

TYPICAL CONDUIT INSTALLATION FOR PVC ENCASED MAJOR CONDUIT LINE

DETAIL #19

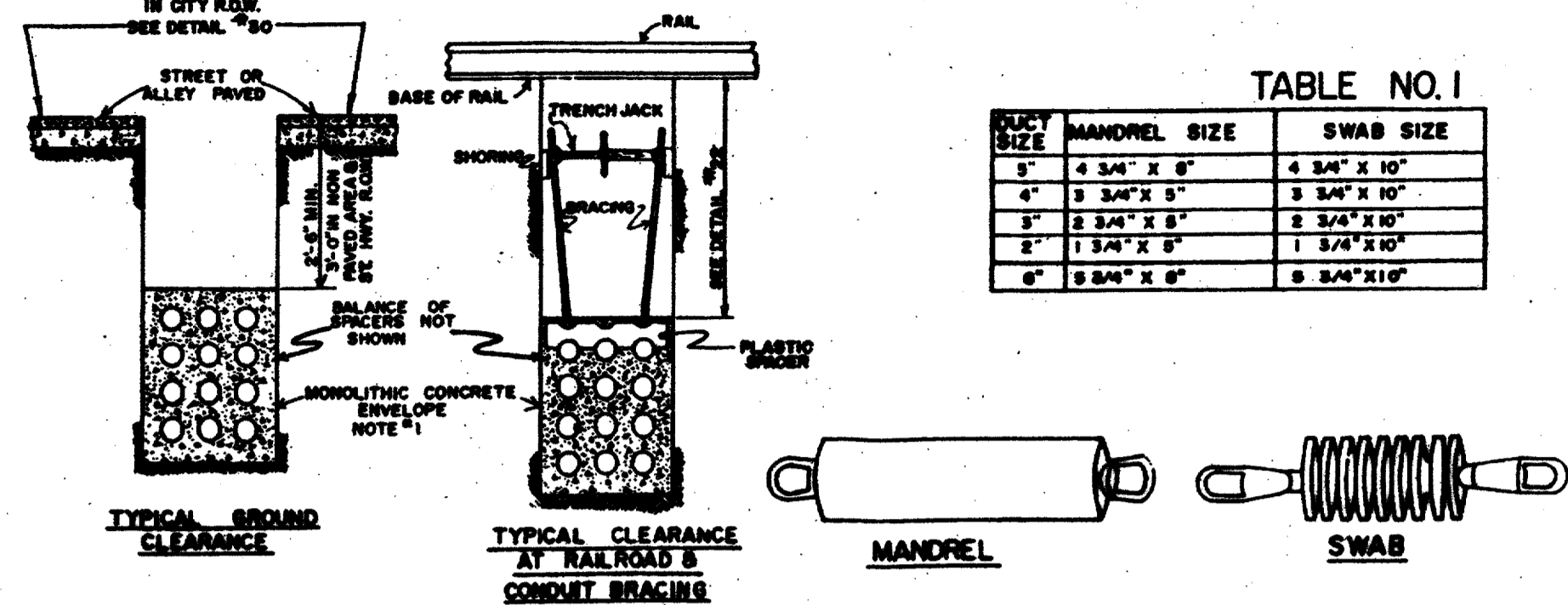
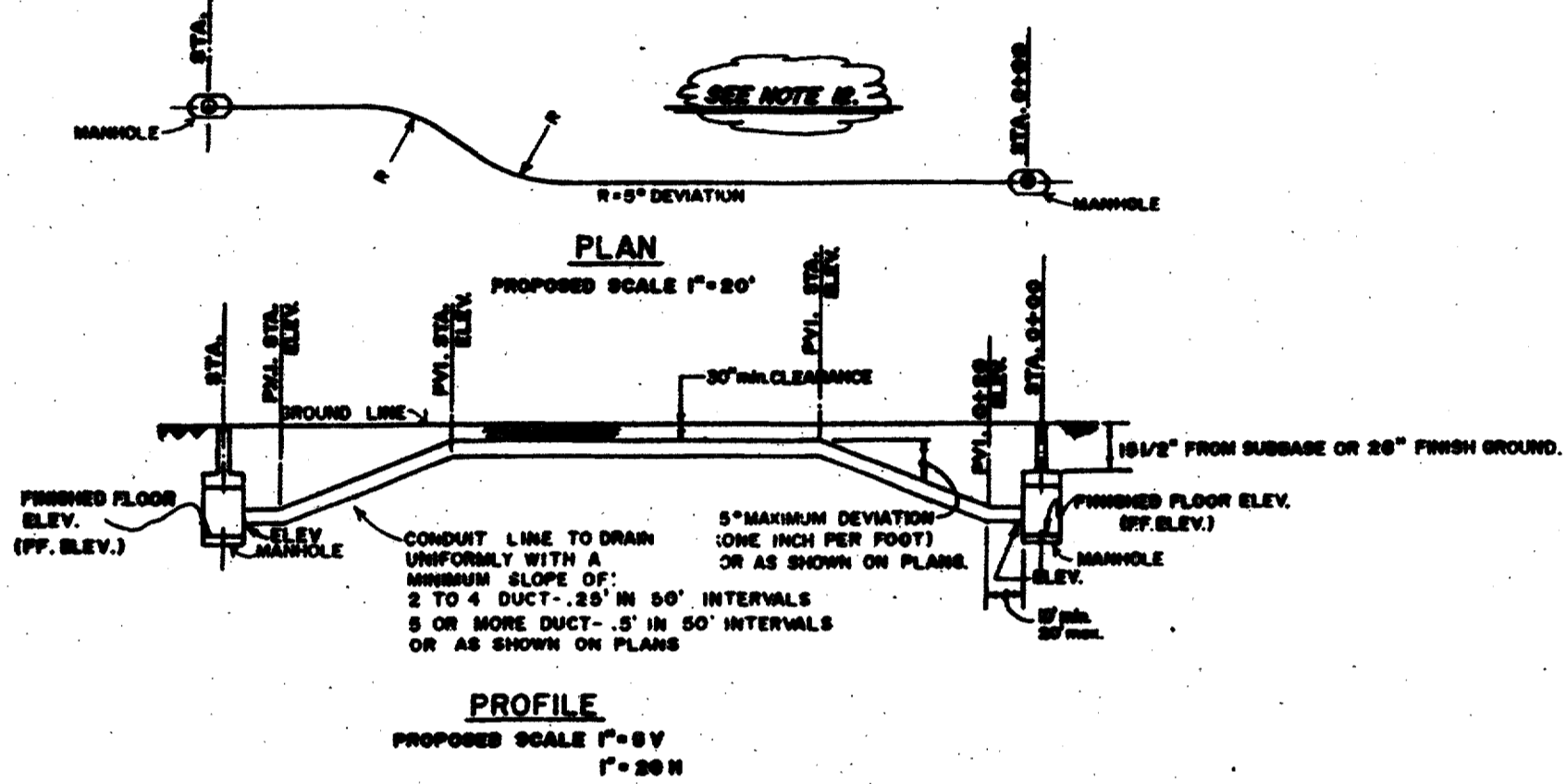


TABLE NO. 1

DUCT SIZE	MANDREL SIZE	SWAB SIZE
3"	4 3/4" X 6"	4 3/4" X 10"
4"	5 3/4" X 6"	5 3/4" X 10"
5"	6 3/4" X 6"	6 3/4" X 10"
6"	7 3/4" X 6"	7 3/4" X 10"



NOTES:

- ALL PORTIONS 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 COVERED LIBERALLY WITH PVC GREASE. FROM CONDUIT AND FITTINGS TOGETHER UNTIL CONDUIT BUTTS AGAINST FITTING SHOULDER. THUS CONDUIT CAN TURN TO FORMER SMOOTH SPREADINGS OF GREASE. NORMAL MIN. COVER TO BE 30".
- WHEN COMPLETE, EACH CONDUIT OF A MANHOLE 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 FITTING BUTTS WILL BE IN ACCORDANCE WITH EXISTING SAFETY REGULATIONS IN EFFECT.
- ALL CONDUIT RINGS ON L.A. & STATE HWY. R.O.W. WILL REQUIRE A MINIMUM OF 6" CONCRETE COVER FROM THE UPPERMOST DUCT, AND MIN. 18" COVER FROM FINISH GRADE.
- SEE PLANS FOR CONDUIT ARRANGEMENT.
- FOR NUMBER, POSITION, AND SIZE OF CONDUITS SEE JOB PLANS.
- HIGH 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 B.B. UNLESS OTHERWISE NOTED ON PLANS.
- SPACING EVERY 100' IN PLAN VIEW AND EVERY 50' WITH ELEVATION IN PROFILE PLUS STRIKES AND ELEVATION AT EACH GRADE CHANGE.

SECTIONS OF TYPICAL FORMATION

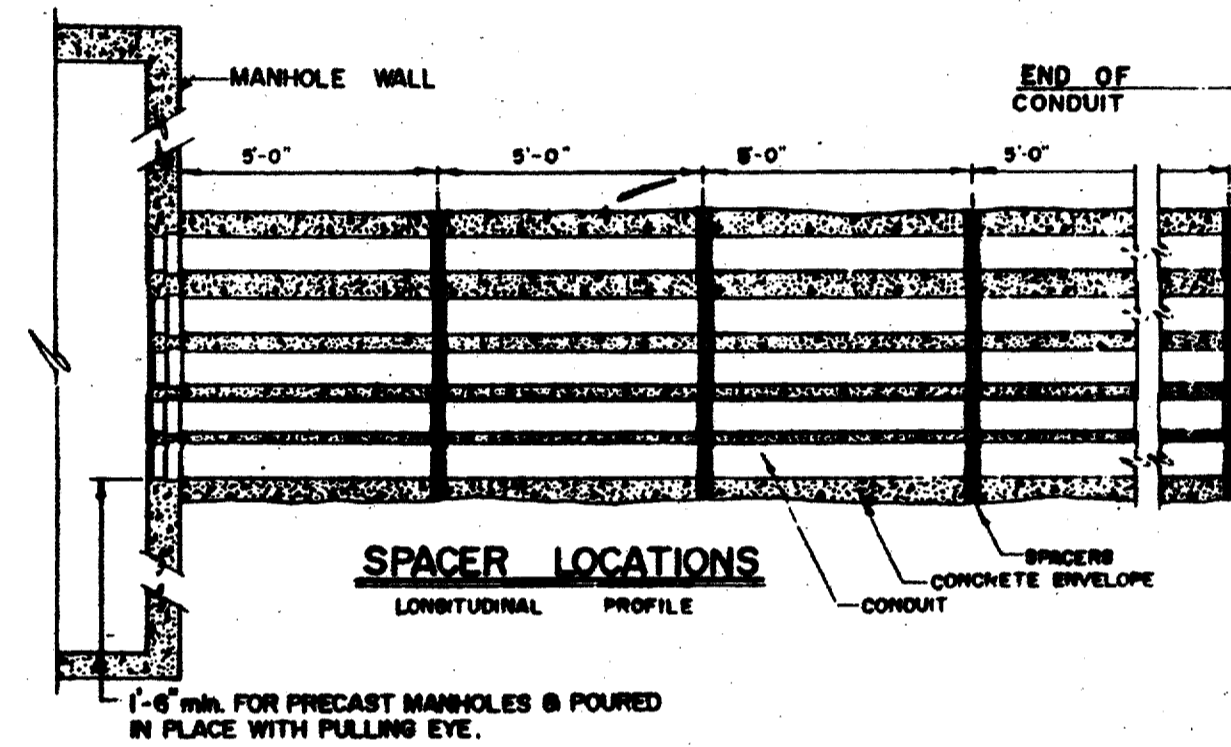
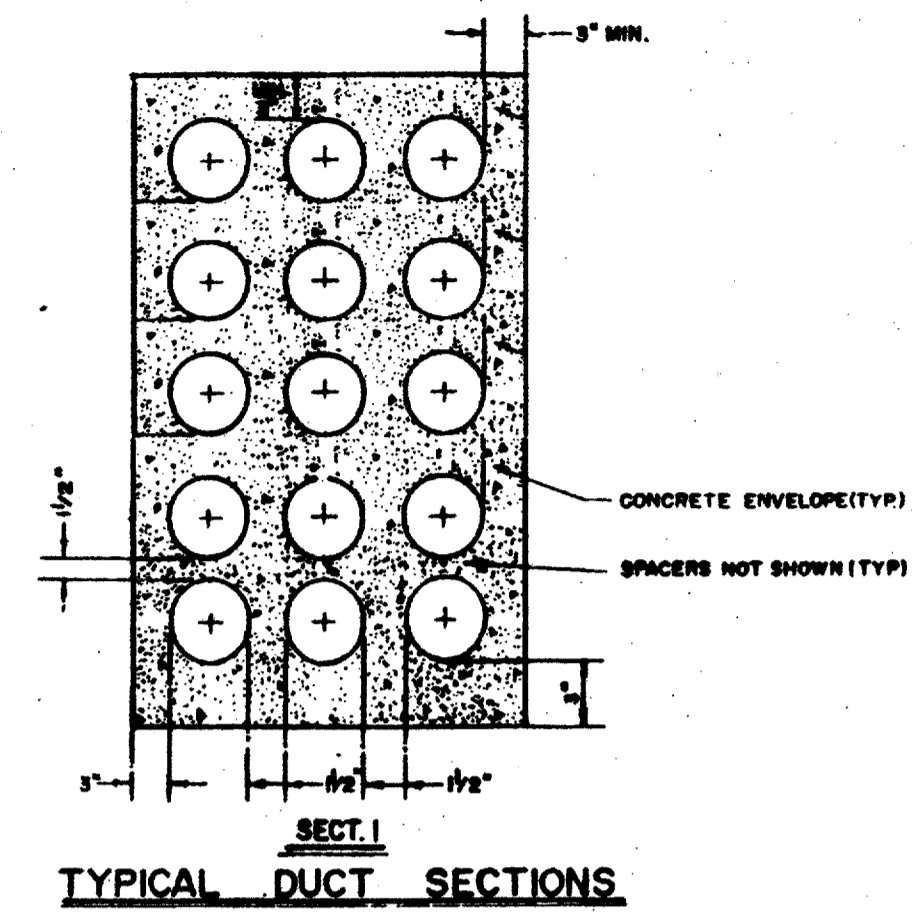


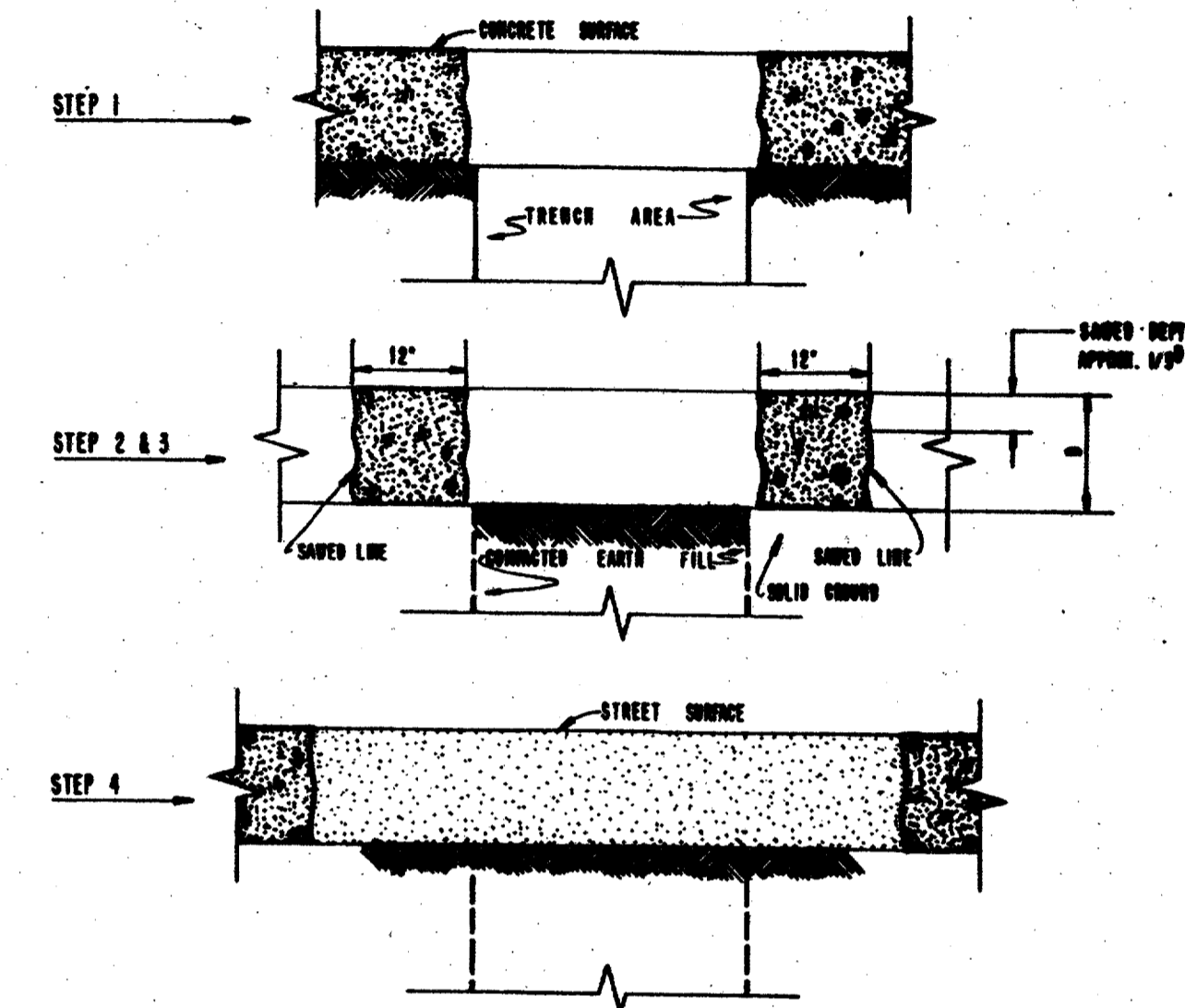
TABLE 2

CONDUIT SIZE	OUTSIDE DIAMETER	TYPE
3"	3.30"	PVC
4"	4.50"	PVC
5"	5.60"	PVC
6"	6.90"	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 BACKFILLED AND COMPACTED TO THE REQUIRED DENSITY 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 CONCRETE. PAVING BREAKERS 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 DRYING SURFACES;
SEQUENCE OF CONSTRUCTION ON CONCRETE STREETS WITH ASPHALT DRYING 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

DETAIL #21
CONCRETE SPECIFICATION

I. GENERAL

THESE SPECIFICATIONS APPLY TO MANHOLE, WALL, AND DUCT LINE CONSTRUCTION ON THE UNDERGROUND SYSTEM IN THE CITY OF LOS ANGELES. THE CONCRETE SHALL BE OF ONE OF THE CLASSES SPECIFIED ON THE DRAWINGS FOR THE TYPE OF WORK UNDER CONSTRUCTION. THE RATIO OF SAND TO CEMENT SHALL BE USED AS TO OBTAIN AS NEAR AND UNIFORM AS POSSIBLE WITH THE MATERIALS AVAILABLE AND FOR THE CLASS OF WORK UNDER CONSTRUCTION. BUT IN NO CASE SHALL THE RATIO OF CEMENT TO THE HEAVY AGGREGATE BE LESS THAN THE CLASS OF CONCRETE SPECIFIED.

II. SPECIFICATIONS FOR MANHOLES

- CONCRETE: THE CONCRETE SHALL CONFORM TO "STANDARD SPECIFICATIONS FOR PORTLAND CEMENT" ASTM C-150 FOR TYPE I NORMAL PORTLAND CEMENT AND TYPE III, HIGH-EARLY-STRENGTH PORTLAND CEMENT. THE CONCRETE SHALL BE PROPERLY PROPORTIONED FROM THE MIXTURE WITH WATER AND SHALL BE SET AND FREE FROM Lumps WHEN PLACED IN THE HOLE.
- SAND: THE SAND SHALL CONSIST OF HARD SILICEOUS MATERIAL, FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SUBSTANCE CAPABLE OF ADHERING TO CONCRETE. THE SAND SHALL BE SAVED IN SIZE FROM ONE-FORTY EIGHT (1/40) INCH DOWN TO AND INCLUDING THIRTY-FIVE (3/8) PER CENT BY WEIGHT PASSING A 100 MESH PER LINEAL FOOT SIEVE. THERE PER CENT BY WEIGHT OF CLAY OR LUMP, OR A COMBINATION OF THE TWO, WILL BE PERMITTED PROVIDED THEY ARE WELL FULFILLING AND UNIFORM THROUGHOUT THE MIX. THE FINEST SAND SHALL NOT BE LESS THAN 2.5 AND NOT MORE THAN 5.0.
- AGGREGATE: THE AGGREGATE SHALL CONSIST OF CLEAN, HARD, TIGHT STONES FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SUBSTANCE CAPABLE OF ADHERING TO CONCRETE. THE AGGREGATE SHALL BE SAVED IN SIZE FROM ONE-HALF INCH DOWN, NOT MORE THAN FIVE PER CENT BY WEIGHT UNDER NO. 10 AND ABOVE, PASSING A SCREEN HAVING FOUR SQUARES PER LINEAL FOOT AND NO INTERMEDIATE SIZES SHALL BE ALLOWED.
- CONCRETE: THE CONCRETE SHALL CONSIST OF CLEAN, HARD, TIGHT STONES FREE FROM VEGETABLE MATTER, ORGANIC MATTER, OR SUBSTANCE CAPABLE OF ADHERING TO CONCRETE. THE CONCRETE SHALL BE PROPERLY PROPORTIONED FROM THE MIXTURE WITH WATER AND SHALL BE SET AND FREE FROM Lumps WHEN PLACED IN THE HOLE.
- WATER: THE WATER USED FOR MIXING OR SPRINKLING CONCRETE SHALL BE CLEAN AND FREE FROM OIL, SALT, ALKALI, OR OTHER DETRIMENTAL IMPURITIES. WHEN POSSIBLE CITY WATER WILL BE USED.
- STEEL: METAL REINFORCEMENT BEFORE BEING PLACED SHALL BE FREE FROM LOOSE RUST SCALE, GREASE, CLAY OR OTHER SUBSTANCES THAT WILL DESTROY OR WEAKEN THE BOND. THE STEEL SHALL CONFORM TO THE LATEST EDITION OF "SPECIFICATIONS FOR REINFORCING BARS AND WIRE" AND 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 RATIO

CLASS OF CONCRETE	A	B	C
	3000 psi	3000 psi	3000 psi
MINIMUM STRENGTH (INCLUDING FREE SURFACE MIXTURE) RATIO OF WATER TO CEMENT BY WEIGHT	.60	.50	.40
MAXIMUM PER CENT SAND	7.5	6.5	6.5
MINIMUM PER CENT SAND	37.5	50.0	50.0
PER CENT SAND PER CIVIL CODE	4	5.5	5.5
TYPE CEMENT	I	I	XXX (HIGH EARLY)
ALLOWABLE SLOPE	1/8" - 4"	1/8" - 4"	1/8" - 4"
MINIMUM PER CENT AGGREGATE	60%	70%	77%
MAXIMUM AGGREGATE SIZE	1/2"	1 1/2"	1 1/2"

- FOR DUCT LINE INSTALLATION USE CLASS A (3000psi) CONCRETE, OR AS SPECIFIED ON PLANS.
- FOR MANHOLE AND WALL INSTALLATION USE CLASS B (3000psi) CONCRETE.
- FOR STREET SAND MIXTURE USE CLASS C (3000psi) CONCRETE.
- HEAVY-WEAR CONCRETE SHALL BE MIXED AND DELIVERED IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN THE LATEST EDITION OF "SPECIFICATIONS FOR READY-MIX CONCRETE" ASTM C-94.
- CONCRETE MADE BY VOLUNTARY BATCHING AND CONTINUOUS MIXING SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE LATEST EDITION OF "SPECIFICATIONS FOR READY-MIX CONCRETE" ASTM C-94.
- CONCRETE MADE BY VOLUNTARY BATCHING AND CONTINUOUS MIXING SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE LATEST EDITION OF "SPECIFICATIONS FOR READY-MIX CONCRETE" ASTM C-94.
- ALL CONCRETE SHALL BE PLACED WITHIN ONE HOUR AFTER MIXING.

V. DESIGN AND MIXING OF MORTAR AND CONCRETE MIXTURES

- MORTAR DESIGN: MORTAR SHALL BE COMPOSED OF ONE PART TYPE I PORTLAND CEMENT TO 2 3/4 PARTS SIFTED STANDARD SAND BY VOLUME. THE SAND SHOULD NOT BE EXCESSIVELY SET OR ENTIRELY DRY WHEN MEASURED.
- CONCRETE MIXTURE DESIGN FOR SMALL JOBS: THE FOLLOWING MIXTURES REFER TO THE VOLUMES, RESPECTIVELY, OF CEMENT, SAND, AND AGGREGATE TO BE USED FOR EACH MIX.
 - (1:1:2 1/4) FOR USE WITH MAXIMUM AGGREGATE SIZE OF 1/2".
 - (1:1:2 1/4) FOR USE WITH MAXIMUM AGGREGATE SIZE OF 1 1/2".
- MIXING OF CONCRETE: THE CEMENT AND MIXTURE AGGREGATE SHALL BE MEASURED IN SUITABLE CONTAINERS. THE MIXTURES SHALL BE PROPORTIONED BY VOLUME, EACH 1 YD3 BEING MEASURED, LOOSE AND SEPARATELY. IF MACHINE MIXED IN A ROTARY TYPE BATCH MIXER, THE SPEED OF THE OUTSIDE EDGE OF THE DRUM SHALL BE ABOUT 120 FEET PER MINUTE. MIX THE CEMENT AND AGGREGATES 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 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 AFTER MIXING. THE CONCRETE WILL BE SO TAMPED OR PULVERED SO AS TO MAKE A DENSE CONCRETE ENVELOPE AROUND THE DUCTS. IF NECESSARY TO JOIN A NEW CONDUIT LINE INTO ONE IN WHICH THE CONCRETE HAS SET, THE OLD SURFACE SHALL BE CLEANED, BUSHED AND RETTIE.
- 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 ANY PLUMBING OF THE CONCRETE IN THE FORMS. THE CONCRETE SHALL BE CONTINUOUSLY SPACED TO EXPEL AIR BUBBLES. THE TOP OF THE WALLS SHALL BE WELL CAPPED, BUSHED AND RETTIE 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 ONE DAY AFTER PLACEMENT. FORMS AND BRACKETS FOR WALLS OF MANHOLES AND TRANSFORMER VAULTS SHALL NOT BE DISTURBED DURING THE FIRST TWENTY-FOUR HOURS AFTER CONCRETE HAS BEEN PLACED. FORMS AND BRACKETS 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 SURFACES AFTER THE FORMS ARE REMOVED, EXCEPT THAT REPAIRS TO THE CONCRETE SURFACE SHALL BE CHISELED OUT AND PATCHED AND FILLED WITH CEMENT MORTAR IN SUCH A MANNER THAT THE PATCH IS SECURELY KEPT INTO THE CONCRETE SURFACE.

TU ELECTRIC

REVISION DESCRIPTION

DATE 05-12-92 DWN: MED CH: JRC ENG: JRC APP: JES APP: PRN W.A. W.A. NO. DATE

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

LIST OF DRAWINGS

W.A. ESTIMATE UNIT ID DWG TYPE

DRAWN: CH: APP: APP:

E-NUA-1
SHEET NO. 8

RECORD
DRAWING

10/3/97 ISSUED FOR CONSTRUCTION

E19