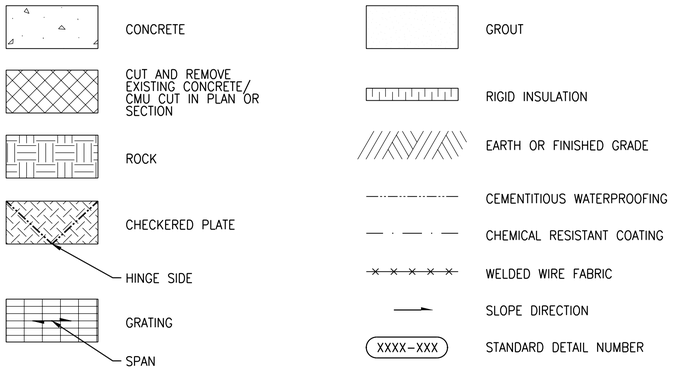
## LEGEND




## GENERAL NOTES

1. SEE DRAWING(S) 1-0102-DDTL-A007 FOR ABBREVIATIONS.
2. DIMENSIONS IN MILLIMETRES.
3. ELEVATIONS IN METRES.
4. READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH ALL RELATED CIVIL, ARCHITECTURAL, MECHANICAL, PROCESS, AND ELECTRICAL DRAWINGS, EXISTING DRAWINGS AND OTHER CONTRACT DOCUMENTS.
5. DESIGN DETAILS, SECTIONS, AND STANDARD DETAILS ARE INTENDED TO BE TYPICAL AND SHALL APPLY TO SIMILAR SITUATIONS AND LOCATIONS OCCURRING THROUGHOUT THE PROJECT, WHETHER OR NOT THEY ARE INDIVIDUALLY CALLED OUT ON DRAWINGS.
6. TYPICAL STRUCTURAL DETAILS SHOWN ON DRAWINGS SHALL GOVERN THE WORK. IF DETAILS DIFFER ON OTHER DRAWINGS OR SPECIFICATIONS, THE MOST STRINGENT SHALL GOVERN.
7. DESIGN LOADS INDICATED ON DRAWINGS ARE SERVICES LOADS (UNFACTORED). DESIGN LOADS INDICATED ON DRAWINGS WITH SUBSCRIPT "f "ARE FACTORED LOADS.
8. DO NOT EXCEED DESIGN LOADS NOTED ON DRAWINGS DURING CONSTRUCTION.
9. SEE OTHER CONTRACT DRAWINGS AND COORDINATE FOR ACTUAL SIZES, LOCATIONS AND DETAILS OF OPENINGS FOR PIPES, SLEEVES, DUCTS, FLOOR DRAINS, CONDUITS, AND OTHER PENETRATIONS NOT SHOWN ON STRUCTURAL DRAWINGS.
10. SEE MECHANICAL AND/OR PROCESS DRAWINGS AND COORDINATE FOR ACTUAL SIZES, LOCATIONS AND DETAILS OF EQUIPMENT BASES, SLUICE GATES, SLIDE GATES, IRRIGATION GATES, STOP LOG GUIDES, AND SIMILAR ITEMS.
11. SEE ELECTRICAL DRAWINGS FOR SIZES, REINFORCING, AND LOCATIONS OF CONCRETE ENCASED CABLES, CONDUITS, DUCT BANKS, AND CONCRETE PADS FOR ELECTRICAL EQUIPMENT NOT SHOWN ON STRUCTURAL DRAWINGS.
12. SEE ARCHITECTURAL DRAWINGS FOR SIZES AND LOCATIONS OF CONCRETE CURBS, RAILING, SHELF ANGLES, LOOSE LINTELS, ABRASIVE STAIR NOSINGS, REGLETS, INSERTS, AND THRESHOLDS NOT SHOWN ON STRUCTURAL DRAWINGS.
13. STRUCTURAL MEMBERS SHALL NOT BE CUT OR MODIFIED UNLESS SPECIFICALLY DETAILED OR APPROVED IN WRITING BY THE CONTRACT ADMINISTRATOR.
14. ALL LIQUID RETAINING STRUCTURES AND STRUCTURES BELOW GRADE SHALL BE WATERTIGHT.
15. DIMENSIONS, ELEVATIONS AND DETAILS OF EXISTING STRUCTURES ARE BASED ON PREVIOUS CONTRACT DRAWINGS AND DO NOT NECESSARILY REPRESENT THE AS-CONSTRUCTED CONDITIONS. FIELD VERIFY ALL DIMENSIONS, ELEVATIONS AND DETAILS OF EXISTING STRUCTURES PRIOR TO FABRICATION OF ADJACENT OR CONNECTING WORK. REPORT TO CONTRACT ADMINISTRATOR ANY DISCREPANCIES OR UNSATISFACTORY CONDITIONS WHICH MAY ADVERSELY AFFECT PROPER COMPLETION OF THE WORK BEFORE PROCEEDING.

## DESIGN CRITERIA

1. APPLICABLE CODE: 2010 NATIONAL BUILDING CODE WITH 2011 MANITOBA AMENDMENTS (NBC).
2. IMPORTANCE CATEGORY — POST DISASTER
   - $I_S$ (ULS) = 1.25
   - $I_S$ (SLS) = 0.9
   - $I_W$ (ULS) = 1.25
   - $I_W$ (SLS) = 0.75
3. SITE LOCATION: WINNIPEG, MANITOBA
4. SNOW LOAD DATA:
   - GROUND SNOW LOADING $S_S$ = 1.90 kPa
   - ASSOCIATED RAIN LOADING $S_r$ = 0.20 kPa
5. RAIN LOAD DATA:
   - ONE DAY RAINFALL 108 mm
6. SEISMIC DATA: N/A
7. WIND LOAD DATA:
   - 1 IN 50 YEAR HOURLY WIND PRESSURE 0.45 kPa
   - EXPOSURE CATEGORY OPEN TERRAIN

## FOUNDATIONS

1. REFER TO GEOTECHNICAL REPORT "SEWPCC UPGRADING/EXPANSION/CIVIL/GEOTECH GEOTECHNICAL INVESTIGATION REFORT BY KGS GROUP, DATED FEBRUARY 2014.
2. DESIGN GROUND WATER LEVEL ELEVATION: 227.800 m
3. DESIGN SURCHARGE: 5.0 kPa EXCEPT WHERE NOTED OTHERWISE
4. BACK FILL:
   UNIT WEIGHT: 19 kPa
   $\gamma_s$ DENSITY OF BACKFILL MATERIAL ABOVE DESIGN GROUND WATER LEVEL 19 kN/m$^3$
   $\gamma_{sb}$ DENSITY OF BACKFILL MATERIAL BELOW DESIGN GROUND WATER LEVEL 22 kN/m$^3$
   EARTH PRESSURE (AT REST COEFFICIENT) Ko (0.42)
   EARTH PRESSURE (ACTIVE COEFFICIENT) Ka (0.27)
5. PRESTRESSED CONCRETE PILES (HEXAGONAL), SEE DETAIL 1/SFDW-K002.

| PILE DIAMETER (D) | SLS PILE CAPACITY |
|---|---|
| 300mm | 555 kN |
| 350mm | 780 kN |
| 400mm | 1050 kN |

5. SEE DETAIL 2/SFDW-K002 FOR TYPICAL CUT-OFF REQUIREMENTS.
7. NOTIFY CONTRACT ADMINISTRATOR IF FINAL ELEVATION OF TOP OF INSTALLED PILE IS BELOW CUT-OFF ELEVATIONS PLUS MINIMUM LENGTH FOR EXPOSED TENDONS. SEE DETAIL 3/SFDW-K002 FOR PILE EXTENSION.
8. PROTECT FOUNDATION INCLUDING: SLAB ON GRADE, GRADE BEAMS AND FOOTINGS AGAINST FREEZING AND FROST ACTION DURING CONSTRUCTION.
9. PROTECT EXISTING FOUNDATIONS, WALLS, PILES AND SHORING TO REMAIN FROM DAMAGE.

## CONCRETE AND CONCRETE REINFORCING

1. CONCRETE COMPRESSIVE STRENGTH (MIN):

| | STRENGTH (MPa) | CLASS OF EXPOSURE |
|---|---|---|
| TYPE - A | 30 AT 56 DAYS | S-3 |
| TYPE - B | 15 | N |
| TYPE - C | 32 AT 28 DAYS | C-2 |
| PRECAST | 35 AT 28 DAYS | S-3 |

2. REINFORCING BARS:
   CAN/CSA-G30.18-09, GRADE 400R, GRADE 400W FOR WELDED REBARS.
3. REFERENCE CODES AND STANDARDS:
   - CSA A23.1-09 CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION
   - CSA A23.2-09 METHODS OF TEST AND STANDARD PRACTICES FOR CONCRETE
   - CSA A23.3-09 DESIGN OF CONCRETE STRUCTURES
   - ACI 350M-06, ACI 350.1-10 AND ACI 350.3-06 FOR LIQUID RETAINING STRUCTURES
4. FABRICATE AND PLACE REINFORCING STEEL IN ACCORDANCE WITH RSIC MANUAL OF STANDARD PRACTICE, UNLESS NOTED OTHERWISE.
5. FOR CONCRETE COVER TO REINFORCING STEEL, BENDS, LAPS AND ADDITIONAL REINFORCEMENT BELOW GRADE FOR WATER TIGHTNESS SEE STANDARD DETAIL.
6. MINIMUM REINFORCING FOR ALL CONCRETE WALLS AND SLABS UNLESS NOTED OTHERWISE:

| WALL THICKNESS (mm) | REINF EACH WAY | LOCATION |
|---|---|---|
| 150 | 15M@300 | CENTRED |
| 200 | 15M@300 | CENTRED |
| 250 | 15M@300 | EACH FACE; EACH WAY |
| 300 | 20M@300 | EACH FACE; EACH WAY |

7. CONTINUOUS WATERSTOP AS SPECIFIED SHALL BE INSTALLED IN ALL CONSTRUCTION JOINTS IN WALLS OF WATER HOLDING BASINS, CHANNELS, AND BELOW GRADE STRUCTURES EXCEPT WHERE SPECIFICALLY NOTED OTHERWISE.
8. CONSTRUCTION JOINTS INDICATED ARE SUGGESTED LOCATIONS. CONTRACTOR MAY REVISE LOCATIONS OF JOINT IN ACCORDANCE WITH SPECIFIED REQUIREMENTS. CONSTRUCTION JOINT LOCATIONS SHALL BE SUBMITTED FOR REVIEW.
9. COORDINATE PLACEMENT OF OPENINGS, CURBS, DOWELS, SLEEVES CONDUITS, BOLTS, INSERTS, ETC. PRIOR TO PLACEMENT OF CONCRETE.
10. PROVIDE 200mm HIGH MINIMUM CONCRETE CURBS BELOW MASONRY WALLS UNLESS NOTED OTHERWISE. WHEN EXPOSED TO VIEW, PROVIDE SETBACKS FOR BOTH LOAD BEARING AND PARTITION MASONRY WALLS AS SHOWN ON ARCHITECTURAL DRAWINGS.
11. PROVIDE CHAMFER TO ALL EXPOSED CORNERS.
12. PROVIDE DOWELS FROM PILES, COLUMNS/PIERS, FOOTINGS, SLABS, WALLS OR BEAMS TO COLUMNS/PIERS OR WALLS SIMILAR IN NUMBERS, SIZE AND SPACING TO THE VERTICAL STEEL IN THE COLUMNS/PIERS OR WALLS ABOVE UNLESS NOTED OTHERWISE.
13. LOCATE SLAB AND BEAM TOP BAR SPLICES AT MID-SPAN AND BOTTOM BAR SPLICES AT SUPPORTS.
14. CONDUITS SHALL NOT BE PLACED PARALLEL WITH BEAM OR COLUMN REINFORCING UNLESS SPECIFICALLY INDICATED IN DRAWINGS.

## CONCRETE SURFACE FINISH LEGEND

(SEE SPECIFICATION 03 39 00.3.9 FOR FINISH DESCRIPTION)

| | | | |
|---|---|---|---|
| W-1 | ORDINARY WALL FINISH | S-1 | STEEL TROWEL FINISH |
| W-2 | SMOOTH WALL FINISH | S-2 | WOOD FLOAT FINISH |
| W-3 | CONTROLLED PERMEABILITY FORM LINER | S-3 | NON SLIP FINISH |
| W-4 | SMOOTH RUBBED FINISH | S-4 | BROOM FINISH |
| W-5 | SACK RUBBED FINISH | S-5 | SCRATCH FINISH |
| W-6 | ABRASIVE BLAST FINISH | S-6 | BONDED CONCRETE TOPPING |

## MASONRY

1. MORTAR: CSA A179-04 PORTLAND CEMENT LIME, TYPE S
2. GROUT: CSA A179-04 12 MPa
3. CONCRETE MASONRY UNITS: CAN/CSA A165.1-04, HOLLOW TYPE H/15/A/M
4. VERTICAL REINFORCING STEEL: CAN/CSA G30.18-92, GRADE 400R
5. HORIZONTAL REINFORCING: CSA A370-04, EXTRA HEAVY DUTY 4.8mm DIAMETER TRUSS TYPE
6. DESIGN f'm OF THE FINISHED ASSEMBLY SHALL BE 7.5 MPa.
7. THE MINIMUM REINFORCING FOR REINFORCING CONCRETE BLOCK WALLS:

| WALL THICKNESS (mm) | VERTICAL REINFORCING | LOCATION | HORIZONTAL REINFORCING |
|---|---|---|---|
| 200 | 15M@1200 | CENTERED | EVERY OTHER COURSE |
| 250 | 15M@1200 | CENTERED | EVERY OTHER COURSE |
| 300 | 15M@1200 | EACH FACE | EVERY OTHER COURSE |

8. PLACE NO CONDUIT IN CELLS CONTAINING REINFORCEMENT.

## STRUCTURAL STEEL AND METAL FABRICATIONS

1. MATERIAL SHALL CONFORM TO THE FOLLOWING:

| | |
|---|---|
| STRUCTURAL STEEL | CAN/CSA G40.20/G40.21-04, GRADE 350W FOR ALL W AND H SECTIONS, GRADE 300W FOR OTHERS |
| HOLLOW STRUCTURAL SECTION | CAN/CSA G40.20/G40.21-04, GRADE 350W, CLASS C |
| HIGH STRENGTH BOLTS | ASTM A325 OR ASTM A490 |
| SHEAR STUDS | 20mm DIAMETER, FY=350MPA |
| ALUMINUM | CAN/CSA S157-05/S157.1-05, ALLOY 6351-T6 FOR STRUCTURAL EXTRUDED SHAPES |
| STAINLESS STEEL | ASTM A666-03, TYPE 316/316L WITH MINIMUM YIELD STRESS Fy = 207 MPa (30 ksi) |
| ANCHOR BOLTS | ASTM A307-04; GRADE 248 MPa |

2. REFERENCE CODES:

| | |
|---|---|
| STRUCTURAL STEEL | CAN/CSA-S16-09 LIMIT STATES DESIGN OF STEEL STRUCTURES |
| ALUMINUM | CAN/CSA S157-05/S157.1-05 STRENGTH DESIGN IN ALUMINUM/ COMMENTARY ON CSA S157-05 |
| STAINLESS STEEL | ASTM A666-03 STANDARD SPECIFICATION FOR ANNEALED OR COLD-WORKED AUSTENITIC STAINLESS STEEL SHEET, STRIP, PLATE, AND FLAT BAR<br>ASTM A276-08 STANDARD SPECIFICATION FOR STAINLESS STEEL BARS AND SHAPES |
| COLD FORMED STEEL | CSA S136-07 NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS |
| WELDING | |
| CARBON STEEL | CSA W59-03 WELD STEEL CONSTRUCTION (METAL ARC WELDING) |
| ALUMINUM | CSA W59.2-M1991(R2008) WELDED ALUMINUM CONSTRUCTION |
| STAINLESS STEEL | AMERICAN WELDING SOCIETY AWS D1.6/D1.6M:2007 STRUCTURAL WELDING CODE - STAINLESS STEEL |

3. ALL SHOP CONNECTIONS SHALL BE WELDED. ALL FIELD CONNECTIONS SHALL BE WELDED OR BOLTED USING HIGH STRENGTH BOLTS, BEARING TYPE WITH THREADS INCLUDED IN THE SHEAR PLANE.
4. BEAM CONNECTIONS SHALL BE C.I.S.C. DOUBLE ANGLE CONNECTIONS USING A325 BOLTS AND E480XX FILLET WELDS UNLESS NOTES OTHERWISE. MINIMUM SIZE OF BOLTS SHALL BE 19mm DIAMETER.
5. ALL MOMENT CONNECTIONS SHALL BE DESIGNED FOR 90% MOMENT CAPACITY OF THE MEMBER. THE WEB CONNECTIONS SHALL BE DESIGNED FOR THE SHEAR CAPACITY OF THE MEMBER.
6. FOR SHEAR AT NON-COMPOSITE SIMPLE SPAN CONNECTIONS, PROVIDE FOR HALF THE TOTAL FACTORED LOAD ON THAT SPAN AS TABULATED IN THE C.I.S.C. STEEL HANDBOOK BEAM LOAD TABLES, BUT NOT LESS THAN 50% OF THE SHEAR CAPACITY OF THE BEAMS.
7. ALL COLUMN SPLICES, DIAGONAL BRACING CONNECTIONS, AND MOMENT CONNECTIONS SHALL BE PRETENSIONED BEARING TYPE CONNECTIONS USING HIGH STRENGTH BOLTS.
8. SPLICES SHALL BE DESIGNED TO DEVELOP THE FULL CAPACITY OF THE MEMBER AT THE POINT OF SPLICE. MEMBER SHALL NOT BE SPLICED AT POINT OF MAXIMUM STRESS.
9. BRACING MEMBERS SHALL BE CONNECTED FOR THE FOLLOWING (WHICHEVER IS LARGER):
   - 50% OF THE FACTORED TENSILE RESISTANCE OF THE MEMBER BASED ON THE GROSS AREA OF THE MEMBER
   - FORCES AS SHOWN ON THE DRAWINGS
   - PROVIDE A MINIMUM OF TWO BOLTS
   - CROSS BRACE SHALL BE CONNECTED AT CENTRE
10. FORCES ARE DESIGNATED BY (+) FOR TENSION AND (-) FOR COMPRESSION.
11. CONNECTION FOR BEAMS SUBJECT TO AXIAL FORCES SHALL BE DESIGNED FOR THE AXIAL FORCES IN ADDITION TO THE SHEAR AND/OR MOMENT FORCES.
12. PROVIDE WELDED STIFFENER PLATES ON BOTH SIDES OF THE WEB OF BEAMS AT POINT OF CONCENTRATED LOAD INCLUDING BEAMS SUPPORTING COLUMNS OR RUNNING OVER TOPS OF COLUMNS. MINIMUM STIFFENER PLATES THICKNESS SHALL BE 10mm OR FLANGE THICKNESS OF THE COLUMN ABOVE OR BELOW, WHICHEVER IS GREATER. MINIMUM SIZE OF WELD SHALL BE 5mm DOUBLE FILLET WELDS OR SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF THE STIFFENER, WHICHEVER IS GREATER.
13. ALL EXTERIOR EXPOSED STEEL SHALL BE HOT-DIP GALVANIZED.



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No. 1441

| NO. | REVISIONS | DATE | DESIGN | CHECK |
|---|---|---|---|---|
| 00 | ISSUED FOR TENDER | 06/2014 | G.O. | J.C. |

CH2MHILL. SNC-LAVALIN KGS GROUP CONSULTING ENGINEERS

| | |
|---|---|
| DESIGNED BY: E. LUI | CHECKED BY: R. PARIKH |
| DRAWN BY: G.OMORI | APPROVED BY: J. CHENG |
| SCALE: NTS | ISSUED FOR CONSTRUCTION BY: T. TURZAK |
| DATE: 2015/08/13 | DATE: 2015/08/13 |
| CONSULTANT NO.: 474248 | |

ENGINEER'S SEAL
PROVINCE OF MANITOBA
S.L.E. LUI
Member 37003
REGISTERED PROFESSIONAL ENGINEER
13 August 2015

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

SOUTH END WATER POLLUTION CONTROL CENTRE
SEWPCC UPGRADING/EXPANSION PROJECT
STRUCTURAL
LEGEND AND GENERAL NOTES

| CITY DRAWING NUMBER | SHEET | REV. | SIZE |
|---|---|---|---|
| 1-0102-SDTL-A001 | | 00 | A1 |

PLOT DATE: 2015\08\12
FILE NAME: 1-0102-SDTL-A001.dgn