NOTES:

1. SCOPE

PIPELINES INCLUDED UNDER THESE SPECIFICATIONS ARE THOSE INSTALLED TO CARRY LIQUID FLAMMABLE PRODUCTS, HAZARDOUS PRODUCTS OR OTHER, HIGHLY VOLATILE SUBSTANCES UNDER PRESSURE. THESE STANDARDS SHALL BE USED IN CONJUNCTION WITH THE SCRRA DESIGN CRITERIA MANUAL, CHAPTER 9, UTILITIES, AND THE AREMA MANUAL OF RAILWAY ENGINEERING CHAPTER 1, PART 5.

2. GENERAL REQUIREMENTS

a. PIPELINES UNDER SCRRA TRACKS AND ACROSS SCRRA RIGHTS-OF-WAY SHALL BE ENCASED IN A LARGER PIPE OR CONDUIT CALLED THE CASING PIPE AS INDICATED IN FIGURE 1.
b. CASING PIPE AND NON-CASED PIPELINES SHALL BE DESIGNED TO CARRY COOPER'S E-80 RAILROAD LIVE LOADING WITH DIESEL IMPACT FACTOR AS PER AREMA.
c. PIPELINES SHALL BE LOCATED, WHERE PRACTICABLE, TO CROSS TRACKS AT APPROXIMATELY RIGHT ANGLES BUT PREFERABLY AT NO LESS THAN 45 DEGREES AND SHALL NOT BE PLACED WITHIN CULVERTS NOR UNDER RAILWAY BRIDGES.
d. TEST BORING OR OTHER SOIL INVESTIGATIONS, APPROVED BY SCRRA SHALL BE MADE, TO DETERMINE THE NATURE OF THE UNDERLYING MATERIAL FOR ALL PIPELINES WITH SIZES EQUAL OR GREATER THAN 48 INCHES IN DIAMETER AND A DEPTH FROM TOP OF PIPE TO BASE OF RAIL BETWEEN FIVE FEET SIX INCHES AND TEN FEET. THE TEST BORING SHOULD BE MADE ON THE CENTERLINE OF THE PIPE NEAR THE END OF THE BALLAST SECTION (IF POSSIBLE) ON EACH SIDE OF THE TRACKS AND AS DEEP AS THE BOTTOM OF THE BORE.
e. EXCEPTION TO ANY DESIGN, CONSTRUCTION, LOCATION OR SPECIFICATION CONTAINED IN THIS STANDARD MUST BE AUTHORIZED BY SCRRA. REQUESTS FOR EXCEPTIONS WILL BE CONSIDERED ONLY WHERE IT IS SHOWN THAT EXTREME HARDSHIP AND/OR UNUSUAL CONDITIONS PROVIDE JUSTIFICATION AND WHERE ALTERNATE MEASURES CAN BE USED IN KEEPING WITH THE INTENT OF THIS STANDARD. ALL REQUESTS FOR EXCEPTIONS SHALL BE FULLY DOCUMENTED WITH DESIGN DATA, CALCULATIONS, COST COMPARISONS AND OTHER PERTINENT INFORMATION.
f. ALL PIPELINES SHALL BE PROMINENTLY MARKED BY SIGNS OR MARKERS (MAINTAINED BY OWNER) LOCATED OVER THE PIPELINE.

3. CARRIER PIPE

a. CARRIER LINE PIPE SHALL BE OF STEEL AND CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI B 31.4 LIQUID TRANSPORTATION SYSTEMS FOR HYDROCARBONS, LIQUID PETROLEUM GAS, ANHYDROUS AMMONIA, AND ALCOHOLS, AND OTHER APPLICABLE ANSI CODES, EXCEPT THAT THE MAXIMUM ALLOWABLE STRESSES FOR DESIGN FOR STEEL PIPE SHALL NOT EXCEED THE FOLLOWING PERCENTAGES OF THE SPECIFIED MINIMUM YIELD STRENGTH (MULTIPLIED BY LONGITUDINAL JOINT FACTOR) OF THE PIPE AS DEFINED IN THE ABOVE CODES.

A. THE FOLLOWING PERCENTAGES APPLY TO HOOP STRESS IN STEEL PIPE WITHIN A CASING UNDER SCRRA TRACKS AND ACROSS SCRRA RIGHTS-OF-WAY.

SEVENTY-TWO PERCENT ON OIL PIPELINES
FIFTY PERCENT FOR PIPELINES CARRYING CONDENSATE, NATURAL GASOLINE, NATURAL GAS LIQUIDS, LIQUIFIED PETROLEUM GAS, OTHER LIQUID PETROLEUM PRODUCTS, HAZARDOUS PRODUCTS, OR OTHER HIGHLY VOLATILE SUBSTANCES.

B. THE FOLLOWING PERCENTAGES APPLY TO HOOP STRESS IN STEEL PIPE LAID LONGITUDINALLY ON SCRAA RIGHTS-OF-WAY.

SIXTY PERCENT ON OIL PIPELINES
FORTY PERCENT FOR PIPELINES CARRYING CONDENSATE, NATURAL GASOLINE, NATURAL GAS LIQUIDS, LIQUIFIED PETROLEUM GAS, OTHER LIQUID PETROLEUM PRODUCTS, HAZARDOUS PRODUCTS, OR OTHER HIGHLY VOLATILE SUBSTANCES.

C. SEE AREMA CHAPTER 1, SECTION 5.2 FOR GAS PIPELINES.

b. THE PIPE SHALL BE LAID WITH SUFFICIENT SLACK SO THAT IT IS NOT IN TENSION.

4. CASING PIPE

a. CASING PIPE AND JOINTS SHALL BE OF STEEL AND OF LEAK PROOF CONSTRUCTION, CAPABLE OF WITHSTANDING AREMA (COOPER E80 LIVE LOAD) AND HAVE A SPECIFIED MINIMUM YIELD STRENGTH OF AT LEAST 35,000 PSI. THE INSIDE DIAMETER OF THE CASING PIPE SHALL BE AT LEAST TWO INCHES GREATER THAN THE LARGEST OUTSIDE DIAMETER OF THE CARRIER PIPE, JOINTS OR COUPLINGS FOR CARRIER PIPE LESS THAN SIX INCHES IN DIAMETER; AND AT LEAST FOUR INCHES GREATER FOR CARRIER PIPE SIX INCHES AND OVER IN DIAMETER. IN ALL CASES THE SPACE PROVIDED SHALL BE ADEQUATE TO ALLOW FOR REMOVAL WITHOUT DISTURBING THE CASING PIPE OR ROADBED.
b. TABLE 1 INDICATES A MINIMUM THICKNESS BASED UPON SUPERIMPOSED LOADS ONLY AND IT IS THE RESPONSIBILITY OF THE LICENSEE AND/OR THE INSTALLER TO PROVIDE A CASING WHICH IS ADEQUATE FOR THE LOADS THAT RESULT DURING INSTALLATION. THE WALL THICKNESS MAY BE DECREASED BY 0.063 INCH, IF THE CASING IS INSTALLED WITH A PROTECTIVE COATING AND IS CATHODICALLY PROTECTED, EXCEPT FOR DIAMETERS UNDER 14 INCHES.
c. CASING PIPE UNDER SCRRA TRACKS AND ACROSS SCRRA RIGHT-OF-WAY SHALL EXTEND TO THE GREATER OF THE FOLLOWING DISTANCES, MEASURED AT RIGHT ANGLE TO CENTERLINE OF TRACK. IF ADDITIONAL TRACKS ARE CONSTRUCTED IN THE FUTURE, THE CASING SHALL BE EXTENDED AT THE LICENSEE'S EXPENSE.
   A. ACROSS THE ENTIRE WIDTH OF THE SCRRA RIGHT-OF-WAY.
   B. THREE FEET BEYOND THE DITCH LINE.
   C. TWO FEET BEYOND THE TOE OF SLOPE.
   D. A MINIMUM DISTANCE OF 25 FEET FROM EACH SIDE OF THE CENTERLINE OF OUTSIDE TRACK WHEN CASING IS SEALED AT BOTH ENDS, AND
   E. A MINIMUM DISTANCE OF 45 FEET FROM EACH SIDE OF THE CENTERLINE OF OUTSIDE TRACK WHEN CASING IS OPEN AT BOTH ENDS.
d. THE DEPTH OF THE CASING SHALL NOT BE LESS THAN AS SHOWN IN FIGURE 1. HORIZONTAL DIRECTIONAL DRILLING OF A PIPELINE CARRYING FLAMMABLE, HAZARDOUS, OR HIGHLY VOLATILE SUBSTANCES SHALL HAVE A MINIMUM COVER FROM BASE OF RAIL TO TOP OF PIPELINE OF 25 FEET. INSTALLATION SHALL BE BY THE DRY BORE METHOD ONLY.

5. CONSTRUCTION

a. CASING PIPE SHALL BE CONSTRUCTED AS TO PREVENT LEAKAGE OF ANY SUBSTANCE FROM THE CASING THROUGHOUT IT'S LENGTH, EXCEPT AT THE ENDS. CASING SHALL BE INSTALLED AS TO PREVENT THE FORMATION OF A WATERWAY UNDER THE ROADBED, AND WITH AN EVEN BEARING THROUGHOUT IT'S LENGTH, AND SHALL SLOPE TO ONE END (EXCEPT FOR LONGITUDINAL OCCUPANCY).
b. THE FACES OF ALL PITS (JACKING AND RECEIVING) SHALL BE LOCATED A MINIMUM OF 25 FEET FROM THE CENTERLINE OF THE NEAREST TRACK, MEASURED AT RIGHT ANGLES TO TRACK. SHORING, IF REQUIRED, SHALL MEET SCRRA'S EXCAVATION SUPPORT GUIDELINES.
c. FOR ALL PIPELINES WITH SIZES EQUAL OR GREATER THAN 48 INCHES, RAIL ELEVATIONS OVER THE WORK MUST BE MONITORED AT INTERVALS PRESCRIBED BY SCRRA TO DETECT ANY TRACK MOVEMENT. MOVEMENTS OVER 1/4" VERTICALLY SHALL BE IMMEDIATELY REPORTED TO SCRRA. SCRRA WILL SURFACE THE TRACK SEVERAL TIMES IN ONE YEAR IF THERE IS ANY MOVEMENT AT LICENSEE AND/OR INSTALLERS'S COST.
d. THE METHOD OF CONSTRUCTION SHALL MEET ALL CURRENT AREMA AND "GREEN BOOK" SPECIFICATIONS AND REQUIREMENTS.
e. THE BORING, TUNNELING OR JACKING OPERATION SHALL BE PROGRESSED ON A 24-HOUR BASIS WITHOUT STOPPAGE WHEN THE CASING IS 20 FEET FROM THE CENTERLINE OF THE NEAREST TRACK.
f. THE BORING, TUNNELING OR JACKING INSTALLATIONS SHALL HAVE A BORED HOLE DIAMETER ESSENTIALLY THE SAME AS THE OUTSIDE DIAMETER OR THE PIPE PLUS THE THICKNESS OF THE PROTECTIVE COATING. IF VOIDS SHOULD DEVELOP OR IF THE BORED HOLE DIAMETER IS GREATER THAN THE OUTSIDE DIAMETER OF THE PIPE (INCLUDING COATING) BY MORE THAN APPROXIMATELY 1 INCH, THE SPACE SHALL BE FILLED BY GROUTING OR OTHER REMEDIAL MEASURES TAKEN AS APPROVED BY SCRRA.
g. THE BORE AND JACK METHOD (PUSHING PIPE INTO THE EARTH WITH A BORING AUGER ROTATING WITHIN PIPE TO REMOVE SPOIL) IS ACCEPTABLE.
h. JACKING METHOD (PUSHING SECTIONS OF PIPE INTO POSITION WITH JACKS PLACED AGAINST A BACKSTOP AND EXCAVATION PERFORMED BY HAND FROM WITHIN THE JACKING SHIELD AT THE HEAD OF THE PIPE) IS ACCEPTABLE. TUNNELING SHALL NOT BE CONSIDERED WHERE LESS THAN SIX FEET OF COVER EXISTS OR WHERE EXCESSIVELY SANDY, LOOSE OR ROCKY SOILS ARE ANTICIPATED.
i. TUNNELING METHOD (PLACING RINGS OF LINER PLATE WITHIN THE TAIL SECTION OF A TUNNELING SHIELD OR TUNNELING MACHINE) IS ACCEPTABLE. TUNNELING SHALL NOT BE CONSIDERED WHERE LESS THAN SIX FEET OF COVER EXISTS OR WHERE EXCESSIVELY SANDY, LOOSE OR ROCKY SOILS ARE ANTICIPATED.
j. HORIZONTAL DIRECTIONAL DRILLING METHOD (BORING A SMALL DIAMETER PILOT HOLE ON A DESIRED VERTICAL AND HORIZONTAL ALIGNMENT USING A CUTTING HEAD WITH VISCOUS SLURRY AND PULLING A PIPE WITH A REAMER) IS ACCEPTABLE.
k. PIPE RAMMING METHOD (PUSHING A SOLID STEEL ROD UNDER THE ROADBED, ATTACHING A CONE SHAPED EXPANDER TO THE END OF THE ROD, ATTACHING A CASING PIPE TO THE EXPANDER AND PULLING BACK THE ROD) IS NOT ACCEPTABLE.
l. THE USE OF WATER JETTING TO FACILITATE CASING PLACEMENT AND SPOIL REMOVAL IS NOT PEMITTED.
m. JACKING, BORING, OR TUNNELING PIPES EQUAL TO OR GREATER THAN 48 INCHES NOMINAL DIAMETER WILL NOT BE ALLOWED WITH LESS THAN ONE AND ONE HALF TIMES THE PIPES NOMINAL DIAMETER OF COVER FROM BASE OF RAIL TO TOP OF PIPELINE.
n. JACKING AND BORING OF PIPELINES WITH A NOMINAL DIAMETER GREATER THAN 72 INCHES SHALL NOT BE ALLOWED UNLESS OTHERWISE APPROVED BY SCRRA.

6. CATHODIC PROTECTION

WHERE CASING AND/OR CARRIER PIPE IS CATHODICALLY PROTECTED, SCRRA SHALL BE NOTIFIED AND A SUITABLE TEST MADE TO VERIFY THAT OTHER SCRRA STRUCTURES AND FACILITIES ARE ADEQUATELY PROTECTED FROM THE CATHODIC CURRENT IN ACCORDANCE WITH THE RECOMMENDATION OF CURRENT REPORTS OF CORRELATING COMMITTEE OF CATHODIC PROTECTION, PUBLISHED BY THE NATIONAL ASSOCIATION OF CORROSION ENGINEERS.

7. INSPECTION AND TESTING

ANSI CODES CURRENT AT TIME OF CONSTRUCTING THE PIPELINE, SHALL GOVERN THE INSPECTION AND TESTING OF THE FACILITY WITHIN SCRRA RIGHTS-OF-WAY EXCEPT AS FOLLOWS:

ONE-HUNDRED PERCENT OF ALL FIELD WELDS SHALL BE INSPECTED BY RADIOGRAPHIC EXAMINATION, AND SUCH FIELD WELDS SHALL BE INSPECTED FOR 100% OF THE CIRCUMFERENCE.
THE PROOF TESTING OF THE STRENGTH OF THE CARRIER PIPE SHALL BE IN ACCORDANCE WITH ANSI REQUIREMENTS.

8. SEALS AND SUPPORTS

THE ENDS OF CASING ARE TO BY SUITABLY SEALED AGAINST THE ENTRANCE OF FOREIGN MATERIAL, BUT ARE NOT TO BE TIGHTLY SEALED. ALL SUPPORTS, INSULATORS OR CENTERING DEVICES FOR THE CARRIER PIPE SHALL BE SO DESIGNED AND CONSTRUCTED THAT NO LOADS FROM THE ROADBED, TRAFFIC OR CASING PIPE ITSELF ARE TRANSMITTED TO THE CARRIER PIPE. THE SPACING OF SUCH SUPPORTS LONGITUDINALLY SHALL NOT BE GREATER THAN 10 FEET.

9. VENTS

CASING PIPE WHEN SEALED, SHALL BE PROPERLY VENTED. VENT PIPES SHALL BE SUFFICIENT DIAMETER, BUT IN NO CASE LESS THAN 2 INCHES IN DIAMETER, SHALL BE ATTACHED NEAR END OF CASING AND PROJECT THROUGH GROUND SURFACE AT RIGHT-OF-WAY LINES OR NOT LESS THAN 45 FEET (MEASURED AT RIGHT ANGLES) FROM CENTERLINE OF NEAREST TRACK. VENT PIPE, OR PIPES, SHALL EXTEND NOT LESS THAN 4 FEET ABOVE GROUND SURFACE. TOP OF VENT PIPE SHALL BE FITTED WITH DOWN-TURNED ELBOW PROPERLY SCREENED, OR A RELIEF VALVE. VENTS IN LOCATIONS SUBJECT TO HIGH WATER SHALL BE EXTENDED ABOVE THE MINIMUM ELEVATION OF HIGH WATER AND SHALL BE SUPPORTED AND PROTECTED IN A MANNER THAT MEETS THE APPROVAL OF SCRRA RIGHT-OF-WAY ENGINEER OR HIS/HER DESIGNATED REPRESENTATIVE. VENT PIPES SHALL NOT BE CLOSER THAN 4 FEET (VERTICALLY) FROM ELECTRIC WIRES.

10. SHUT-OFF VALVES

ACCESSIBLE EMERGENCY SHUT-OFF VALVES SHALL BE INSTALLED WITHIN EFFECTIVE DISTANCES EACH SIDE OF THE TRACK AS MUTUALLY AGREED TO BY SCRRA AND THE PIPELINE COMPANY. WHERE PIPELINES ARE PROVIDED WITH AUTOMATIC CONTROL STATIONS AT LOCATIONS AND WITHIN DISTANCES APPROVED BY SCRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION, NO ADDITIONAL VALVES SHALL BE REQUIRED. SHUT-OFF VALVES ON SCRRA RIGHT-OF-WAY SHOULD BE AVOIDED.

11. LONGITUDINAL PIPELINES

PIPELINES LAID LONGITUDINALLY ON SCRRA RIGHT-OF-WAY SHALL BE LOCATED AS FAR AS PRACTICABLE FROM ANY TRACKS OR OTHER IMPORTANT STRUCTURES AND AS CLOSE TO THE SCRRA PROPERTY LINE AS POSSIBLE. THEY MUST NOT BE WITHIN 25 FEET OF ANY TRACK AND MUST HAVE MINIMUM OF SIX (6) FEET GROUND COVER OVER THE PIPELINE UP TO 50 FEET FROM THE CENTERLINE OF TRACK. WHERE PIPELINE IS LAID MORE THAN 50 FEET FROM CENTERLINE OF TRACK, MINIMUM COVER SHALL BE AT LEAST FIVE (5) FEET. PIPELINE MUST BE MARKED BY A SIGN APPROVED BY SCRRA EVERY 500 FEET AND AT EVERY ROAD CROSSING, STREAMBED, OTHER UTILITY CROSSING AND AT LOCATIONS OF MAJOR CHANGE IN DIRECTION OF THE PIPE.

12. APPROVAL OF PLANS

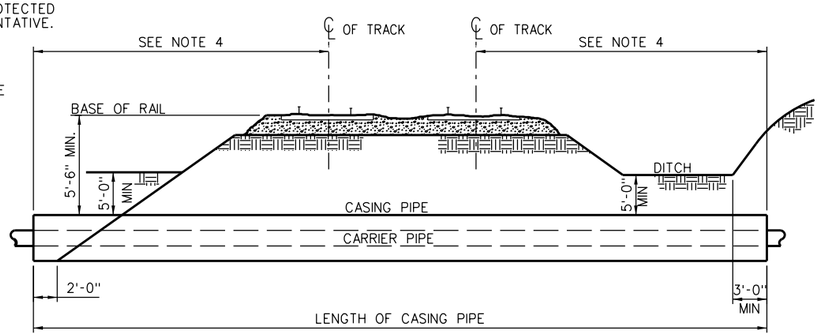
SCRRA'S RIGHT-OF-WAY ENCROACHMENT APPLICATION, PLAN REVIEW FEES, AND PLANS FOR PROPOSED INSTALLATION SHALL BE SUBMITTED TO SCRRA FOR APPROVAL PRIOR TO CONSTRUCTION. PLANS SHALL BE DRAWN TO SCALE SHOWING THE RELATION OF THE PROPOSED PIPELINE TO SCRRA TRACKS, ANGLE OF CROSSING, LOCATION OF VALVES, SCRRA SURVEY STATION, RIGHT-OF-WAY LINES AND GENERAL LAYOUT OF TRACKS AND SCRRA FACILITIES. PLANS SHOULD ALSO SHOW A CROSS SECTION (OR SECTIONS) FROM FIELD SURVEY, SHOWING PIPE IN RELATION TO ACTUAL PROFILE OF GROUND AND TRACKS. ADDITONAL INFORMATION ON APPROVAL PROCESSES AND REQUIREMENTS ARE AVAILABLE ON SCRRA'S WEBSITE AT WWW.METROLINKTRAINS.COM.

13. EXECUTION OF WORK

THE PIPELINE REAL ESTATE AGREEMENT AND SCRRA'S TEMPORARY RIGHT-OF-ENTRY AGREEMENT (SCRRA FORM NO. 36) SHALL BE FULLY EXECUTED BEFORE ANY WORK WILL BE ALLOWED ON SCRRA RIGHT-OF-WAY. THE EXECUTION OF WORK ON SCRRA RIGHTS-OF-WAY, INCLUDING THE SUPPORTING OF TRACKS, SHALL BE SUBJECT TO THE INSPECTION AND DIRECTION OF SCRRA RIGHT-OF-WAY ENGINEER OR HIS/HER AUTHORIZED REPRESENTATIVE. THE INSTALLER SHALL PERFORM THE CONSTRUCTION OR MAINTENANCE WORK IN SUCH A MANNER AND AT SUCH TIMES AS SHALL NOT ENDANGER OR INTERFERE WITH SCRRA'S OPERATIONS, INCLUDING RELATION TO THE PROPER MANNER OF PROTECTING THE TRACKS, SIGNALS, FIBER OPTIC CABLES, PIPELINES, OTHER PROPERTY AND TENANTS OR LICENSEES AT OR IN THE VICINITY OF THE WORK DURING THE PERIOD OF CONSTRUCTION.

TABLE 1

STEEL CASING (UNCOATED AND UNPROTECTED)			
NOMINAL DIAMETER (INCHES)	MIN. WALL THICKNESS (INCHES)	NOMINAL DIAMETER (INCHES)	MIN. WALL THICKNESS (INCHES)
14" & UNDER	0.250" (1/4")	44" & 46"	0.656" (21/32")
16"	0.281" (9/32")	48"	0.688" (11/16")
18"	0.312" (5/16")	50"	0.719" (23/32")
20" & 22"	0.344" (11/32")	52"	0.750" (3/4")
24"	0.375" (3/8")	54"	0.781" (25/32")
26"	0.406" (13/32")	56" & 58"	0.812" (13/16")
28"	0.438" (7/16")	60"	0.844" (27/32")
30"	0.469" (15/32")	62"	0.875" (7/8")
32"	0.500" (1/2")	64"	0.906" (29/32")
34" & 36"	0.531" (17/32")	66" & 68"	0.938" (15/16")
38"	0.562" (9/16")	70"	0.969" (31/32")
40"	0.594" (19/32")	72"	1.000" (1")
42"	0.625" (5/8")	OVER 72" MUST BE APPROVED BY SCRRA	



CASING REQUIREMENTS - FIGURE 1

X	XX-XX-XX	REVISION	XX	XX
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN BY: A. CARLOS DATE: 03/31/2011

ASSISTANT DIRECTOR: STANDARDS & DESIGN

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METROLINK®
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ENGINEERING STANDARDS

PIPE LINES FOR FLAMMABLE AND HAZARDOUS SUBSTANCES ACROSS OR ALONG RIGHT OF WAY

STANDARD 5002
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