

TYPICAL CONDUIT INSTALLATION FOR PVC ENCASED MAJOR CONDUIT LINE

DETAIL #19

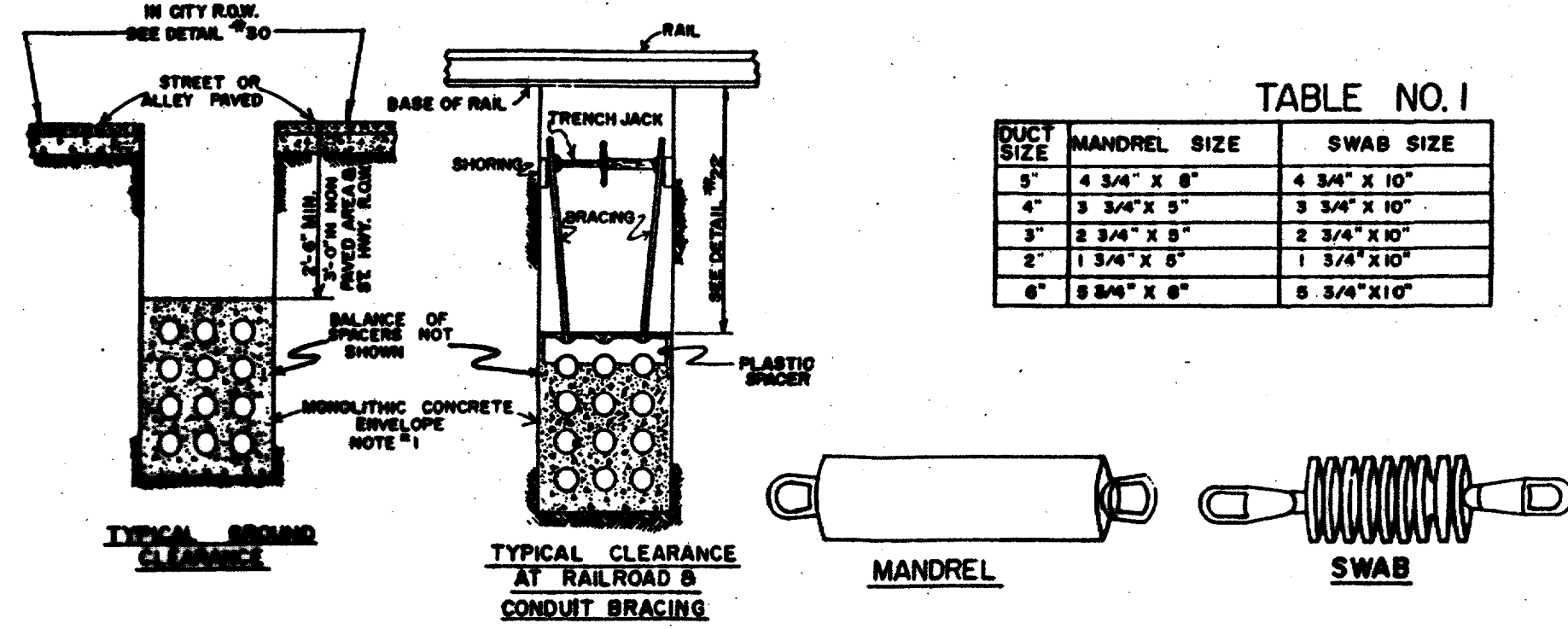


TABLE NO. 1

DUCT SIZE	MANDREL SIZE	SWAB SIZE
4"	4 3/4" X 5"	4 3/4" X 10"
3"	3 3/4" X 5"	3 3/4" X 10"
2"	2 3/4" X 5"	2 3/4" X 10"
1 1/2"	1 3/4" X 5"	1 3/4" X 10"
1"	1 3/4" X 5"	1 3/4" X 10"

SECTIONS OF TYPICAL FORMATION

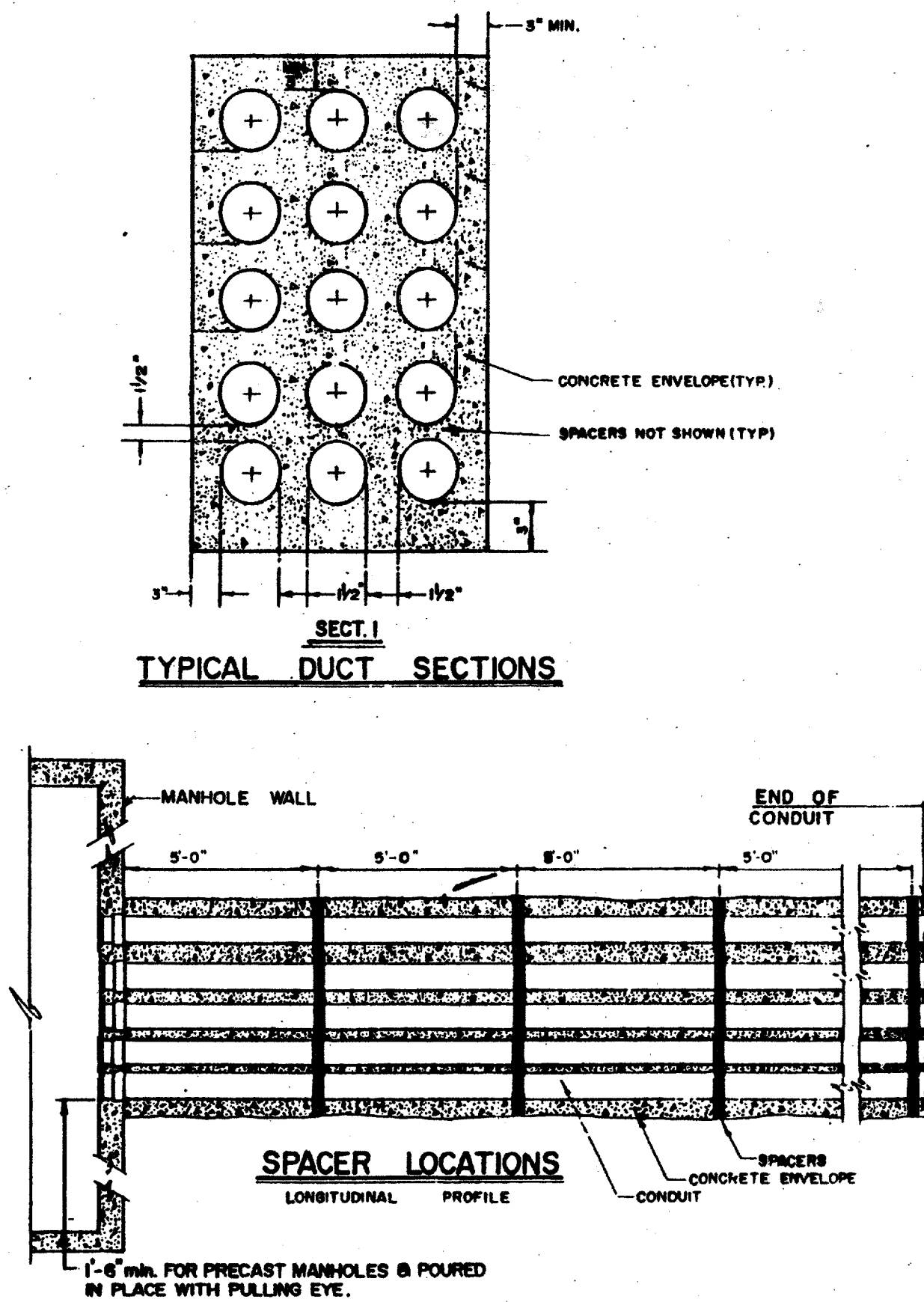


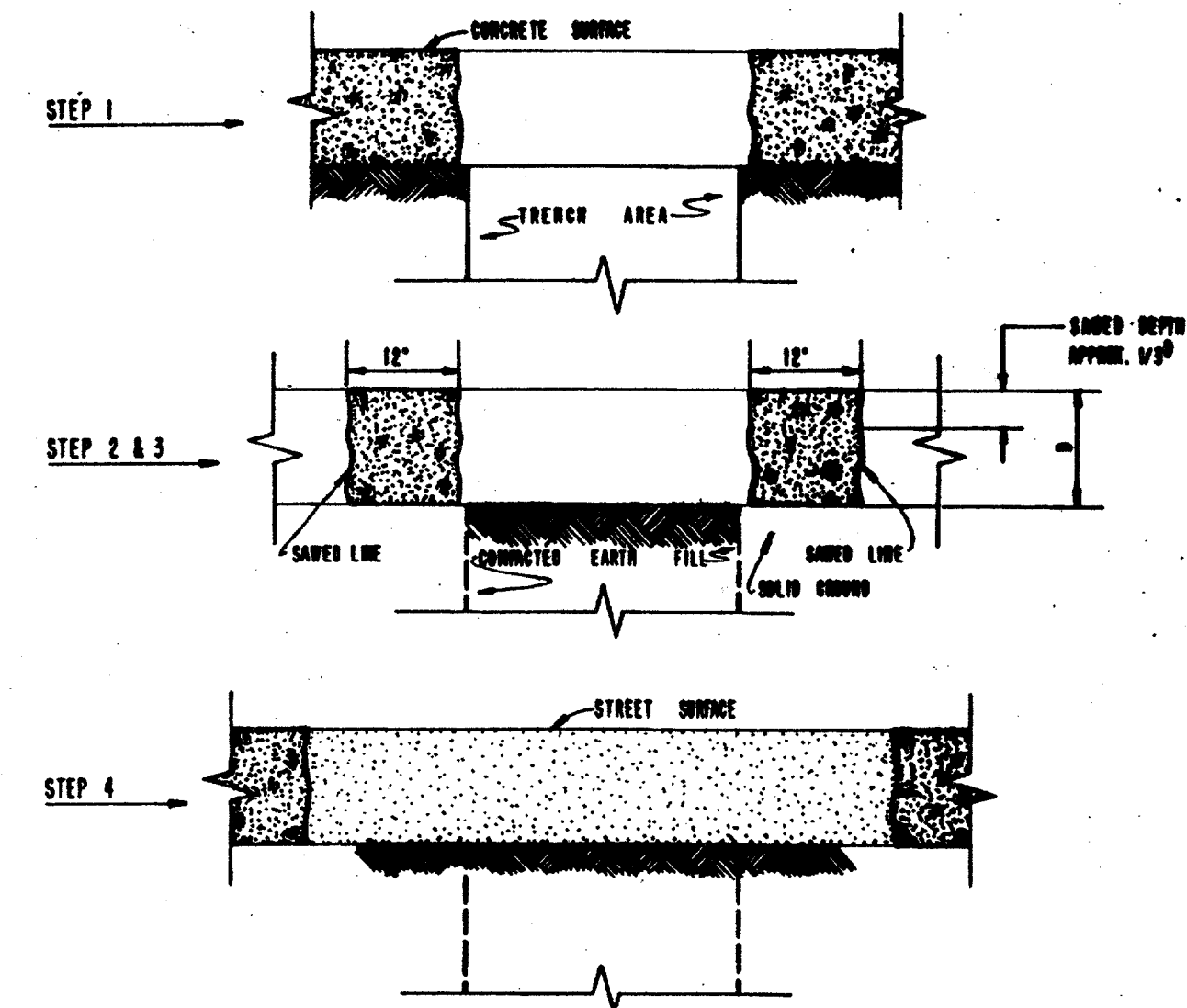
TABLE 2

CONDUIT SIZE	OUTSIDE DIAMETER	TYPE
2"	2.38"	PVC
3"	3.50"	PVC
4"	4.50"	PVC
6"	6.56"	PVC
8"	8.56"	PVC
PVC CEMENT		

DETAIL #20

SEQUENCE OF CONSTRUCTION

- SUFFICIENT CONCRETE WILL BE REMOVED TO PERMIT TRENCH EXCAVATION.
- UPON COMPLETION OF THE INSTALLATION OF THE CONDUIT LINE, THE TRENCH WILL BE UNDOUBLED AND COMPACTED TO THE REQUIRED DEPTH UP TO THE BASE OF PAVEMENT.
- THE CONCRETE PAVEMENT WILL BE SAVED TO A DEPTH OF APPROXIMATELY ONE THIRD OF THE DEPTH OF PAVEMENT PARALLEL TO THE LINE OF TRENCH, ONE FOOT BACK OF SOLID SHOULDER. FINISHING BEARERS CAN THEN BE USED TO BREAK THE EXCESS CONCRETE.
- THE EXPOSED EDGES OF THE CONCRETE WILL BE CLEANED SO A GOOD BOND CAN BE OBTAINED WHEN VOID IS FILLED.



NOTE: ASPHALT DRIVING SURFACES;
SEQUENCE OF CONSTRUCTION ON CONCRETE STREETS WITH ASPHALT DRIVING SURFACES WILL BE THE SAME AS SEQUENCE EXCEPT STEP 3, THE ASPHALT WILL BE CUT IN A STRAIGHT LINE USING METHODS ACCEPTABLE WITH THE CITY SPECIFICATIONS. SAVING OF THE CONCRETE WILL NOT BE REQUIRED.

STREET BREAKING AND REPLACEMENT DETAILS

NOTES:

- ALL SECTIONS OF THE CONDUIT WILL BE RUN IN A STRAIGHT LINE AS CONDITIONS WILL PERMIT. DEVIATIONS WILL BE LAID OUT BY THE POWER COMPANY ENGINEER.
- THE CONDUIT & FITTINGS WILL BE COATED LIBERALLY WITH PVC GREASE. PUSH CONDUIT AND FITTING TOGETHER UNTIL CONDUIT BUTTS AGAINST FITTING SHOULDER. VERIFY CONDUIT IS TIGHT TO ASSURE SMOOTH SPREADING OF GREASE. NORMAL MIN. COVER TO BE 50".
- WHEN COMPLETE, EACH CONDUIT OF A MAIN DUCT LINE WILL HAVE A MANDREL AND SWAB PULLED THROUGH THE ENTIRE LENGTH OF EACH CONDUIT OF A LATERAL LINE WILL HAVE A SWAB PULLED THROUGH THE ENTIRE LENGTH TO CHECK FOR BLOCKAGES OR OTHER UNDESIRABLE CONDITIONS. SEE TABLE NO. 1 FOR MANDREL AND SWAB SIZE FOR CORRESPONDING CONDUIT SIZE.
- ALL DUCTS MUST BE IN ACCORDANCE WITH EXISTING SAFETY REGULATIONS IN EFFECT.
- ALL CONDUIT MUST BE IN ACCORDANCE WITH EXISTING SAFETY REGULATIONS IN EFFECT.
- USE PLANS FOR CONDUIT ARRANGEMENT.
- FOR NUMBER, FORMATION, AND SIZE OF CONDUITS SEE JOB PLANS.
- FROM EARLY STRENGTH CEMENT PROHIBITED.
- SHOW WITH ELEVATIONS @ 5' INTERVALS @ EACH GRADE CHANGE AND AT MANHOLE ENTRANCE.
- SHOW MANHOLE FINISH FLOOR ELEVATION.
- ALL CONDUIT TO BE TYPE III OR II UNLESS OTHERWISE NOTED ON PLANS.
- SHOW EVERY 100' IN PLAN VIEW AND EVERY 50' WITH ELEVATION IN PROFILE PLUS STRUCK AND ELEVATION AT EACH GRADE CHANGE.

DETAIL #21
CONCRETE SPECIFICATION

I. GENERAL

THESE SPECIFICATIONS APPLY TO MANHOLE, WALL, AND DUCT LINE CONSTRUCTION ON THE UNDERGROUND SYSTEMS IN THE DRAINAGE NETWORK. THE CONCRETE SHALL BE OF ONE OF THE CLASSES SPECIFIED IN THE SUMMARY FOR THE TYPE OF WORK UNDER CONSTRUCTION. THE RATIO OF SAND TO GRAVEL SHALL BE USED SO AS TO OBTAIN A DENSE AND COMPACT CONCRETE AS FURNISHED WITH THE MATERIALS AVAILABLE AND FOR THE CLASS OF WORK UNDER CONSTRUCTION. BUT IN NO CASE SHALL THE RATIO OF CEMENT TO THE HEAVY CONTENTS BE LESS THAN THE CLASS OF CONCRETE SPECIFIED.

II. SPECIFICATIONS FOR MATERIALS

- CONCRETE: THE CONCRETE SHALL CONFORM TO "STANDARD SPECIFICATIONS FOR PORTLAND CEMENT" ASTM C-150 FOR TYPE I OR TYPE II PORTLAND CEMENT AND TYPE III, HIGH-STRENGTH-EXPOSURE PORTLAND CEMENT. THE CEMENT SHALL BE PROPERLY PROTECTED FROM THE WEATHER UNTIL USED AND SHALL BE DRY AND FREE FROM LUMPS WHEN PLACED IN THE MIXER.
- SAND: THE SAND SHALL CONSIST OF HARD SILICEOUS MATERIAL, FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SURFACE COATING, THAT IS CLEAN AND FREE FROM LUMPS WHEN PLACED IN THE MIXER. IT SHALL BE WASHED AND PASSED THROUGH A NO. 20 SIEVE AND NOT MORE THAN FIVE PER CENT PASSING A NO. 100 SIEVE. THERE SHALL BE NOT MORE THAN FIVE PER CENT PASSING A NO. 20 SIEVE AND NOT MORE THAN FIVE PER CENT PASSING A NO. 100 SIEVE. THREE PER CENT BY WEIGHT OF SAND OR LUMP, OR A COMBINATION OF THE TWO, SHALL BE PERMITTED PROVIDED THEY ARE WELL PULVERIZED AND DISPERSED THROUGHOUT THE MIX. THE FINEST SANDS SHALL NOT BE LESS THAN 2.5 AND NOT MORE THAN 2.0.
- GRAVEL: THE GRAVEL SHALL CONSIST OF CLEAN, HARD, TIGHT STONES FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SURFACE COATING, RANGING IN SIZE FROM ONE & ONE HALF INCH DOWN, BUT NOT MORE THAN FIVE PER CENT BY WEIGHT MORE THAN TWENTY-FIVE PER CENT BY WEIGHT MORE THAN ONE INCH AND NO INTERMEDIATE SIZES SHALL BE REMOVED.
- CONDUIT GRAVEL: THE GRAVEL SHALL CONSIST OF CLEAN, TIGHT STONES, FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SURFACE COATING, RANGING IN SIZE FROM ONE-HALF INCH DOWN, BUT NOT MORE THAN FIVE PER CENT BY WEIGHT MORE THAN ONE INCH AND NO INTERMEDIATE SIZES SHALL BE REMOVED.
- WATER: THE WATER USED FOR MIXING OR SPRINKLING CONCRETE SHALL BE CLEAN AND FREE FROM OIL, SALT, ALKALI, SODA, OR OTHER DETRIMENTAL IMPURITIES. WHEN POSSIBLE CITY WATER WILL BE USED.
- STEEL: METAL REINFORCEMENT BEFORE BEING PLACED SHALL BE FREE FROM LOOSE RUST SCALE, BRIDGE, CLAY OR OTHER COATINGS THEY WILL REMAIN ON BEFORE THE POUR. THE STEEL SHALL CONFORM TO THE LATEST EDITION OF "SPECIFICATION FOR REINFORCED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT" ASTM A-615.

III. FIELD TESTS FOR MATERIALS

FIELD TESTS SHALL BE MADE AS OFTEN AS IS NECESSARY TO INSURE THE MATERIALS CONFORMING TO THE FOREGOING SPECIFICATIONS. THE METHOD OF MAKING THESE TESTS SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE AMERICAN SOCIETY FOR TESTING MATERIALS FOR CONCRETE AND CONCRETE AGGREGATES.

IV. CLASSIFICATION OF CONCRETE AND MIX DESIGN

CLASS OF CONCRETE	A	B	C
CLASS OF CONCRETE	2000 psi	2000 psi	2000 psi
MIXING WATER (INCLUDING FREE SURFACE MOISTURE) BY WEIGHT OF CEMENT	.50	.50	.50
WALLS PER SACK	7.5	6.5	4.5
CONCRETE ENVELOPE PERIODS PER CUBIC YARD	275	520	520
TYPE CEMENT	I	I	III (HIGH EARLY)
ALLOWABLE SLOPE	1/2"	1/2"	1/2"
MINIMUM FREE AGGREGATE	600	395	275
MAXIMUM AGGREGATE SIZE	1/2"	1 1/2"	1 1/2"

- FOR DUCT LINE INSTALLATION USE CLASS A (2000psi) CONCRETE, OR AS SPECIFIED ON PLANS.
- FOR MANHOLE AND WALL INSTALLATION USE CLASS B (2000psi) CONCRETE.
- FOR STREET CURB REPAIR USE CLASS C (2000psi) CONCRETE.
- HEAVY-MIX CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN THE LATEST EDITION OF "SPECIFICATIONS FOR HEAVY-MIX CONCRETE" ASTM C-95.
- CONCRETE MADE BY VOLUMETRIC BATCHING AND CONTINUOUS MIXING SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE LATEST EDITION OF "SPECIFICATIONS FOR CONCRETE MADE BY VOLUMETRIC BATCHING AND CONTINUOUS MIXING" ASTM C-908.
- ALL CONCRETE SHALL BE PLACED WITHIN ONE HOUR AFTER MIXING.

V. DESIGN AND MIXING OF MORTAR AND CONCRETE MEND MIXES

- MORTAR DESIGN: MORTAR SHALL BE COMPOSED OF ONE PART TYPE I PORTLAND CEMENT TO 2 1/2 PARTS GRADED STANDARD SAND BY VOLUME. THE SAND SHOULD NOT BE EXCESSIVELY WET OR EXTREMELY DRY WHEN MEASURED.
- CONCRETE MEND MIX DESIGN FOR SHALL BE THE FOLLOWING UNLESS REFER TO THE VOLUMES, RESPECTIVELY, OF CEMENT, SAND, AND AGGREGATE TO BE USED FOR EACH MIX.
 - (1:2:2 1/2) FOR USE WITH MAXIMUM AGGREGATE SIZE OF 1/2".
 - (1:1:2 1/2) FOR USE WITH MAXIMUM AGGREGATE SIZE OF 1 1/2".
- MIXING OF CONCRETE: THE CEMENT AND INITIAL RATED AGGREGATE SHALL BE MEASURED IN SUITABLE CONTAINERS. THE MIXTURE SHALL BE PORTIONED BY VOLUME, EACH ITEM BEING MEASURED, LOOSE AND SEPARATELY. IF MACHINE MIXED IN A ROTARY TYPE BATCH MIXER, THE SPEED OF THE OUTSIDE RING OF THE DRUM SHALL BE ABOUT 150 FEET PER MINUTE. BUT NOT THE CEMENT AND AGGREGATE UNTIL UNIFORM MIXTURE. WATER SHALL THEN BE ADDED UNTIL A WORKABLE MIXTURE IS PRODUCED. EACH BATCH OF CONCRETE SHOULD BE USED IMMEDIATELY AFTER MIXING.
- MIXING OF MORTAR: THE CEMENT AND SAND SHALL BE MIXED DRY UNTIL OF UNIFORM COLOR. WATER SHOULD THEN BE ADDED AND THE MIXTURE TURNED UNTIL IT FORMS A UNIFORM AND WORKABLE PASTE. EACH BATCH OF MORTAR SHOULD BE USED IMMEDIATELY AFTER MIXING.

VI. PLACING OF CONCRETE

- DUCT LINES: THE CONCRETE FOR CONDUIT LINES SHALL BE PLACED IMMEDIATELY IMMEDIATELY AFTER MIXING. THE CONCRETE WILL BE SO TAMPED OR PULLED SO AS TO MAKE A DENSE CONCRETE ENVELOPE AROUND THE DUCTS. IF NECESSARY TO JOIN A NEW CONDUIT LINE ONTO ONE IN WHICH THE CONCRETE HAS SET, THE OLD SURFACE SHALL BE CLEANED, REWORKED AND RESET.
- MANHOLES AND TRANSFORMER VAULTS: THE CONCRETE FOR MANHOLES AND VAULTS SHALL BE PLACED IMMEDIATELY AFTER MIXING. THE CONCRETE SHALL BE PLACED SO AS TO KEEP THE SURFACE OF THE CONCRETE LEVEL TO PREVENT AIR FLOWING OF THE CONCRETE IN THE FORMS. THE CONCRETE SHALL BE CONTINUOUSLY SPADED TO EXPEL AIR BUBBLES. THE TOP OF THE WALLS SHALL BE WELL CURED, REWORKED AND RESET IMMEDIATELY BEFORE POURING THE ROOF SLAB.
- STREET PAVEMENT: SEE DETAIL #20

VII. PROTECTION OF FRESH CONCRETE

CONCRETE SHALL BE KEPT MOIST BY SPRINKLING WITH WATER FOR A PERIOD SUITABLE TO THE CHARACTER OF THE STRUCTURE. WALKING OR WORKING OVER FINISHED SURFACES SHALL NOT BE PERMITTED UNTIL SAME HAVE SUFFICIENTLY SET. FINISHED STREET SURFACES SHALL BE WELL WATERED FOR AT LEAST FORTY-EIGHT HOURS AFTER PLACEMENT. FORMS AND BRACING FOR WALLS OF MANHOLES AND TRANSFORMER VAULTS SHALL NOT BE DISTURBED DURING THE FIRST TWENTY-SIX HOURS AFTER CONCRETE HAS BEEN PLACED. FORMS AND BRACING FOR ROOFS OF MANHOLES AND TRANSFORMER VAULTS SHALL NOT BE REMOVED FOR AT LEAST SEVEN DAYS AFTER CONCRETE HAS BEEN PLACED.

VIII. FINISH

UNLESS ESPECIALLY CALLED FOR, NO WORK IS TO BE DONE BY WAY OF FINISHING CONCRETE TO SURFACE AFTER THE FORMS ARE REMOVED, EXCEPT THAT SURFACE FAULTS IN THE CONCRETE SURFACE SHALL BE CHISELED OUT AND PROCELY FORMED AND FILLED WITH CEMENT MORTAR IN SUCH A MANNER THAT THE PATCH IS SECURELY KEPT INTO THE CONCRETE SURFACE.

TU ELECTRIC

CD

SCALE (H=NO SCALE) (V=NO SCALE)

LIST OF DRAWINGS

W.A.

ESTIMATE

UNIT ID

DWG TYPE

REVISION DESCRIPTION

DRAWN CH.

APP.

DATE

NO.

W.A.

APP. JES

APP. PRN

CH. JRC

ENG. JRC

DWN. MED

DATE 05-12-92

NETWORK UNDERGROUND APPURTENANCE SHEETS MISCELLANEOUS DETAILS

E-NUA-1 SHEET NO. 8