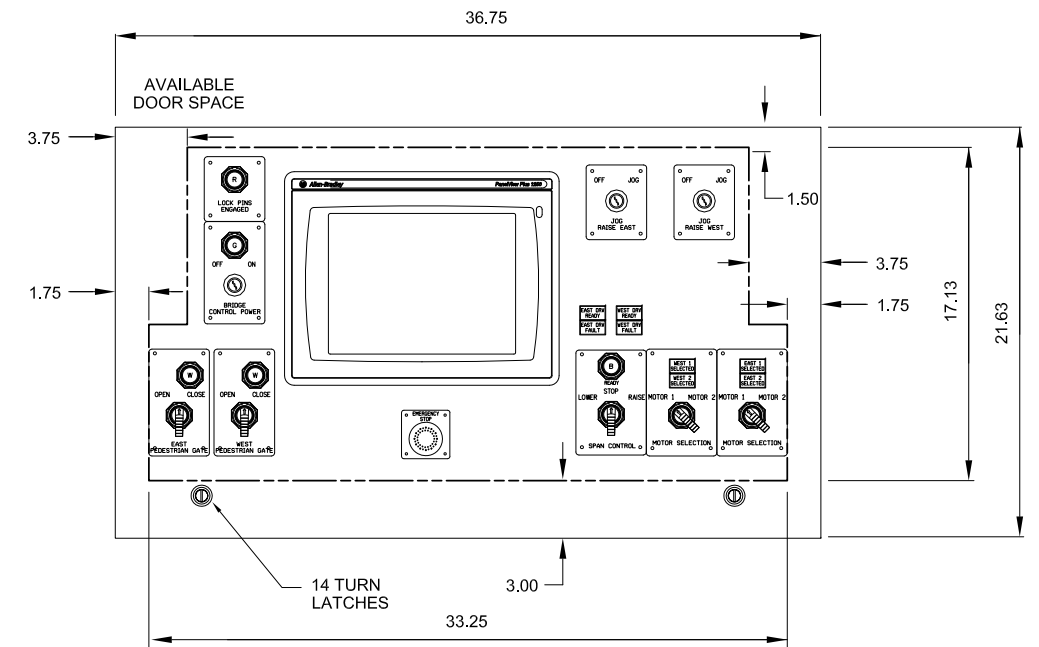
1. PUSHBUTTONS, SELECTOR SWITCHES, TUMBLER SWITCHES, AND INDICATING LIGHTS SHALL BE OF HEAVY DUTY. OILTIGHT CONSTRUCTION FURNISHED WITH NAMEPLATE PER CONTRACT DOCUMENTS. INDICATOR LIGHTS SHALL CONSIST OF A CANDELABRA SCREW BASE SOCKET WITH SCREW TERMINAL, SCREW CAP, AND FLAT POLY CARBONATE LENS WITH COLOR AND LEGEND AS SHOWN ON DRAWING. SWITCHES, PUSHBUTTONS, AND INDICATING LIGHTS SHALL BE SIMILAR TO CUTLER HAMMER 1250T OR APPROVED EQUAL. ALL INDICATING LAMPS SHALL BE LED TYPE, RATED 120 VOLTS.
2. DUAL FIELD LIGHTS COLORS ARE AS FOLLOWS:  
STATUS "READY" LIGHTS:BLUE  
GATE OPEN LIGHTS:GREEN  
GATE CLOSED LIGHTS:WHITE
3. SEE SHEET 33 FOR CONTROL DESK ELEVATION DETAILS.



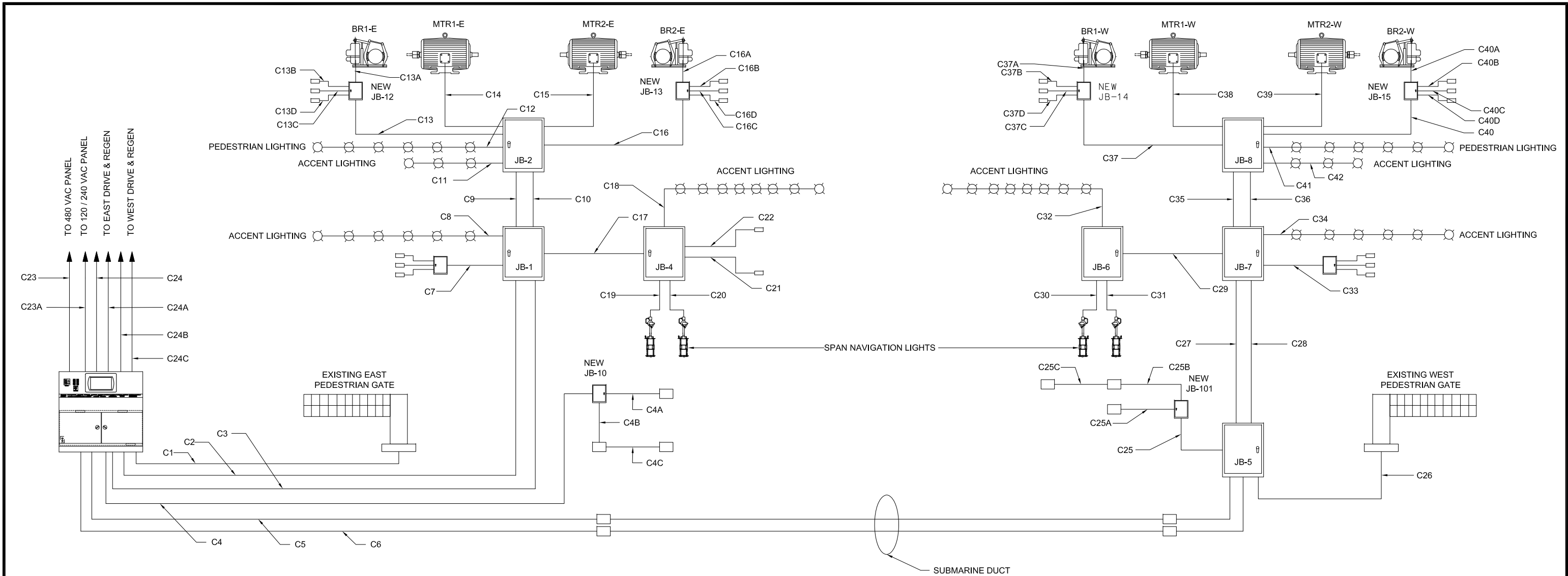
FRONT VIEW



RIGHT SIDE VIEW



SLOPE DOOR DETAIL



CONDUIT NUMBER	FROM	TO	STATUS	SIZE	FILL
C1	CONTROL CONSOLE	EAST PEDESTRIAN GATE	NEW	1"	
C2	CONTROL CONSOLE	EXISTING JB-1	EXISTING	3/4"	7 - NO. 10 AWG
C3	CONTROL CONSOLE	EXISTING JB-1	EXISTING	1 1/2"	7 - NO. 12 AWG, 35 NO. 14 AWG
C4	CONTROL CONSOLE	NEW JB-10	NEW	3/4"	2 - NO. 16 AWG TSP
C4A	NEW JB-10	EAST SPAN INCLINOMETER	NEW		NO. 16 AWG TSP
C5	CONTROL CONSOLE	EXISTING JB-5	EXISTING	2 1/2"	7 - NO. 10 AWG, 10 - NO. 12 AWG, 40 NO. 14 AWG
C6	CONTROL CONSOLE	EXISTING JB-5	EXISTING	1"	2 - NO. 16 AWG TSP, 3 RG6 COAX
C7	EXISTING JB-1	EAST POSITION PROXIMITY SWITCHES	EXISTING		
C8	EXISTING JB-1	EXISTING ACCENT LIGHTING	EXISTING		MAINTAIN EXISTING
C9	EXISTING JB-1	EXISTING JB-2	NEW	SOOW	7 - NO. 10 AWG SOOW CORD
C10	EXISTING JB-1	EXISTING JB-2	NEW	SOOW	40 - NO. 12 AWG SOOW
C11	EXISTING JB-2	EXISTING ACCENT LIGHTING	EXISTING		MAINTAIN EXISTING
C12	EXISTING JB-2	EXISTING PEDESTRIAN LIGHTING	EXISTING		MAINTAIN EXISTING
C13	EXISTING JB-2	NEW JB-12	NEW	3/4"	8 NO. 14 AWG
C13A	NEW JB-12	BRAKE 1 EAST	NEW	SOOW	4 - NO. 14 AWG
C13B	NEW JB-12	BRAKE 1 EAST LS-BR1-SET-E	NEW	SOOW	3 - NO. 14 AWG
C13C	NEW JB-12	BRAKE 1 EAST LS-BR1-REL-E	NEW	SOOW	3 - NO. 14 AWG
C13D	NEW JB-12	BRAKE 1 EAST LS-BR1-HR-H	NEW	SOOW	3 - NO. 14 AWG
C14	EXISTING JB-2	EAST MAIN MOTOR 1	NEW	3/4"	4 - NO. 10 AWG, 4 - NO. 12 AWG
C15	EXISTING JB-2	EAST MAIN MOTOR 2	NEW	3/4"	4 - NO. 10 AWG, 4 - NO. 12 AWG
C16	EXISTING JB-2	NEW JB-13	NEW	3/4"	8 NO. 14 AWG
C16A	NEW JB-13	BRAKE 2 EAST	NEW	SOOW	4 - NO. 14 AWG
C16B	NEW JB-13	BRAKE 2 EAST LS-BR2-SET-E	NEW	SOOW	3 - NO. 14 AWG
C16C	NEW JB-13	BRAKE 2 EAST LS-BR2-REL-E	NEW	SOOW	3 - NO. 14 AWG
C16D	NEW JB-13	BRAKE 2 EAST LS-BR2-HR-H	NEW	SOOW	3 - NO. 14 AWG
C17	EXISTING JB-1	EXISTING JB-4	EXISTING		MAINTAIN EXISTING
C18	EXISTING JB-4	EXISTING ACCENT LIGHTING	EXISTING		MAINTAIN EXISTING
C19	EXISTING JB-4	EXISTING NE SPAN NAVIGATION LIGHT	EXISTING		MAINTAIN EXISTING
C20	EXISTING JB-4	EXISTING SE SPAN NAVIGATION LIGHT	EXISTING		MAINTAIN EXISTING
C21	EXISTING JB-4	NEW NE MATED PROXIMITY SWITCH	EXISTING	3/4"	3 - NO. 14 AWG
C22	EXISTING JB-4	NEW SE MATED PROXIMITY SWITCH	EXISTING	3/4"	3 - NO. 14 AWG
C23	CONTROL CONSOLE	480 VAC PANEL	EXISTING		7 - NO. 10 AWG
C23A	CONTROL CONSOLE	120 / 240 VAC PANEL	EXISTING		16 - NO. 12 AWG
C24	CONTROL CONSOLE	EAST DRIVE & BRAKING	NEW	1"	7 - NO. 10 AWG, 5 NO. 14
C24A	CONTROL CONSOLE	WEST DRIVE & BRAKING	NEW	1/2"	CAT 5
C24B	CONTROL CONSOLE	EAST DRIVE & DYNAMIC BRAKING	NEW	1"	7 NO. 10 AWG, 5 NO. 14
C24C	CONTROL CONSOLE	WEST DRIVE & DYNAMIC BRAKING	NEW	1/2"	CAT 5

CONDUIT NUMBER	FROM	TO	STATUS	SIZE	FILL
C25	EXISTING JB-5	NEW JB-11	NEW	3/4"	2 - NO. 16 AWG TSP
C25A	NEW JB-11	WEST SPAN INCLINOMETER	NEW		NO. 16 AWG TSP
C26	EXISTING JB-5	EXISTING WEST PEDESTRIAN GATE	NEW	1"	4 - NO. 12 AWG, 8 BO. 14 AWG
C27	EXISTING JB-5	EXISTING JB-7	EXISTING	3/4"	7 - NO. 10 AWG
C28	EXISTING JB-5	EXISTING JB-7	EXISTING	1 1/2"	7 - NO. 12 AWG, 35 NO. 14 AWG
C29	EXISTING JB-7	EXISTING JB-6	EXISTING		MAINTAIN EXISTING
C30	EXISTING JB-6	EXISTING NW SPAN NAVIGATION LIGHT	EXISTING		MAINTAIN EXISTING
C31	EXISTING JB-6	EXISTING SW SPAN NAVIGATION LIGHT	EXISTING		MAINTAIN EXISTING
C32	EXISTING JB-6	EXISTING ACCENT LIGHTING	EXISTING		MAINTAIN EXISTING
C33	EXISTING JB-7	WEST POSITION PROXIMITY SWITCHES	EXISTING		MAINTAIN EXISTING
C34	EXISTING JB-7	EXISTING ACCENT LIGHTING	EXISTING		MAINTAIN EXISTING
C35	EXISTING JB-7	EXISTING JB-8	NEW	SOOW	7 - NO. 10 AWG SOOW CORD
C36	EXISTING JB-7	EXISTING JB-8	NEW	SOOW	30 - NO. 12 AWG SOOW
C37	EXISTING JB-8	NEW JB-14	NEW	3/4"	8 NO. 14 AWG
C37A	NEW JB-14	BRAKE 1 WEST	NEW	SOOW	4 - NO. 14 AWG
C37B	NEW JB-14	BRAKE 1 WEST LS-BR1-SET-W	NEW	SOOW	3 - NO. 14 AWG
C37C	NEW JB-14	BRAKE 1 WEST LS-BR1-REL-W	NEW	SOOW	3 - NO. 14 AWG
C37D	NEW JB-14	BRAKE 1 WEST LS-BR1-HR-W	NEW	SOOW	3 - NO. 14 AWG
C38	EXISTING JB-8	WEST MAIN MOTOR 1	NEW	3/4"	4 - NO. 10 AWG, 4 - NO. 12 AWG
C39	EXISTING JB-8	WEST MAIN MOTOR 2	NEW	3/4"	4 - NO. 10 AWG, 4 - NO. 12 AWG
C40	EXISTING JB-8	NEW JB-15	NEW	3/4"	8 NO. 14 AWG
C40A	NEW JB-15	BRAKE 2 WEST	NEW	SOOW	4 - NO. 14 AWG
C40B	NEW JB-15	BRAKE 2 WEST LS-BR2-SET-W	NEW	SOOW	3 - NO. 14 AWG
C40C	NEW JB-15	BRAKE 2 WEST LS-BR2-REL-W	NEW	SOOW	3 - NO. 14 AWG
C40D	NEW JB-15	BRAKE 2 WEST LS-BR2-HR-W	NEW	SOOW	3 - NO. 14 AWG
C41	EXISTING JB-8	EXISTING PEDESTRIAN LIGHTING	EXISTING		MAINTAIN EXISTING
C42	EXISTING JB-8	EXISTING ACCENT LIGHTING	EXISTING		MAINTAIN EXISTING

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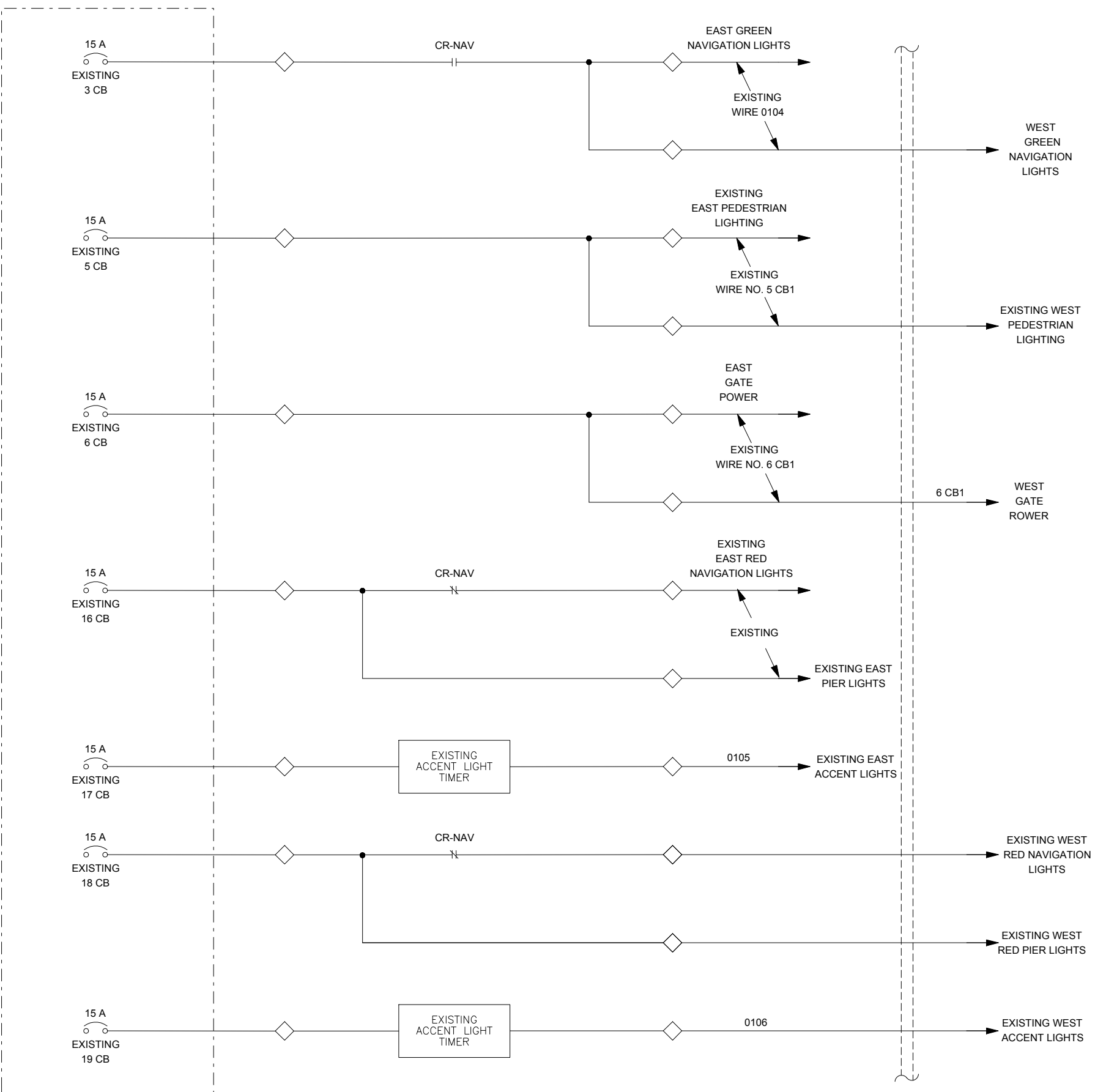
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CONDUIT BLOCK DIAGRAM

Sheet No. 34 of 37 Sheets



EXISTING  
LIGHTING PANEL



NOTES:

- EXISTING WIRE NUMBERS TO BE FIELD VERIFIED.
- NEW CONDUCTORS ARE TO BE PULLED FROM THE LIGHTING PANEL THROUGH THE NEW CONTROL CONSOLE AND INTO EXISTING JB-1 AND JB-2 AND INTO EXISTING JB-5, JB-7 AND JB-8. EXISTING CONDUITS AND CONDUCTORS ROUTED TO THE NAVIGATION, PEDESTRIAN AND ACCENT LIGHTING ARE TO REMAIN AND BE REUSED.

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EXISTING LIGHTING CIRCUITS

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LEGEND	DESCRIPTION	QUANTITY	RATING
CS-EG	EAST GATE CONTROL SWITCH	2	3 POSITION, SPRING RETURN TO CENTER
CS-WG	WEST GATE CONTROL SWITCH		
CS-MTR-E	EAST MOTOR SELECTOR SWITCH	2	2 POSITION MAINTAINED CONTACT LEVER SELECTOR SWITCH
CS-MTR-W	WEST MOTOR SELECTOR SWITCH		
CS-SPAN	SPAN OPERATION CONTROL SWITCH	1	THREE POSITION, SPRING RETURN TO CENTER
KS-CP	CONTROL POWER SWITCH	1	2 POSITION KEYED SELECTOR SWITCH
KS-JOG-E	EAST JOG KEY SWITCH	2	2 POSITION KEYED SELECTOR SWITCH, SPRING RETURN OFF
KS-JOG-W	WEST JOG KEY SWITCH		
PB-ES	EMERGENCY STOP PUSHBUTTON	1	ILLUMINATED MUSROOM HEAD PUSHBUTTON
PL-CP	CONTROL POWER PILOT LIGHT		30 MM LED PILOT LIGHT
PL-DRV-E-FLT	EAST DRIVE FAULTED PILOT LIGHT	4	DUAL FIELD LED PILOT LIGHT
PL-DRV-E-RDY	EAST DRIVE READY PILOT LIGHT		
PL-DRV-W-FLT	WEST DRIVE FAULTED PILOT LIGHT		DUAL FIELD LED PILOT LIGHT
PL-DRV-W-RDY	WEST DRIVE READY PILOT LIGHT		
PL-MTR1-E	EAST MOTOR 1 SELECTED PILOT LIGHT		DUAL FIELD LED PILOT LIGHT
PL-MTR1-W	WEST MOTOR 1 SELECTED PILOT LIGHT		
PL-MTR2-E	EAST MOTOR 2 SELECTED PILOT LIGHT		DUAL FIELD LED PILOT LIGHT
PL-MTR2-W	WEST MOTOR 2 SELECTED PILOT LIGHT		
PL-LP	LOCK PINS ENGAGED PILOT LIGHT	4	30 MM LED PILOT LIGHT
PL-PG-E	EAST PEDESTRIAN GATE CLOSED PILOT LIGHT	3	
PL-PG-W	WEST PEDESTRIAN GATE CLOSED PILOT LIGHT		
PL-RDY	SPAN OPERATION CONTROL CLEAR PILOT LIGHT		
CB-DYNAMIC	DYNAMIC CONTROL POWER CIRCUIT BREAKER	2	7 AMP CIRCUIT BREAKER
CB-STATIC	STATIC CONTROL POWER CIRCUIT BREAKER		
CR-GATES	GATE PERMISSIVE RELAY	3	MACHINE TOOL RELAY
CR-NAV	NAVIGATION LIGHT RELAY		
UVR	UNDERVOLTAGE RELAY		
MCR	MASTER CONTROL RELAY	1	MACHINE TOOL RELAY WITH 20 AMPERE CONTACTS
CR-PIN1-E	EAST LOCK PIN 1 PROXIMITY SWITCH INTERPOSING RELAY	4	24 VDC 2PDT GENERAL PURPOSE RELAY
CR-PIN1-W	WEST LOCK PIN 1 PROXIMITY SWITCH INTERPOSING RELAY		
CR-PIN2-E	EAST LOCK PIN 2 PROXIMITY SWITCH INTERPOSING RELAY		
CR-PIN2-W	WEST LOCK PIN 2 PROXIMITY SWITCH INTERPOSING RELAY		
SR1	SAFETY RELAY 1	2	SAFETY RELAY
SR2	SAFETY RELAY 2		
M-BR1-E	EAST MOTOR BRAKE 1 STARTER	4	IEC 9 AMP COMBINATION STARTER/CIRCUIT BREAKER
M-BR1-W	WEST MOTOR BRAKE 1 STARTER		
M-BR2-E	EAST MOTOR BRAKE 2 STARTER		
M-BR2-W	WEST MOTOR BRAKE 2 STARTER		
M-MTR-E	EAST MOTOR CONTACTOR	2	NEMA SIZE 2 REVERSING CONTACTOR MECH. INTERLOCKED
M-MTR-W	WEST MOTOR CONTACTOR		
PFR-E	EAST PHASE FAILURE RELAY	2	PHASE FAILURE RELAY
PFR-W	WEST PHASE FAILURE RELAY		
FU-DRV-E	EAST DRIVE LINE FUSES	6	3 - SEMICONDUCTOR DRIVE PROTECTION FUSES
FU-DRV-W	WEST DRIVE LINE FUSES		
FU-IN-1	INPUT MODULE 1 FUSE	18	3 AMP CARTRIDGE FUSE
FU-IN-2	INPUT MODULE 2 FUSE		
FU-IN-3	INPUT MODULE 3 FUSE A		
FU-IN-4	INPUT MODULE 3 FUSE B		
FU-IN-5	INPUT MODULE 4 FUSE		
FU-IN-6	INPUT MODULE 5 FUSE		
FU-IN-7	INPUT MODULE 6 FUSE		
FU-OUT-1	OUTPUT MODULE 1 FUSE		
FU-OUT-2	OUTPUT MODULE 2 FUSE		
FU-OUT-3	OUTPUT MODULE 3 FUSE		
FU-INCL	INCLINOMETER PWER SUPPLY FUSE		
FU-PFR-E	EAST PHASE FAILURE RELAY FUSES		
FU-PFR-W	WEST PHASE FAILURE RELAY FUSES		
FU-PINS	LOCK PINS PROXIMITY SWITCH POWER SUPPLY FUSE		

CPU	ALLEN BRADLEY 1769-L33ER	1	COMPACTLOGIX CONTROLLER
INPUT 1	ALLEN BRADLEY 1769-IA16	6	16 POINT COMPACTLOGIX AC DIGITAL INPUT MODULE
INPUT 2			
INPUT 3			
INPUT 4			
INPUT 5			
INPUT 6			
ANALOG IN	ALLEN BRADLEY 1769-IF4	1	4 POINT COMPACTLOGIX ANALOG INPUT MODULE
OUTPUT 1	ALLEN BRADLEY 1769-OW16	3	16 POINT COMPACTLOGIX RELAY OUTPUT MODULE
OUTPUT 2			
OUTPUT 3			
POWER SUPPLY	ALLEN BRADLY 1769-PA4	1	COMPACTLOGIX POWER SUPPLY
HMI	ALLEN BRADLEY 2711P-T12C4A8	1	1250 PANELVIEW PLUS
		1	POWER CONDITIONER LINE FILTER
		1	ETHERNET SWITCH
PSPLY-INCL	INCLINOMETER PWER SUPPLY	2	50 WATT 24 VDC SWITCHING POWER SUPPLY
PSPLY-PINS	LOCK PINS PROXIMITY SWITCH POWER SUPPLY		
LEGEND	DESCRIPTION	QUANTITY	RATING
MM1-E	EAST MAIN SPAN MOTOR 1	4	15 HP, 8 POLE, 480 VAC, INVERTER DUTY, 1.25 SERVICE FACTOR, DESIGN B MOTOR
MM1-W	WEST MAIN SPAN MOTOR 1		
MM2-E	EAST MAIN SPAN MOTOR 2		
MM2-W	WEST MAIN SPAN MOTOR 2		
BR1-E	EAST MOTOR BRAKE 1	4	8" 480 VAC THRUSTOR BRAKE
BR1-W	WEST MOTOR BRAKE 1		
BR2-E	EAST MOTOR BRAKE 2		
BR2-W	WEST MOTOR BRAKE 2		
INCL-E	EAST INCLINOMETER	2	PLUS/MINUS 80 DEGREE 2 WIRE CURRENT OUTPUT ENCLOSED INCLINOMETER
INCL-W	WEST INCLINOMETER		
LS-BR1-HR-E	EAST MOTOR BRAKE 1 HAND RELEASED LIMIT SWITCH	12	INDUSTRIAL LEVER LIMIT SWITCH
LS-BR1-HR-W	WEST MOTOR BRAKE 1 HAND RELEASED LIMIT SWITCH		
LS-BR1-R-E	EAST MOTOR BRAKE 1 RELEASED LIMIT SWITCH		
LS-BR1-R-W	WEST MOTOR BRAKE 1 RELEASED LIMIT SWITCH		
LS-BR1-S-E	EAST MOTOR BRAKE 1 SET LIMIT SWITCH		
LS-BR1-S-W	WEST MOTOR BRAKE 1 SET LIMIT SWITCH		
LS-BR2-HR-E	EAST MOTOR BRAKE 2 HAND RELEASED LIMIT SWITCH		
LS-BR2-HR-W	WEST MOTOR BRAKE 2 HAND RELEASED LIMIT SWITCH		
LS-BR2-R-E	EAST MOTOR BRAKE 2 RELEASED LIMIT SWITCH		
LS-BR2-R-W	WEST MOTOR BRAKE 2 RELEASED LIMIT SWITCH		
LS-BR2-S-E	EAST MOTOR BRAKE 2 SET LIMIT SWITCH		
LS-BR2-S-W	WEST MOTOR BRAKE 2 SET LIMIT SWITCH		
PS-FO-E	EAST FULL OPEN PROXIMITY SWITCH	8	LEVERLESS MAGNETIC LIMIT SWITCH
PS-FO-W	WEST FULL OPEN PROXIMITY SWITCH		
PS-MTD-1	MATED PROXIMITY SWITCH 1		
PS-MTD-2	MATED PROXIMITY SWITCH 2		
PS-NC-E	EAST NEAR CLOSED PROXIMITY SWITCH		
PS-NC-W	WEST NEAR CLOSED PROXIMITY SWITCH		
PS-NO-E	EAST NEAR OPEN PROXIMITY SWITCH		
PS-NO-W	WEST NEAR OPEN PROXIMITY SWITCH		
PS-PIN1-E	EAST LOCK PIN 1 PROXIMITY SWITCH	4	20 MM NORMALLY CLOSED 24 VDC PROXIMITY SWITCH
PS-PIN1-W	WEST LOCK PIN 1 PROXIMITY SWITCH		
PS-PIN2-E	EAST LOCK PIN 2 PROXIMITY SWITCH		
PS-PIN2-W	WEST LOCK PIN 2 PROXIMITY SWITCH		
	EAST AB-20-COMM-E	2	POWERFLEX 700 ETHERNET COMMUNICATIONS MODULE
	WEST AB-20-COMM-E		

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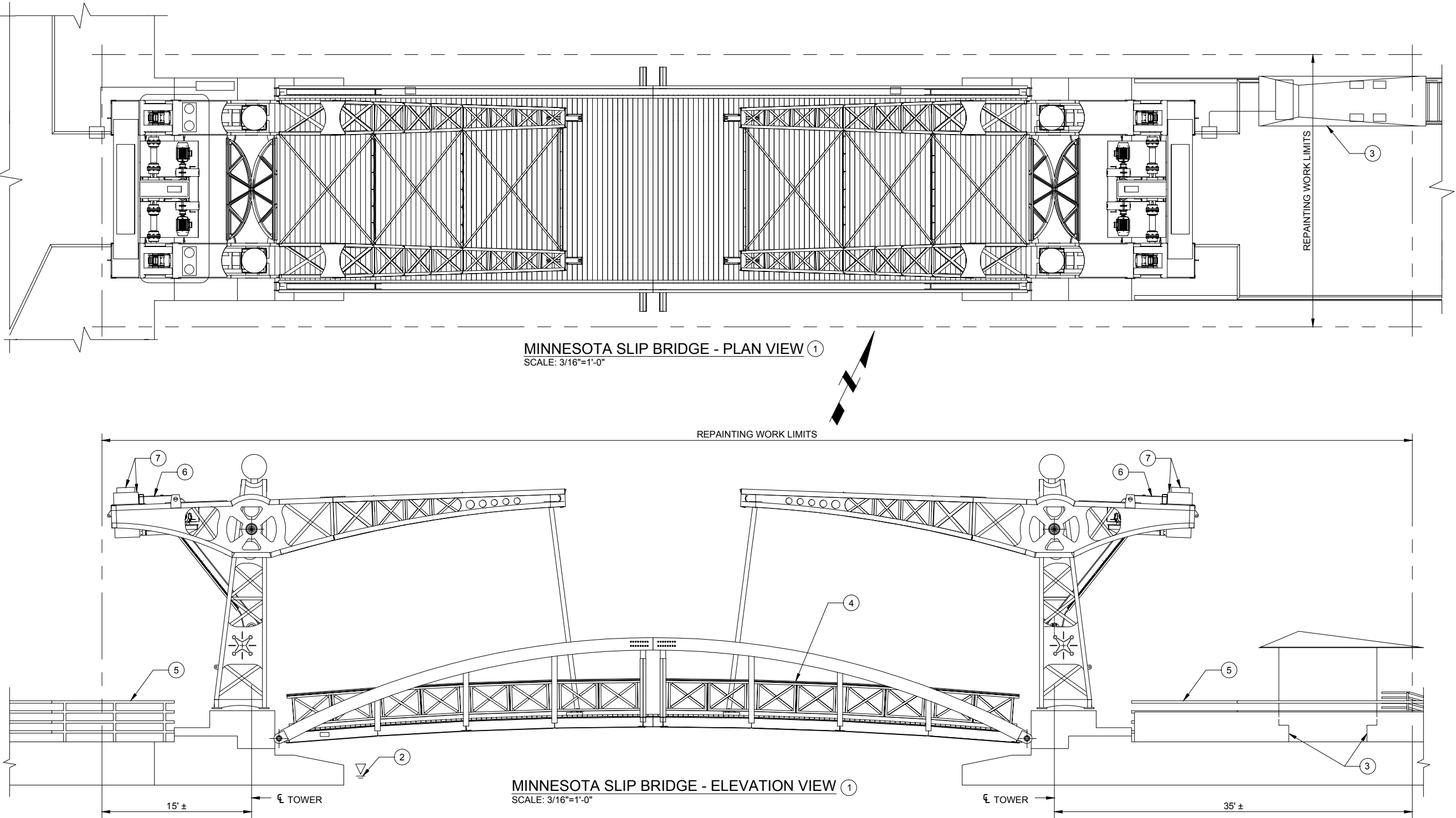
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BILL OF MATERIALS

Sheet No. 36 of 37 Sheets

KEY NOTES

- 1 SEE ORIGINAL BRIDGE CONSTRUCTION PLANS FOR GENERAL DIMENSIONS OF BRIDGE STRUCTURE. ALL PREVIOUSLY PAINTED (BLUE) SURFACES OF THE BRIDGE STRUCTURE (EXCLUDING METAL RAILINGS MOUNTED ON CONCRETE OFF OF THE BRIDGE AND UPPER PORTIONS OF THE OPERATOR'S HOUSE NOT ON BRIDGE BUT WITHIN THE IDENTIFIED REPAINTING WORK LIMITS), AND ALL NEW STRUCTURAL STEEL FURNISHED UNDER THIS CONTRACT SHALL BE INCLUDED IN THE LUMP SUM AREA TO BE REPAINTED, UNLESS NOTED OTHERWISE.
- 2 THE CLEARANCE FROM THE UNDERSIDE OF THE BRIDGE STRUCTURE TO THE WATER SURFACE IS APPROXIMATELY 3'-9".
- 3 THE EXPOSED/ ACCESSIBLE STEEL BASE OF THE OPERATOR'S HOUSE SHALL BE INCLUDED IN REPAINTING AREA. STEEL BASE EXTENDS FROM THE CONCRETE WALK TO 1'-8" ± ABOVE THE CONCRETE SURFACE. IT IS PERMISSIBLE FOR THIS PAINTING TO BE DEFERRED UNTIL THE SPRING 2018 TOUCH-UP WORK IS PERFORMED, AT CONTRACTOR'S OPTION, BUT WOULD HAVE TO BE PERFORMED WITH THE BRIDGE IN OPERATION AND OPEN TO PEDESTRIANS.
- 4 THE TIMBER RAIL CAP (BOTH SIDES OF STRUCTURE) SHALL BE REMOVED PRIOR TO PAINT REMOVAL AND REINSTALLED FOLLOWING REPAINTING OPERATIONS UTILIZING NEW GALVANIZED OR STAINLESS STEEL FASTENERS (REMOVAL, REINSTALLATION AND FASTENERS TO BE INCIDENTAL).
- 5 THE BLUE PAINTED METAL PIPE RAILINGS EXTENDING FROM, BUT NOT ATTACHED TO, THE BRIDGE STRUCTURE WHICH LIE WITHIN THE REPAINTING WORK LIMITS AND/ OR CONTAINMENT ARE TO BE PROTECTED DURING PAINTING WORK. RAILING WITHIN THE CONTAINMENT MAY BE BLASTED AND PAINTED AT CONTRACTOR'S OPTION AND AT NO ADDITIONAL COST TO THE CITY IN LIEU OF PROTECTION.
- 6 MACHINERY PLATFORM TO BE INSTALLED DURING THIS PROJECT WILL BE PAINTED WITH A NON-SKID SURFACE. THIS PAINTED SURFACE SHALL BE PROTECTED AND IS NOT REQUIRED TO BE REPAINTED.
- 7 UPPER SURFACE OF COUNTERWEIGHT BOX TO BE PAINTED WITH A NON-SKID SURFACE BY APPLICATION OF A SECOND INTERMEDIATE COAT AND ADDITION OF AN APPROVED NON-SKID FILLER (INCIDENTAL).



PAINT NOTES

- ALL SURFACES TO BE REPAINTED ARE TO BE CLEANED TO BARE METAL IN ACCORDANCE WITH THE REQUIREMENTS OF COMMERCIAL BLAST CLEANING OF THE SOCIETY FOR PROTECTIVE COATINGS (SSPC) SP10, NEAR WHITE. ALL AREAS OF PACK RUST SHALL BE CHISELED, IF NECESSARY, PRIOR TO BLAST CLEANING AS DIRECTED BY THE ENGINEER.
- EXISTING BRIDGE FINISH (PAINT) DOES NOT CONTAIN LEAD. ALL REMOVAL OPERATIONS SHALL PROPERLY COLLECT SPENT ABRASIVES, DUST, PAINT CHIPS ETC. FOR DISPOSAL IN ACCORDANCE WITH THE LAWS OF THE STATE OF MINNESOTA, THE SPECIAL PROVISIONS AND APPLICABLE FEDERAL RULES AND REGULATIONS.
- FOLLOWING PAINT REMOVAL, ALL PREPARED SURFACES SHALL BE REPAINTED WITH A NEW 3-COAT SYSTEM PER SPEC MnDOT 2748. REPAINTING TO BE INCLUDED UNDER ITEM "ORGANIC ZINC-RICH PAINT SYSTEM (OLD)."
- DURING THE COURSE OF THE WORK, THE CONTRACTOR SHALL NOT DAMAGE OR CONTAMINATE ANY EXISTING ITEMS WHICH ARE TO REMAIN. ALL MACHINERY, ELECTRICAL, STAINLESS STEEL, GALVANIZED, WOOD, CONCRETE, PLASTIC AND GLASS COMPONENTS OF THE STRUCTURE ARE TO BE STRICTLY PROTECTED FROM BLASTING AND PAINT OVERSPRAY. THESE COMPONENTS INCLUDE BUT ARE NOT LIMITED TO: WIRING AND CABLING; BEARINGS; PIN ASSEMBLIES; MECHANICAL MOTORS, GEARS, ETC.; ELECTRICAL SYSTEM; WOOD DECKING; LIGHTING; SECURITY GATES; AND FISH SCULPTURES. ANY DAMAGE DONE TO EXISTING ITEMS TO REMAIN SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE CITY.
- PEDESTRIAN TRAFFIC SHALL BE CLOSED FROM ACCESSING/ USING THE BRIDGE DURING THE BRIDGE REPAINTING WORK. CONTRACTOR IS RESPONSIBLE FOR ALL PROTECTIVE BARRICADES AND FENCING (INCLUDED UNDER ITEM "WASTE COLLECTION AND DISPOSAL") AND CLOSURE SIGNING (INCLUDED UNDER ITEM "TRAFFIC CONTROL") PLACED AT EACH END OF BRIDGE AS REQUIRED TO PROTECT AND NOTIFY PEDESTRIANS.
- WASTE MATERIALS, DEBRIS, AND OTHER MATERIALS SHALL BE PROTECTED FROM FALLING TO THE AREAS ADJACENT TO OR UNDER THE BRIDGE. PLATFORMS, NETS, SCREENS, OR OTHER PROTECTIVE DEVICES SHALL BE USED TO CATCH THE MATERIAL. IF THE ENGINEER DETERMINES THAT ADEQUATE PROTECTIVE DEVICES ARE NOT BEING EMPLOYED, THE WORK SHALL BE SUSPENDED UNTIL ADEQUATE PROTECTION IS PROVIDED. ALL MATERIAL FALLING ON THE AREA BELOW AND ADJACENT TO THE BRIDGE SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR AT NO COST TO THE CITY.
- THE COST OF FURNISHING, INSTALLING, MAINTAINING, REMOVING AND DISPOSING OF ALL ACCESS EQUIPMENT, PLATFORMS, NETS, SCREENS, OR OTHER PROTECTIVE DEVICES SHALL BE INCLUDED UNDER ITEM "WASTE COLLECTION AND DISPOSAL."

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.  
NAME: *Joseph D. Litman* LIC. NO. 21833 DATE 10/26/2016  
Joseph D. Litman

City of Duluth Proj. No. 1554

PAINT PLAN

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