ITEMS OF WORK

1. CENTER BEARING ASSEMBLY
2. BALANCE VERIFICATION
3. TIE ROD ASSEMBLY
4. OPERATING MACHINERY
5. STRUCTURAL REMOVAL/STRUCTURAL STEEL
6. ELECTRICAL SERVICE
7. EXISTING VARIABLE FREQUENCY DRIVES
8. CONTROL CONSOLE
9. ELECTRICAL MACHINERY
10. LIMIT SWITCHES
11. EXISTING PEDESTRIAN GATES
12. CONDUIT AND CABLE

NOTES:
1. THIS SHEET SHOWS THE GENERAL LOCATION OF MOST WORK ITEMS AND IS NOT INTENDED TO REPRESENT THE FULL SCOPE OF WORK.
2. FOR DESCRIPTION OF ITEMS OF WORK SEE SHEET 3.
3. FOR GENERAL MACHINERY NOTES SEE SHEET 4.
4. FOR GENERAL ELECTRICAL NOTES SEE SHEET 21.
GENERAL MACHINERY NOTES

1. These rules are based on the original contract plans (circa 1970), which are included for reference. The original contract plans have been used as references for the general machinery notes. These rules are intended to cover all aspects of the project and provide guidance for the installation and maintenance of machinery on the project.

2. Machine and equipment specifications are included in the project documents. All machinery and equipment shall be in accordance with the specifications and installation requirements. 

3. All machinery and equipment shall be installed in accordance with the instructions provided by the manufacturer. 

4. All machinery and equipment shall be tested and operated as required by the project specifications. 

5. All machinery and equipment shall be maintained in accordance with the manufacturer's instructions. 

6. All machinery and equipment shall be installed in a safe and efficient manner. 

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101. All machinery and equipment shall be installed in a safe and efficient manner.
EXISTING ARCH TRUSS ELEVATION
SCALE 1 1/2" = 1'-0"

CENTER LATCH DEMOLITION PLAN
SCALE 1 1/2" = 1'-0"

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.

DENOTES REMOVAL
Installation Notes:
1. Remove all welded plates and equipment associated with existing center latches.
2. Trim Jack Bearing CR x 11.3 channels to provide 1/4" clearance with new center bearing assemblies.
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. 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.
6. Install W8 x 31 center bearing support using 3/4" A325 bolts. Supports shall be installed level.
7. Install W8 x 31 center bearing support using 3/4" A325 bolts. Supports shall be installed level.
8. Install male and female center bearing with nominal 1/4" shims as shown.
9. Verify that bridge will seat at correct elevation when at 60°F. Add or subtract shims as required.
10. Lubricate interface between male and female center bearing prior to span operation.
1. The structural connection plates (inset at 202) indicate that the existing tie rod assemblies require final assembly. Final assembly requires a full-scale diagram showing the structural connection to the tie rod assemblies. The existing connections are noted as making a 90° change from the tie rod to the flange plate.

2. The tie rod assemblies shall be provided with new flange, spherical flange, and new attachment.

3. The connections shall be made using new bolts and nuts galvanized to provide the structural connections. New bolts and nuts shall be provided for the new tie rod assemblies. The existing connections shall be made using new bolts and nuts galvanized to provide the structural connections. New bolts and nuts shall be provided for the new tie rod assemblies.

4. All tie rod assemblies shall be provided with new flanges and spherical flanges. The existing flanges shall be provided with new bolts and nuts galvanized to provide the structural connections. New bolts and nuts shall be provided for the new tie rod assemblies.

5. For information on installing tie rods, see Sheet 4.

City of Duluth Proj. No. 1554

TIE ROD END

MTE: ASTM A668 CL. G
SCALE: 6" = 1' - 0"
(8) REQUIRED

TIE ROD END ASSEMBLY - DEVELOPED VIEW

SATE: 6063 T6-11003
BORE: OD = 3/4" (8) REQUIRED

PEARL CHROMIUM STEEL
MTE: ASTM A479 CL. H
(8) REQUIRED
(SEE NOTE 3)

PIN
(9) REQUIRED
(SEE NOTE 3)

TIE ROD END ASSEMBLY

SCALE: FULL

EXISTING CLEVIS PLATES

MATL: AISI 316 SS
(16) REQUIRED

1.97 in [50.0 mm] O.D. SPACER
(SEE NOTE 4)

3° MAX. ROTATION

2.95 in [75.0 mm] O.D.

1/4" SPACER
(20) [2.4 mm]

REMOVING PIN CLEARANCE
EXISTING CLEVIS PLATES

3.07 in [78.0 mm] O.D.

RETAINING RING GROOVE

.09 in [2.4 mm]

RETAINING RING GROOVE WIDTH

.26" OD x 1 1/8" WALL SEAMLESS MECHANICAL TUBE
MTE: ASTM A519 GRADE CD 1026.
EXISTING TOWER SHEAVE SUPPORTS DEMOLITION

NOTE: NEAR SIDE GUSSET PL. AND TOWER LEG NOT SHOWN FOR CLARITY
RACK ASSEMBLY - ELEVATION VIEW

SCALE: 1 1/2"=1'-0"

(4) ASSEMBLIES REQUIRED

RACK BEAM ASSEMBLY DETAILS

SEE DETAIL 1

SEE DETAIL 2

54.454 RACK SEGMENT (26 TEETH) = "(TYP.)"

163.363 (3) RACK SEGMENTS PER RACK WELDMENT = " (REF.)"

17'-2 1/4" (OVERALL LENGTH)
13'-8 11/16"
2'-3 7/8"
16'-3 3/4"
8 1/4"
10.458
0.01" (HOLD)
7 3/4"
10 3/4" (HOLD)
11"

4'-3 3/4" (24) 3 4" DIA. H.S. BOLTS SPA @ 2 1/4" = "(TYP.)"
(24 BOLTS PER RACK SEGMENT, 72 REQUIRED PER RACK ASSEMBLY)

SECTION A-A

SCALE: HALF

DRILL THRU RACK BEAM AND RACK SEGMENTS FOR (72) H.S. BOLTS, WASHERS, AND NUT.

10 1/8"
125°
2 1/4"
2/3"
10.46"

RACK ASSEMBLY - DEVELOPED ELEVATION VIEW

SCALE: 1 1/2"=1'-0"

RACK ASSEMBLY - ELEVATION VIEW

SCALE: 1 1/2"=1'-0"

(4) ASSEMBLIES REQUIRED

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RACK ASSEMBLY - DEVELOPED ELEVATION VIEW

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SECTION A-A

SCALE: HALF

DRILL THRU RACK BEAM AND RACK SEGMENTS FOR (72) H.S. BOLTS, WASHERS, AND NUT.

10 1/8"
125°
2 1/4"
2/3"
10.46"
PINION ASSEMBLY - DEVELOPED VIEW
SCALE: 3"=1'-0"

RACK AND PINION MESH VIEW
(4) PINIONS REQUIRED
(12) RACK SEGMENTS REQUIRED

PINION ASSEMBLY - DEVELOPED VIEW
RACK BEAM NOT SHOWN FOR CLARITY

PINION ASSEMBLY DETAIL
SEE DETAIL 1

7" PINION
FACE WIDTH
COUPLING, C2-B
1/2" SHIMS (TYP.)
7 1/2" DIA. FN2 FIT W/ RACK SPACER
8 1/2" DIA.
R1/8" SHAFT FILLET
6" (REF.)

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

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME NAME: LIC. NO.
OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DATE
City of Duluth Proj. No. 1554
PAUL SKELTON
26363 10/26/16

RACK AND PINION DATA

<table>
<thead>
<tr>
<th>Rack</th>
<th>Pinion</th>
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<tbody>
<tr>
<td>RACK PITCH DIA.</td>
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</tr>
<tr>
<td>Shaft Diameter</td>
<td>1.000</td>
</tr>
<tr>
<td>Pitch Diameter</td>
<td>11.33</td>
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</tbody>
</table>

RACK AND PINION MESH VIEW
(4) PINIONS REQUIRED
(12) RACK SEGMENTS REQUIRED

TABLE OF RACK AND PINION MATERIALS

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
<th>Diameter</th>
<th>Tensile Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>RACK SPACER</td>
<td>Alloy Steel</td>
<td>2.1/4&quot; (TYP.)</td>
<td>60,000 (MIN.)</td>
</tr>
<tr>
<td>PINION BEARING SUPPORT</td>
<td>Aluminum</td>
<td>3 3/4&quot;</td>
<td>40,000</td>
</tr>
</tbody>
</table>

NOTES:
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3. CARRIAGE ASSEMBLY SHALL BE TESTED WITH RACK AND PINION FOR SMOOTH OPERATION UNDER NO LOAD CONDITION IN THE SHOP.
OPERATING MACHINERY ASSEMBLY - PLAN VIEW

SCALE: 3/4"=1'-0"

(2) ASSEMBLIES REQUIRED

OPERATING MACHINERY OUTPUT SHAFT ASSEMBLY - ELEVATION VIEW

SCALE: 1"=1'-0"

RACK NOT SHOWN FOR CLARITY

OPERATING MACHINERY INPUT SHAFT - ELEVATION VIEW

SCALE: 1"=1'-0"

OUTPUT MACHINERY NOT SHOWN

NOTES:

1. 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.

2. THE CONTRACTOR SHALL COORDINATE WITH THE REDUCER, COUPLING AND PINION MANUFACTURER AND PROVIDE A COLLINEAR ALIGNMENT BETWEEN PINION SHAFT PAIRS.

3. PROVIDE ½ INCH NOMINAL SHIM PACKS AT MOUNTING BASE OF ALL OPERATING MACHINERY EQUIPMENT.

4. ALL MACHINERY SUPPORT SURFACES TO BE FLAT AND LEVEL AND PARALLEL TO EACH OTHER.

5. FOR OPERATING MACHINERY SUPPORTS SEE SHEETS 18 THRU 20.

6. FOR ELECTRICAL DETAILS SEE SHEETS 21 THRU 36.

INSTALLATION NOTES:

1. 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.
EXISTING CIRCUIT BREAKER IN 480 VAC PANEL BOARD

EXISTING POWER FLEX 700 DRIVE

EXISTING DYNAMIC BRAKING MODULE

REGEN FAULT

EXISTING DRIVE TO BE PROVIDED WITH NEW ETHERNET COMMUNICATION MODULE

LEGEND:

TERMINAL IN CONTROL PANEL

.mybatis
NOTES FOR CONTROL DESK CONSTRUCTION:

1. PUSHBUTTONS, SELECTOR SWITCHES, TURNLEVER SWITCHES, AND INDICATING LIGHTS SHALL BE OF HEAVY DUTY, ULTRATHICK CONSTRUCTION, PULLED WITH NON-MELTED PULL LEVERS, which MUST BE MADE OF BRASS OR COPPER, AND WHICH MINIMUM LIFTS SHALL BE A CABLE LIBRARY SCREW BASE SOCKET WITH BONDED TERMINAL, BORRIS CATHODE, AND FLAT POLY CARBONATE LENS WITH COLOR AND LEGENDS AS SHOWN ON DRAWING. THROUGH TrouBleshooting LIGHTS SHALL BE SIMILAR TO CUTOFF HABAND TEST ON APPROVED EQUAL, ALL INDICATING LIGHTS SHALL BE LED TYPE, RATED 120 VAC.

2. DUAL FIELD LIGHTS COLORS ARE AS FOLLOWS:
   - FIELD "OPEN" LIGHT IS RED
   - FIELD "CLOSED" LIGHT IS GREEN

3. DRAW SHEET 3D FOR CONTROL DESK ELEVATION DETAILS.
**NOTES:**

1. **EXISTING WIRE NUMBERS TO BE FIELD VERIFIED.**

2. **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.**
**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 EXPOSED ACCESSIBLE STEEL BASE OF THE OPERATOR'S HOUSE SHALL BE INCLUDED IN REPAINTING AREA. STEEL BASE EXTENDS FROM THE CONCRETE SURFACE. IT IS PERMISSIBLE FOR THE 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.

3. THE EXPOSED ACCESSIBLE STEEL BASE OF THE OPERATOR'S HOUSE SHALL BE INCLUDED IN THE 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.

4. THE CLEARANCE FROM THE UNDERSIDE OF THE BRIDGE STRUCTURE TO THE WATER SURFACE IS APPROXIMATELY 3'-9".

5. THE EXPOSED ACCESSIBLE STEEL BASE OF THE OPERATOR'S HOUSE SHALL BE INCLUDED IN REPAINTING AREA. STEEL BASE EXTENDS FROM THE CONCRETE SURFACE. IT IS PERMISSIBLE FOR THE 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.

**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 (SPCC) SP10. NEAR WHITE. ALL AREAS OF PACK RUST SHALL BE CHISELED, IF NECESSARY, PRIOR TO BLAST CLEANING AS DIRECTED BY THE ENGINEER.

- 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.

- PEDESTRIAN TRAFFIC SHALL BE CLOSED FROM ACCESSING USING THE BRIDGE DURING THE BRIDGE REPAINTING WORK. CONTRACTOR IS RESPONSIBLE FOR ALL PROTECTIVE BARRIECADES 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.

- 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*.

- 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.

- 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).

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- 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*.

- 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).

- PEDESTRIAN TRAFFIC SHALL BE CLOSED FROM ACCESSING USING THE BRIDGE DURING THE BRIDGE REPAINTING WORK. CONTRACTOR IS RESPONSIBLE FOR ALL PROTECTIVE BARRIECADES 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.

- 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*.

- 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.

- 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).