

2-2

ESIGN DESIGNATION

CURRENT ADT (1990) = 14,710
DESIGN YEAR ADT (2010) = 16,000
D.H.V. (2009) = 1600
D = 58 %
T = 8 %
DESIGN SPEED = 40 MPH
LEGAL SPEED = 35 MPH
FUNCTIONAL CLASSIFICATION URBAN MINOR ARTERIAL

MICROFILMED
OCT 20 1995

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
CUY-43-4.80 (6.07)
CITY OF SOLON
CUYAHOGA COUNTY

FHWA REGION	STATE	PROJECT
5	OHIO	BHF-58(31)

CUYAHOGA COUNTY
CUY-43-4.80 (6.07)

BHF-58 (31)

CONVENTIONAL SIGNS

RIGHT OF WAY LINE	EXISTING	— R/W —
SECTION LINE		— LA R/W —
LIMITED ACCESS RIGHT OF WAY LINE		— LA R/W —
CENTERLINE		—
EXISTING CONTOUR LINE		—
WATER LINE	EXISTING	— W —
	PROPOSED	— W —
WATER HYDRANT	EXISTING	— G —
GAS LINE	EXISTING	— G —
	PROPOSED	— G —
STORM SEWER	EXISTING	— ST —
	PROPOSED	— ST —
SANITARY SEWER	EXISTING	— SAN —
CATCH BASIN	EXISTING	—
MANHOLE	EXISTING	—
UTILITY POLE	EXISTING	—
TELEPHONE	EXISTING	—
POWER	EXISTING	—
LIGHT	EXISTING	—
FENCE	EXISTING	—
GUARD RAIL	EXISTING	—
CONSTRUCTION LIMITS	EXISTING	—
TREE	EXISTING	—

INDEX OF SHEETS

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LINE DATA

BEGIN WORK STA. 218 + 26.30
BEGIN PROJECT STA. 220 + 36.30
END PROJECT STA. 221 + 32.80
END WORK STA. 223 + 42.80

LENGTH OF PROJECT 96.50 Lin. Ft. = 0.018 MILE
LENGTH OF WORK 516.50 Lin. Ft. = 0.098 MILE

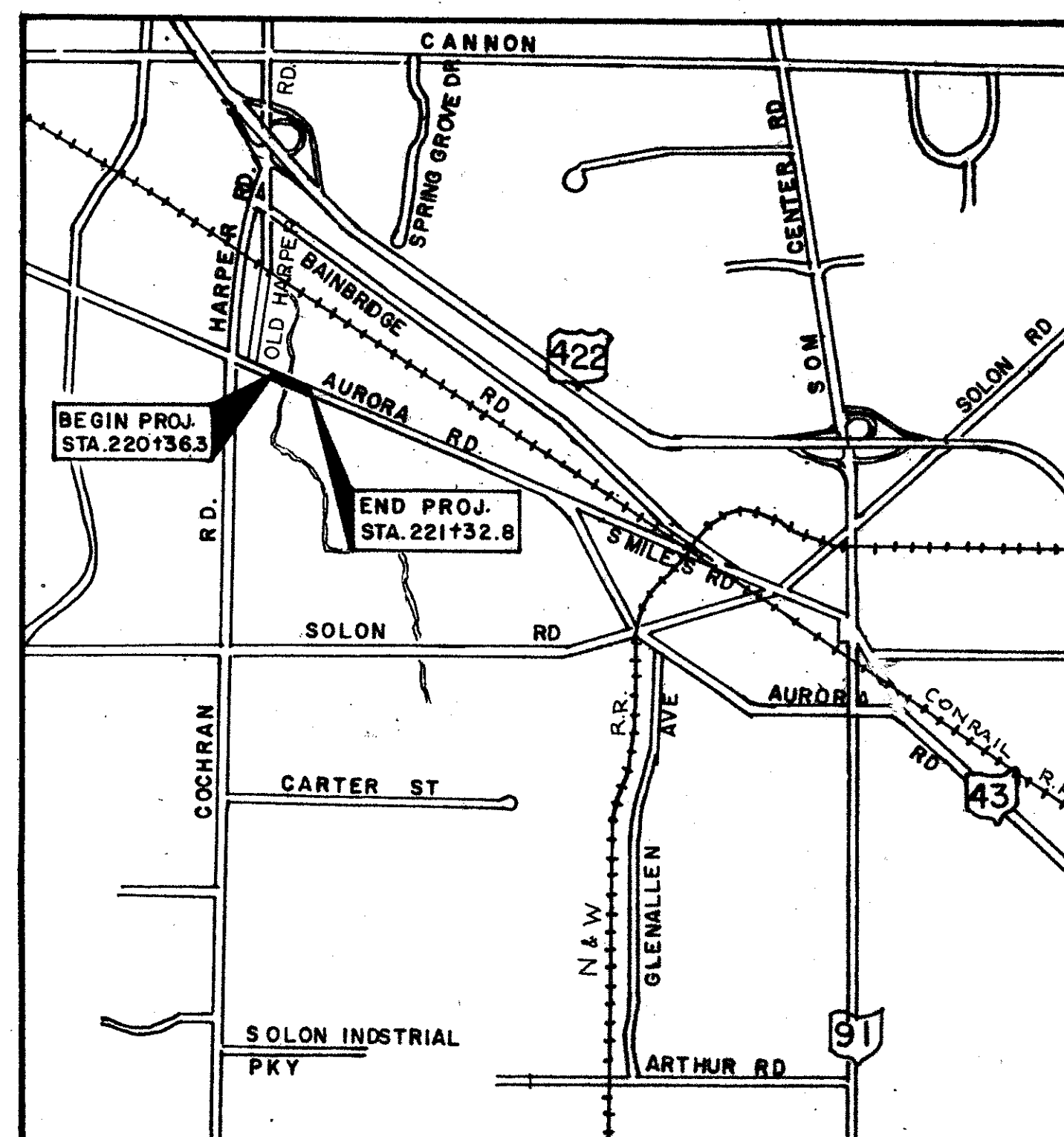
UNDERGROUND UTILITIES

2 WORKING DAYS
BEFORE YOU DIG
CALL 800-362-2764 (TOLL FREE)
OHIO UTILITIES PROTECTION SERVICE
NON-MEMBERS
MUST BE CALLED DIRECTLY

1 1/2 0 1 MILE

PLAN: 0 20
PROFILE: HORIZONTAL 0 20 VERTICAL 0 5
CROSS SECTION: HORIZONTAL 0 5 VERTICAL 0 5

LOCATION MAP



1991 SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL NOT REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT PROVISIONS FOR MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON PLANS AND ESTIMATES.

APPROVED: Martin A. Gallito
DATE: 7-24-90 DISTRICT DEPUTY DIRECTOR OF TRANSPORTATION

APPROVED: B.D. Hanchamian
DATE: 8/24/90 ENGINEER, BUREAU OF BRIDGES AND STRUCTURAL DESIGN

APPROVED: Kenneth M. Miller
DATE: 1-14-91 CHIEF ENGINEER, PLANNING AND DESIGN

APPROVED: Jerry Wray
DATE: 1-17-91 DIRECTOR, DEPARTMENT OF TRANSPORTATION

ROBERT P. MADISON INTERNATIONAL, INC.
ARCHITECTS-ENGINEERS-PLANNERS
2980 EUCLID AVE. CLEVELAND, OHIO



DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR

DATE

FILE NO. CUY-43-4.80

DATE OF LETTING
CONTRACT NO.

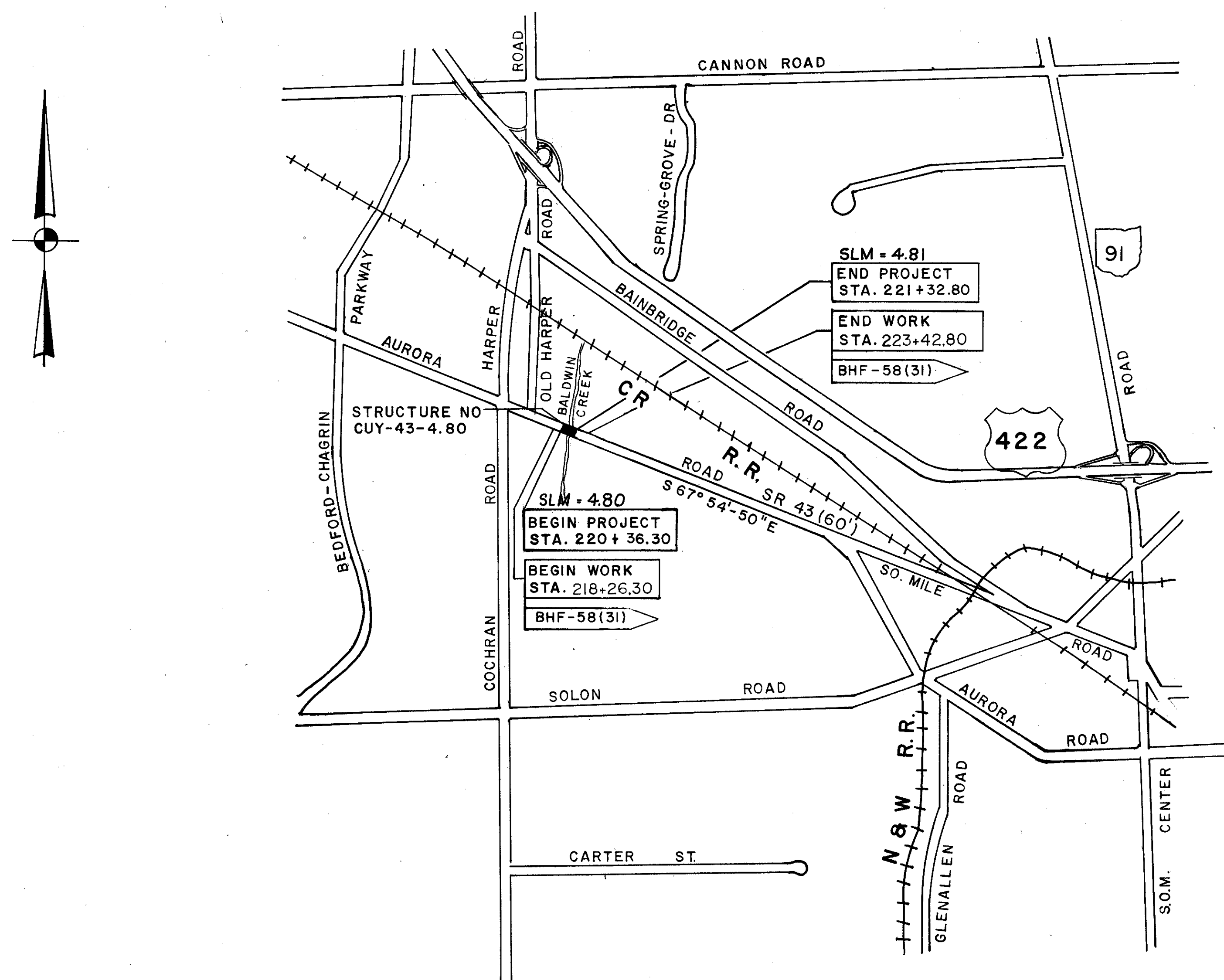
STANDARD CONSTRUCTION DRAWINGS					
NUMBER	DATE	NUMBER	DATE	Number	Date
BP-2	1-11-85	GR-4.2	5-6-91	PSBD-1-81	6-20-89
BP-3	12-6-76	MC-4	7-26-76	GR-3.4	5-6-91
BP-4	10-1-87	MC-9.2	5-6-91	DSR-2-73	4-10-73
BP-5	10-1-87	MC-11	8-1-78	GR-1.2	5-6-91
GR-1.1	5-6-91			GR-2.2	5-6-91
GR-2.1	5-6-91	MT-99.10	11-14-86		
GR-4.1	5-6-91				
MH-3	12-18-84	MT-101.60	4-1-90		

SUPPLEMENTAL SPECIFICATIONS			
NUMBER	DATE	NUMBER	DATE
802	4-18-90	940	8-10-87
820	3-18-92	942	3-18-92
944	3-18-92		

FHWA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	

2
25

CUYAHOGA COUNTY
CUY-43-4.80



SCHEMATIC PLAN



REVISED 11-13-91
REVISED 7-22-91

SCHEMATIC PLAN

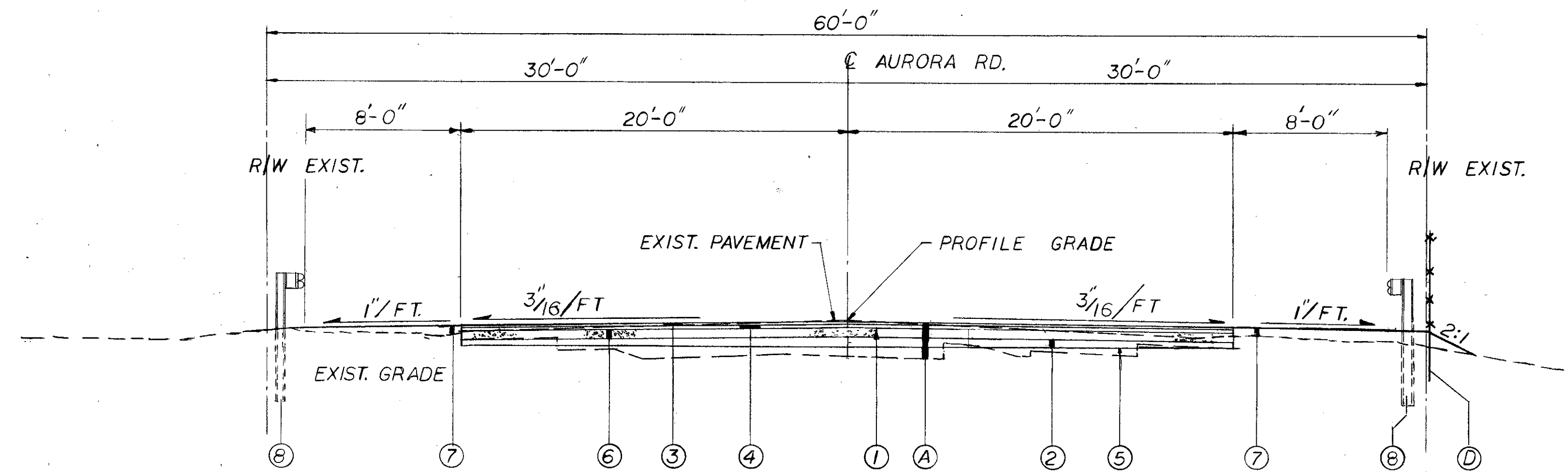
TYPICAL SECTION TYPE 404 ON 305



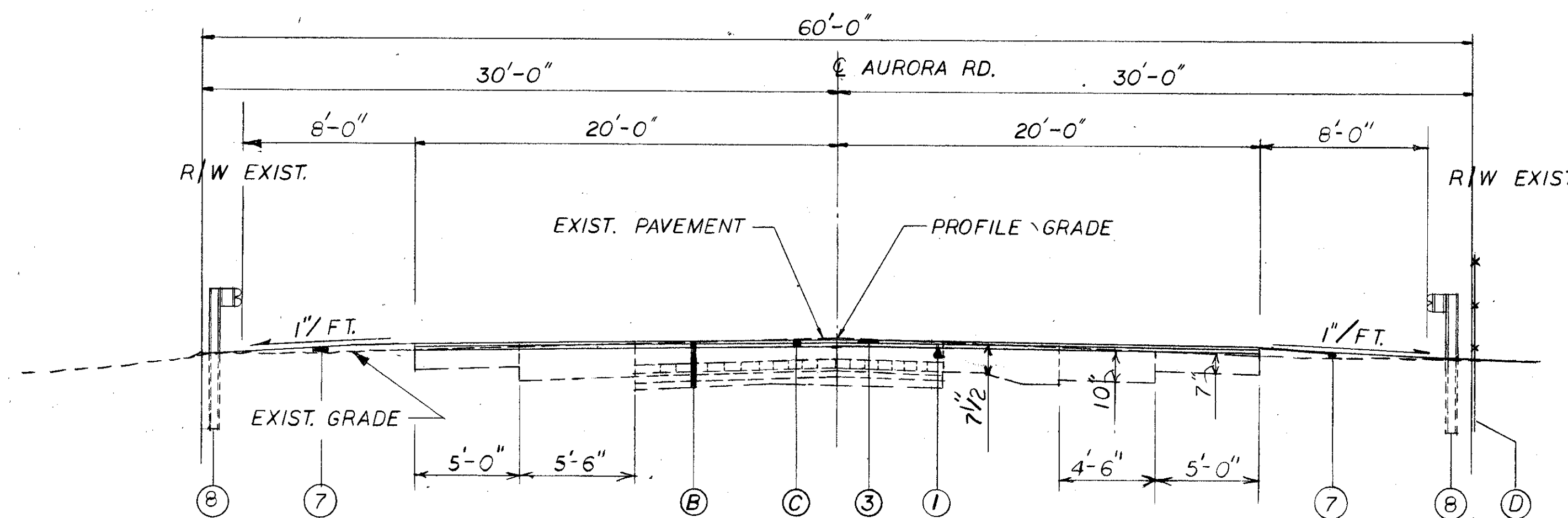
FHWA REGION	STATE	PROJECT
5	OHIO	BHF-58(31)

CUYAHOGA COUNTY
CUY-43-4,80

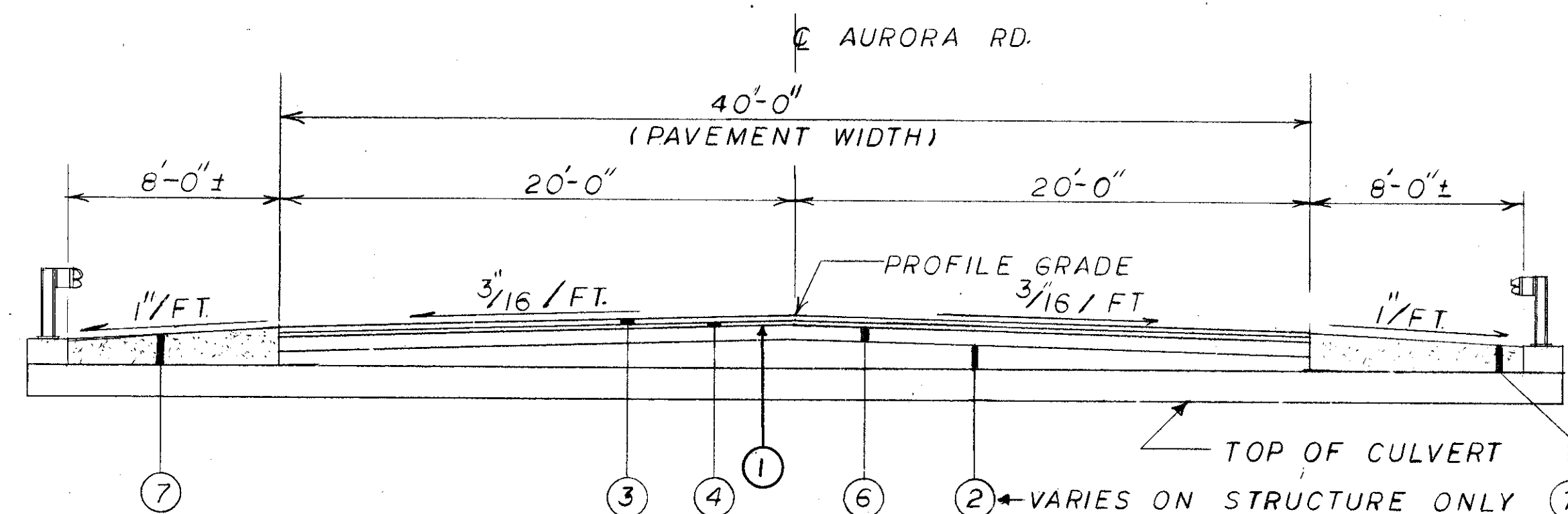
3
25



STA. 220+36.3 TO STA. 221+32.8

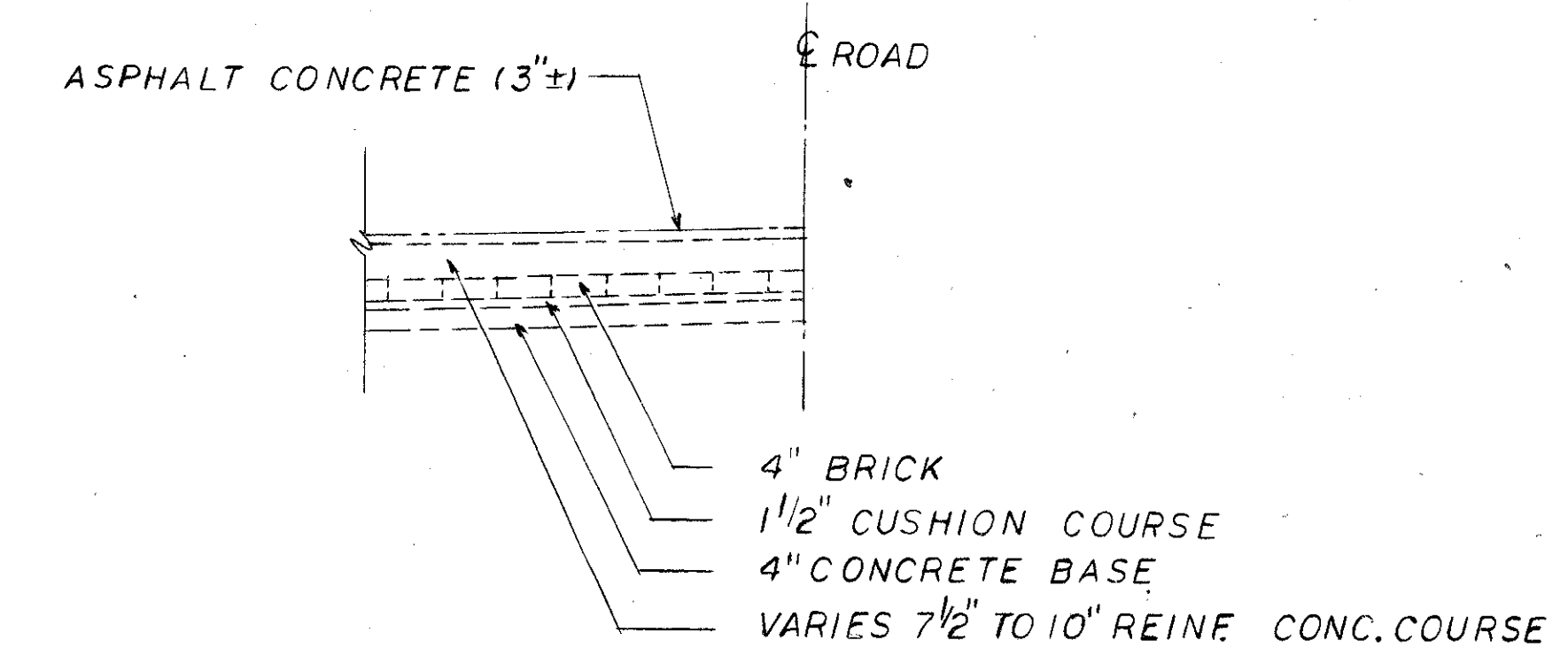


STA. 220+26.3 TO STA. 220+36.3
STA. 221+32.8 TO STA. 221+42.8



STA. 220+67.54 TO STA. 221+01.66

- ## LEGEND
- ① ITEM 407 TACK COAT
 - ② ITEM 310 6" SUBBASE TYPE I GRADING A, AS PER PLAN
 - ③ ITEM 404 1 1/4" ASPHALT CONCRETE AC-20
 - ④ ITEM 402 1 3/4" ASPHALT CONCRETE AC-20
 - ⑤ ITEM 203 SUBGRADE COMPACTION
 - ⑥ ITEM 305 8" CONCRETE BASE
 - ⑦ ITEM 617 COMPACTED AGGREGATE, Type A
 - ⑧ ITEM 606 GUARDRAIL TYPE 5
 - Ⓐ ITEM 202 PAVEMENT REMOVED
 - Ⓑ EXISTING PAVEMENT
 - Ⓒ ITEM 254 PAVEMENT PLANING BITUMINOUS (1 1/2" ±)
 - Ⓓ ITEM 202 FENCE REMOVED



TYP. EXIST. PAVEMENT
MID-SECTION

WORD AND SYMBOL MARKING DETAILS

FED RD DIVISION	STATE	PROJECT	
5	OHIO		

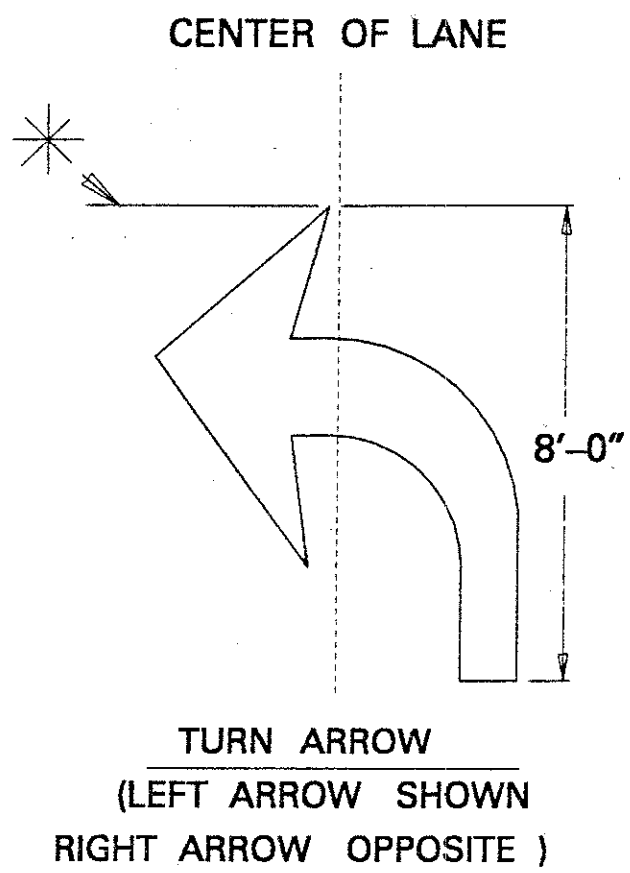
3a
25

PLAN NO.

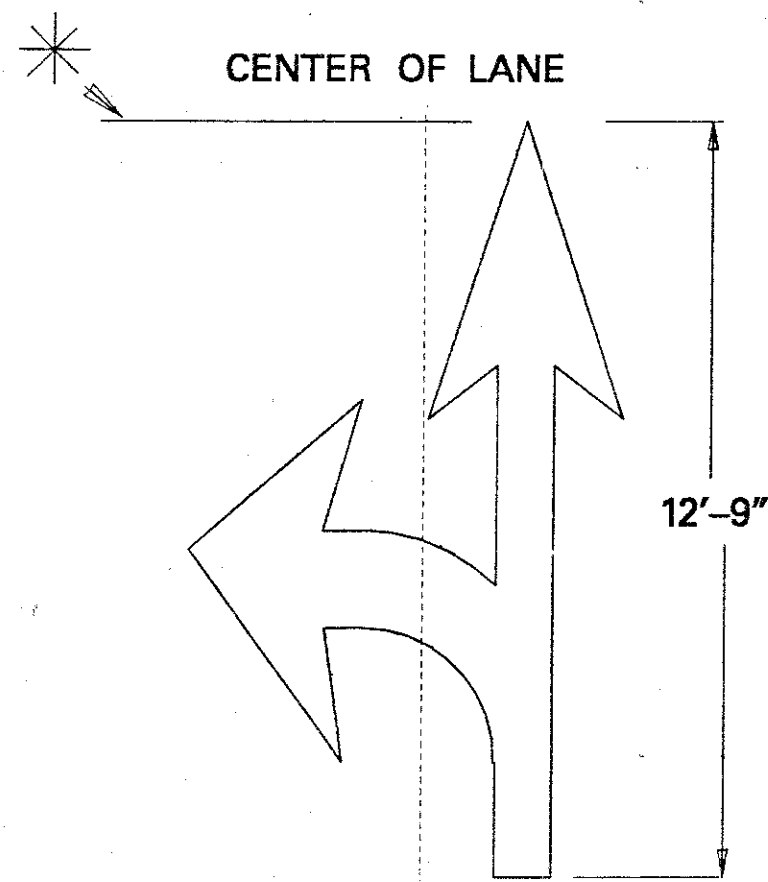
Cuyahoga County
CUY-43-4.80

- NOTES:
- ON MULTI-LANE APPROACHES, THE TRANSVERSE LINES USED WITH THE RAILROAD SYMBOLS SHALL EXTEND ACROSS ALL APPROACH LANES AND SYMBOLS SHALL BE PLACED IN EACH APPROACH LANE.
 - THE RAILROAD SYMBOL SHALL BE LOCATED SO THAT THE W-94, "RAILROAD ADVANCE WARNING SIGN", IS WITHIN THE TWO TRANSVERSE BOUNDARY LINES OF THE RAILROAD SYMBOL. THE STOP LINE SHALL BE LOCATED FOR BEST SIGHT DISTANCE WITHIN 15 FEET TO 50 FEET OF THE NEAR EDGE OF THE TRACKS. STOP LINES SHALL BE PERPENDICULAR TO THE CENTER LINE OF THE ROADWAY. WIDTH OF "X" MAY VARY ACCORDING TO LANE WIDTH.
 - ON MULTI-LANE APPROACHES, THE TRANSVERSE LINES USED WITH THE WORD "SCHOOL" SHALL EXTEND ACROSS ALL APPROACH LANES WITH A SINGLE WORD "SCHOOL" CENTERED ACROSS THE APPROACH LANES. ON TWO LANE ROADWAYS, THE TRANSVERSE LINES SHALL EXTEND ACROSS THE ROADWAY WITH THE WORD "SCHOOL" CENTERED ACROSS THE ROADWAY. CENTER OR LANE LINES SHALL NOT PASS THROUGH THE "SCHOOL" MARKING.
 - THE STOP LINE SHOULD BE PLACED WHERE CROSS-CORNER VISION IS MAXIMUM, IN NO CASE MORE THAN 30 FEET OR LESS THAN 4 FEET FROM THE NEAREST EDGE OF THE INTERSECTING ROADWAY. FOR NORMAL INTERSECTIONS A MAXIMUM DISTANCE OF 10 FEET IS RECOMMENDED.
 - IF A MARKED CROSSWALK IS PRESENT, THE STOP LINE SHOULD BE PLACED 4 FEET IN ADVANCE OF AND PARALLEL TO THE NEAREST CROSSWALK.
 - FOR TRAFFIC PAINT AND POLYESTER APPLICATION, TEMPLATE GAPS SHALL BE FILLED WITH MARKING MATERIAL IN ACCORDANCE WITH 641.03. FOR EXTRUDED THERMOPLASTIC MATERIAL, THESE GAPS MAY REMAIN UNFILLED IN ACCORDANCE WITH 644.03.
 - USE STANDARD DIMENSIONS CONFORMING TO REQUIREMENTS OF OMUTCD SECTION 3B-40 THROUGH 3B-43 INCLUSIVE. (THAT IS THE 1977 METRIC EDITION STANDARD ALPHABETS FOR HIGHWAY SIGNS AND PAVEMENT MARKING WITH ERRATA.)

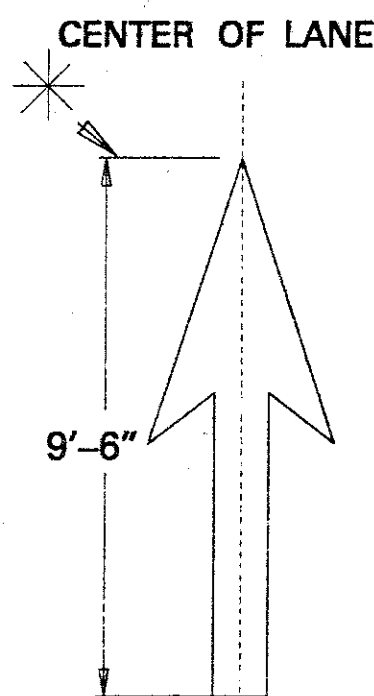
* INDICATES STATION REFERENCE POINT



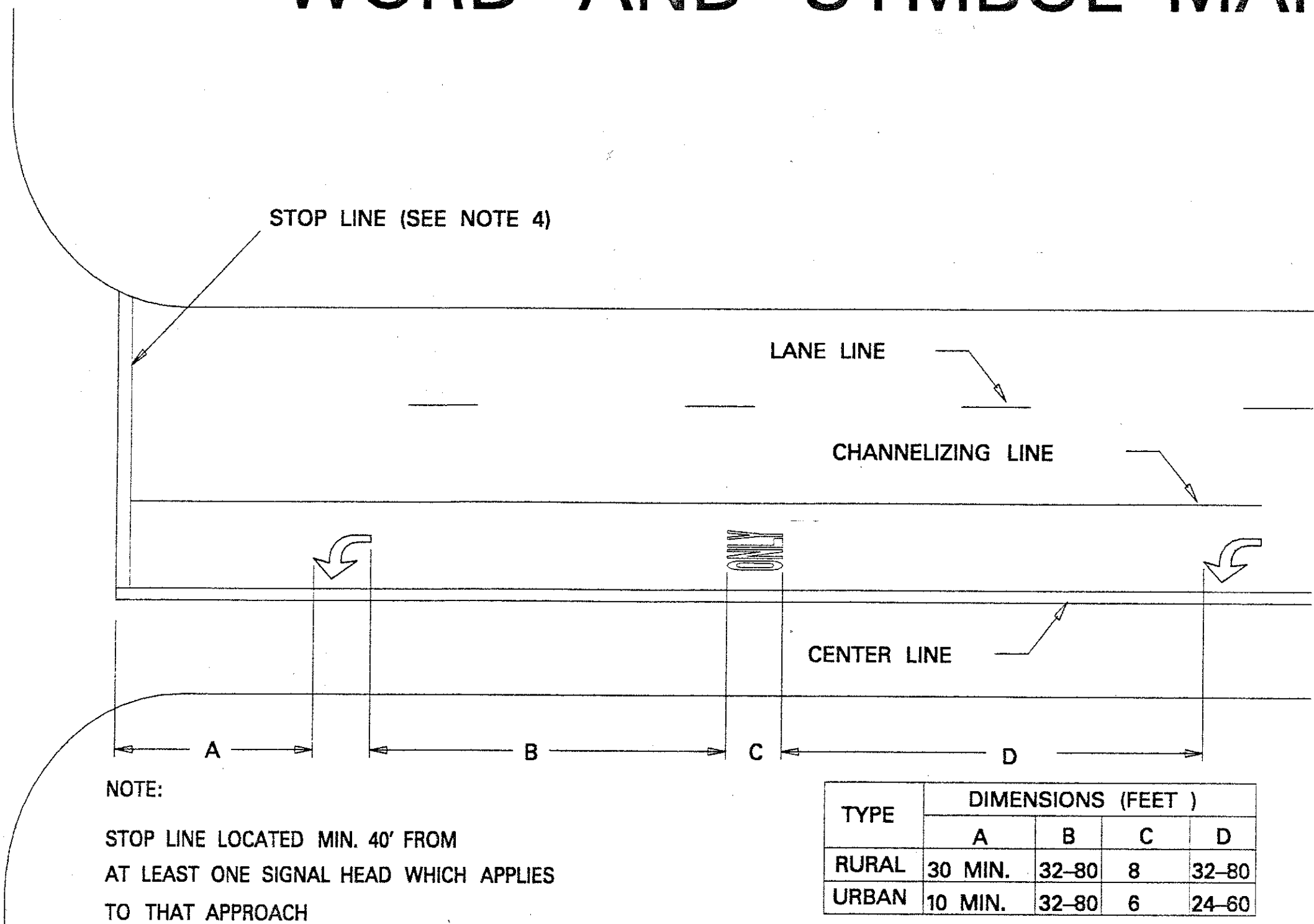
TURN ARROW
(LEFT ARROW SHOWN
RIGHT ARROW OPPOSITE)



COMBINED ARROW
(THREE HEAD DIRECTIONAL ARROWS
CAN BE ACHIEVED BY THE COMBINATION
OF TURN ARROWS.)

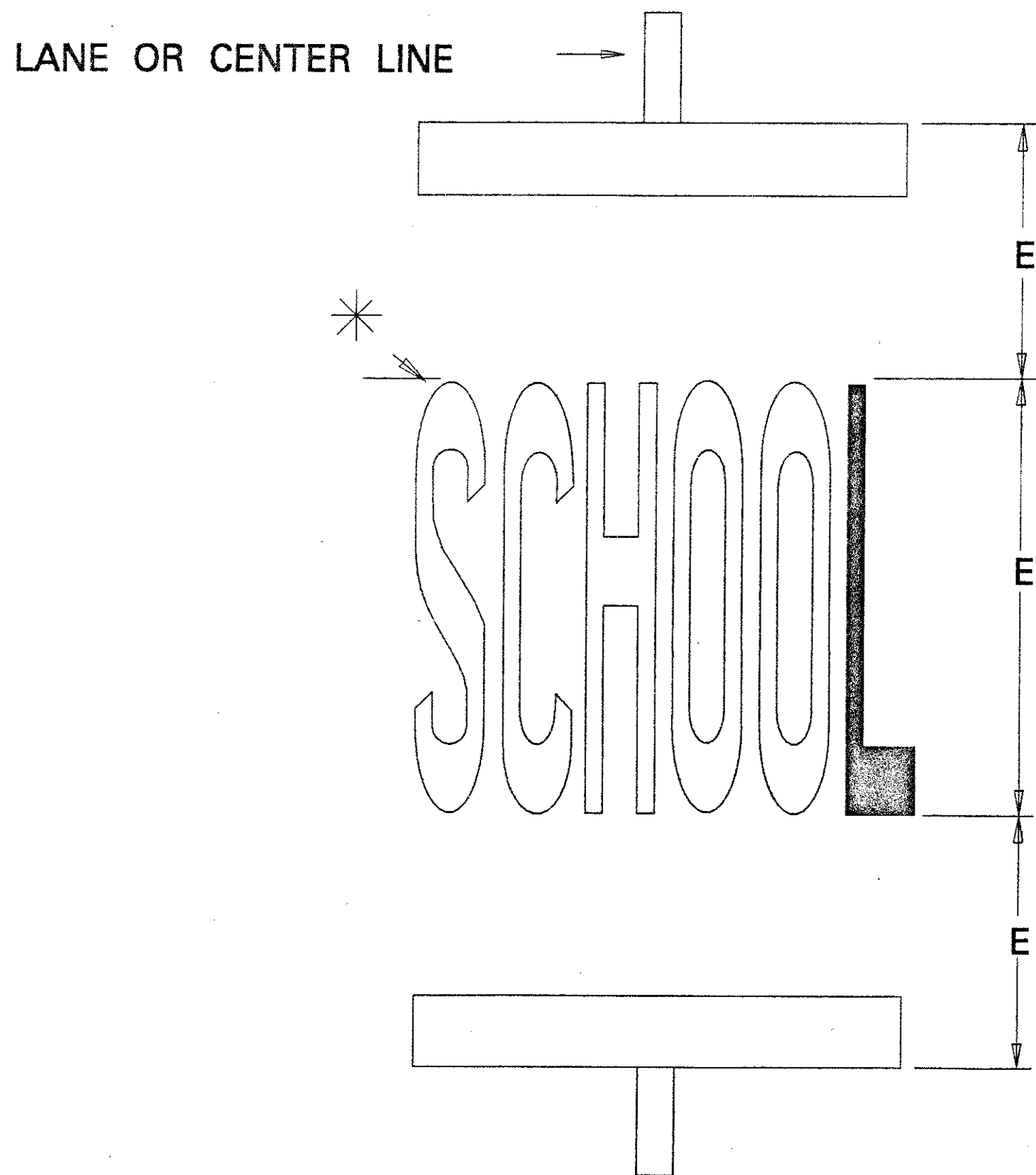


THROUGH ARROW

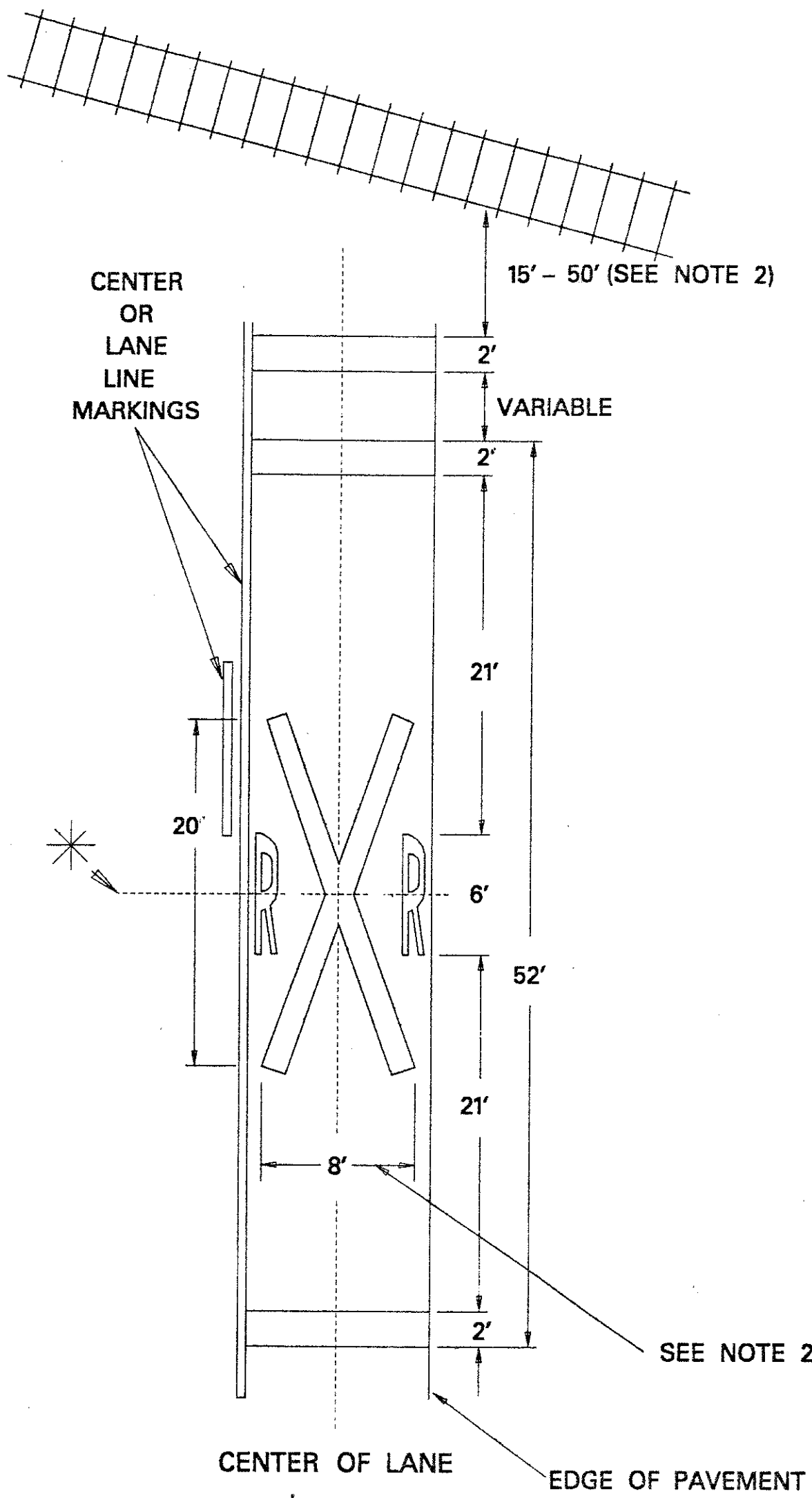


NOTE:
STOP LINE LOCATED MIN. 40' FROM
AT LEAST ONE SIGNAL HEAD WHICH APPLIES
TO THAT APPROACH

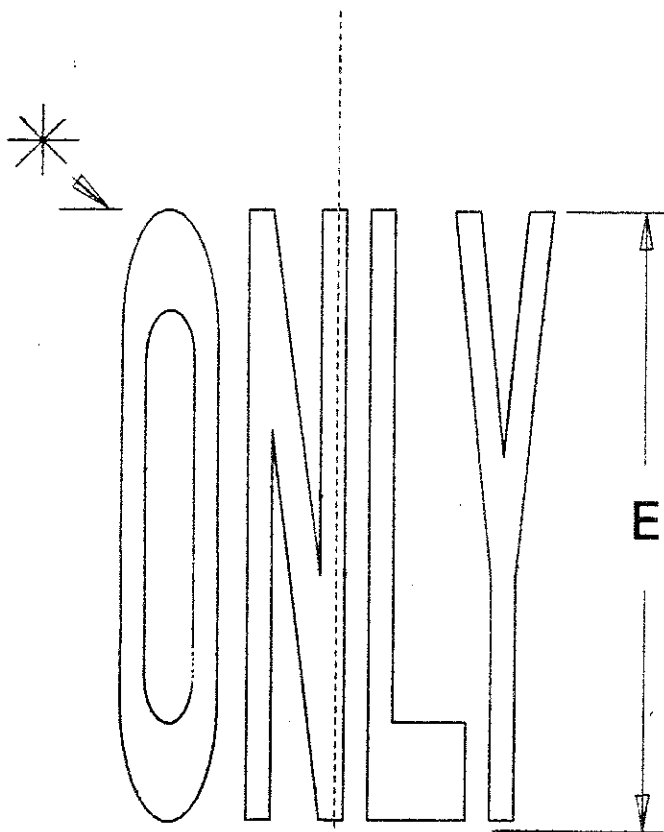
TYPE	DIMENSIONS (FEET)			
	A	B	C	D
RURAL	30 MIN.	32-80	8	32-80
URBAN	10 MIN.	32-80	6	24-60



TYPE	INCHES
	E
RURAL	96
URBAN	72



CENTER OF LANE



GENERAL NOTES

GENERAL

~~ITEM 619 FIELD OFFICE~~

THE CONTRACTOR SHALL PROVIDE A SUITABLE FIELD OFFICE HAVING A MINIMUM OF 300 SQ. FT. OF FLOOR SPACE. PAYMENT SHALL BE AT THE LUMP SUM PRICE BID FOR ITEM 619, FIELD OFFICE.

CONTINGENCY QUANTITIES:

THE CONTRACTOR SHALL NOT ORDER MATERIALS OR PERFORM WORK FOR PLAN ITEMS SET UP TO BE USED "AS DIRECTED BY THE ENGINEER" UNLESS AUTHORIZED BY THE ENGINEER. THE ACTUAL WORK LOCATIONS AND QUANTITIES USED AT THE ENGINEER'S DISCRETION, SHALL BE MADE A MATTER OF RECORD BY INCORPORATION INTO THE FINAL CHANGE ORDER COVERING COMPLETION OF THIS PROJECT.

ELEVATION DATUM

ALL ELEVATIONS SHOWN ON THESE PLANS ARE IN FEET ABOVE THE U.S.G.S. DATUM PLANE.

UNDERGROUND UTILITIES

THE LOCATIONS OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE AS OBTAINED FROM THE OWNERS OF UTILITIES AS REQUIRED BY SECTION 153.64 ORC.

UTILITY OWNERSHIP

THE FOLLOWING UTILITIES AND OWNERS ARE LOCATED WITHIN THE WORK LIMITS OF THIS PROJECT:

WATER LINES DEPARTMENT OF PUBLIC UTILITIES
CITY OF CLEVELAND
1201 LAKESIDE AVENUE
CLEVELAND OHIO 44114 (216) 664-3349

ELECTRIC THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
ILLUMINATING BUILDING
55 PUBLIC SQUARE
CLEVELAND, OHIO 44113 (216) 861-9000

TELEPHONE THE OHIO BELL TELEPHONE CO.
100 ERIEVIEW PLAZA
CLEVELAND, OHIO 44114 (216) 822-9000

SANITARY SEWER & STORM SEWER DEPT. OF PUBLIC UTILITIES
CITY OF SOLON
6315 S.O.M. CENTER ROAD
SOLON, OHIO 44139 (216) 248-1155

REVIEW OF DRAINAGE FACILITY

BEFORE ANY WORK IS STARTED ON THE PROJECT, AND AGAIN BEFORE FINAL ACCEPTANCE BY THE STATE, REPRESENTATIVES OF THE STATE AND THE CONTRACTOR SHALL MAKE AN INSPECTION OF THE EXISTING SEWERS WITHIN THE WORK LIMITS WHICH ARE TO REMAIN IN SERVICE AND WHICH MAY BE AFFECTED BY THE WORK. THE CONDITIONS OF THE EXISTING CONDUITS AND THEIR APPURTENANCES SHALL BE DETERMINED FROM FIELD OBSERVATIONS. RECORDS OF THE INSPECTIONS SHALL BE KEPT IN WRITING BY THE STATE OF OHIO.

ALL NEW CONDUITS, INLETS, CATCH BASINS AND MANHOLES CONSTRUCTED AS PART OF THE PROJECT SHALL BE FREE OF ALL FOREIGN MATTER AND IN A CLEAN CONDITION BEFORE THE PROJECT WILL BE ACCEPTED BY THE STATE.

ALL EXISTING SEWERS INSPECTED INITIALLY BY THE ABOVE MENTIONED PARTIES, SHALL BE MAINTAINED AND LEFT IN A CONDITION REASONABLY COMPARABLE TO THAT DETERMINED BY THE ORIGINAL INSPECTION. ANY CHANGE IN THE CONDITION RESULTING FROM THE CONTRACTORS OPERATIONS SHALL BE CORRECTED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER.

PAYMENT FOR ALL OPERATIONS DESCRIBED ABOVE SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PERTINENT 603 CONDUIT ITEMS OF THE CONTRACT.

CLEARING AND GRUBBING

ALL TREES AND STUMPS SPECIFICALLY MARKED FOR REMOVAL WITHIN THE CONSTRUCTION LIMITS OF THIS PROJECT SHALL BE REMOVED UNDER THE LUMP SUM PRICE BID FOR ITEM 201, CLEARING AND GRUBBING, EXCEPT THAT THOSE TREES FOR WHICH PROTECTION AND PRESERVATION WORK IS INDICATED ELSEWHERE IN THESE PLANS SHALL NOT BE REMOVED.

THE FOLLOWING IS AN APPROXIMATE ESTIMATE OF THE NUMBER OF TREES AND STUMPS TO BE REMOVED:

SIZES (INCHES)	NO. OF TREES	NO. OF STUMPS	TOTAL
18	8	--	8
30			
48			
60			

THE ABOVE ESTIMATE IS APPROXIMATE AND THE STATE OF OHIO RESERVES THE RIGHT TO ORDER THE REMOVAL OF ADDITIONAL TREES OR STUMPS OUTSIDE OF THE LIMITS OF CONSTRUCTION BUT WITHIN THE RIGHT-OF-WAY AND/OR EASEMENT LINES. PAYMENT FOR THE REMOVAL OF THESE ADDITIONAL TREES OR STUMPS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 201, CLEARING AND GRUBBING.

CONNECTIONS TO EXISTING PIPE

WHERE THE PLANS PROVIDE FOR PROPOSED DRAINAGE STRUCTURES OR PROPOSED CONDUIT TO BE CONNECTED TO, OR TO CROSS EITHER OVER OR UNDER AN EXISTING SEWER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE THE EXISTING PIPE BOTH AS TO LINE AND GRADE BEFORE HE STARTS TO LAY THE PROPOSED CONDUIT OR TO CONSTRUCT THE PROPOSED DRAINAGE STRUCTURE. PAYMENT FOR ALL OPERATIONS DESCRIBED ABOVE SHALL BE INCLUDED IN THE UNITY PRICE BID FOR THE PERTINENT 603 or 604 ITEMS.

ITEM 407 TACK COAT

THE RATE OF APPLICATION OF 407 TACK COAT SHALL BE SUBJECT TO ADJUSTMENT, AS DIRECTED BY THE ENGINEER. WHEN COVER AGGREGATE IS NEEDED ON THIS PROJECT, IT SHALL BE USED AS DIRECTED BY THE ENGINEER AND IT SHALL BECOME INCIDENTAL TO AND INCLUDED FOR PAYMENT IN, ITEM 407 TACK COAT. PLAN QUANTITIES INDICATE AVERAGE APPLICATION RATES OF 0.1 GALLONS PER SQUARE YARD OF TACK COAT FOR ESTIMATING PURPOSED ONLY.

ITEM 614-MAINTENANCE OF TRAFFIC

THE WORK CALLED FOR UNDER THIS CONTRACT INVOLVES PARTIAL CLOSING OF THE LANE AS SHOWN ON SHEET NO. 2012. THE CONTRACTOR SHALL PROSECUTE TO THE FULLEST EXTENT THE WORK INVOLVED SO AS TO REDUCE TO A MINIMUM THE LENGTH OF TIME THE LANE WILL BE CLOSED TO TRAFFIC. NO LANE WILL BE CLOSED UNTIL NECESSARY FOR CONSTRUCTION AS DETERMINED BY THE ENGINEER. LOCAL ACCESS TO ABUTTING PROPERTIES SHALL BE MAINTAINED AT ALL TIMES. ALL TRAFFIC CONTROL DEVICES SHALL COMPLY WITH THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. ALL ADVANCE WARNING SIGNS AND SUPPORTS SHALL BE FURNISHED, INSTALLED, MAINTAINED, AND SUBSEQUENTLY REMOVED BY THE CONTRACTOR. PAYMENT FOR ALL MAINTENANCE OF TRAFFIC ITEMS SHALL BE INCLUDED IN THE LUMP SUM BID PRICE FOR ITEM 614 - MAINTAINING TRAFFIC.

NOTIFICATION

SINCE FUNCTIONAL TRAFFIC MAINTENANCE IS A MAJOR CONCERN OF THIS PROJECT IT IS ESSENTIAL THAT THE MOTORING PUBLIC BE ADEQUATELY FOREWARNED OF FUTURE LANE CLOSURES AND TRAFFIC CONSTRICTIONS.

THEREFORE, THE CONTRACTOR SHALL NOTIFY THE OHIO DEPARTMENT OF TRANSPORTATION OF THE LOCATION AND DATE OF EACH LANE CLOSURE AT LEAST TWO WEEKS PRIOR TO THE IMPLEMENTATION OF ANY SUCH CLOSURES.

CITY OF SOLON SHALL BE NOTIFIED OF THE LANE CLOSING AT LEAST 5 WORKING DAYS PRIOR TO ACTUAL CLOSING.

MAINTENANCE OF TRAFFIC SYSTEMS

A. MINIMUM PROVISION

THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL NECESSARY TRAFFIC CONTROL DEVICES AS REQUIRED BY THE PLANS AND SPECIFICATIONS AND THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. HEREINAFTER REFERRED TO AS THE "MANUAL" TWO-WAY TRAFFIC ON ONE 12 FOOT MINIMUM LANES SHALL BE MAINTAINED AT ALL TIMES. TEMPORARY SIGNALS SHOWN IN THE MAINTENANCE OF TRAFFIC PLANS SHALL BE USED. THE TRAFFIC CONTROL SYSTEMS IN THE "MANUAL", AND THESE PLANS CONSTITUTE THE MINIMUM PROVISIONS FOR MAINTAINING TRAFFIC. WHENEVER THE ENGINEER DEEMS ADDITIONAL OR ALTERNATIVE DEVICES NECESSARY, HE MAY DIRECT THAT THEY BE USED.

B. ADVANCE WARNING SIGNS

ALL ADVANCE WARNING SIGNS FOR ANY TRAFFIC RESTRICTIONS SHALL BE ERECTED BEFORE SUCH RESTRICTION IS PUT INTO EFFECT. ALL EXISTING TRAFFIC CONTROL SIGNS AND TEMPORARY CONSTRUCTION SIGNS SHALL BE COVERED OR REMOVED FROM THE VIEW OF TRAFFIC WHENEVER THEY ARE NOT APPLICABLE.

C. CONDITIONS

A MINIMUM 24" FOOT LANES SHALL BE MAINTAINED DURING BRIDGE WORK AS SHOWN IN THE MAINTENANCE OF TRAFFIC PLANS.

D. FAILURE TO COMPLY

IF THERE IS ANY FAILURE TO COMPLY WITH THE PROVISIONS FOR TRAFFIC MAINTENANCE SET OUT IN THE PLANS, NOTES OR "MANUAL", THE HIGHWAY IN THE VICINITY OF THE WORK AREA SHALL NOT BE CONSIDERED IN A CONDITION FOR THE SAFE AND CONVENIENT USE BY THE TRAVELING PUBLIC, WHICH SHALL BE CONSIDERED A BREACH OF THIS CONTRACT. WORK SHALL BE SUSPENDED UNTIL THE CONTRACTOR WITH THE PROVISIONS OF THE AFOREMENTIONED ITEMS.

JOINT SEALERS

ALL REFERENCES TO 705.01 OR 705.02, APPEARING ON STANDARD DRAWINGS OR ON THE PLANS, SHALL BE CONSIDERED TO READ 705.04.

SEEDING

QUANTITIES FOR SEEDING ARE CALCULATED FOR THE SOIL AREAS WITHIN THE WORK LIMITS.

EROSION CONTROL

TEMPORARY SOIL EROSION AND SEDIMENT CONTROL

THE FOLLOWING ESTIMATED QUANTITY IS TO BE USED AS DIRECTED BY THE ENGINEER FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES.

ITEM 207 STRAW OR HAY BALES 100 EACH

ITEM 207 - TEMPORARY SEEDING AND MULCHING 39 SQ. YD.

ITEM 659-COMMERCIAL FERTILIZER .01 TON

ITEM 659 - WATER 1.0 M. GALS.

GUARD RAILS

THE LOCATIONS OF GUARDRAIL RUNS, AS SHOWN IN THESE PLANS, ARE SUBJECT TO ADJUSTMENT PRIOR TO FINAL ACCEPTANCE. THE ENGINEER SHALL BE SATISFIED THAT ALL INSTALLATIONS WILL AFFORD MAXIMUM PROTECTION FOR TRAFFIC.

CONDUIT END TREATMENT: IMMEDIATELY AFTER PLACEMENT OF ANY CONDUITS, THE CONTRACTOR SHALL CONSTRUCT THE END TREATMENTS REQUIRED BY THE PLANS AT BOTH THE OUTLET AND INLET ENDS. THIS SHALL INCLUDE HEADWALLS, CONCRETE RIPRAP, ROCK CHANNEL PROTECTION, SODDING, ETC.

EROSION CONTROL: ITEM 601, IS PROVIDED IN THE PLANS FOR EROSION CONTROL. ROCK OF A STABLE NATURE WILL NOT BE REMOVED IN ORDER TO PLACE ANY OF THESE ITEMS. THE ENGINEER SHALL CHECK AND NON-PERFORM QUANTITIES OR ADJUST LOCATIONS AND QUANTITIES FOR THESE ITEMS WHERE INDICATED BY FIELD CONDITIONS DURING CONSTRUCTION.

OVERHEAD UTILITIES

NO CRANE, MACHINERY, OR OTHER EQUIPMENT WILL BE USED WITHIN 25 FEET OF ANY TRANSMISSION LINE STRUCTURE, OR WITHIN 20 FEET OF ANY ELECTRICAL TRANSMISSION LINE WIRE. IT SHOULD BE UNDERSTOOD THAT THE TRANSMISSION AND DISTRIBUTION LINES ARE ENERGIZED AND IN SERVICE, AND A HIGH DEGREE OF CAUTION SHOULD BE USED WHEN WORKING IN THE RIGHT-OF-WAY, ESPECIALLY IN THE VICINITY OF THE TRANSMISSION STRUCTURES.

WINTER TRAFFIC LIMITATIONS

ALL EXISTING LANES SHALL BE OPEN TO TRAFFIC BETWEEN NOVEMBER 15 AND APRIL 15. NOVEMBER 15 SHALL BE CONSIDERED TO CONSTITUTE AN INTERIM COMPLETION DATE AND LIQUIDATED DAMAGES SHALL BE ASSESSED IN ACCORDANCE WITH SECTION 108.07 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS FOR EACH CALENDAR DAY THAT ALL LANES ARE NOT OPEN AND AVAILABLE TO TRAFFIC.

ITEM 310 SUBBASE, GRADING A AS PER PLAN

MATERIALS FURNISHED FOR THIS ITEM, SHALL EXCLUDE ALL SLAG EXCEPT GRANULATED SLAG OR CRUSHED AIR-COOLED BLAST FURNACE SLAG.

General Notes Continued on Sheet 5

WATERWORK NOTES

FWMA REGION	STATE	PROJECT	
5	OHIO	BHF-58(3I).	



CUYAHOGA COUNTY
CUY.-43-4.80

GENERAL NOTES

THE EXACT LOCATION OF EXISTING WATER LINES AND UNDERGROUND STRUCTURES IS NOT KNOWN. INFORMATION SHOWN ON THE PLANS WAS OBTAINED FROM CLEVELAND WATER DEPARTMENT DRAWINGS.

THE FIELD TESTING HEAD SHALL BE 75 PSI PLUS THAT DUE TO THE STATIC HEAD, BUT IN NO CASE LESS THAN 150 PSI.

THE CONTRACTOR SHALL NOTIFY THE CLEVELAND WATER DEPARTMENT INSPECTION AND ENFORCEMENT THREE (3) WEEKS PRIOR TO STARTING ANY WATER WORKS CONSTRUCTION. CALL 271-4264.

AFTER AWARD OF CONTRACT, THE CONTRACTOR THROUGH THE PROJECT ENGINEER SHALL SUBMIT TO THE CITY OF CLEVELAND WATER DEPARTMENT, INSPECTION AND ENFORCEMENT SECTION, A CONSTRUCTION SCHEDULE RELATING TO WATERWORK.

DEFINITIONS

WHEREVER IN THESE SPECIFICATIONS OR IN OTHER CONTRACT DOCUMENTS THE FOLLOWING TERMS OR PRONOUNS IN PLACE OF THEM ARE USED, THE INTENT AND MEANING SHALL BE INTERPRETED AS FOLLOWS:

THE STATE

THE STATE IS THE STATE OF OHIO ACTING THROUGH ITS AUTHORIZED REPRESENTATIVE.

ENGINEER

THE ENGINEER IS DISTRICT DEPUTY DIRECTOR OR DISTRICT ENGINEER, THE DISTRICT CONSTRUCTION ENGINEER OR THE DISTRICT MAINTENANCE ENGINEER OR THE PROJECT ENGINEER ASSIGNED TO ADMINISTER THE CONTRACT, OR THEIR DULY DESIGNATED DEPUTIES, AGENTS, OR REPRESENTATIVES.

THE CITY

THE CITY IS THE DIRECTOR, DEPARTMENT OF PUBLIC UTILITIES OF THE CITY OF CLEVELAND OR THEIR DULY DESIGNATED DEPUTIES, AGENTS, OR REPRESENTATIVES.

STATUS OF CITY INSPECTORS

INSPECTORS AS DESIGNATED BY THE DIRECTOR OF PUBLIC UTILITIES ARE AUTHORIZED TO INSPECT ALL WORK DONE AND MATERIALS FURNISHED, SUCH INSPECTION MAY EXTEND TO ALL OR ANY PART OF THE WATERWORK, AND TO THE PREPARATION OR MANUFACTURE OF THE MATERIALS TO BE USED IN THE WATERWORK. THE CITY INSPECTOR AS DESIGNATED BY THE DIRECTOR OF PUBLIC UTILITIES WILL MAKE WORK INSTRUCTIONS THROUGH THE PROJECT ENGINEER. ARRANGEMENTS FOR CITY INSPECTORS ARE TO BE MADE BY NOTIFYING INSPECTION AND ENFORCEMENT DIVISION OF WATER AND HEAT, 271-4264, WITHIN THE TIME SPECIFIED. NO WORK SHALL BE ACCEPTED UNLESS INSPECTED.

ACCESS TO WORK AND PLACE OF MANUFACTURE

THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE DIRECTOR OF PUBLIC UTILITIES, AT LEAST SEVEN (7) DAYS PREVIOUS TO THE COMMENCEMENT OF THE MANUFACTURE OF ANY MATERIALS, OF THE TIME AND PLACE WHERE THE MANUFACTURE IS TO COMMENCE, IN ORDER THAT A REPRESENTATIVE OF THE ENGINEER AND DIRECTOR MAY BE PRESENT TO INSPECT THE MANUFACTURE. THE CONTRACTOR SHALL PROVIDE, WITHOUT ANY CHARGE OR EXPENSE TO THE STATE AND CITY, ALL NECESSARY ASSISTANCE TO THE ENGINEER AND DIRECTOR WHEN REQUIRED FOR INSPECTION OR VERIFICATION OF WORK DONE.

DIMENSIONS, DETAILED DRAWINGS, AND ELEVATIONS

FIGURED DIMENSIONS ON DRAWINGS SHALL TAKE PRECEDENT OVER MEASUREMENTS BY SCALE, AND DETAILED DRAWINGS ARE TO TAKE PRECEDENCE OVER GENERAL DRAWINGS AND SHALL BE CONSIDERED AS EXPLANATORY OF THEM AND NOT AS INDICATING EXTRA WORK. IF, HOWEVER, ANY OF THE DETAILED DRAWINGS SHOW MORE ELABORATE OR EXPENSIVE WORK THAN IS NORMALLY SPECIFIED AND INDICATED BY THE CONTRACT DRAWINGS, NOTICE THEREOF MUST BE GIVEN TO THE ENGINEER BY THE CONTRACTOR WITHIN TEN (10) DAYS AFTER RECEIPT OF SUCH DETAILED DRAWINGS IN ORDER THAT THE DRAWINGS MAY BE AMENDED OR THE ADDITIONAL EXPENSE ON ACCOUNT OF SUCH WORK MAY BE ADJUSTED AND AUTHORIZED. IF THE ENGINEER DOES NOT RECEIVE SUCH NOTICE FROM THE CONTRACTOR WITHIN TEN (10) DAYS AFTER THE DETAILED DRAWINGS HAVE BEEN RECEIVED BY HIM, IT IS HEREBY AGREED THAT THE CONTRACTOR ACCEPTS THE DRAWINGS AND WILL EXECUTE THEM WITHOUT CLAIM FOR EXTRA COMPENSATION.

ERRORS AND DISCREPANCIES

IF THE CONTRACTOR, IN THE COURSE OF HIS WORK, FINDS ANY DISCREPANCY BETWEEN THE PLANS, DESCRIPTION AND LOCATION OF WORK AND ESTIMATE OF QUANTITIES, THE PHYSICAL CONDITION OF THE LOCALITY, OR ANY ERRORS IN PLANS OR IN THE LAYOUT AS GIVEN BY THE DRAWINGS AND INSTRUCTIONS WHICH MAKE IT IMPOSSIBLE FOR HIM TO COMPLETE THE WORK REQUIRED UNDER THE PLANS AND SPECIFICATIONS, IT SHALL BE HIS DUTY TO IMMEDIATELY INFORM THE ENGINEER IN WRITING AND THE ENGINEER SHALL VERIFY THE SAME. ANY WORK DONE AFTER SUCH DISCOVERY, UNTIL AUTHORIZED, SHALL BE DONE AT THE CONTRACTOR'S RISK.

FLOODS AND FREEZING WEATHER

PROPER FACILITIES SHALL BE PROVIDED FOR PROTECTING THE WORK FROM DAMAGE BY FLOOD, RAIN, OR FROST, AND WORK DONE IN FREEZING WEATHER SHALL BE DONE IN SUCH MANNER AS THE ENGINEER MAY APPROVE. VALVES SHALL BE PROTECTED FROM FREEZING UNTIL BACKFILLED IN THE COMPLETED WORK.

ADDITIONAL WORK

(A) ATTENTION IS CALLED TO THE FACT THAT THE WORK OF THIS CONTRACT INCLUDED CERTAIN PERFORMANCE AS INCIDENTAL TO THE ITEMIZED REQUIREMENTS HEREOF, THOUGH NOT EXCLUSIVE AS FOLLOWS: TO PERFORM ALL EXCAVATION, BACKFILLING, SHEETING, SORTING, AND TO TEST AND CHLORINATE THE INSTALLATION. THE STATE WILL MAKE NO SPECIFIC OR SEPARATE PAYMENT OR ALLOWANCE, BUT THE COST THERE SHALL BE INCLUDED IN THE PRICES STIPULATED TO BE PAID FOR UNDER THE VARIOUS WATERWORK ITEMS OF WORK TO BE DONE UNDER THIS CONTRACT.

(B) PRELIMINARY FLUSHING: BEFORE BEING PLACED IN SERVICE, ALL DIRT AND FOREIGN MATTER SHALL BE REMOVED FROM THE NEW WATER MAIN OR EXTENSIONS TO EXISTING MAINS BY A THOROUGH FLUSHING THROUGH THE HYDRANTS OR BY OTHER APPROVED MEANS. EACH VALVED SECTION OF NEWLY LAID PIPE SHALL BE FLUSHED INDEPENDENTLY. THIS SHALL BE DONE AFTER THE PRESSURE TEST AND MAY BE DONE BEFORE OR AFTER THE TRENCH SHALL HAVE BEEN BACKFILLED.

TESTING MAINS

(A) ALL PIPES, VALVES, FITTINGS, ETC., SHALL BE LAID IN SUCH A MANNER AS TO LEAVE ALL JOINTS WATERTIGHT. AFTER THE PIPE IS LAID, SUCH LENGTHS OF THE WATER MAIN AS THE DIRECTOR OR HIS DESIGNATE MAY DETERMINE, SHALL BE TESTED UNDER HYDROSTATIC PRESSURE INDICATED IN GENERAL NOTES.

(B) THE HYDROSTATIC TEST SHALL BE UNDER THE DIRECTION OF THE DIRECTOR OF PUBLIC UTILITIES OR HIS DESIGNATE. THE CONTRACTOR MAY OBTAIN WATER FOR TESTING BY OBSERVING THE RULES AND REGULATIONS ENFORCED IN THE MUNICIPALITIES OR TOWNSHIPS IN WHICH THE WORK IS BEING DONE. THE CITY WILL FURNISH A PRESSURE GAUGE FOR MEASURING THE PRESSURE ON THE WATER MAIN, BUT THE CONTRACTOR SHALL FURNISH A SUITABLE PUMP, PIPES, TEST HEADS, AND ALL APPLIANCES, LABOR, FUEL, AND OTHER APPURTENANCES NECESSARY TO MAKE THESE TESTS.

(C) THE HYDROSTATIC TEST PRESSURE SHALL BE FOR A DURATION OF A MINIMUM OF TWO (2) HOURS WITH ALL VALVES CLOSED DURING WHICH TIME THE INTERNAL PRESSURE SHALL REMAIN WITHIN 5 PSI OF THE SPECIFIED TEST PRESSURE. SHOULD THE TEST PRESSURE DROP MORE THAN 5 PSI, THE CONTRACTOR SHALL RECHARGE THE WATERMAIN TO THE SPECIFIED TEST PRESSURE AND LOCATE AND REPAIR THE LEAK TO THE SATISFACTION OF THE CITY. ANY DAMAGED OR DEFECTIVE PIPE, PIPE JOINTS, FITTINGS, VALVES, HYDRANTS, OR APPURTENANCES SHALL BE REPAIRED OR REPLACED WITH SOUND MATERIAL AND THE HYDROSTATIC PRESSURE TEST REPEATED.

(D) AFTER A SECTION OF THE WATER MAIN HAS BEEN TESTED, THE CONTRACTOR SHALL FLUSH THE SAME. IN THE CASE OF SUPPLY MAINS WHERE DRAINS ARE CONNECTED TO VALVE OR DRAIN VALVES, THE CONTRACTOR SHALL, WITHIN A REASONABLE TIME AFTER THE TEST HAS BEEN COMPLETED, PUMP ALL WATER OUT OF THE VAULTS. FLUSHING SHALL BE DONE IN ACCORDANCE WITH THESE SPECIFICATIONS.

(E) IN COLD WEATHER IMMEDIATELY AFTER TESTING A SECTION OF THE WATER MAIN, THE CONTRACTOR SHALL OPEN ALL VALVES, AND IN THE CASE OF SUPPLY MAINS ALL AIR RELIEF VALVES, BYPASSES AND DRAINS AND PROPERLY DRAIN BONNETS OF ALL VALVES IN THE SECTION OF THE WATER MAIN, AND TAKE ALL OTHER PRECAUTIONS NECESSARY TO PREVENT INJURY TO WATER MAIN AND APPURTENANCES DUE TO FREEZING.

(F) IN ORDER TO BE ABLE TO MAKE PROPER ALLOWANCE FOR LEAKAGE AT VALVES, AIR RELIEF VALVES, BYPASSES, AND DRAINS, ONLY SECTIONS OF WATER MAIN TO BE TESTED SHALL HAVE SUCH VALVES, TEST PLUGS AND CAPS ACCESSIBLE.

(G) IN TESTING NEW MAINS, THE CONTRACTOR SHALL NOT BE PERMITTED TO USE ANY PART OF THE EXISTING MAINS IN HIS TEST UNLESS OTHERWISE SHOWN ON THE CONTRACT DRAWINGS. THE LIMITS OF THE HYDROSTATIC SHALL BE SHOWN AS ON THE PLANS. THE CONTRACTOR SHALL PROVIDE BLIND FLANGES, PLUGS OR CAPS, DEPENDING ON DESIGN, TO THE TESTED LENGTH OF THE PROPOSED MAIN SO THAT IT WILL BE COMPLETELY INDEPENDENT OF THE SAID EXISTING MAINS. PROPER RESTRAINT OF ALL BLIND FLANGES, PLUGS OR CAPS TO PREVENT BLOWOFF SHALL BE PROVIDED AND IN THE CASE OF DEAD END MAINS CONCRETE PIERS WILL BE REQUIRED. NO EXTRA PAYMENT WILL BE MADE AND THE ENTIRE COST SHALL BE DEEMED TO BE INCLUDED IN THE BID PRICE.

WATER MAIN DISINFECTION

(A) WATER MAIN DISINFECTION SHALL CONSIST OF: FLUSHING WATER MAINS AFTER THE HYDROSTATIC TEST AND PRIOR TO THE CHLORINATION PROCEDURE; THE CHLORINATION PROCEDURE, THE FINAL FLUSHING AND SAMPLING.

1. TAPS, TAPPING SADDLES, SERVICE PIPES, COMBINATION BLOWOFFS, AND EXISTING WATER MAINS WITH READILY ACCESSIBLE CONTROL VALVES, AND ALL PIPES, APPLIANCES, LABOR, AND OTHER APPURTENANCES SHALL BE FURNISHED OR PROVIDED BY THE CONTRACTOR. THEY SHALL BE USED FOR INTRODUCING DISINFECTING AGENT AND WATER FOR FLUSHING INTO THE NEW OR EXTENDED WATER MAINS. TAPS OR SERVICE PIPES SHALL BE A MINIMUM ONE INCH (1") SIZE OF COPPER TO IRON PIPE THREAD CONFIGURATION. ADDITIONAL TAPS SHALL BE PROVIDED IF NECESSARY. ALL ONE INCH (1") TAPS ON DUCTILE IRON WATER MAINS WITH THICKNESS LESS THAN CLASS 56 WILL REQUIRE BRONZE DOUBLE STRAP TAPPING SADDLES, OR APPROVED EQUAL, FURNISHED BY THE CONTRACTOR. COMBINATION BLOWOFFS AND SAMPLING TAPS SHALL BE: EITHER TAPPED OUTLET OR REGULAR BRANCH OUTLET TEES; AND/OR TAPPED PLUGS OR PIPE ENDS WHICH SHALL BE PLUGGED; OR HAVE ENDS CONNECTED TO WATER SYSTEM AFTER SATISFACTORY DISINFECTION AND FLUSHING. TAPPING OF WATER MAINS FOR CHLORINATION SHALL BE IN ACCORDANCE WITH THAT SPECIFIED IN PARAGRAPH "WORK TO BE DONE BY CITY".

2. ON EXISTING WATER MAINS AND ON NEW, RELOCATED OR EXTENDED WATER MAINS PLACED IN SERVICE ONLY THE CITY WILL OPERATE THE VALVES. THE CONTRACTOR WILL COOPERATE WITH CITY'S CHLORINATION CREW IN COORDINATING THE CHLORINATION AND FLUSHING IN DETERMINING THE AMOUNTS AND EXTENT OF CHLORINATION AND FLUSHING.

WATERWORK NOTES

FINAL REGION	STATE	PROJECT	
5	OHIO	BHF-58(3)	

4B
25

CUYAHOGA COUNTY
CUY.-43-4.80

3. SUCH LENGTHS OF THE WATER MAIN AS THE CITY MAY DETERMINE, SHALL BE CHLORINATED; HOWEVER, IN NO CASE SHALL THE LENGTH EXCEED THAT WHICH CAN BE CHLORINATED SATISFACTORILY IN ONE (1) WORK DAY. SUCH MAXIMUM LENGTH IS GENERALLY UP TO THREE (3) MILES TOTAL, INCLUDING BRANCHES AND CONNECTING WATER MAIN(S), FOR SIXTEEN INCH (16") AND SMALLER; AND THREE (3) VALVE SECTIONS, OR TWO (2) MILES, FOR TWENTY INCH (20") OR LARGER WATER MAINS.

4. THE CONTRACTOR SHALL PREPARE AND PRESENT TO THE CITY FOR APPROVAL A PLAN FOR ALL DISINFECTION FROM THE HYDROSTATIC TESTING TO THE FINAL FLUSHING FOR THE NEW OR EXTENDED WATER MAIN, INCLUDING ANY BRANCHES. THE DISINFECTION PLAN SHALL SHOW COMPLETE LAYOUT, INCLUDING SIZES AND LOCATION OF: (A) FLUSHING WATER SOURCE; (B) WATER SOURCE FOR CHLORINATION UTILIZING CALCIUM HYPOCHLORITE SOLUTION FURNISHED IN MIXING DRUM; (C) BLENDING WATER SOURCE TO ASSURE PROPER AND UNIFORM CONCENTRATION OF CHLORINATION SOLUTION THROUGHOUT THE WATER MAIN TO BE DISINFECTED; (D) OUTLETS TO BE UTILIZED OR PROVIDED FOR THE DRAWING AND FINAL FLUSHING OF CHLORINE SOLUTION THROUGH AND FROM THE WATER MAIN BEING DISINFECTED; AND (E) TYPE, NUMBER, SEQUENCE, AND SIZES OF OUTLETS INCLUDING FIRE HYDRANTS AND VALVES TO BE OPERATED.

5. BEFORE HYDROSTATIC TESTING WILL BE PERMITTED, THE CONTRACTOR SHALL OBTAIN FROM THE CITY, DIVISION OF WATER, PERMITS AND SALES, MISCELLANEOUS SERVICE RECEIPT (MR CARD). APPROVED WATER MAIN PLANS OF THE NEW WATER MAIN OR EXTENSION SHALL BE USED IN PREPARATION OF THE PLAN FOR DISINFECTION. UPON RECEIPT OF APPROVAL BY THE COMMISSIONER OF WATER AND HEAT OF THE PLAN FOR DISINFECTION, THE CONTRACTOR SHALL SUBMIT THE PLANS TO THE INSPECTION AND ENFORCEMENT RESIDENT INSPECTOR ALONG WITH THE MISCELLANEOUS SERVICE RECEIPT (MR CARD). ONLY UPON RECEIPT OF THE PLANS AND MR CARD WILL THE CHLORINATION PROCEDURE BE PERFORMED. THE CITY'S CHLORINATION CREW WILL INSPECT THE ENTIRE JOB AS TO BEING IN ACCORDANCE WITH APPROVED PLANS AND FOOTAGE LENGTH ON MAINS TO BE CHLORINATED.

6. CHLORINATION PROCEDURE FOR DISINFECTING NEW OR EXTENDED WATER MAINS SHALL BE BY THE CONTINUOUS FEED METHOD USING A SOLUTION FORMED BY MIXING WATER AND CALCIUM HYPOCHLORATE. NO OTHER FORM OF CHLORINE WILL BE USED. AMERICAN WATER WORKS ASSOCIATION AWWA STANDARD FOR DISINFECTING WATER MAINS - ANSI/AWWA C-651-86 SHALL BE FOLLOWED AS TO NEED, PROCEDURES, METHODS, HOLDING TIME, FREE CHLORINE RESIDUAL, APPLICATION AND CONFINEMENT TO WATER MAIN BEING DISINFECTED. WATER USED FOR CHLORINATION, BLENDING OF CHLORINATION SOLUTION TO DETERMINED CONCENTRATION, AND TO FEED DOSAGE INTO FULL LENGTH OF MAINS TO BE DISINFECTED SHALL BE OBTAINED AS FOR TESTING.

7. THE CITY WILL SUPPLY THE PUMP, SOLUTION MIXING PADDLE, 35 GALLON DRUM, GASOLINE POWERED ELECTRIC GENERATOR, AND SUPPLY OF POWDERED CALCIUM HYPOCHLORITE. THE CONTRACTOR SHALL SUPPLY ALL PIPES, HOSES, VALVES, FITTINGS, ETC., FOR THE USE EITHER TO CONVEY WATER, CHLORINE SOLUTION OR COMBINATION THEREOF AND TO DISPOSE OF HIGHLY CHLORINATED WATER FLUSHED TO WASTE.

8. THE CONTRACTOR SHALL COOPERATE WITH THE CITY'S CHLORINATION CREW OR RESIDENT INSPECTOR BY OPERATING ANY REQUIRED WATER MAIN APPURTENANCES TO ASSURE THE DISINFECTION OF SUCH APPURTENANCES AND OF ANY PIPE BRANCHES TO ASSURE CHLORINATION SOLUTION IS CONFINED TO WATER MAIN BEING DISINFECTED.

9. THE WATER DEPARTMENT CHLORINATION CREW WILL DETERMINE THE LENGTH OF TIME THE CHLORINE SOLUTION IS TO BE HELD IN THE WATER MAIN BEING DISINFECTED.

(B.) FLUSHING

1. BEFORE DISINFECTION ALL DIRT AND FOREIGN MATTER SHALL BE REMOVED FROM THE NEW WATER MAIN OR EXTENSIONS TO EXISTING MAINS BY A THOROUGH FLUSHING THROUGH THE HYDRANTS OR BY OTHER APPROVED MEANS. EACH VALVE SECTION OF THE NEWLY LAID PIPE SHALL BE FLUSHED INDEPENDENTLY. THIS SHALL BE DONE AFTER THE PRESSURE TEST. FLUSHING SHALL BE IN ACCORDANCE WITH ANSI/AWWA C 651 STANDARD FOR DISINFECTING WATER MAINS. WHERE THE FLUSHING VELOCITY SPECIFIED THEREIN CANNOT BE ATTAINED, FLUSHING RATES AS DETERMINED BY THE DIRECTOR TO BE SUFFICIENT SHALL BE PERMITTED. IF IN THE OPINION OF THE DIRECTOR THE FLUSHING PRIOR TO THE CHLORINATION PROCEDURE DOES NOT REMOVE DIRT OR OTHER ACCUMULATIONS IN THE PIPE, THE PIPE SHALL BE CLEANED BY MECHANICAL MEANS BY THE CONTRACTOR AND THE FLUSHING SHALL BE REPEATED.

2. THE FLUSHING OF THE CHLORINATION SOLUTION SHALL BE DONE BY THE CONTRACTOR UNTIL THE CHLORINE SOLUTION IS TOTALLY FLUSHED OUT OF THE SYSTEM BEING DISINFECTED. ALL FLUSHING SHALL BE UNDER THE CONTROL OF THE DIRECTOR OF PUBLIC UTILITIES, OR HIS DESIGNATE. THE CONTRACTOR SHALL OBTAIN WATER FOR FLUSHING IN THE SAME MANNER AS FOR TESTING.

3. IN FLUSHING, THE CONTRACTOR SHALL PROPERLY DISPOSE OF THE CHLORINATION SOLUTION. ONLY POINTS OF DISCHARGE APPROVED BY THE CITY'S CHLORINATION CREW SHALL BE UTILIZED WITHOUT ANY TREATMENT TO CHEMICALLY NEUTRALIZE THE SOLUTION. IN CASES WHERE DIRECT DISPOSAL IS NOT APPROVED, THE CONTRACTOR SHALL NEUTRALIZE THE CHLORINE SOLUTION AS PROVIDED IN APPENDIX B OF AWWA C-651. CONTRACTOR SHALL OBTAIN APPROVAL, IN WRITING, OF THE LOCAL SEWER AUTHORITY BEFORE DISPOSING TO A SANITARY SEWER. A COPY OF SUCH WRITTEN APPROVAL SHALL BE PROVIDED TO THE RESIDENT INSPECTOR AND CHLORINATION CREW BEFORE ANY FLUSHING IS BEGUN.

4. THE CITY'S CHLORINATION CREW WILL DETERMINE WHEN THE DISINFECTION SOLUTION HAS BEEN SATISFACTORILY FLUSHED FROM THE MAIN AND BRANCHES.

(C) SAMPLING

1. A TIME PERIOD AS DETERMINED BY THE CITY SHALL ELAPSE BEFORE WATER SAMPLES ARE TAKEN FROM THE WATER MAIN(S) AND BRANCH(ES) TO DETERMINE THE BACTERIOLOGICAL QUALITY OF THE WATER THEREIN. IN NO CASE, SHALL THE TIME PERIOD BE LESS THAN TWENTY-FOUR (24) HOURS. NO SAMPLES SHALL BE TAKEN FROM FIRE HYDRANTS. THE CONTRACTOR SHALL ASSIST THE CITY'S CHLORINATION CREW IN OBTAINING SAMPLES. THE CITY WILL FURNISH ALL CONTAINERS AND CONTROL PROCEDURES FOR OBTAINING SAMPLES. THE CITY WILL DETERMINE THE NUMBER AND LOCATIONS OF SAMPLES TO BE TAKEN FROM THE DISINFECTED SECTIONS. THE CITY WILL DETERMINE THE BACTERIOLOGICAL QUALITY OF WATER SAMPLES. IF SAMPLING RESULTS IN TWO (2) CONSECUTIVE POSITIVE SAMPLES, THE PROCEDURE OF CHLORINATION, FLUSHING AND SAMPLING SHALL BE REPEATED. FIGURE 1, SUGGESTED COMBINATION AND SAMPLING TAP, TAKEN FROM AWWA C-651, IS HEREIN MADE A PART OF THESE SPECIFICATIONS.

2. IN CASES WHERE THE LENGTH OF THE WATER MAIN IS LESS THAN 350 FEET, AFTER HYDROSTATIC TESTING ONLY, PRELIMINARY FLUSHING AND SAMPLING WILL BE DONE; HOWEVER, IF THERE ARE TWO (2) POSITIVE SAMPLES, AFTER FLUSHING, THE ENTIRE PROCEDURE OF PRELIMINARY FLUSHING, CHLORINATION, FLUSHING AND SAMPLING SHALL BE REQUIRED. THE CITY'S CHLORINATION CREW WILL COMPLETE AND DISTRIBUTE THE CHLORINATION APPROVAL FORM.

CONTRACTOR'S LABOR

THE CONTRACTOR SHALL FURNISH AT LEAST TWO (2) TRAINED WORKMEN TO PERFORM ALL LABOR UNDER THE SUPERVISION AND DIRECTION OF THE CITY'S CHLORINATION CREW. THE CONTRACTOR'S LABORERS SHALL PERFORM ALL DUTIES SPECIFIED IN WATER MAIN GENERAL NOTE. THE CONTRACTOR SHALL PROVIDE PROPER EQUIPMENT AND PROTECTIVE CLOTHING AS MAY BE REQUIRED BY THE LABORERS IN PERFORMING THE NEEDED TASK. THE CITY WILL MIX THE CHLORINATION SOLUTION TO BE USED BY THE CONTRACTOR FOR DISINFECTING.

ACCESS PITS

(A) THE CONTRACTOR SHALL PROVIDE TIGHTLY WOOD SHEETED ACCESS PITS, CONFORMING TO THE REQUIREMENTS OF THE SPECIFIC SAFETY REQUIREMENTS OF THE INDUSTRIAL COMMISSION OF OHIO RULE IC-3-11, FOR ACCESS TO ALL WATER MAIN APPURTENANCES TO BE UTILIZED IN DISINFECTING WATER MAINS.

(B) THE CONTRACTOR SHALL HAVE ON HAND READY FOR USE, PUMPING EQUIPMENT TO DEWATER THE ACCESS PITS WHEN ORDERED BY THE DIRECTOR.

CONNECTION OF NEW MAINS

WHEN THE NEW MAINS HAVE BEEN TESTED AND CHLORINATED AND ARE READY TO BE CONNECTED TO THE OLD MAIN, THE CONTRACTOR SHALL MAKE SUCH CONNECTIONS AT A TIME DESIGNATED BY THE CITY. PRIOR TO SHUTTING DOWN THE EXISTING MAINS, THE CONTRACTOR SHALL TAKE SUITABLE PRECAUTIONS TO ASSURE A MINIMUM INTERRUPTION TO SERVICE, INCLUDING THE FOLLOWING:

(A) PERFORM ALL NECESSARY EXCAVATION, INCLUDING BELL HOLES, EXPOSING THE EXISTING MAIN SUFFICIENTLY FOR THE OPERATION OF THE PIPE SAW BY THE CITY OR PIPE CUTTING BY THE CONTRACTOR.

(B) REMOVE THE CAP OR PLUG FROM THE END OF THE NEW MAIN.

(C) SWAB THE INSIDE OF ALL PIPES, BENDS, AND SLEEVES TO BE USED IN CONNECTION THOROUGHLY WITH A CHLORINE SOLUTION OF AT LEAST 100 P.P.M.

(D) MAKE UP AS MUCH OF THE CONNECTION AS POSSIBLE OUTSIDE THE DITCH TO ELIMINATE THE NEED FOR MAKING MOST OF THE NECESSARY JOINTS DURING THE SHUTDOWN. BY CAREFUL MEASUREMENT ALL PIPE CUTS CAN BE MADE BY THE CONTRACTOR PRIOR TO SHUTTING DOWN.

(E) HAVE SUFFICIENT MANPOWER AND EQUIPMENT ON THE SITE TO PERFORM THE OPERATION IN A MINIMUM OF TIME.

PAINTING

(A) IT IS THE INTENTION OF THESE SPECIFICATIONS TO PROVIDE THAT ALL METAL WORK SUBJECT TO CORROSION SHALL BE SATISFACTORILY PROTECTED BY A DURABLE COATING OF PAINT OR OTHER APPROVED MATERIAL AND THAT ALL METAL SURFACES NOT BURIED IN EARTH, OR IN CONCRETE SHALL BE LEFT CLEAN AND WELL PAINTED AT THE COMPLETION OF THE CONTRACT. UNLESS OTHERWISE SPECIFIED, THE PROTECTION SHALL BE AT LEAST THAT GIVEN BY THREE (3) COATS OF APPROVED PAINT. THE FIRST COAT IS TO BE APPLIED AT THE SHOP BEFORE THE METAL HAS RUSTED AND AFTER ALL GREASE, DIRT, AND SCALE HAS BEEN REMOVED. BOLTS AND NUTS SHALL NOT BE SHOP COATED, BUT SHALL RECEIVE THREE (3) COATS OF APPROVED PAINT AFTER INSTALLATION.

(B) ALL METAL WORK WHICH HAS NOT BEEN COATED BEFORE THE ARRIVAL ON THE JOB SHALL BE GIVEN A TEMPORARY PROTECTIVE COATING OF SUCH A NATURE AS TO PERMIT THE READY ADHERENCE OF FUTURE COATINGS. THE TEMPORARY COATING SHALL BE A GOOD GRADE ASPHALTIC PAINT OR OTHER APPROVED MATERIAL. THE TEMPORARY PROTECTION SHALL APPLY PARTICULARLY TO THE VALVE BOXES AND COVERS, MANHOLE RINGS AND COVERS, LADDERS AND LADDER RUNGS, DRESSER TYPE COUPLINGS AND ELSEWHERE WHEN IN THE OPTION OF THE CITY, SUCH PROTECTION IS NECESSARY.

(C) ALL SURFACES OF METAL WHICH WILL BE IN CONTACT AFTER ASSEMBLING SHALL BE PAINTED, AT LEAST ONE COAT, BEFORE ASSEMBLING. THE FINAL COAT OF PAINT ON ALL EXPOSED WORK SHALL BE GIVEN SHORTLY BEFORE THE COMPLETION OF THE CONTRACT.

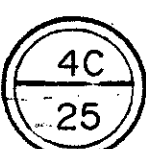
(D) WHERE PAINTING CLAUSES APPEAR HEREINAFTER, THEY SHALL TAKE PRECEDENCE OVER THIS SECTION, EXCEPT THAT TEMPORARY PROTECTION HEREIN DESCRIBED MAY BE REQUIRED.

(E) ALL OF THIS WORK SHALL BE INCLUDED IN THE PRICE BID FOR THE PARTICULAR ITEM REQUIRING THE PAINTING.

WATERWORK NOTES

CALC. BY:	L.A.B.	DATE:	10-86
CHK. BY:	D.P.B.	DATE:	10-86

FHWA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	



CUYAHOGA COUNTY
CUY.-43-4.80

TESTS, INSPECTION AND REPORTS

NOT WITHSTANDING THE REQUIREMENTS OF ANY OTHER PROVISIONS OF THESE SPECIFICATIONS, THE CONTRACTOR SHALL ARRANGE FOR AND PAY ALL COSTS INVOLVED FOR SHOP INSPECTION OF ALL MATERIALS FURNISHED, MANUFACTURE OF ALL PIPE, VALVES, FITTINGS, ETC., FIELD AND SHOP WELDS AND WELDING, AND FURNISH TO THE STATE AND THE CITY OF CLEVELAND COPIES OF ALL SHOP, FABRICATION, MANUFACTURE AND OTHER RELATED INSPECTION REPORTS OF MATERIALS FURNISHED. THIS INSPECTION SHALL BE DONE BY A RECOGNIZED INSPECTION LABORATORY APPROVED BY THE CITY OF CLEVELAND. IN THE CASE OF ANY ITEM NOT SPECIFICALLY MENTIONED IN THE "WATERWORK NOTES," OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS - JANUARY 1, 1989 SHALL GOVERN.

HANDLING PIPE AND ACCESSORIES

(A) UNLOADING PIPE, FITTINGS, VALVES, HYDRANTS, AND OTHER ACCESSORIES SHALL, UNLESS OTHERWISE DIRECTED, BE UNLOADED AT THE POINT OF DELIVERY, HAULED TO AND DISTRIBUTED AT THE SITE OF THE PROJECT BY THE CONTRACTOR. THEY SHALL AT ALL TIMES BE HANDLED WITH CARE TO AVOID DAMAGE. IN LOADING AND UNLOADING, THEY SHALL BE LIFTED BY HOISTS OR SLID, OR ROLLED ON SKIDWAYS IN SUCH MANNER AS TO AVOID SHOCK. UNDER NO CIRCUMSTANCES SHALL THEY BE DROPPED. PIPE HANDLED ON SKIDWAYS MUST NOT BE SKIDDED OR ROLLED AGAINST PIPE ALREADY ON THE GROUND.

(B) AT SITE OF WORK: IN DISTRIBUTING MATERIAL AT THE SITE OF THE WORK, EACH PIECE SHALL BE UNLOADED OPPOSITE OR NEAR THE PLACE WHERE IT IS TO BE LAID IN THE TRENCH.

(C) PROTECTION OF PIPE COATING: PIPE SHALL BE HANDLED IN SUCH MANNER THAT A MINIMUM AMOUNT OF DAMAGE TO THE COATING WILL RESULT. ANY PIPE OR FITTING, THE COATING OF WHICH HAS BEEN DAMAGED IN SHIPPING OR HANDLING, SHALL HAVE THE DAMAGED PORTION WELL CLEANED AND COVERED WITH AN ASPHALT PAINT, APPROVED BY THE CITY BEFORE BEING PLACED IN THE WORK. THE CONTRACTOR SHALL THOROUGHLY COAT ALL EXPOSED PART OF BOLTS AND NUTS WITH AN APPROVED ASPHALT PAINT, AFTER ALL PIPE HAS BEEN LAID AND BEFORE BACKFILLING HAS BEEN PLACED. ALL FIELD COATINGS SHALL BE FURNISHED BY THE CONTRACTOR.

(D) PROTECTION OF CONCRETE PIPE: IF, IN THE PROCESS OF MANUFACTURE, TRANSPORTATION, OR HANDLING, ANY CONCRETE PIPE OR SPECIAL RECEIVES ANY INDENTATION OR DEFORMATION TO THE CONCRETE, STEEL ENDS OR CONNECTIONS, THE REMOVAL OF WHICH IN ANY DEGREE INJURE IT, SUCH PIPE OR SPECIAL SHALL BE REJECTED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

(D) PIPE KEPT CLEAN: THE INTERIOR OF THE PIPE, FITTINGS, AND OTHER ACCESSORIES SHALL BE KEPT FREE FROM DIRT AND FOREIGN MATTER AT ALL TIMES.

(E) FROST PROTECTION: VALVES AND HYDRANTS BEFORE INSTALLATION SHALL BE DRAINED AND STORED IN A MANNER THAT WILL PROTECT THEM FROM DAMAGE BY FREEZING.

CHANGES IN WATER MAINS

(A) WHEREVER IT BECOMES NECESSARY, IN THE OPTION OF THE ENGINEER OR CITY TO CHANGE THE LOCATION OR ELEVATION OF WATER MAINS AND HYDRANTS AND WHERE CONNECTIONS ARE TO BE MADE BETWEEN EXISTING DISTRIBUTION MAINS AND WATER MAINS UNDER THIS CONTRACT, THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING WATER LINE MATERIALS REQUIRED TO MAKE THE CONNECTION, AND SHALL FURNISH AND INSTALL COMPLETE ALL THE DUCTILE IRON PIPE, PRESTRESSED CONCRETE CYLINDER PIPE, FITTINGS, AND VALVES TO MAKE THE CONNECTIONS INDICATED, EXCEPT TAPPING SLEEVES AND VALVES WHICH SHALL BE FURNISHED BY THE CONTRACTOR AND INSTALLED BY THE CITY. PRESSURE TAPS FOR DISTRIBUTION MAINS SHALL BE MADE BY THE CITY OF CLEVELAND DIVISION OF WATER. THE CONTRACTOR SHALL ALSO FURNISH ALL NECESSARY LABOR, MATERIALS, TOOLS, AND EQUIPMENT AND MAKE THE EXCAVATION, BACKFILL, AND REPAVING FOR SUCH CONNECTIONS. PAYMENT FOR THIS WILL BE INCLUDED IN PRICE BID UNDER APPROPRIATE ITEM FOR SIZE OF WATER MAIN OR CONNECTION TO BE INSTALLED. ALL PIPES, VALVES, AND APPURTENANCES REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR. (SEE WORK TO BE DONE BY THE CITY).

WORK TO BE DONE BY THE CITY OF CLEVELAND

(A) THE CITY WILL INSTALL ALL BRANCH SLEEVES AND VALVES FURNISHED BY THE CONTRACTOR. THE CONTRACTOR SHALL SUPPLY THE BRANCH SLEEVES AND VALVES AND DO ALL THE NECESSARY EXCAVATION, BACKFILLING AND REPAVING REQUIRED THEREFORE. THE CONTRACTOR SHALL FURNISH ALL AIR COMPRESSORS REQUIRED FOR THE WORK.

(B) IN LOCATIONS WHERE BRANCH SLEEVES AND VALVES CANNOT BE INSTALLED, THE CONTRACTOR WILL BE REQUIRED TO CUT IN TEES AND SLEEVE IN THE REMAINDER OF THE CUT SECTION OF THE EXISTING MAIN. TO SPEED UP THIS OPERATION, IT IS CALLED TO THE CONTRACTOR'S ATTENTION THAT THE WATER DEPARTMENT HAS ON HAND AT HARVARD YARDS MOTOR OPERATED PIPE CUTTERS WHICH ARE AVAILABLE FOR CUTTING PIPE BY CITY FORCES. COST INCLUDES THAT FOR LABOR, USE OF PIPE CUTTING MACHINE, AND TRUCK. THE CITY WILL CHARGE FOR CUTTING PIPE BY CITY FORCES. THE COSTS CHARGED MUST BE OBTAINED FROM THE PERMITS-SALES SECTION OF THE DIVISION OF WATER, PUBLIC UTILITIES BUILDING, 1201 LAKESIDE AVENUE, CLEVELAND, OHIO 44114. THE CONTRACTOR SHALL DO ALL NECESSARY EXCAVATION, BACKFILLING AND REPAVING AND ALL AIR COMPRESSOR AND CRANE SERVICE SHALL BE FURNISHED BY THE CONTRACTOR.

EXCAVATION

(A) THE CONTRACTOR SHALL REMOVE ALL EXISTING STRUCTURES, ROADWAYS, DRIVEWAYS, AND OTHER SIMILAR MATERIALS AND MAKE ALL EXCAVATION NECESSARY FOR THE PROPER CONSTRUCTION OF THE WATER MAIN, PIPE CONNECTIONS AND APPURTENANT STRUCTURES, INCLUDING TUNNEL AND SHAFT EXCAVATION. THE EXCAVATION SHALL INCLUDE THE REMOVAL, HANDLING, REHANDLING AND DISPOSAL OF MATERIALS ENCOUNTERED IN THE WORK AND SHALL INCLUDE ALL PUMPING, BAILING, DRAINAGE, SHEETING, AND BRACING. MOREOVER, THE CONTRACTOR MUST ASSUME ALL RESPONSIBILITY FOR ANY ADDED EXPENSE OR OTHER LIABILITY WHICH MAY ARISE BY MEANS OF QUICKSAND, OBSTACLES OR CONDITIONS FORESEEN AND UNFORESEEN OR ENCOUNTERED IN THE WORK OF THIS CONTRACT.

(B) TRENCHES SHALL IN EVERY CASE BE OF SUFFICIENT WIDTH TO PERMIT SOLID PACKING OF BACKFILL UNDER AND AROUND PIPES, AND SATISFACTORY CONSTRUCTION OF ALL APPURTENANCES AND FOR SUCH SHEETING AND SHORTING, PUMPING AND DRAINING AS MAY BE NECESSARY.

(C) THE TRENCH SHALL BE DUG TO THE ALIGNMENT AND DEPTH REQUIRED AND ONLY SO FAR IN ADVANCE OF PIPE LAYING AS THE ENGINEER SHALL PERMIT. THE TRENCH SHALL BE SO BRACED AND DRAINED THAT WORKMEN MAY WORK THEREIN SAFELY AND EFFICIENTLY. IT IS ESSENTIAL THAT THE DISCHARGE FROM PUMPS BE LED TO NATURAL DRAINAGE CHANNELS, TO DRAINS, OR TO SEWERS.

(D) THE TRENCH WIDTH MAY VARY WITH AND DEPEND UPON THE DEPTH OF TRENCH AND THE NATURE OF THE EXCAVATED MATERIAL ENCOUNTERED, BUT IN ANY CASE SHALL BE OF AMPLE WIDTH TO PERMIT THE PIPE TO BE LAID AND JOINTED PROPERLY AND OF THE BACKFILL TO BE PLACED AND COMPACTED PROPERLY. THE MINIMUM WIDTH OF UNSHEETED, TRENCH SHALL BE

EIGHTEEN (18) INCHES LARGER THAN THE OUTSIDE

DIAMETER OF THE PIPE, MAXIMUM CLEAR WIDTH OF TRENCH SHALL BE NOT MORE THAN TWO (2) FEET GREATER THAN THE OUTSIDE PIPE DIAMETER. WHEN SHEETING AND BRACING IS USED, THE TRENCH WIDTH SHALL BE INCREASED ACCORDINGLY.

(E) THE TRENCH, UNLESS OTHERWISE SPECIFIED, SHALL HAVE A FLAT BOTTOM CONFORMING TO THE GRADE TO WHICH THE PIPE IS TO BE LAID. THE PIPE SHALL BE LAID UPON SOUND SOIL CUT TRUE AND EVEN, SO THAT THE BARREL OF THE PIPE WILL HAVE A BEARING FOR ITS FULL LENGTH.

(F) ANY PART OF THE TRENCH EXCAVATED BELOW GRADE SHALL BE CORRECTED WITH APPROVED MATERIAL, THOROUGHLY COMPACTED.

(G) WHEN THE UNCOVERED TRENCH BOTTOM AT SUBGRADE IS SOFT AND IN THE OPINION OF THE ENGINEER CANNOT SUPPORT THE PIPE, A FURTHER DEPTH AND OR WIDTH SHALL BE EXCAVATED AND BACKFILLED TO PIPE FOUNDATION GRADE AS REQUIRED UNDER (F), OR OTHER APPROVED MEANS SHALL BE ADOPTED TO ASSURE A FIRM FOUNDATION FOR THE PIPE.

(H) LEDGE ROCK, BOULDERS, LARGE STONES, AND SHALE SHALL BE REMOVED TO PROVIDE A CLEARANCE OF AT LEAST SIX (6) INCHES BELOW ALL PARTS OF THE PIPE, VALVES, OR FITTINGS AND A CLEAR WIDTH OF SIX (6) INCHES ON EACH SIDE OF ALL CONCRETE PIPE AND NINE (9) INCHES ON EACH SIDE OF ALL CAST IRON AND STEEL PIPE SHALL BE PROVIDED.

(I) EXCAVATION BELOW SUBGRADE IN ROCK, SHALE OR IN BOULDERS SHALL BE BACKFILLED TO SUBGRADE WITH APPROVED MATERIAL, THOROUGHLY COMPACTED.

(J) BELL HOLES OR AMPLE DIMENSIONS SHALL BE DUG IN EARTH TRENCHES AT EACH JOINT TO PERMIT THE JOINTING TO BE MADE PROPERLY. ADEQUATE CLEARANCE FOR PROPER JOINTING PIPE LAID IN ROCK SHALL BE PROVIDED AT BELL HOLES.

(K) THE USE OF EXCAVATING MACHINERY WILL BE PERMITTED EXCEPT IN PLACES WHERE ITS OPERATION WILL CAUSE DAMAGE TO TREES, BUILDINGS, OR EXISTING STRUCTURES ABOVE OR BELOW GROUND, IN WHICH CASE HAND METHODS SHALL BE EMPLOYED.

(L) TREES, FENCES, POLES AND ALL OTHER PROPERTY SHALL BE PROTECTED UNLESS THEIR REMOVAL IS AUTHORIZED. ANY PROPERTY DAMAGED SHALL BE SATISFACTORILY RESTORED BY THE CONTRACTOR.

(M) HYDRANTS UNDER PRESSURE, VALVE PIT COVERS, VALVE BOXES, CURB STOP BOXES, OR OTHER UTILITY CONTROLS SHALL BE LEFT UNOBSTRUCTED AND ACCESSIBLE DURING THE CONSTRUCTION PERIOD.

(N) THE CONTRACTOR SHALL MAINTAIN ALL EXCAVATING IN GOOD ORDER DURING THE CONSTRUCTION, SO AS NOT TO HINDER OR INJURE THE PIPE LAYING, MASONRY OR OTHER WORK. HE SHALL TAKE ALL REASONABLE PRECAUTIONS TO PREVENT MOVEMENT OF THE SIDES OF SUCH EXCAVATION, AND SHALL REMOVE AT HIS OWN EXPENSE ANY MATERIAL SLIDING INTO THE EXCAVATION.

SHEETING AND BRACING

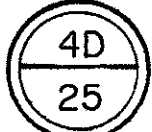
(A) THE CONTRACTOR SHALL FURNISH AND PUT IN PLACE SUCH SHEETING AND BRACING AS MAY BE REQUIRED TO SUPPORT THE SIDES OF TRENCHES OR OTHER EXCAVATION AND SHALL REMOVE SUCH SHEETING AND BRACING, AS THE TRENCH OR EXCAVATION IS FILLED UP, UNLESS THE ENGINEER SHALL ORDER IT LEFT IN PLACE, IN WHICH CASE THE CONTRACTOR SHALL CUT THE PLANK OFF AT A HEIGHT AS ORDERED BY THE ENGINEER, OR AS CALLED FOR ON THE CONTRACT DRAWINGS. THAT PORTION OF THE TIMBER ORDERED TO BE LEFT ON PLACE WILL BE PAID FOR AT THE CONTRACT UNIT PRICE BID PER THOUSAND FEET BOARD MEASURE. NO PAYMENT WILL BE MADE FOR WASTED ENDS. A QUANTITY OF 1 M.B.F. HAS BEEN PROVIDED IN THE GENERAL SUMMARY FOR ITEM SPECIAL - SHEETING LEFT IN PLACE.

(B) FOR ALL EXCAVATIONS FOR THE WORK DESCRIBED HEREIN, THE CONTRACTOR SHALL FURNISH AND PLACE SHEETING AND BRACING SO AS TO REDUCE TO A MINIMUM THE POSSIBILITY OF INJURY OR DAMAGE TO THE SAME.

(C) IF THE ENGINEER IS OF THE OPINION THAT AT ANY POINT SUFFICIENT OR PROPER SUPPORTS, SHEETING, OR BRACINGS HAVE NOT BEEN PROVIDED, HE MAY ORDER ADDITIONAL SUPPORTS, SHEETING OR BRACING, AT THE EXPENSE OF THE CONTRACTOR, AND THE COMPLIANCE WITH SUCH ORDERS BY THE CONTRACTOR SHALL NOT RELIEVE OR RELEASE HIM FROM HIS RESPONSIBILITY FOR SUFFICIENCY OF SUCH SUPPORTS.

(D) SHEETING AND BRACING SHALL BE PROVIDED IN ACCORDANCE WITH RULE 1C-3-11 OF THE SAFETY REQUIREMENTS OF THE INDUSTRIAL COMMISSION OF OHIO.

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PREQUALIFICATIONS OF CONTRACTOR FOR TAPPING

THAT THE COMMISSIONER OF WATER IS AUTHORIZED TO DEEM PERSONS OR FIRMS QUALIFIED TO TAP MAINS FOR SERVICE CONNECTION REINSTALLATION AFTER QUALIFICATIONS OF TAPPER, INSPECTION OF EQUIPMENT, AND PROVEN ABILITY AND WORKMANSHIP HAVE BEEN ESTABLISHED AS TO TAP SIZES TO HIS SATISFACTION. TO DETERMINE THE QUALIFICATIONS OF ANY PERSON OR FIRM TO TAP MAINS, THE COMMISSIONER OR HIS DESIGNEE SHALL WITNESS THE INSTALLATION OF A SERVICE CONNECTION IN A WATER MAIN UNDER PRESSURE AND INSPECT TAPPING EQUIPMENT TO BE USED BY TAPPER. UPON SUCCESSFUL COMPLETION OF A TAP SIZE, THE TAPPER SHALL BE CERTIFIED BY LETTER FROM THE COMMISSIONER TO THE DIRECTOR OF TRANSPORTATION OF TAPPER'S COMPETENCE AND QUALIFICATIONS. THIS QUALIFICATION MAY BE REVOKED BY THE COMMISSIONER OF WATER AND HEAT IF IT IS DETERMINED THAT THE TAPPER'S COMPETENCY IS NOT MAINTAINED OR EQUIPMENT IS CHANGED.

NO TAPPING SHALL BE DONE WITHOUT THE KNOWLEDGE AND APPROVAL OF THE DIVISION OF WATER AND HEAT INSPECTOR. FOR EACH TAP TO BE MADE TO REINSTALL A WATER SERVICE CONNECTION, THE TAPPER SHALL OBTAIN AND COMPLETE A CITY OF CLEVELAND "CITY METER REPAIRS HY" FORM C OF C 101-130A FROM THE INSPECTOR. FAILURE TO PRESENT FORM AT TIME OF COMPLETION OF REINSTALLATION SHALL BE CAUSE FOR IMMEDIATE DISQUALIFICATION.

ON CLASS 52 DUCTILE IRON WATER MAIN ALL SERVICE CONNECTIONS WILL REQUIRE A BRONZE DOUBLE STRAP TAPPING SADDLE.

REMOVAL OF EXCAVATED MATERIAL

(A) ALL SURPLUS MATERIAL AND SUCH OTHER MATERIAL AS THE ENGINEER MAY DEEM UNFIT FOR USE AS BACKFILL SHALL BE DISPOSED OF BY THE CONTRACTOR SO AS TO GIVE A MINIMUM OF INCONVENIENCE TO THE PUBLIC. IN CASE OF SETTLEMENT AFTER BACKFILL, THE CONTRACTOR SHALL SUPPLY SUFFICIENT MATERIAL SATISFACTORY TO THE ENGINEER TO MAKE UP FOR THE DEFICIENCY.

(B) IN THE STORING OF EXCAVATED MATERIAL, WHICH IS TO BE USED AS A BACKFILL, THE CONTRACTOR SHALL EXERCISE CARE SO AS TO AVOID INCONVENIENCING THE PUBLIC. IF IN THE OPINION OF THE ENGINEER IT IS NECESSARY TO REMOVE THIS EXCAVATED MATERIAL FROM THE STREET OR LOTS, THE CONTRACTOR SHALL BE REQUIRED TO DO SO.

(C) ANY MATERIAL WHICH MAY SPILL OR DRIP FROM VEHICLES BY HAULING IN THE STREETS SHALL BE REMOVED AND THE STREETS CLEANED BY THE CONTRACTOR, TO THE SATISFACTION OF THE ENGINEER.

(D) WHEN SO DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL IMMEDIATELY REMOVE ALL EXCAVATED MATERIALS FROM THE SITE.

LAYING PIPE

(A) PROPER IMPLEMENTS, TOOLS, AND FACILITIES, SATISFACTORY TO THE ENGINEER, SHALL BE PROVIDED AND USED BY THE CONTRACTOR FOR THE SAFE AND CONVENIENT PROSECUTION OF THE WORK. ALL PIPE, FITTINGS, AND VALVES SHALL BE CAREFULLY LOWERED INTO THE TRENCH, PIECE BY PIECE, BY MEANS OF DERRICK, PROPER SLINGS, AND OTHER SUITABLE TOOLS OR EQUIPMENT, IN SUCH MANNER AS TO PREVENT DAMAGE TO PIPE OR COATING. UNDER NO CIRCUMSTANCES SHALL PIPE OR ACCESSORIES BE DROPPED OR DUMPED INTO THE TRENCH. IF ANY DEFECTIVE PIECE IS DISCOVERED WHILE PIPE IS SUSPENDED OR AFTER BEING LAID, A NEW PIECE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.

(B) ALL FOREIGN MATTER OR DIRT SHALL BE REMOVED FROM THE INSIDE OF THE PIPE BEFORE IT IS LOWERED INTO ITS POSITION IN THE TRENCH, AND IT SHALL BE KEPT CLEAN BY APPROVED MEANS DURING AND AFTER LAYING.

(C) AT TIMES WHEN PIPE LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF PIPE SHALL BE CLOSED BY APPROVED MEANS, AND NO TRENCH WATER SHALL BE PERMITTED TO ENTER THE PIPE. NO PIPE SHALL BE LAID IN WATER, OR WHEN THE TRENCH CONDITIONS OR THE WEATHER IS UNSUITABLE FOR SUCH WORK, EXCEPT BY PERMISSION OF THE ENGINEER.

(D) WHEREVER NECESSARY TO DEFLECT PIPE FROM A STRAIGHT LINE, EITHER IN THE VERTICAL OR HORIZONTAL PLANE TO AVOID OBSTRUCTIONS, TO PLUMB STEMS, OR FOR OTHER REASONS, THE DEGREE OF DEFLECTION SHALL BE APPROVED BY THE ENGINEER.

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(E) BEFORE LAYING DUCTILE IRON PIPE, ALL LUMPS, BLISTERS, AND EXCESS COAL TAR COATING SHALL BE REMOVED FROM THE BELL AND SPIGOT ENDS OF EACH PIPE. THE PIPE ENDS SHALL THEN BE KEPT CLEAN UNTIL JOINTS ARE MADE.

(F) BEFORE LAYING CONCRETE PIPE, THE PIPE ENDS SHALL BE MADE SMOOTH WITH EMERY CLOTH, FILE, OR OTHER APPROVED MEANS, WIRE BRUSHED AND WIPED UNTIL CLEAN AND DRY. PIPE ENDS SHALL BE KEPT CLEAN UNTIL JOINTS ARE MADE. AFTER CLEANING AND DRYING, ALL CONTACT SURFACES OF THE GASKETS AND STEEL JOINT RINGS SHALL BE COATED WITH AN APPROVED FLAX SOAP BEFORE ENTERING THE SPIGOT ENDS INTO THE SOCKET. IMMEDIATELY AFTER THE JOINT IS PULLED TOGETHER, THE PIPE SHALL BE BLOCKED WITH WOOD BLOCKING. A SURCINGLE SHALL BE INSTALLED AROUND THE JOINT AND THE PIPE SHALL BE SECURED WITH EARTH OR SAND AS REQUIRED, CAREFULLY TAMPED UNDER AND ON EACH SIDE UP TO THE SPRING-LINE OF THE PIPE, INCLUDING THE BELL HOLES. ALL BLOCKING SHALL BE REMOVED WHEN BACKFILL HAS REACHED THE SPRING LINE FOR THE PIPE.

FLOATING

THE CONTRACTOR SHALL TAKE EVERY PRECAUTION AGAINST THE FLOATING OF THE PIPE DUE TO WATER COMING INTO THE TRENCH, OR THROUGH CAVING IN, FLUSHING OR PUDDLING. IN CASE OF SUCH FLOATING THE CONTRACTOR SHALL REPLACE THE PIPE AT HIS OWN EXPENSE AND MAKE WHOLLY GOOD ANY INJURY OR DAMAGE WHICH MAY HAVE RESULTED.

PLUGGING DEAD ENDS

STANDARD RESTRAINED PLUGS WITH CLAMPS SHALL BE INSERTED INTO THE BELL OF ALL DEAD ENDS OF PIPES, TEES, OR CROSSES, AND SPIGOT ENDS SHALL HAVE RESTRAINED CAPS AND CLAMPS INSTALLED BY THE CONTRACTOR, ON ALL MAINS CONSTRUCTED BY HIM AND ON EXISTING WATER MAINS WHERE INDICATED IN THE CONTRACT DRAWINGS. CONCRETE PIERS SHALL BE PLACED WHEN CALLED FOR ON THE CONTRACT DRAWINGS, OR ORDERED BY THE CITY. THE COST OF FURNISHING AND INSTALLING THE PLUGS IN NEW WATER MAINS SHALL BE INCLUDED IN THE PER LINEAR FOOT PRICE FOR THE VARIOUS SIZES OF NEW WATER MAINS. THE COST OF FURNISHING AND INSTALLING THE PLUG IN EXISTING WATER MAIN SHALL BE INCLUDED IN THE UNIT PRICE BID FOR EACH "ITEM SPECIAL-PLUGGING EXISTING WATER MAINS AND BRANCHES," CLASSIFIED AS TO SIZE AS SHOWN ELSEWHERE IN THESE PLANS. PAYMENT FOR TEMPORARY PLUGS OR CAPS FOR TESTING AND CHLORINATION SHALL BE INCLUDED IN THE UNIT PRICE BID PER LINEAL FOOT OF WATER MAIN TO BE TESTED AND CHLORINATED.

BACKFILLING

(A) BACKFILL, UNLESS OTHERWISE SPECIFIED, MAY BE MADE WITH MATERIAL EXCAVATED FROM TRENCHES, PROVIDING IT IS SATISFACTORY TO THE CITY. IF, IN THE OPINION OF THE CITY, THE MATERIAL EXCAVATED IS UNSATISFACTORY, THEN THE CONTRACTOR SHALL FURNISH AT HIS OWN EXPENSE OTHER MATERIAL SUITABLE FOR BACKFILL. ALL BACKFILL SHALL BE FREE FROM SLAG, CINDERS, RUBBISH AND OTHER OBJECTIONABLE MATERIAL.

(B) BEFORE LAYING THE PIPE, THE BOTTOM OF THE TRENCH SHALL BE BROUGHT TO THE GRADE OF THE BOTTOM OF THE PIPE, EXCEPT AT FIELD JOINTS. WHEREVER THE BOTTOM OF THE TRENCH HAS BEEN EXCAVATED BELOW THE BOTTOM OF THE PIPE, THE CONTRACTOR SHALL PLACE SAND, OR OTHER MATERIAL SATISFACTORY TO THE ENGINEER TO BRING THE BOTTOM OF THE TRENCH TO THE GRADE OF THE BOTTOM OF THE PIPE. THIS BED SHALL BE THOROUGHLY TAMPED BEFORE THE PIPE IS LAID.

(C) UNLESS OTHERWISE SPECIFIED, THE BACKFILL UNDER, AROUND AND TO A DEPTH OF ONE (1) FOOT ABOVE THE TOP OF ALL PIPE SHALL BE MADE WITH SAND IN ACCORDANCE WITH 703.02, WHICH MATERIAL SHALL BE FREE FROM OBJECTIONABLE MATERIAL NOTED ABOVE. THE CONTRACTOR MUST USE SPECIAL CARE IN PLACING THIS PORTION OF THE BACKFILL, SO AS TO AVOID INJURING, DISTORTING OR MOVING THE PIPE DURING COMPACTION. ABOVE THIS LEVEL THE BACKFILL SHALL BE MADE WITH MATERIAL SATISFACTORY TO THE CITY.

(D) BACKFILLING AS NOTED IN PARAGRAPH (D) SHALL BE TAMPED IN THIN LAYERS, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED, SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.

(E) ONLY AFTER THE BACKFILL PREVIOUSLY MENTIONED HAS BEEN SATISFACTORILY COMPACTED, MAY WORK PROCEED IN PLACING THE REMAINING BACKFILL WHICH MUST BE CAREFULLY PLACED AND COMPACTED IN FOUR INCH LAYERS BY TAMPING, WITH MECHANICAL TAMPERS OR ROLLING. ALL PRECAUTIONS MUST BE TAKEN TO ELIMINATE FUTURE SETTLEMENT. THE NUMBER OF MEN TAMPING SHALL BE NOT LESS THAN THE NUMBER BACKFILLING, AND ADDITIONAL MEN SHALL BE KEPT IN THE TRENCH TO SPREAD THE MATERIAL.

(F) BACKFILLING SHALL NOT BE DONE IN FREEZING WEATHER EXCEPT BY PERMISSION OF THE ENGINEER, AND IT SHALL NOT BE MADE WITH FROZEN MATERIAL, NOR SHALL ANY FILL BE MADE WHERE THE MATERIAL ALREADY IN THE DITCH IS FROZEN.

(G) ALL BACKFILL SHALL BE MADE WITH SAND, ITEM 703.02 OF O.D.O.T. SPECIFICATIONS WHERE PERMANENT PAVEMENTS, CURBS, DRIVEWAYS, OR SIDEWALKS HAVE BEEN OPENED FOR OR UNDERCUT BY THE EXCAVATION, WHERE ORDERED BY THE ENGINEER.

(H) SPECIAL TREATMENT OF THE TRENCH WILL BE REQUIRED WHERE CINDER OR ACTIVE SULPHUR BEARING SHALL OR CLAYS EXCAVATION EXCEEDING ONE FOOT MEASURED FROM THE TOP SURFACE IS ENCOUNTERED. BEFORE LAYING THE PIPE, THE BOTTOM OF THE TRENCH SHALL BE DUG BELOW GRADE AND THEN BROUGHT TO THE GRADE OF THE PIPE IN THE FOLLOWING MANNER: A FOUR (4) INCH LAYER OF CRUSHED LIMESTONE SHALL BE PLACED ON THE ENTIRE WIDTH OF THE BOTTOM OF THE TRENCH FOLLOWED BY A FILLER OF HYDRATED LIME AND A LAYER OF THREE (3) INCHES OF SAND. THE CRUSHED LIMESTONE SHALL BE WELL GRADED FROM THE FINE TO COARSE AND FREE FROM SLAG, CINDERS, ASHES, RUBBISH, OR OTHER OBJECTIONABLE MATERIAL. ALL LIMESTONE MUST BE CAPABLE OF BEING PASSED THROUGH A 3/4 INCH SIEVE. ON TOP OF THIS LAYER OF CRUSHED STONE, HYDRATED LIME SHALL BE SUPPLIED IN THE AMOUNT OF 3/8 OF A POUND PER SQUARE FOOT OF TRENCH. THIS BED OF CRUSHED LIMESTONE SHALL BE THOROUGHLY TAMPED BEFORE THE 3" LAYER OF SAND IS PLACED. THE BACKFILL AROUND AND TO THE DEPTH OF 3" ABOVE THE TOP OF PIPE SHALL BE MADE WITH SAND. THE CONTRACTOR MUST USE SPECIAL CARE IN PLACING THIS PORTION OF THE BACKFILL SO AS TO AVOID INJURING OR MOVING THE PIPE WHEN COMPACTING SAME. ON TOP OF THE SAND THE CONTRACTOR SHALL PLACE ANOTHER LAYER OF CRUSHED LIMESTONE FIVE (5) INCHES THICK ON THE ENTIRE WIDTH OF THE TRENCH. ON TOP OF THE COMPACTED LAYER OF LIMESTONE HYDRATED LIME SHALL THEN BE APPLIED IN THE AMOUNT OF 3/4 OF A POUND PER SQUARE FOOT OF TRENCH. THE REMAINING BACKFILL SHALL BE MADE WITH SAND CAREFULLY PLACED AND COMPACTING BY TAMPING, OR ROLLING. ALL PRECAUTIONS SHALL BE TAKEN TO ELIMINATE FUTURE SETTLEMENT. THE TREATMENT OF THE TRENCH BOTTOM, PREVIOUSLY DESCRIBED, MAY BE OMITTED WHERE THE CINDER DEPTH MEASURED FROM THE TOP SURFACE DOES NOT EXCEED 2'-6".

PROVISIONS FOR PROTECTING THE WORK

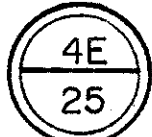
THE CONTRACTOR SHALL FURNISH ALL THE NECESSARY EQUIPMENT, SHALL TAKE ALL NECESSARY PRECAUTIONS AND SHALL ASSUME THE ENTIRE COST OF HANDLING ANY SEWAGE, SEEPAGE, STORM SURFACE AND FLOOD FLOWS OR ICE, WHICH MAY BE ENCOUNTERED AT ANY TIME DURING THE CONSTRUCTION OF THE WORK. THE MANNER OF PROVIDING FOR THESE OCCURANCES SHALL MEET WITH THE APPROVAL OF THE ENGINEER. AFTER INSTALLATION, THE CONTRACTOR SHALL FURNISH AND MAINTAIN SATISFACTORY PROTECTION TO ALL EQUIPMENT WHETHER OF THIS OR OTHER CONTRACT AGAINST INJURY BY WEATHER, FLOODING OR BY DIRECT OR INCIDENTAL DAMAGE FROM HIS OWN OPERATIONS, LEAVING ALL WORK IN A PERFECT CONDITION AT THE COMPLETION OF THE CONTRACT. NO EXTRA PAYMENT WILL BE MADE FOR THIS WORK BUT THE ENTIRE COST OF THE SAME SHALL BE INCLUDED IN THE WORK TO BE DONE IN THIS CONTRACT.

DRAWINGS

(A) THE CONTRACTOR SHALL SUBMIT TO THE DIRECTOR FOR APPROVAL, DUPLICATE PRINTS OF ALL SHOP DRAWINGS AS DEVELOPED BY THE FABRICATOR, FOR CONCRETE PIPE, FITTINGS AND SPECIALS, AND MISCELLANEOUS DETAILS, SUCH AS VALVES, DRAIN FORGOINGS, PRECAST VALVES, CASTINGS, ETC. DRAWINGS SHALL INCLUDE DETAILS, LAYOUTS AND LAYING SCHEDULE FOR ALL PIECES FURNISHED REQUIRING DRAWING SUBMITTAL.

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(B) ONE PRINT OF EACH OF THE DRAWINGS SUBMITTED WILL BE RETURNED WITH THE CRITICISMS OR APPROVAL OF THE DIRECTOR. IN CASE THE DRAWINGS ARE NOT APPROVED, THE CONTRACTOR SHALL AGAIN SEND FOR APPROVAL DUPLICATE REVISED PRINTS OF THE DRAWINGS TO TAKE CARE OF THE CRITICISMS NOTED

NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED. DRAWINGS SHALL BE ON COMPOSITE SHEETS 24" X 36". NO SMALLER SHEETS WILL BE ACCEPTED.

(C) THE APPROVAL OF THE DRAWINGS BY THE DIRECTOR SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

TUNNELING

TUNNELING WILL NOT BE PERMITTED WITHOUT PERMISSION OF THE CITY. IN BACKFILLING TUNNELS, SAND SHALL BE USED AS FAR AS POSSIBLE AND BALANCE OF BACKFILLING MADE WITH CONCRETE, RAMMED IN PLACE.

LISTS AND INVOICES

(A) THE CONTRACTOR SHALL FURNISH THE CITY WITH THE LIST IN DUPLICATE OF PIECES IN EACH SHIPMENT OF PIPE AND SPECIALS, GIVING THE SERIAL NUMBER AND DESIGNATION OF EACH PIPE AND SPECIAL SENT AT THAT TIME.

(B) THE MATERIAL SHALL BE SHIPPED IN SUCH SECTIONS AS THE CITY MAY ORDER.

ITEM SPECIAL-DUCTILE IRON PIPE AND FITTINGS

WORK INCLUDED

(A) THE CONTRACTOR UNDER THIS ITEM, SHALL FURNISH ALL THE MATERIALS FOR AND SHALL PROPERLY CONSTRUCT AND CONNECT IN PLACE AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED, ALL DUCTILE IRON PIPE AND FITTINGS, INCLUDING ALL EXCAVATION WORK, THE CUTTING INTO AND REMOVAL OF EXISTING PIPE, BACKFILLING, SAND BACKFILL, AND REPAVING, ALL AS REQUIRED FOR THE PROPER COMPLETION OF THE WORK INCLUDED UNDER THIS CONTRACT. IN GENERAL THIS WORK SHALL INCLUDE THE FURNISHING, LAYING, CONNECTING, PAINTING AND TESTING OF PIPE AND FITTINGS, THE EXCAVATION, SHEETING AND SORTING, BACKFILLING, SAND BACKFILL, SEEDING AND SODDING, THE PERMANENT REPAVING, IF SO NOTED ON THE CONTRACT DRAWINGS, THE CUTTING INTO, REMOVAL AND STORAGE OF EXISTING MAINS AND THE FURNISHING OF ALL LABOR, MATERIALS, TOOLS AND EQUIPMENT TO COMPLETE THE WORK AS SPECIFIED, SHOWN OR ORDERED.

(B) IN MAKING THE CONNECTION TO EXISTING MAINS WHERE BRANCH SLEEVES CAN BE USED, THE CONTRACTOR SHALL SUPPLY THE SAME. THE DIVISION OF WATER WILL INSTALL THE BRANCH SLEEVE AND MAKE THE PRESSURE TAP IN ACCORDANCE WITH "WORK TO BE DONE BY THE CITY". IF THE INSTALLATION OF BRANCH SLEEVES AND VALVES CANNOT BE ACCOMPLISHED, THE CONTRACTOR WILL BE REQUIRED TO USE TEES AND SLEEVES TO COMPLETE THE CONNECTION. THE CONTRACTOR WILL BE REQUIRED TO MAKE THE NECESSARY EXCAVATION, BACKFILL AND REPAVING.

DUCTILE-IRON PIPE AND FITTINGS

(A) ALL PIPE AND FITTINGS SHALL BE MANUFACTURED IN ALL RESPECTS IN ACCORDANCE WITH AND SHALL MEET THE REQUIREMENTS OF THE LATEST "AMERICAN NATIONAL STANDARD" SPECIFICATIONS FOR DUCTILE-IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SANDLINED MOLDS, AND DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS, ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION; WHICH STANDARDS EXCEPT AS HEREIN MODIFIED ARE MADE A PART OF THESE SPECIFICATIONS. PIPE UP TO AND INCLUDING 24 INCHES SHALL HAVE RETAINED MECHANICAL JOINT PIPE AND FITTINGS. BOLTLESS RESTRAINED PIPE AND FITTINGS SHALL BE USED WHERE CALLED FOR ON THE CONTRACT DRAWINGS. PIPE 30-INCH AND LARGER SHALL HAVE BOLTLESS RESTRAINED SLIP-ON JOINTS WITHIN "RESTRAINED DISTANCE" SHOWN ON THE CONTRACT DRAWINGS.

(B) ALL PIPE AND FITTINGS SHALL BE CEMENT LINED AND OF THE SIZE AND THICKNESS AND PRESSURE CLASSES NOTED ON THE RESPECTIVE CONTRACT DRAWING OR DIRECTLY SPECIFIED. ALL FITTINGS ON PIPE SIZES UP TO AND INCLUDING 12-INCHES SHALL BE OF THE SHORT BODIED TYPE.

(C) THE CONTRACTOR SHALL FURNISH CENTRIFUGAL CAST DUCTILE-IRON CEMENT LINED PIPE. DUCTILE-IRON METAL SHALL HAVE A MINIMUM TENSILE STRENGTH OF 60,000 PSI, MINIMUM YIELD STRENGTH OF 42,000 PSI AND MINIMUM ELONGATION OF 10 PERCENT AND SHALL BE FOR THE THICKNESS CLASS NOTED ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED. PIPE MAY BE FURNISHED IN 18 OR 20 FOOT NOMINAL LAYING LENGTHS. THE CENTRIFUGALLY CAST DUCTILE SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD ANSI A21.51-1976/AWWA C151-76 AND ALL SUBSEQUENT AMENDMENTS THERETO. PIPE ON STRAIGHT RUNS SHALL HAVE PUSH-ON SINGLE RUBBER-GASKET COMPRESSION JOINTS. ALL IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD ANSI A21.11-80/AWWA C111-80 RUBBER-GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS. ALL PIPE SHALL BE CEMENT LINED, FOR PIPE SIZES UP TO AND INCLUDING 24-INCHES, RETAINED MECHANICAL JOINTS SHALL BE FURNISHED AT BENDS, TEES, CROSSES, SPECIAL FITTINGS AND BETWEEN VERTICAL OFFSETS OR BENDS, ON HYDRANT BRANCHES AND SHALL BE RETAINED AS SPECIFIED IN PARAGRAPH E, "RETAINED MECHANICAL JOINTS".

(D) THE CONTRACTOR SHALL FURNISH DUCTILE-IRON CEMENT LINED FITTINGS. ALL DUCTILE-IRON FITTINGS ON PIPE SIZES 16" AND LARGER SHALL BE MANUFACTURED IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD ANSI A21.10-82/AWWA C110-82 AND ALL SUBSEQUENT AMENDMENTS THERETO. METAL FOR FITTINGS SHALL CONFORM TO AMERICAN NATIONAL STANDARD ANSI A21.10-82. ALL FITTINGS SHALL BE OF THE SHORT BODIED TYPE IN ACCORDANCE WITH ANSI/AWWA C153/A21.53-84 AND ALL SUBSEQUENT AMENDMENTS THERETO.

(E) STANDARD THICKNESS AND PIPE CLASS TABLES

THE THICKNESS OF THE CENTRIFUGALLY CAST DUCTILE IRON PIPE SHALL CONFORM TO THE FOLLOWING TABLE:

STANDARD THICKNESS OF CENTRIFUGALLY CAST DUCTILE IRON PIPE							
WORKING SIZE	PRESSURE	STANDARD THICKNESS				FITTINGS CLASS	
		52	53	54	56	PSI	
4"	350	.29	.32	.35	.41	350	
6"	350	.31	.34	.37	.43	350	
8"	350	.33	.36	.39	.45	350	
10"	350	.35	.38	.41	.47	350	
12"	350	.37	.40	.43	.49	350	
16"	350	.40	.43	.46	.52	350	
18"	350	.41	.44	.47	.53	350	
20"	350	.42	.45	.48	.54	350	
24"	350	.44	.47	.50	.56	350	
30"	350	.47	.51	.55	.63	250	
36"	350	.53	.58	.63	.73	250	
42"	350	.59	.65	.71	.83	250	
48"	350	.65	.72	.79	.93	250	

(F) ALL FITTINGS, OTHERWISE NOTED IN THE CONTRACT DRAWINGS, SUCH AS BENDS, TEES, CROSSES, HYDRANT BENCHES, ETC. SHALL HAVE BELL AND BELL, BELL AND PLAIN ENDS OF THE MECHANICAL BOLTED STUFFING-BOX TYPE WITH PIPE OR FITTING PLAIN END SEALING GASKET AND BOLTED FOLLOWER GLAND. MECHANICAL JOINT FITTINGS SHALL BE THE MECHANICAL JOINTED BOLTED STUFFING-BOX TYPE IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD ANSI A21.11-80/AWWA C111-80 RUBBER-GASKET JOINTS FOR DUCTILE IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS. ALL FITTINGS SHALL BE CEMENT LINED. ALL MECHANICAL JOINTS SHALL BE RETAINED AS SPECIFIED IN PARAGRAPH E: "RETAINED MECHANICAL JOINTS". PIPE AND FITTINGS WITHIN "RESTRAINED DISTANCE" ON PIPE SIZES 30-INCH AND LARGER SHALL BE FURNISHED WITH BOLTLESS RESTRAINED SLIP-ON JOINTS.

(G) WHERE "RESTRAINED DISTANCES" ARE SHOWN ON THE PLANS OR DIRECTLY SPECIFIED, PIPE AND FITTINGS HAVING APPROVED SLIP-ON SINGLE RUBBER-GASKET BOLTLESS RESTRAINED TYPE JOINTS SHALL BE FURNISHED.

(H) GLANDS FOR ALL MECHANICAL JOINT PIPE AND FITTINGS SHALL BE DUCTILE-IRON. BOLTS AND NUTS SHALL BE CORROSION RESISTANT, HIGH-STRENGTH, LOW ALLOY STEEL IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD ANSI A21.11-80/AWWA C111-80 RUBBER GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS.

GASKETS SHALL BE OF RUBBER OR OTHER EQUALLY EFFECTIVE PROTECTION AGAINST UNEVEN DISTORTION OF GASKET.

(I) WHERE FITTINGS ARE SHOWN WHICH ARE NOT COVERED BY THE ABOVE SPECIFICATIONS, THEY IN SUCH PARTICULARS AS ARE LACKING THEREON SHALL CONFORM TO THE DIMENSIONS AND OTHERWISE MEET THE SPECIFICATIONS FOR THE RESPECTIVE TYPE WHICH ARE CARRIED IN THE LATEST REVISIONS TO THE CURRENT EDITION OF THE DUCTILE IRON PIPE RESEARCH ASSOCIATION "HANDBOOK OF DUCTILE IRON PIPE" OR WHICH ARE OTHERWISE SHOWN ON THE CONTRACT DRAWINGS.

(J) WHEREVER CHANGES IN LINE AND GRADES OF THE MAIN AS SHOWN ON THE DRAWINGS ARE NOT STANDARD FITTING DEFLECTIONS, THE CONTRACTOR WILL BE PERMITTED TO SUBMIT DETAILS USING COMBINATIONS OF STANDARD FITTINGS AND SMALL DEFLECTIONS (NOT TO EXCEED THE MANUFACTURER'S MAXIMUM SUGGESTED JOINT OPENING) IN THE ADJOINING LENGTHS OF PIPE.

(K) ON NEW OR EXTENDED WATER MAINS, UP TO AND INCLUDING 24-INCH DIAMETER WHERE WATER MAINS END OR TERMINATE AND ARE NOT CONNECTED TO EXISTING MAINS, RETAINED MECHANICAL BELL JOINT PLUGS ARE TO BE INSTALLED. ON MAINS 30" AND LARGER AN APPROVED TYPED RESTRAINED CAP/PLUG SHALL BE FURNISHED AND INSTALLED. PLUGS CAPS SHALL BE FURNISHED WITH TWO (2) PLUGGED TWO (22")-INCH TAPS FOR DRAIN AND AIR RELIEF CONNECTIONS.

(L) CLOSURE PIECES SHALL BE ACCURATELY MEASURED AND CUT IN THE FIELD AND INSTALLED USING SOLID SHORT PATTERN SLEEVES HAVING MECHANICAL BELL JOINTS. MECHANICAL BELL JOINT SLEEVES SHALL BE OF THE RETAINED TYPE AS SPECIFIED IN SECTION 1-8, E: "RETAINED MECHANICAL JOINTS"

(M) TESTS, INSPECTION, REPORTS AND ANALYSES OF TESTS OF SAMPLES FOR ALL MATERIALS SHALL BE FURNISHED IN ACCORDANCE WITH THESE SPECIFICATIONS.

(N) BITUMASTIC COATING SHALL BE APPLIED ON THE EXTERIOR OF ALL DUCTILE IRON PIPE AND FITTINGS IN ACCORDANCE WITH AWWA SPECIFICATIONS.

CEMENT LINING

ALL PIPE FITTINGS SHALL BE GIVEN A CEMENT MORTAR LINING AT THE POINT OF MANUFACTURE. THE LINING SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD A21.4-1980 (AWWA C104-80) AND ALL SUBSEQUENT AMENDMENTS THERETO.

MARKING

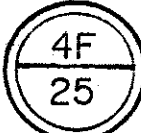
ALL PIPE AND FITTINGS SHALL BE SUITABLY MARKED TO DENOTE THE MANUFACTURER, CLASS, DATE, WEIGHT AND OTHER ELEMENTS OF IDENTIFICATION.

FACING AND DRILLING

ALL FLANGES SHALL BE CAST SOLID AND FACED ACCURATELY AT RIGHT ANGLES TO THE AXIS OF THE PIPE. ALL FLANGES SHALL BE COATED WITH WHITE LEAD IMMEDIATELY AFTER THEY HAVE BEEN FACED AND DRILLED. ALL FLANGED PIPE AND FITTINGS SHALL BE FACED AND DRILLED TO ANSI B16-1, 125 LB. DRILLING, UNLESS SPECIAL DRILLING IS CALLED FOR. WHERE TAP OR STUD BOLTS ARE REQUIRED, FLANGES SHALL ALSO BE TAPPED.

WATERWORK NOTES

FWHA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	



CUYAHOGA COUNTY
CUY.-43-4.80

LAYING

(A) PROPER AND SUITABLE TOOLS AND APPLIANCES FOR THE SAFE AND CONVENIENT HANDLING AND LAYING OF THE PIPE AND FITTINGS SHALL BE USED. GREAT CARE SHALL BE TAKEN TO PREVENT THE PIPE COATING AND FITTINGS FROM BEING DAMAGED PARTICULARLY ON THE INSIDE OF THE PIPES AND FITTINGS AND ANY SUCH DAMAGE SHALL BE REMEDIED AS DIRECTED. ALL PIPES AND FITTINGS SHALL BE CAREFULLY EXAMINED BY THE CONTRACTOR FOR DEFECTS JUST BEFORE LAYING AND NO PIPE OR FITTINGS SHALL BE LAID WHICH IS KNOWN TO BE DEFECTIVE.

(B) IF ANY DEFECTIVE PIPE IS DISCOVERED AFTER HAVING BEEN LAID, IT SHALL BE REMOVED AND REPLACED WITH A SOUND PIPE OR FITTING IN A SATISFACTORY MANNER, BY THE CONTRACTOR AT HIS OWN EXPENSE. ALL PIPES AND FITTINGS SHALL BE THOROUGHLY CLEANED BEFORE THEY ARE LAID, SHALL BE KEPT CLEAN UNTIL THEY ARE USED IN THE COMPLETED WORK, AND WHEN LAID, SHALL CONFORM TO THE LINES AND GRADES. OPEN ENDS OF PIPES SHALL BE KEPT PLUGGED WITH A BULKHEAD DURING CONSTRUCTION.

(C) PIPE LAID IN TRENCH SHALL BE LAID TO A FIRM AND EVEN BEARING FOR ITS FULL LENGTH. PRECAUTIONS SHALL BE TAKEN AGAINST FLOATING.

(D) IT IS THE INTENTION OF THESE SPECIFICATIONS TO SECURE FIRST CLASS WORKMANSHIP IN THE PLACING OF PIPE AND ACCESSORIES. IN SUCH DETAILS AS ARE NOT SPECIFICALLY MENTIONED HEREIN OR CALLED FOR ON THE DRAWINGS, THE CONTRACTOR WILL BE REQUIRED TO CONFORM WITH THE APPLICABLE SECTIONS OF THE LATEST AMERICAN NATIONAL STANDARD ANSI/AWWA C600-77, INSTALLATION OF GRAY AND DUCTILE CAST IRON WATER MAINS AND APPURTENANCES AS ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION.

CUTTING PIPE

WHENEVER THE PIPES REQUIRE CUTTING TO FIT INTO THE LINES, THE WORK SHALL BE DONE IN A SATISFACTORY MANNER SO AS TO LEAVE A SMOOTH END AT RIGHT ANGLES TO THE AXIS OF THE PIPE. WHEN A PIECE OF PIPE IS CUT TO FIT INTO THE LINE, NO PAYMENT WILL BE MADE FOR THE PORTION CUT OFF AND NOT USED IN THE LINE.

JOINTS

(A) FLANGED JOINTS

PARAGRAPH DELETED

(1) FLANGED JOINTS SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS. FLANGES SHALL BE EITHER CAST STEEL, FORGED OR ROLLED STEEL OR PROPERLY WELDED AND MACHINED FABRICATED STEEL PLATES, WELDED TO PIPE WITH TWO CONTINUOUS WELDS. THEY SHALL HAVE PLAIN FACES AND SHALL BE FACED TRUE AND SMOOTH AT RIGHT ANGLES TO THE AXIS OF THE PIPE AND SHALL BE SPOT FACED ON THE BACK. DRILLING SHALL CONFORM TO ANSI B16.1, 125LBS. EACH BLIND FLANGE SHALL BE CAST IRON AND HAVE BOSSES TAPPED AT TOP AND BOTTOM FOR TWO (2) INCH STANDARD PIPE AND FURNISHED WITH PLUGS.

(2) ALL BOLTS AND NUTS USED IN THE FINISHED WORK FOR FLANGES SHALL BE MADE OF SILICON BRONZE (ASTM B 98-74A, ALLOY A) OR STAINLESS STEEL (ASTM A 276-75, TYPE 302). THE ENDS OF ALL BOLTS MUST BE FINISHED TO STANDARD RADIUS IN ACCEPTABLE MANNER. ALL SCREW THREADS SHALL BE AMERICAN STANDARD COARSE THREAD (N.C.). STUD BOLTS DOUBLE END (ROD) SHALL BE USED TO MAKE THE FLANGED JOINTS ON PIPE. ALL DIMENSIONS TO BE ACCORDING TO AMERICAN STANDARD HEAVY. BOLTS AND NUTS SHALL BE DELIVERED TO THE FIELD FREE FROM GREASE, RUST AND DIRT AND SHALL BE PROPERLY PROTECTED FROM MOISTURE AND DIRT IN THE FIELD. GASKETS FOR FLANGED PIPE SHALL BE 5X MANILA ROPE PATTERN OR OTHER APPROVED TYPE.

(B) SLIP-ON JOINTS

ALL PIPE UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWING, DIRECTLY SPECIFIED OR CONNECTED TO FITTINGS, VALVES AND HYDRANTS SHALL HAVE SOCKET BY PLAIN END RUBBER-GASKET PUSH-ON JOINTS WITH RADIALLY COMPRESSED LOCKED IN PLACE RUBBER RING GASKETS APPROVED BY THE COMMISSIONER OF WATER AND HEAT. SLIP-ON COMPRESSION JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT FOR PUSH-ON JOINTS IN AMERICAN NATIONAL STANDARD ANSI/AWWA C111/A21.11-80 FOR RUBBER GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS.

(C) MECHANICAL JOINTS

ALL FITTINGS AND PIPE BELL ENDS CONNECTED TO FITTINGS, UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWINGS, OR DIRECTLY SPECIFIED SHALL HAVE BELL OR PLAIN END JOINTS OF THE MECHANICAL BOLTED STUFFING-BOX TYPE WITH SEALING GASKET AND BOLTED DUCTILE-IRON FOLLOWER GLAND AND, WHERE REQUIRED OR CALLED FOR ON THE CONTRACT DRAWINGS, BE OF THE SPECIFIED RETAINED TYPE. BOLTS AND NUTS FOR MECHANICAL JOINTS SHALL BE CORROSION RESISTANT, HIGH STRENGTH, LOW ALLOY STEEL. MECHANICAL JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT THAT ALL GLANDS SHALL BE DUCTILE-IRON WITH JOINT DIMENSIONS AND TOLERANCES, BOLT HOLES AND SLOTS, GASKETS, RUBBER, QUALITY CONTROL, BOLTS AND NUTS AND MARKING 80 FOR RUBBER GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS. WHERE REQUIRED OR CALLED FOR ON THE CONTRACT DRAWINGS, MECHANICAL JOINTS SHALL BE RETAINED AS SPECIFIED IN PARAGRAPH E, "RETAINED MECHANICAL JOINTS". ALL MECHANICAL JOINTS SHALL BE POLYETHYLENE ENCASED AS SPECIFIED IN PARAGRAPH G, "POLYETHYLENE ENCASEMENTS OF JOINTS."

(D) VICTAULIC TYPE COUPLINGS

PARAGRAPH DELETED

(1) WHERE SHOWN ON THE DRAWINGS OR WHERE REQUIRED, THE CONTRACTOR SHALL FURNISH AND INSTALL VICTAULIC TYPE COUPLINGS FOR CONNECTION OF DUCTILE IRON REDUCERS TO VALVES, CONCRETE PIPE OR STEEL PIPE. STEEL PIPE ENDS SHALL BE FABRICATED AND GROOVED AS INDICATED ON THE DRAWINGS. THE COUPLINGS SHALL BE ADAPTED FOR INSTALLATION ON SHOULDERED END CAST IRON SPACERS, REDUCERS AND FITTINGS AND DESIGNED FOR NOT LESS THAN THE WORKING PRESSURE NOTED ON THE CONTRACT DRAWINGS. COUPLINGS SHALL BE COMPOSED OF MALLEABLE IRON HOUSING HELD TOGETHER WITH STEEL BOLTS HEAT TREATED AND "HOT DIP" GALVANIZED AND WITH A CONTINUOUS HOLLOW, MOLDED RUBBER SEALING RING, OF SUCH TYPE THAT THE SEAL BECOMES TIGHT AS THE PRESSURE WITHIN THE PIPE INCREASES. THE JOINTS SHALL BE CONSTRUCTED AND INSTALLED AND BE EQUAL IN ALL RESPECTS TO THOSE MANUFACTURED BY THE VICTAULIC COMPANY OF AMERICA. MALLEABLE HOUSINGS SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR MALLEABLE IRON CASTINGS ASTM DESIGNATION A 47-68". BOLTS SHALL BE MANUFACTURED BY THE COUPLING MANUFACTURER AND SHALL BE HEAT TREATED STEEL BOLTS HAVING 100,000 PSI TENSILE STRENGTH. ALL BOLTS AND NUTS SHALL BE ZINC COATED BY THE "HOT DIP" METHOD ACCORDING TO ASTM DESIGNATION A 123.

(2) ALL METAL PARTS OF THE COUPLINGS SHALL BE COATED AT THE SHOP WITH ONE COAT OF BITUMINOUS PRIMER FURNISHED BY THE SAME MANUFACTURER WHO FURNISHES THE COATINGS AS SPECIFIED UNDER "COATING".

(E) RETAINED MECHANICAL JOINTS

ON ALL PIPE AND FITTINGS AT BENDS, TEES, CROSSES, SPECIAL FITTINGS, BETWEEN VERTICAL OFFSETS OR BENDS, ON HYDRANT BRANCHES, ON VALVES AND HYDRANT BASE ELBOWS UP TO AND INCLUDING 24-INCH SIZE WHERE SHOWN ON THE DRAWINGS OR WHERE REQUIRED BY "RESTRAINED DISTANCE", THE CONTRACTOR SHALL FURNISH AND INSTALL RETAINED TYPED MECHANICAL JOINTS.

PIPE AND FITTING BELL JOINT AND GASKETS SHALL BE FURNISHED AS SPECIFIED. GLANDS FOR RETAINED MECHANICAL JOINTS SHALL BE BOLTED TYPE OF DUCTILE-IRON MATERIAL CONFORMING TO AMERICAN NATIONAL STANDARD ANSI/AWWA C111/A21.11-80 FOR RUBBER-GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS AND/OR CONFORMING WITH ASTM A 536-80 WITH THE ADDITIONAL REQUIREMENT THAT ALL SUCH GLANDS SHALL BE OF THE DUCTILE-IRON GRADE 60-42-10 MINIMUM REQUIREMENTS OF CENTRIFUGALLY CAST DUCTILE-IRON PIPE. RETAINED MECHANICAL JOINTS SHALL BE EQUIPPED WITH CUPPED END SQUARE HEAD CORROSION RESISTANT ALLOY STEEL OR COPPER-BEARING DUCTILE IRON SET SCREWS THREADED THROUGH TAPPED AND THREADED HOLES IN THE GLAND LIP. GLAND FLANGE SHALL BE THICKENED AND GLAND LIP SHALL BE EXTENDED TO PROVIDE FOR GLAND STRENGTH AND SET SCREW SIZE. NO SPLIT RETAINER GLANDS SHALL BE USED. LONGER BOLTS FOR JOINT ASSEMBLY SHALL BE FURNISHED WITH RETAINER GLANDS. SET SCREWS SHALL BE MINIMUM FIVE-EIGHTHS INCH (5/8") SIZE. NUMBER OF PERPENDICULAR SET SCREWS PER RETAINED JOINT SHALL BE: 4 FOR 4" PIPE, 6 FOR 6" PIPE, MINIMUM OF 8 FOR 8" PIPE, MINIMUM OF 12 FOR 10" PIPE, 16 FOR 12" PIPE, 24 FOR 16" PIPE, 28 FOR 20" PIPE AND 32 FOR 24" PIPE. WEDGE ACTION TYPE RETAINED MECHANICAL JOINTS HAVING TWIST-OFF NUTS MAY BE USED IF APPROVED BY THE COMMISSIONER OF WATER AND HEAT AS TO SIZE, NUMBER AND BOLT SIZE. WHERE JOINT DEFLECTION IS NECESSARY FOR ALIGNMENT SUCH DEFLECTION SHALL BE LIMITED TO 3 DEGREES. SET SCREWS SHALL BE TIGHTENED AFTER JOINT IS MADE TO 75 FOOT-POUNDS TORQUE. SET-SCREW TIGHTENING SHALL BE DONE AFTER THE JOINT BOLTS HAVE TIGHTENED. SET SCREWS SHALL ALL BE MADE FINGER-TIGHT AND TIGHTENED TO MAXIMUM TORQUE BY ALTERNATING TO OPPOSITE SIDES. ALL RETAINED MECHANICAL JOINT RETAINER GLANDS SHALL BE OF A DESIGN APPROVED BY THE COMMISSIONER OF WATER AND HEAT. ALL RETAINED JOINTS SHALL BE RATED FOR 250 PSI PRESSURE. ALL RETAINED JOINTS SHALL BE POLYETHYLENE ENCASED AS SPECIFIED IN PARAGRAPH G.

(F) BOLTLESS RESTRAINED SLIP-ON JOINTS

WHERE INDICATED ON THE DRAWINGS AND ON ALL SUPPLY MAINS WHERE DUCTILE-IRON PIPE SIZE IS GREATER THAN 20-INCHES WHERE "RESTRAINED DISTANCE" IS REQUIRED OR SHOWN ALL RESTRAINT SHALL BE OF THE BOLTLESS RESTAINED SLIP-ON JOINT TYPE. VALVES WITHIN "RESTRAINED DISTANCES" SHALL BE OF THE TYPE INDICATED ON THE CONTRACT DRAWINGS. BOLTLESS RESTRAINED SLIP-ON JOINTS SHALL BE OF A DESIGN CONSISTING OF A SHOP WELDED RETAINER RING OR SEGMENT ON THE SPIGOT END OF THE PIPE THAT WHEN THE JOINT IS FULLY ASSEMBLED "LOCKS" INTO THE BELL OF THE ADJACENT PIPE OR FITTING PROVIDING A POSITIVE RESTRAINED JOINT. NO FIELD WELDED RESTRAINED JOINTS ARE PERMITTED EXCEPT ON LENGTHS OF PIPE LESS THAN NOMINAL LENGTH NEED TO CLOSE THE LINE.

BOLTLESS RESTRAINED JOINT SHALL BE OF A DESIGN THAT PROVIDES RESTRAINED ACTION BETWEEN THE SPIGOT AND BELL OF THE PIPE OR FITTING INDEPENDENT OF THE GASKET.

(G) POLYETHYLENE ENCASEMENT

ALL MECHANICAL JOINTS, ALL RETAINED MECHANICAL JOINTS AND ALL PIPE AND FITTING WHERE SHOWN ON THE DRAWING OR WHERE REQUIRED SHALL BE POLYETHYLENE ENCASED. POLYETHYLENE ENCASEMENT FOR MECHANICAL JOINTS, RETAINED MECHANICAL JOINTS OR ANY JOINT REQUIRING BOLTS SHALL BE GENERALLY IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD ANSI/AWWA C105/A21.582 FOR POLYETHYLENE ENCASEMENT FOR DUCTILE-IRON PIPING FOR WATER AND OTHER LIQUIDS. MECHANICAL JOINTS, RETAINED MECHANICAL JOINTS AND ALL BOLTED JOINTS SHALL HAVE DOUBLE POLYETHYLENE ENCASEMENT OF CLASS "C" (BLACK) FILM, METHOD "C" DOUBLING SHEET AND PROVIDING ONE FOOT (1') MINIMUM OVERLAP ON PIPE OR FITTING ON BOTH SIDES OF JOINT. ALL PIPE AND FITTINGS WHERE SHOWN ON THE DRAWINGS OR WHERE OTHERWISE REQUIRED TO BE POLYETHYLENE ENCASED SHALL BE ENCASED USING CLASS "C" FILM, METHOD "B". POLYETHYLENE ENCASEMENT SHALL BE SECURELY TAPED SNUG AROUND PIPE AND FITTINGS.

(H) ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS AND RETAINED MECHANICAL JOINTS SHALL HAVE FIELD APPLIED THREE (3) COAT OF BITUMASTIC COATING PRIOR TO POLYETHYLENE ENCASEMENT.

PAINTING

AFTER ERECTION AND BEFORE POLYETHYLENE ENCASEMENT, ALL EXPOSED OR DAMAGED COATING AND ALL BOLTS FOR MECHANICAL JOINTS, RETAINED MECHANICAL JOINTS, FLANGES AND VICTAULIC OR COMPRESSION TYPE BOLTED SLEEVED COUPLINGS SHALL BE CLEANED AND PAINTED WITH THREE (3) FIELD COATS OF KOPPERS BITUMASTIC SUPER TANK SOLUTION OR EQUIVALENT.

WATERWORK NOTES

FHWA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	

4G
25

CUYAHOGA COUNTY
CUY.-43-4.80

DRAWINGS

(A) THE CONTRACTOR SHALL SUBMIT TO THE DIRECTOR FOR APPROVAL DUPLICATE PRINTS OF ALL SHOP DRAWINGS FOR PIPE AND FITTINGS AND MISCELLANEOUS OR SPECIAL DETAILS OF PIPE AND FITTING JOINTS WHICH ARE NOT STANDARD CONSTRUCTION OR FULLY DETAILED IN THE REGULAR CATALOGUE OF THE COMPANY FURNISHING THE PIPE, FITTINGS AND SPECIALS. NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN APPROVED.

(B) THE APPROVAL OF THE DRAWINGS BY THE DIRECTOR SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH HIS CONTRACT.

ITEM SPECIAL - VALVES

WORK INCLUDED

THE CONTRACTOR SHALL FURNISH ALL MATERIALS FOR AND SHALL PROPERLY SET IN PLACE AND CONNECT AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER. ALL AIR RELIEF VALVES, DRAIN VALVES AND GATE VALVES OF THE VARIOUS SIZES AND TYPE SPECIFIED OR ORDERED, ALL AS REQUIRED FOR THE PROPER COMPLETION OF THE WORK INCLUDED UNDER THIS CONTRACT.

AIR RELIEF VALVES

ALL AIR RELIEF VALVES OR AIR VENT VALVES SHALL BE 2-INCH BRONZE ANGLE METER VALVES WITH A BRONZE WATER METER 2-INCH IRON PIPE THREAD COMPANION FLANGE, AND A 2-INCH EXTRA HEAVY BRASS "CLOSE" (2-INCH LONG) NIPPLE. 2-INCH AIR RELIEF VALVES SHALL BE EQUAL IN ALL RESPECTS TO THE 2-INCH ANGLE METER VALVE MANUFACTURED BY J. JONES CO., NO. J-1527-F, FORD METER BOX CO. NO. FV-7, OR MUELLER CO., NO. H-14286.

CHECK VALVES

(A) TYPE OF VALVES

ALL CHECK VALVES SHALL BE OF THE SWING GATE TYPE, WITH HINGED GATES SEATING IN A VERTICAL OR INCLINED POSITION. CHECK VALVES SHALL BE CONSTRUCTED TO BE USED IN A HORIZONTAL POSITION.

(B) MATERIAL

CHECK VALVES 2" AND UNDER SHALL BE OF ALL BRONZE CONSTRUCTION, AND CHECK VALVES 3" AND OVER IN SIZE SHALL HAVE IRON BODIES WITH BRONZE MOUNTINGS.

(C) BODIES AND COVERS

THE BODIES OF ALL CHECK VALVES SHALL BE PROVIDED WITH HANDHOLES OR MANHOLES OF SUFFICIENT SIZE TO PERMIT REMOVAL OF SWING GATES. CHECK VALVES 2" AND UNDER IN SIZE SHALL HAVE HANDHOLES FITTED WITH THREADED CAPS, CHECK VALVES 3" TO 12" INCLUSIVE IN SIZE SHALL BE PROVIDED WITH HANDHOLES HAVING FLANGED COVERS. ALL FLANGED COVERS SHALL BE SECURELY BOLTED IN PLACE. ARROWS SHALL BE CAST ON THE VALVE BODIES TO ASSURE PROPER INSTALLATION. THE ARROWS SHALL POINT IN THE DIRECTION OF FLOW IN THE LINE.

(D) GATES

CHECK VALVES 12" AND UNDER IN SIZE SHALL BE PROVIDED WITH ONE GATE AND SHALL BE EQUIPPED WITH AN OUTSIDE LEVER. THE GATES FOR CHECK VALVES 6" AND UNDER IN SIZE SHALL BE OF CAST BRONZE; THE GATES FOR CHECK VALVES 8" AND OVER IN SIZE SHALL BE OF CAST IRON WITH BRONZE GATE RINGS. THE GATES SHALL BE SO CONSTRUCTED TO PREVENT THEIR SWINGING HIGHER THAN HORIZONTAL WHEN WIDE OPEN AND FREE OF THE WATERWAY, ALSO TO PREVENT THEM FROM BECOMING STUCK IN THE OPEN POSITION. GATES FOR CHECK VALVES 2" AND UNDER IN SIZE SHALL BE ATTACHED TO THE HINGES BY MEANS OF A HUB OR STUD ON BACK OF GATE, ON WHICH THE GATE SHALL BE FREE TO ROTATE. GATES FOR CHECK VALVES 3" AND LARGER IN SIZE SHALL BE ATTACHED TO THE HINGES BY MEANS OF HUBS, STUDS, OR HINGE PINS. WHERE HINGE PINS ARE USED FOR ATTACHING GATES TO HINGES, THE MOVEMENT OF GATES SHALL BE CONFINED TO PREVENT EXCESSIVE TILTING ON HINGES.

(E) HINGES AND PINS

THE HINGES AND PINS FOR SUSPENDING GATES OF CHECK VALVES SHALL BE OF CAST BRONZE, ALL PINS USED FOR FASTENING GATES TO HINGES AND FOR SUSPENDING HINGES IN BODIES OR CHECK VALVES SHALL BE OF GRADE FOUR BRONZE. WHERE PINS ATTACHING HINGES TO BODIES ARE ACCESSIBLE FROM THE OUTSIDE OF BODIES, THEY SHALL BE RETAINED IN PLACE BY MEANS OF REMOVABLE BRONZE SIDE PLUGS. ALL PINS SHALL BE SECURELY FASTENED IN PLACE.

(F) SEAT AND GATE RINGS

ALL CHECK VALVES HAVING CAST IRON BODIES SHALL HAVE BODY SEAT RINGS OF BRONZE SCREWED IN PLACE. WHERE GATES ARE MADE OF MATERIAL OTHER THAN BRONZE, THEY SHALL BE FITTED WITH BRONZE SEAT RINGS SECURELY FASTENED IN PLACE. THE FACES OF GATE AND SEAT RINGS COMING INTO CONTACT SHALL BE MACHINED FLAT TO PROVIDE TIGHT JOINTS. THE DIMENSIONS OF BRONZE SEAT AND GATE RINGS FOR THE VARIOUS SIZE CHECK VALVES SHALL NOT BE LESS THAN THOSE GIVEN IN SECTION FOR BOTTOM WEDGE GATE VALVES OF THE SAME SIZE.

(G) FLANGE ENDS

THE END FLANGES OF FLANGED AND CHECK VALVES SHALL CONFORM IN DIMENSIONS AND DRILLING TO THE "AMERICAN 125 LB. CAST IRON FLANGE STANDARD" UNLESS OTHERWISE ORDERED.

(H) SCREW ENDS

ALL 2" CHECK VALVES AND UNDER SHALL BE MADE WITH SCREW ENDS. THE 3" CHECK VALVES SHALL BE FURNISHED WITH SCREW ENDS WHENEVER REQUIRED BY THE ENGINEER. THREADS TO BE INSIDE STANDARD IRON PIPE THREADS.

(I) BOLTS AND NUTS

ALL BOLTS AND NUTS FOR FLANGED COVERS SHALL MEET REQUIREMENTS OF THESE SPECIFICATIONS.

GATE VALVES

(A) TYPE OF VALVES

THE GATE VALVES SHALL BE MANUFACTURED IN FULL COMPLIANCE WITH THE STANDARD SPECIFICATIONS FOR GATE VALVES FOR ORDINARY WATER WORKS ASSOCIATION AWWA C-500-80 OR LATEST REVISION THEREOF AND IN ADDITION SHALL COMPLY WITH THE FOLLOWING SUPPLEMENTARY REQUIREMENTS OR BE EQUAL TO VALVES PRESENTLY FURNISHED TO CITY UNDER REQUIREMENT CONTRACT.

1) ALL GATE VALVES SHALL BE OF THE NONREVOLVING DOUBLE DISC PARALLEL SEAT BOTTOM WEDGE OR SIDE WEDGE TYPE.

2) IN OPENING OR CLOSING THE VALVE, THE GATES SHALL BE FORCED ASCEND OR DESCEND BY REASON OF THE THE THRUST EXERTED UPON THEM BY THE VALVE STEM NUT; THIS THRUST BEING GENERATED BY THE ROTATION OF THE VALVE STEM.

3) IN CLOSING THE VALVE DISCS, WHEN OPPOSITE THE PORTS, SHALL BE PRESSED FIRMLY AGAINST THE BODY SEATS BY WEDGES OR SOME OTHER DEVICE EQUALLY SUITABLE TO THE ENGINEER.

4) THE DESIGN OF THE MECHANICAL WEDGING ACTION SHALL BE SUCH THAT SEATING FORCE IS APPLIED EQUALLY TO TWO OR MORE CONTACT POINTS NEAR THE OUTER EDGE OF EACH DISC AT OR ABOVE OR BELOW THE HORIZONTAL CENTER LINE OF DISC. THE MECHANISM SHALL BE DESIGNED SO THAT ALL WEDGING MEMBERS ARE ACTIVATED AT ONE TIME. IT SHOULD BE OF THE TYPE WHICH WILL ELIMINATE UNBALANCED SEATING PRESSURE AND MINIMIZE DISTORTION OF THE DISC.

5) ALL GATE VALVES, 16 INCH AND UNDER, SHALL BE CONSTRUCTED TO WORK VERTICALLY. VALVES OVER 16 INCH SHALL BE CONSTRUCTED TO WORK HORIZONTALLY.

6) ALL VALVES TO HAVE MECHANICAL JOINTS WITH BELL END UNLESS OTHERWISE NOTED.

(B) VALVES WITH STATIONARY STEMS

ALL GATE VALVES, UNLESS OTHERWISE ORDERED, SHALL BE MADE WITH SINGLE NONRISING STEMS.

(C) OUTSIDE SCREW AND YOLK VALVES

GATE VALVES WITH OUTSIDE SCREW AND YOLKS, SHALL BE MADE WITH SINGLE RISING STEMS. ALL OUTSIDE SCREW AND YOLK VALVES SHALL BE EQUIPPED WITH WHEELS FOR OPERATING SAME. WHEELS ARE TO BE MALLEABLE IRON. WHEELS SHALL HAVE CAST ON THEM AN ARROW INDICATING THE DIRECTION OF TURNING FOR OPENING THE VALVE.

(D) HUB ENDS

THE DIMENSIONS OF THE BELLS ON VALVES UP TO AND INCLUDING 24 INCHES IN DIAMETER SHALL CONFORM TO THOSE FOR CLASS "D" PRESSURE FITTINGS AS REQUIRED BY AWWA C100 ON VALVES 30 INCHES AND LARGER IN SIZE. THE BELL DIMENSIONS SHALL BE FOR THE CLASSES ORDERED.

(E) VICTAULIC ENDS

VICTAULIC ENDS SHALL CONFORM TO THE DIMENSIONS GIVEN ON THE CONTRACT DRAWINGS.

(D) MECHANICAL JOINT ENDS

THE BELL DIMENSIONS SHALL CONFORM TO TABLE 11.1 OF ANSI A-21.11 (AWWA C111, "A MECHANICAL JOINT FOR CAST IRON PRESSURE PIPE AND FITTINGS". JOINTS TO BE OF RETAINED TYPE.

(G) FLANGE ENDS

THE END FLANGES OF FLANGED END GATE VALVES SHALL CONFORM IN DIMENSIONS AND DRILLING TO THE "AMERICAN 125 LB. CAST IRON FLANGE STANDARD". UNLESS OTHERWISE ORDERED.

(H) SCREW ENDS

ALL 2 INCH GATE VALVES AND UNDER SHALL BE MADE WITH SCREW ENDS, UNLESS OTHERWISE SPECIFIED. THE 3 INCH AND 4 INCH HANDWHEEL GATE VALVES SHALL BE FURNISHED WITH SCREW ENDS WHENEVER REQUIRED BY THE ENGINEER. THREADS TO BE INSIDE STANDARD IRON PIPE THREADS.

(I) SOLDER JOINT ENDS

THE END CONNECTION SOCKETS OF SOLDER-JOINT GATE VALVES SHALL BE MADE TO CLOSE TOLERANCES AND SNUGLY FIT TYPE K AND L COPPER TUBING TO PERMIT MAKING SWEAT JOINTS. DEPTH OF JOINTS ON 1-1/2 INCH VALVES SHALL BE NOT LESS THAN 1-3/16 INCH AND ON 2 INCH VALVES, NOT LESS THAN 1-3/8 INCH.

(J) SLIP-ON JOINT ENDS

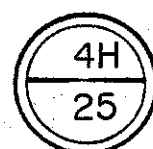
ALL VALVES 4" UP TO AND INCLUDING 12" IN DIAMETER WHEN SPECIFICALLY ORDERED SHALL BE FURNISHED WITH SLIP-ON JOINT ENDS COMPLETE WITH GASKETS WHICH WILL FIT THE PLAIN-END OF ALL CAST IRON PIPE CLASSES 150, 200 OR 250 MANUFACTURED TO SPECIFICATIONS ANSI A21.8 OF THE LATEST REVISION INCLUDING THE PLAIN END OF ALL MAKES OF CAST IRON PIPE OF SLIP CONNECTION TYPE.

(K) BYPASSES

BYPASSES WITH GATE VALVES SHALL BE PROVIDED ON VALVES 20 INCH AND LARGER. THE BYPASS SHALL BE LOCATED ON OR BELOW THE HORIZONTAL CENTERLINE OF THE VALVES. BYPASS VALVES SHALL BE OF THE SAME SIZE AS THE BYPASS AND SHALL CONFORM TO THE REQUIREMENT OF THESE SPECIFICATIONS FOR THE SPECIFIC VALVE USED. THE SIZE REQUIREMENTS OF THE BYPASS SHALL BE AS FOLLOWS: 20 INCH VALVES SHALL BE PROVIDED WITH 3 INCH BYPASS; VALVES 24 INCH TO 30 INCH INCLUSIVE SHALL BE PROVIDED WITH 4 INCH BYPASSES; VALVES 36 INCH TO 42 INCH INCLUSIVE SHALL BE PROVIDED WITH 6 INCH BYPASSES; 48 INCH VALVES SHALL BE PROVIDED WITH 8 INCH BYPASSES.

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(L) DOWEL PINS

ALL GATE VALVES SHALL HAVE TWO DOWEL PINS SET IN THE FLANGES CONNECTING THE DOME AND THE BODY. SIZE OF PINS TO BE SHOWN IN PLANS.

(M) BOSSES

OUTSIDE SCREW AND YOLK, GATE VALVES 6 INCHES AND LARGER IN SIZE SHALL BE PROVIDED WITH TWO BOSSES ON ONE SIDE OF THE BODY, LOCATED ON THE HORIZONTAL CENTERLINE OF GATE VALVES, TO PERMIT THE INSTALLATION OF BYPASS AROUND THE GATE. BOSSES ARE TO BE LEFT SOLID AND OF AMPLE SIZE TO PERMIT DRILLING AND TAPPING FOR BYPASSES HAVING DIAMETERS NOT LESS THAN ONE SIXTH OF THE NOMINAL SIZE OF THE GATE VALVE.

(N) FLANGES

WHEN FLANGED VALVES ARE REQUIRED, THE FLANGES SHALL BE FACED AND DRILLED. BOLT HOLES SHALL BE SPOT FACED ON THE BACK WHEN NECESSARY TO SECURE AN EVEN BEARING. ALL BOLT HOLES SHALL BE OF THE SIZE SHOWN ON THE DRAWINGS TO BE SUBMITTED AND APPROVED; SHALL BE ACCURATELY DRILLED FROM TEMPLATES, SPACED EQUAL DISTANCES APART AND SHALL STRADDLE HORIZONTAL AND VERTICAL AXES, ALL AS SHOWN ON THE DRAWINGS. THE DIMENSIONS AND DRILLING OF ALL END FLANGES SHALL CONFORM TO THE SPACING INDICATED ON THE DRAWINGS WHICH SHALL BE THE "AMERICAN 125 LBS. CAST IRON FLANGE STANDARD". FLANGES SHALL BE PLAIN FACE WITH A SMOOTH FINISH.

(E) MARKING

ALL GATE VALVES 3 INCHES AND OVER SHALL HAVE THE IDENTITY OF MAKER, SIZE AND THE YEAR WHEN MADE AND ALSO THE LETTERS "C.W.D." CAST UPON ITS BODY OR DOME IN RAISED LETTERS.

(F) STUFFING BOXES

THE STUFFING BOX ON EACH GATE VALVE 3 INCHES OR OVER MUST BE SEPARATE FROM THE DOME AND FASTENED TO IT BY BOLTS. FOR 2 INCH VALVES AND UNDER, THE STUFFING BOXES MAY BE FORMED IN THE DOME OF THE VALVE. WHEN REQUIRED BY THE ENGINEER, VALVES 16 INCHES AND SMALLER SHALL BE FURNISHED WITH "O" RING TYPE SEAL PLATE. THE SEAL PLATE SHALL BE FITTED WITH AT LEAST TWO (2) "O" RINGS, THE LOWER "O" RING SERVING AS THE PRESSURE SEAL AND THE UPPER "O" RING AS A COMBINED DIRT AND MOISTURE SEAL. THE "O" RINGS SHALL BE COMPOUNDED TO MEET ASTM D-200, AND HAVE PHYSICAL PROPERTIES SUITABLE FOR THE APPLICATION.

(G) SEAT AND GATE RINGS

DIMENSIONS OF THE BRONZE SEAT AND GATE RINGS SHALL BE PROPORTIONED TO FIT THE TEST PRESSURE REQUIRED, AND SHALL MEET THE APPROVAL OF THE ENGINEER. GATE RINGS SHALL BE ROLLED OR PRESSED INTO GROOVES MACHINED IN THE DISCS OR FASTENED BY SOME OTHER METHOD ACCEPTABLE TO THE CITY. DIMENSIONS OF THE BRONZE SEAT AND GATE RINGS FOR GATE VALVES SHALL BE + OR - 1/8 INCH OF THAT SPECIFIED IN THE FOLLOWING TABLES. BODY SEAT RINGS SHALL BE MADE OF GRADE ONE BRONZE. GATE SEAT RINGS SHALL BE MADE OF GRADE ONE BRONZE.

BODY AND GATE RINGS
(DIMENSIONS IN INCHES)

BOTTOM WEDGE

VALVE SIZE	BODY RINGS				GATE RINGS		
	A FACE	B DEPTHS	C THICKNESS	D THICKNESS	E FACE	F THICKNESS	G DEPTHS
3	7/16	9/16	3/16	3/16	1/2	5/32	1/4
4	1/2	9/16	3/16	3/16	9/16	1/8	5/16
6	1/2	9/16	3/16	3/16	5/16	1/8	5/16
8	5/8	5/8	3/16	7/32	11/16	5/32	5/16
10	3/4	5/8	3/16	7/32	11/16	5/32	11/32
12	3/4	5/8	7/32	7/32	13/16	5/32	11/32
16	1	3/4	1/4	9/32	1	3/16	1/2
20	1-3/8	1-1/8	5/16	3/8	1-3/8	3/8	5/8
24	1-3/8	1-1/8	5/16	3/8	1-3/8	3/8	5/8
30	1-1/2	1-1/4	3/8	7/16	1-1/2	7/16	3/4
36	1-1/2	1-1/4	3/8	7/16	1-1/2	7/16	3/4
42	1-3/4	1-1/2	1/2	1/2	1-3/4	1/2	7/8
48	2	1-3/4	1/2	5/8	2	5/8	1

SIDE WEDGE

VALVE SIZE	BODY RINGS				GATE RINGS		
	A FACE	B DEPTHS	C THICKNESS	D THICKNESS	E FACE	F THICKNESS	G DEPTHS
3	13/32	1/2	3/16	3/16	ALL BRONZE DISC		
4	7/16	9/16	3/16	3/16	1/2	5/32	21/64
6	1/2	11/16	9/32	1/2	5/8	5/32	21/64
8	17/32	11/16	9/32	1/4	11/16	5/32	21/64
10	5/8	13/16	3/8	5/16	13/16	5/32	21/64
12	5/8	13/16	3/8	5/16	13/16	5/32	21/64
16	3/4	1	15/32	3/8	7/8	3/16	13/32
20	7/8	1-5/16	17/32	7/16	1	1/4	17/32
24	1-1/16	1-3/8	21/32	1/2	1-3/16	5/16	19/32
30	1-5/16	1-1/2	25/32	1/2	1-7/16	5/16	19/32
36	1-1/2	1-1/2	27/32	1/2	1-9/16	5/16	19/32
42	1-3/4	1-9/16	29/32	9/16	1-13/16	5/16	5/8
48	2	1-5/8	29/32	5/8	2-1/16	3/8	11/16

(H) VALVE STEM

ALL GATE VALVES SHALL BE OF SINGLE SCREW TYPE. ALL THE STEMS SHALL BE OF BRONZE AND MEET THE MINIMUM TENSILE STRENGTH, MAXIMUM NOMINAL YIELD AND MAXIMUM ELONGATION. THE THREADS OF STEMS AND STEM NUTS SHALL BE ACME, MODIFIED ACME OR ONE-HALF V TYPE. THE LENGTH OF THE FLAT ON THE VALVE STEM SHALL BE EQUAL TO THE HEIGHT OF THE OPERATING NUT. IF REQUESTED, A MANUFACTURER'S CERTIFICATE OF TEST SHALL BE FURNISHED WITH ALL BRONZE STEMS. THE DIAMETERS OF STEMS AT THE BASE OF THE THREAD SHALL BE NOT LESS THAN THOSE SHOWN BELOW, UNLESS OTHERWISE APPROVED BY THE DIRECTOR. THE STEM SHALL BE OF SUFFICIENT LENGTH TO ALLOW THE REMOVAL OF PACKING WITHOUT NECESSITATING THE REMOVAL OF THE OPERATING NUT. THE STEM OPENING AND THRUST BEARING RECESS SHALL BE GRADE ONE, BRONZE BUSHED WITH TWO "O" RING SEALS LOCATED ABOVE THE THRUST COLLAR OR HAVE AN "O" RING LOCATED ABOVE THE THRUST COLLAR AND ONE BELOW FORMING A LUBRICANT CHAMBER. THE NUMBER OF THREADS PER INCH SHALL BE GIVEN BELOW:

SIZE OF VALVE INCHES	MINIMUM TENSILE STRENGTH	DIA. OF STEM AT BASE OF THREAD-IN	MAXIMUM NOMINAL YIELD	NO. OF THREADS PER IN.	NO. ELONG.
1	60,000 PSI	0.469	35,000 PSI	4	15%
1-1/2	"	"	"	"	"
2	"	"	"	"	"
3	"	0.859	"	"	"
4	"	"	"	"	"
6	"	1.000	"	3	"
8	"	"	"	"	"
10	"	1.125	"	"	"
12	"	1.188	"	"	"
16	"	1.438	"	"	"
20	"	1.772	20,000 PSI	"	"
24	"	1.980	"	"	"
30	80,000 PSI	2.480	32,000 PSI	2	"
36	"	2.730	"	"	"
42	"	3.230	"	"	"
48	"	3.750	"	"	"

THE MANUFACTURER SHALL SUPPLY DATA CONCERNING TORQUE AND END PULL OR PUSH AT THE REQUEST OF THE DIRECTOR.

(I) WRENCH CAPS

THE WRENCH CAPS AND RETAINING NUTS ON HEADS OF VALVE STEMS AND PINION SHAFTS SHALL BE OF BRONZE OR DUCTILE IRON SPECIFICATION A 536, ON VALVES 24 INCH AND OVER, WRENCH CAPS SHALL BE 2 INCH SQUARE AND 2 INCH DEEP. ON VALVES 4 INCHES TO 20 INCHES INCLUSIVE. THEY SHALL BE 1-3/4 INCHES SQUARE ON TOP, 1-7/8 INCHES SQUARE AT BASE, AND 1-3/4 INCHES DEEP. ON 3 INCH VALVES AND UNDER, THEY SHALL BE 1-1/4 INCHES SQUARE ON TOP, 1-3/8 INCHES SQUARE AT BASE AND 1-1/2 INCHES DEEP. MACHINED WRENCH CAPS FOR VALVES 3 INCHES TO 48 INCHES INCLUSIVE SHALL BE FITTED TO A MACHINED SQUARE STEM OF PINION SHAFT AND HELD IN PLACE BY A RETAINING NUT OF GRADE THREE BRONZE, ON 1-1/2 AND 2 INCH VALVES THE WRENCH CAP SHALL BE SECURED TO THE SHAFT WITH A BRASS PIN. WRENCH CAPS SHALL HAVE A CUTAWAY SKIRT TO PERMIT EASY ACCESS TO GLAND BOLTS.

(J) VALVES

VALVES ARE TO OPEN CLOCKWISE EXCEPT THOSE 2 INCHES AND UNDER. ALL GATE VALVES 3 INCHES AND OVER INCLUDING BYPASS VALVES, SHALL BE MADE BY TURNING IN A CLOCKWISE DIRECTION. ALL VALVES ARE TO BE SO MADE THAT THEY CAN BE EASILY OPERATED.

(K) FACING OF GATES

ALL DISCS OF GATES AND THREADS FOR SEAT RINGS IN THE BODY SHALL BE MACHINED TRUE AND A GROOVE SHALL BE MACHINED IN EACH DISC OR GATE FOR THE RECEPTION OF THE FACE RING. THE DISC AND SEAT RINGS SHALL BE SECURELY AND RIGIDLY ATTACHED TO THE DISC OF BODY SEATS IN A MANNER APPROVED BY THE ENGINEER, AND THE RINGS ARE TO BE FINISHED TO A TRUE SURFACE.

(V) ROLLERS AND SCRAPERS

IN ALL VALVES 20 INCH IN DIAMETER AND LARGER, DESIGNED TO LIE HORIZONTALLY, EACH GATE OR DISC SHALL BE PROVIDED WITH TWO BRONZE ROLLERS TRAVELLING ON BRONZE-FACED TRACKS AND PROVIDED WITH SUITABLE STAINLESS STEEL SCRAPERS. THE THICKNESS OF THE FACING OF THE TRACKS SHALL NOT BE LESS THAN 1/4 INCHES. THE BRONZE SHALL BE CLASS 1 AND THE STAINLESS STEEL SHALL BE ASTM A 276-75, TYPE 302.

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MATERIAL SPECIFICATION

(A) STRENGTH OF VALVES

THE GATE AND CHECK VALVES 3 INCHES TO 12 INCHES SHALL BE DESIGNED FOR 200 P.S.I. WORKING PRESSURE AND 16 INCH AND ABOVE 150 P.S.I. SHALL WITHSTAND AN INTERNALLY APPLIED HYDROSTATIC PRESSURE AT ALL POINTS OF AT LEAST 300 POUNDS PER SQUARE INCH, EXCEPT AS SPECIFIED IN SECTION ON "HYDROSTATIC TEST AT THE FACTORY". A FACTOR OF SAFETY OF NOT LESS THAN 10 SHALL BE USED ON THIS DESIGN. SHOULD TEST REVEAL ANY WEAKNESS THE VALVES FROM THAT DESIGN SHALL BE REJECTED, AND A NEW DESIGN MADE.

(B) REINFORCEMENT AT FLANGES

ALL VALVE FLANGES SHALL BE REINFORCED BY FILLETS IN ACCORDANCE WITH THE MANUFACTURER'S PRACTICE PROVEN SATISFACTORY IN ACTUAL SERVICE.

(C) JOINTS

ALL JOINTS OF THE VALVES SHALL BE FACED TRUE IN A LATHE OR PLANER, AND PUT TOGETHER WITH A GASKET OF SOME MATERIAL ACCEPTABLE TO THE ENGINEER.

(D) BOLT HOLES

ALL BOLT HOLES SHALL BE ACCURATELY DRILLED FROM TEMPLATES AND SPACED EQUAL DISTANCES APART.

(E) BOLTS AND NUTS

ALL BOLTS AND NUTS SHALL BE MADE OF SILICONE BRONZE (ASTM B 98-74 ALLOY A), STAINLESS STEEL (ASTM A 276-55, TYPE 302), DUCTILE IRON (ASTM A 536 SQUARE GRADE 65-45-12), KORETEN A OR AN ACCEPTABLE EQUIVALENT.

(F) PARTS TO BE INTERCHANGEABLE

ALL PARTS OF VALVES OF THE SAME SIZE AND MAKE MUST BE PERFECTLY INTERCHANGEABLE AND ALL WORK MUST BE DONE IN A THOROUGH AND WORKMANLIKE MANNER.

(G) CASTINGS

ALL CASTINGS, WHETHER OF BRONZE, IRON OR STEEL, SHALL BE SOUND AND SMOOTH WITHOUT COLD SHUTS, SWELLS, LUMPS, SCABS, BLISTERS, SAND HOLES OR OTHER IMPERFECTIONS, AND SHALL BE MADE IN ACCORDANCE WITH THE BEST MODERN FOUNDRY PRACTICE TO OBTAIN CASTINGS OF THE BEST QUALITY AND/OR UNIFORM THICKNESS. NO WELDING, PLUGGING OR FILLING OF HOLES OR OTHER DEFECTS WILL BE PERMITTED. FOR PARTS WHOSE THICKNESS IS LESS THAN ONE (1) INCH, CASTING BEING THINNER THAN THE SPECIFIED THICKNESS BY 0.06 OF AN INCH OR MORE SHALL BE REJECTED; AND FOR PARTS WHOSE THICKNESS IS ONE (1) INCH OR MORE, CASTING BEING THINNER THAN SPECIFIED BY 0.08 OF AN INCH OR MORE SHALL BE REJECTED.

(H) BRONZE PARTS

1) BRONZE FOR PARTS, OTHER THAN THOSE LISTED BELOW, SHALL BE GRADE ONE OR APPROVED EQUIVALENT.

2) VALVE STEMS, PINION SHAFTS, STEM NUTS, WRENCH CAPS AND RETAINING NUTS SHALL BE MADE OF GRADE THREE BRONZE.

3) DISC RINGS SHALL BE MADE OF GRADE FIVE BRONZE.

(I) TESTS OF BRONZE

1) IF REQUESTED, A MANUFACTURER'S CERTIFICATE OF TEST SHALL BE FURNISHED WITH ALL BRONZE STEMS.

2) ALL STEMS OF 16 INCH GATE VALVES AND OVER SHALL HAVE A PROLONGATION ON ONE END OF EACH STEM, OF THE SAME DIMENSIONS AND CROSS SECTION AS THE STEM, AND OF SUFFICIENT LENGTH TO ENABLE THE CUTTING OF SPECIMENS PARALLEL WITH THE LONGITUDINAL AXIS OF THE STEM. SPECIMENS SHALL BE CUT FROM PROLONGATIONS ONE-HALF WAY BETWEEN SURFACE AND CENTRAL AXIS. OTHER METHODS OF TEST WILL BE CONSIDERED BY THE ENGINEER.

3) FOR ALL STEMS OF GATE VALVES SMALLER THAN 16 INCHES, NOT LESS THAN TWO TEST PIECES SHALL BE CAST FROM THE MOLTEN METAL OF EACH HEAT FROM WHICH VALVE STEMS ARE BEING MADE.

4) ALL STEMS MADE FROM BRONZE SHOWING LESS STRENGTH ELONGATION AND OR DUCTILITY THAN ABOVE REQUIRED SHALL BE REJECTED.

5) TESTS OF VALVE STEMS, OR THE VARIOUS PARTS OF ANY VALVE, MAY BE MADE AT ANY TIME BEFORE OR AFTER DELIVERY, AND IF FOUND TO BE DEFICIENT IN STRENGTH OR UNSATISFACTORY TO THE ENGINEER, THE WHOLE LOT OR SHIPMENT MAY BE REJECTED.

(J) CAST IRON

1) QUALITY: CAST IRON SHALL CONFORM TO ASTM SPECIFICATIONS A 126, CLASS B, OR LATEST REVISION THEREOF. ALL IRON CASTINGS SHALL BE TOUGH AND WITHOUT BRITTLINESS, SUCH AS MAY BE CUT, DRILLED CHIPPED BY HAND WITH DUE EASE. A BLOW FROM A HAMMER SHALL PRODUCE AN INDENTATION ON THE EDGE OF THE CASTING WITHOUT FLAKING THE METAL.

2) TEST BARS FROM THE MOLTEN METAL FROM WHICH THE VALVES ARE BEING MADE SHALL BE TESTED AT SUCH TIME AND IN SUCH MANNER AS THE ENGINEER MAY REQUIRE. THE REQUIREMENTS OF ASTM SPECIFICATIONS A 126 SHALL GOVERN TESTING PROCEDURES TO DETERMINE THE PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE IRON CASTINGS. SHOULD THE RESULT OBTAINED FROM THE BAR TESTED FAIL TO SHOW THAT THE CAST IRON MEETS THE REQUIREMENTS HEREIN SPECIFIED, THE ENTIRE MELT WILL BE REJECTED. TEST BARS, HOWEVER, WHOSE FAILURE IS DUE TO INHERENT DEFECTS SHALL NOT BE CONSIDERED. ALL VALVES MADE FROM IRON SHOWING LESS STRENGTH THAN CALLED FOR IN THE ASTM SPECIFICATIONS WILL BE REJECTED.

(K) QUALITY OF MATERIALS

GRADE ONE CAST BRONZE SHALL CONFORM TO THE PROPERTIES OF ASTM B 62.

GRADE TWO CAST BRONZE SHALL CONFORM TO THE PROPERTIES OF ASTM B 132, ALLOY A.

GRADE THREE CAST BRONZE SHALL CONFORM TO THE PROPERTIES OF ASTM B 132, ALLOY B.

GRADE FOUR ROLLED BRONZE SHALL CONFORM TO THE PROPERTIES OF ASTM B 21, ALLOY A (ONE-HALF HARD).

GRADE FIVE BRONZE SHALL BE SUFFICIENTLY MALLEABLE TO CONFORM TO DOVETAILED GROOVES WHEN PEENED OR ROLLED, AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH, WITHOUT DEFORMATION, OF 4,000 PSI, AND SHALL HAVE THE FOLLOWING CHEMICAL COMPOSITION:

COPPER, PERCENT	91.0
TIN, PERCENT	0.0
ZINC, PERCENT	5.0
LEAD, PERCENT	4.0

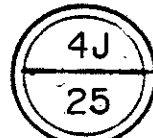
SILICON BRONZE SHALL CONFORM TO ASTM SPECIFICATION B 98, ALLOY A.

STAINLESS STEEL SHALL CONFORM TO ASTM SPECIFICATION A 276, TYPE 302.

CAST IRON SHALL CONFORM TO ASTM SPECIFICATIONS A 126, CLASS B. WROUGHT IRON SHALL BE TOUGH FIBEROUS, AND UNIFORM IN CHARACTER, SPECIMENS CUT FROM BARS AND BROKEN IN A TESTING MACHINE SHALL SHOW A TENSILE STRENGTH OF NOT LESS THAN 4500 PSI WITH AN ELONGATION OF 18 PERCENT IN EIGHT DIAMETERS.

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(L) OTHERS MATERIALS

ALL OTHER MATERIALS USED IN THE MANUFACTURE OF THESE VALVES AND NOT SPECIFIED IN THE SPECIFICATIONS SHALL BE OF THE BEST QUALITY OF THEIR KINDS, AND SUBJECT TO INSPECTION, TESTS, AND APPROVAL OF THE ENGINEER.

(M) CHEMICAL ANALYSIS

CHEMICAL ANALYSIS OF THE MATERIAL USED SHALL BE FURNISHED BY THE CONTRACTOR WHENEVER REQUIRED BY THE ENGINEER.

(N) CLEANING OF CASTINGS

ALL IRON CASTINGS SHALL BE THOROUGHLY CLEANED ON THE OUTSIDE AND INSIDE SURFACES, AND PROTECTED FROM RAIN OR MOISTURE UNTIL THE ARE PAINTED.

(O) HYDROSTATIC TESTS AT SHOP

ALL GATE VALVES SHALL BE TESTED IN THE SHOP BY HYDROSTATIC PRESSURE BY CLOSING THE VALVE AND APPLYING THE REQUIRED TEST PRESSURE IN THE BODY AND DOME OF THE VALVE SPECIFICATION BELOW:

4" THROUGH 12"	400 PSI - NO TIME REQUIREMENT
14" THROUGH 20"	300 PSI FOR 15 MINUTES, DROP PRESSURE TO 150 PSI, THEN ELEVATE AGAIN TO 300 PSI FOR 15 MINUTES - TOTAL OF 1/2 HOUR.

THIS IS A MODIFICATION OF SECTION 29 OF THE "STANDARD SPECIFICATIONS AWWA DESIGNATION C-500 71". ALL LEAKS, FLAWS OR OTHER DEFECTS DEVELOPED IN MAKING THESE TESTS SHALL BE CORRECTED TO THE SATISFACTION OF THE ENGINEER OR THE ENTIRE PIECE SHALL BE REJECTED. AFTER TESTING, ALL VALVES SHALL BE THOROUGHLY DRAINED. ALL EQUIPMENT FOR TESTING AND ALL TESTS SHALL BE MADE AT THE CONTRACTORS EXPENSE.

(P) PERFORMANCE TESTS

EACH VALVE SHALL BE OPERATED IN THE POSITION THAT IT WILL ASSUME IN SERVICE, AND FOR THE FULL LENGTH OF GATE TRAVEL IN BOTH DIRECTIONS TO DEMONSTRATE THE FREE AND PERFECT FUNCTIONING OF ALL PARTS IN THE INTENDED MANNER. ANY DEFECTS OF WORKMANSHIP SHALL BE CORRECTED AND THE TEST REPEATED UNTIL SATISFACTORY PERFORMANCE IS DEMONSTRATED.

PLACING AND TESTING

(A) ALL VALVES SHALL BE SET ACCURATELY AND CAREFULLY TO THE LINES AND GRADES GIVEN. ALL CONNECTIONS TO PIPE SHALL HAVE THE NECESSARY FLANGED, LEAD, SOLDER JOINT, SCREWED OR VICTAULIC ENDS AS REQUIRED UNDER THE VARIOUS SECTIONS OF THESE SPECIFICATIONS AND AS SHOWN ON THE VALVE SCHEDULE.

(B) AFTER THE VALVES ARE SET IN PLACE AND READY TO OPERATE, THE CONTRACTOR SHALL TEST THEM UNDER WORKING PRESSURE AND CONDITIONS HEREIN SPECIFIED UNDER "GENERAL TESTING MAINS". ANY VALVE FOUND TO LEAK SHALL BE MADE WATERTIGHT AND IF FOUND TO BE OF FAULTY DESIGN, SHALL BE SATISFACTORILY REPAIRED OR REPLACED BY THE CONTRACTORS.

PAINTING

(A) IRON BODY VALVES SHALL EITHER BE DIPPED IN ASPHALT PAINT AND ALL BRONZE PARTS CLEANED, OR ALL IRON CASTINGS SHALL BE PAINTED INSIDE BEFORE ASSEMBLING WITH TWO (2) COATS OF APPROVED PAINT, AND AFTER PASSING THE HYDRAULIC TEST, SHALL BE GIVEN AT LEAST TWO (2) COATS OF APPROVED PAINT OUTSIDE.

(B) AFTER ERECTION, ALL EXPOSED METAL SURFACES OF VALVES EXCEPT BRASS OR BRONZE SHALL BE PAINTED WITH (2) FIELD COATS OF COAL TAR PITCH PAINT USING INERTOL 66, OR KOPPERS BITUMASTIC 50 OR APPROVED EQUAL.

INSPECTION

THE ENGINEER OR HIS AUTHORIZED DESIGNATE WILL INSPECT THE MATERIAL AND WORK DONE, AS THE INTERESTS OF THE CITY OR STATE MAY REQUIRE. HE SHALL HAVE UNRESTRICTED ACCESS TO THE CONTRACTOR'S PLANT, AND TO ALL PARTS OF THE WORK; AND OTHER PLACES AT WHICH THE PREPARATION OF THE MATERIAL AND THE CONSTRUCTION OF THE DIFFERENT PARTS OF THE WORK TO BE DONE UNDER THESE SPECIFICATIONS ARE CARRIED ON, AND HE SHALL RECEIVE ALL FACILITIES AND ASSISTANCE TO CARRY OUT HIS WORK OF INSPECTION AND TESTING IN A MANNER SATISFACTORY TO THE ENGINEER. SUCH INSPECTION SHALL NOT RELIEVE THE CONTRACTOR FROM ANY OBLIGATION TO PREFORM SAID WORK STRICTLY IN ACCORDANCE WITH THE SPECIFICATIONS, OR ANY MODIFICATIONS THEREOF AS HEREIN PROVIDED, AND WORK NOT SO CONSTRUCTED SHALL BE REMOVED AND MADE GOOD BY THE CONTRACTOR AT HIS OWN EXPENSE.

DATE WITH PROPOSAL

PROPOSAL SHALL BE ACCOMPANIED BY DRAWINGS FURNISHED BY THE MANUFACTURER, FULLY AND DISTINCTLY ILLUSTRATING AND DESCRIBING AND GIVING THE WEIGHT OF THE VALVES PROPOSED TO BE FURNISHED.

DRAWINGS

(A) PRIOR TO THE MANUFACTURE OF ANY VALVES, THE CONTRACTOR SHALL SUBMIT FOR THE APPROVAL OF THE ENGINEER AND DIRECTOR OF PUBLIC UTILITIES OF THE CITY OF CLEVELAND COMPLETE WORKING, DETAIL, AND DIMENSION DRAWINGS SHOWING THICKNESS AND KINDS OF MATERIAL, AND SIMILAR INFORMATION.

(B) ONE (1) PRINT EACH OF THE DRAWINGS SUBMITTED WILL BE RETURNED WITH THE CRITICISMS OR APPROVAL OF THE ENGINEER. IN CASE THE DRAWINGS ARE NOT APPROVED, THE CONTRACTOR SHALL AGAIN SEND FOR APPROVAL DUPLICATE REVISED PRINTS OF THE DRAWINGS TO TAKE CARE OF THE CRITICISMS NOTED.

NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED.

(C) IF THE VALVE FURNISHED IS ONE PREVIOUSLY APPROVED FOR WHICH DRAWINGS ARE PRESENTLY ON FILE WITH THE DEPARTMENT OF PUBLIC UTILITIES, THE DRAWING REQUIREMENT WILL BE WAIVED.

PAYMENT

THE UNIT PRICE STIPULATED FOR EACH "ITEM SPECIAL-VALVES" CLASSIFIED AS TO SIZE AND TYPE, SHALL INCLUDE THE FURNISHING, PLACING, TESTING AND THE PAINTING OF THE AIR RELIEF LOCKS, DRAIN VALVES, INCLUDING THE BYPASS VALVES, OPERATING NUTS VALVE BOXES AND COVERS AND OTHER ACCESSORIES AND APPURTENANCES AND THE FURNISHING OF ALL MATERIALS, LABOR, TOOLS AND APPLIANCES NECESSARY TO COMPLETE THE WORK AS SPECIFIED OR AS SHOWN.

ITEM SPECIAL - 54" STEEL CASING PIPE (0.75" WALL THICKNESS)

THIS ITEM SHALL INCLUDE THE INSTALLATION OF A 54" DIAM. STEEL CASING PIPE AS SHOWN IN THE PLANS FOR A FUTURE 36" WATER MAIN. PIPE ENDS SHALL BE TEMPORARILY BULKHEADED WITH WOOD PLANKING OR BRICK MASONRY TO PREVENT EMBANKMENT MATERIAL FROM ENTERING THE CASING. ALL COSTS FOR THIS WORK SHALL BE INCLUDED IN TH UNIT PRICE BID FOR ITEM SPECIAL - 54" STEEL CASING PIPE.

THIS ITEM OF WORK IS SUBJECT TO NON-PERFORMANCE IN THE EVENT THE 36" WATER MAIN IS INSTALLED BY SEPARATE CONTRACT PRIOR TO THIS PROJECT. THE CONTRACTOR SHALL NOT ORDER MATERIALS FOR THIS ITEM OF WORK UNTIL DIRECTED BY THE ENGINEER.

SEE SHEET 14A FOR QUANTITIES.

ITEM SPECIAL - TEMPORARY SERVICE CONNECTION

THE CONTRACTOR SHALL PROVIDE A TEMPORARY 8" SERVICE CONNECTION TO AN EXISTING FIRE PROTECTION LINE LOCATED AT STA. 221+70, 32'LT. A TAP IS TO BE MADE ON A TEMPORARY BYPASS OR A WATER MAIN THAT WILL REMAIN IN SERVICE AND THE SERVICE CONNECTION SHALL BE TEMPORARILY CONNECTED. THE CONTRACTOR SHALL ESTABLISH THIS CONNECTION PRIOR TO COMMENCING WORK ON RELOCATING THE EXISTING 12" WATER MAIN AND SHALL MAINTAIN THE TEMPORARY SERVICE CONNECTION AT ALL TIMES UNTIL THE NEW 12" WATER MAIN IS IN PLACE AND OPERATIONAL. AL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO PERFORM THIS ITEM OF WORK SHALL BE INCLUDED IN THE UNIT BID PRICE EACH FOR ITEM -SPECIAL TEMPORARY SERVICE CONNECTION.

SEE SHEET 14A FOR WATER WORK QUANTITIES

CN-2643-4.80 92602

General Notes Cont.

Watering Permanent Seeded Areas
The following estimated quantities are to be used as directed
by the Engineer to promote growth and to care for the permanent
seeded areas, as per 659.09:

659 Water
 $195 \times \frac{9}{1000} \times \frac{240}{1000} = 1 \text{ M. Gal.}$

659 Commercial Fertilizer
 $195 \times \frac{9}{2000} \times \frac{80}{1000} = 0.02 \text{ Ton}$

ITEM 615 - TEMPORARY ROADS

ITEM 615 - TEMPORARY PAVEMENT, CLASS A

THESE ITEMS SHALL BE USED TO CONSTRUCT THE
TEMPORARY PAVEMENT ON BOTH SIDES OF THE
EXISTING PAVEMENT AS SHOWN IN STAGE I AND
STAGE II OF THE MAINTENANCE OF TRAFFIC PLANS.

TEMPORARY GUARDRAIL SHALL BE INCLUDED
UNDER TEMPORARY ROADS AND INSTALLED AS
SHOWN ON SHEET 21

THE FOLLOWING ESTIMATED QUANTITY HAS BEEN
CARRIED TO THE GENERAL SUMMARY:

ITEM	DESCRIPTION	QTY.	UNIT
615	TEMPORARY ROADS		LUMP
615	TEMPORARY PAVEMENT	281	SQ.YD.

Cal. By Date
Check By Date

FHWA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	

CUYAHOGA COUNTY
CUY-43-4.80

5
25

GENERAL SUMMARY

SHEET NUMBER										GRAND TOTAL	UNIT	ITEM	ITEM EXT.	DESCRIPTION
	4	5	6	7	8		20		23					ROADWAY
	LUMP									LUMP		201	11000	CLEARING AND GRUBBING
			429							429	SQ.YD.	202	23000	PAVEMENT REMOVED
			248							248	LIN.FT.	202	75000	FENCE REMOVED
					25	164				189	CU.YD.	203	12000	EXCAVATION NOT INCLUDING EMBANKMENT CONSTRUCTION
				12						12	CU.YD.	203	20000	EMBANKMENT
			429							429	SQ.YD.	203	50000	SUBGRADE COMPACTION
			250							250	LIN.FT.	606	13000	GUARDRAIL TYPE 5
			2							2	EACH	606	25000	ANCHOR ASSEMBLY TYPE A
			2							2	EACH	606	26800	ANCHOR ASSEMBLY TYPE T
			4							4	EACH	606	35140	BRIDGE TERMINAL ASSEMBLY TYPE 4
														EROSION CONTROL
			436							436	CU.YD.	601	32100	ROCK CHANNEL PROTECTION, TYPE B WITH FILTER
	100									100	EACH	207	70000	STRAW OR HAY BALES
	39									39	SQ.YD.	207	10000	TEMPORARY SEEDING & MULCHING
					195					195	SQ.YD.	659	10000	SEEDING & MULCHING
	.01	0.02								.03	TON	659	20000	COMMERCIAL FERTILIZER
	1	1								2	M.GAL	659	35000	WATER
			LUMP							LUMP		615	10000	TEMPORARY ROAD
			281							281	SQ.YD.	615	20000	TEMPORARY PAVEMENT, CLASS A
														DRAINAGE
			8							8	LIN.FT.	603	00900	6" CONDUIT, TYPE B
			96							96	LIN.FT.	603	04400	12" CONDUIT, TYPE B
			12							12	LIN.FT.	603	07400	18" CONDUIT, TYPE B
			69							69	LIN.FT.	603	13400	30" CONDUIT, TYPE B
			1							1	EACH	604	31500	MANHOLE NO. 3
			9							90	Sq.Yd.	254	01000	Pavement Planing, Bituminous
			429							429	SQ.YD.	305	12000	8" CONCRETE BASE
			72							72	CU.YD.	310	12001	SUBBASE, TYPE I, GRADING A, AS PER PLAN (See Sht 4)
			21							21	CU.YD.	402	20000	ASPHALT CONCRETE, AC-20
			19							19	CU.YD.	404	20000	ASPHALT CONCRETE, AC-20
			53							53	GAL.	407	10000	TACK COAT
			79							79	CU.YD.	617	10100	COMPACTED AGGREGATE TYPE A
									5	5	Each	614	13202	Barrier Reflector, Type A2
							430			430	Lin.Ft.	622	40020	PORTABLE Concrete Barrier, 32"
							80			80	Lin.Ft.	622	40010	PORTABLE Concrete Barrier, Type BRD
							.04			.04	MILES	614	21300	TEMPORARY CENTER LINES, CLASS I, 140.05, TYPE C
									25	25	EACH	614	13302	BARRIER REFLECTORS, TYPE-B2
							270			270	EACH	614	12800	TEMPORARY RAISED PAVEMENT MARKER
							0.75			0.75	MILES	614	22300	TEMPORARY EDGE LINE, CLASS I, 140.05, TYPE C
							0.20			0.20	MILES	614	22000	TEMPORARY EDGE LINE, CLASS I
							0.20			0.20	MILES	614	21400	TEMPORARY CENTER LINES, CLASS II
			2							2	Each	642	01302	Lane Arrow, TYPE 2
			0.20							0.20	Miles	642	00102	Edge Line, TYPE 2
			0.20							0.20	Miles	642	00302	Center Line, TYPE 2
									6	6	EACH	802	00100	BARRIER REFLECTORS, TYPE A
			2							2	EACH	630	85100	REMOVAL OF GROUND MOUNTED SIGN AND REERECTION
										LUMP		614	11000	MAINTAINING TRAFFIC
										LUMP		619	15000	FIELD OFFICE, Type A
										LUMP		623	10000	CONSTRUCTION LAYOUT STAKES
										LUMP		624	10000	MOBILIZATION
														FOR STRUCTURE QUANTITIES SEE SHEET NO. II
														FOR WATER WORK GENERAL SUMMARY SEE SHEET NO. 14 A
														GENERAL SUMMARY

Revised 7-1-91
Revised 7-1-91
Revised 7-22-91
Revised 5-14-91

PAVEMENT MARKINGS					
CENTERLINE STATION			642	642	642
FROM	TO	LT-RT	BROKEN SOLID	EDGE LINE	LANE ARROW
218+26.30	223+42.80		.20	.20	
	219+50				2
	TOTAL		0.20	0.20	2

Begin Work
Sta. 218+26.30

T.B.M. HYDRANT AT STA.
219+90, (28' RT.
TOP ELEV. 1049.67

J. FOUKAL
P.P. NO. 951-29-001

S.P. MANUFACTURING CORP.
P.P. NO. 951-29-006

For proposed R/W or channel
easement see sheet 25.

Pavement Planing Bituminous

End Work
Sta. 223+42.80

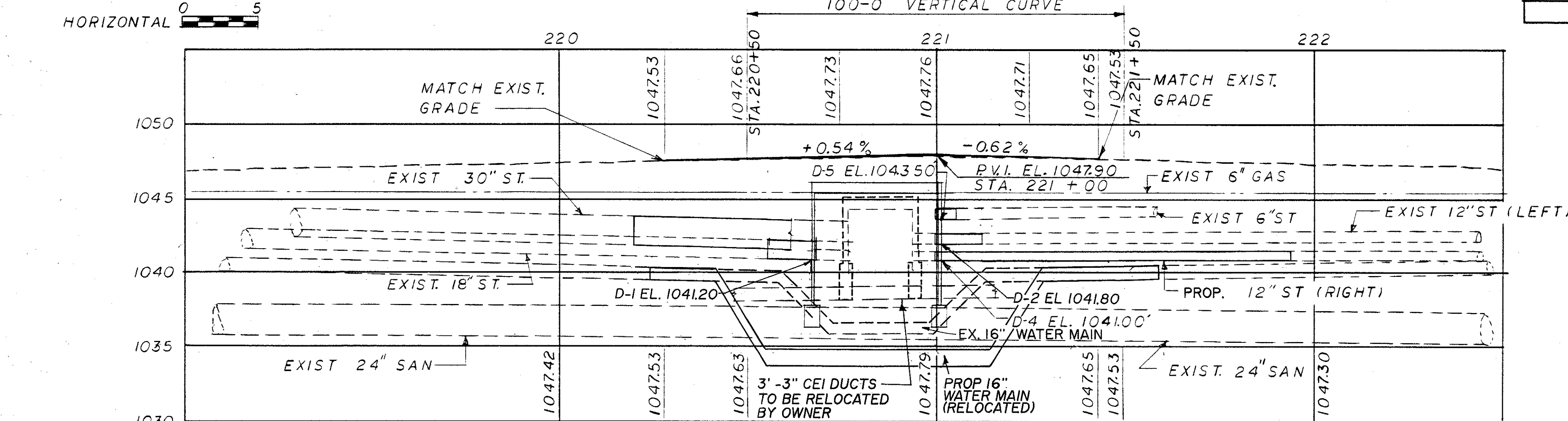
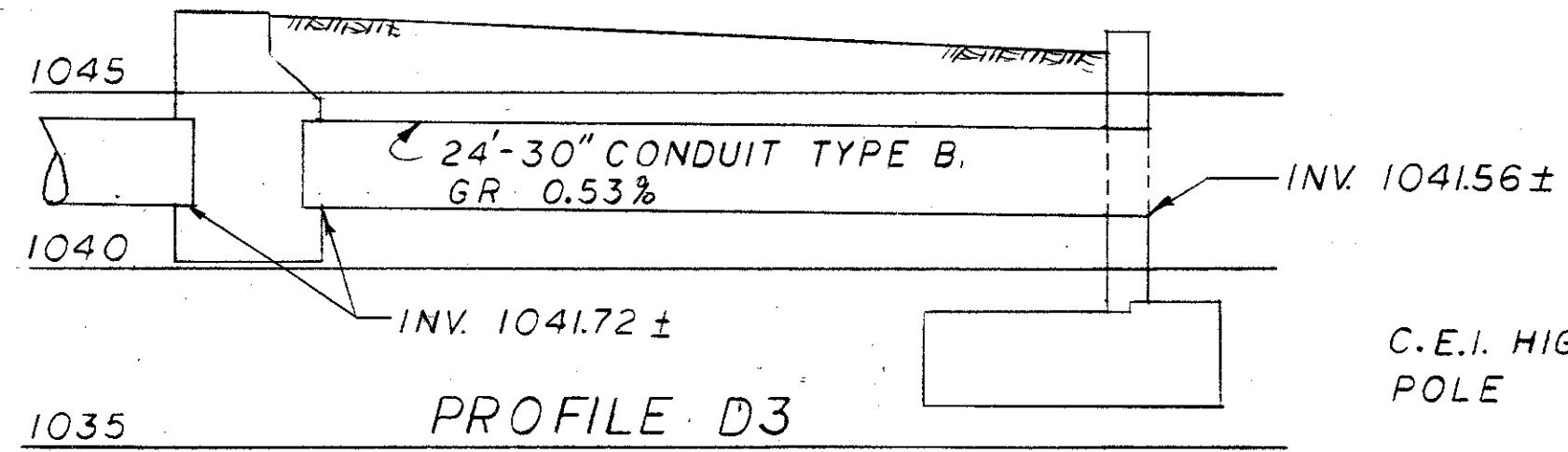
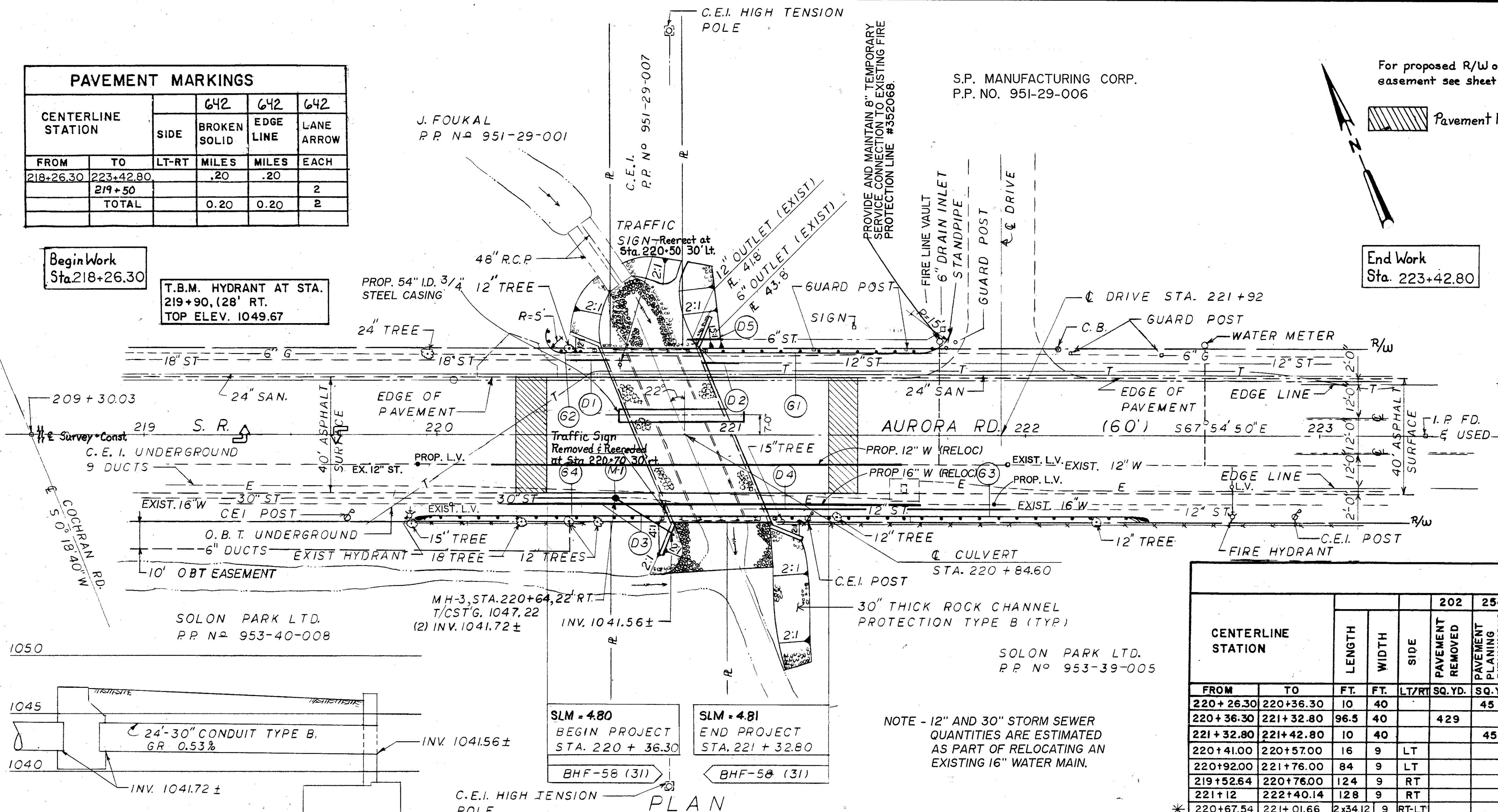
GUARDRAIL							
REF. NO.	CENTERLINE STATION	SIDE	606	606	606	606	
			GUARDRAIL TYPE 5	ANCHOR ASSEMBLY TYPE T	ANCHOR ASSEMBLY TYPE A	BRIDGE TERMINAL ASSEMBLY TYPE B	
FROM	TO	LT-RT	LINE FT.	EACH	EACH	EACH	
G1	220+91.56	221+75.31	LT	81.25	1		
G2	220+36.56	220+54.06	LT	12.50	1		
G3	221+15.14	222+40.14	RT	100			
G4	219+96.39	220+77.64	RT	56.25	1		
	TOTAL		250	2	2	4	

ITEM 601 With Filter				
ROCK CHANNEL PROTECTION TYPE 'B' T=2'-6"				
FROM	TO	SIDE	CUBIC AREA	CU. YD.
220+45 ±	220+96 ±	L	47' x 30' x 2.5' = 3525	130.55
220+73 ±	221+18 ±	R	45' x 15' x 2.5' = 1687.5	62.50
221+18 ±	221+31 ±	R	13' x 47' x 2.5' = 1527.50	56.57
220+67 ±	221+00 ±	UNDER	33' x 61' x 2.5' = 5032.5	186.39
	TOTAL			436.01

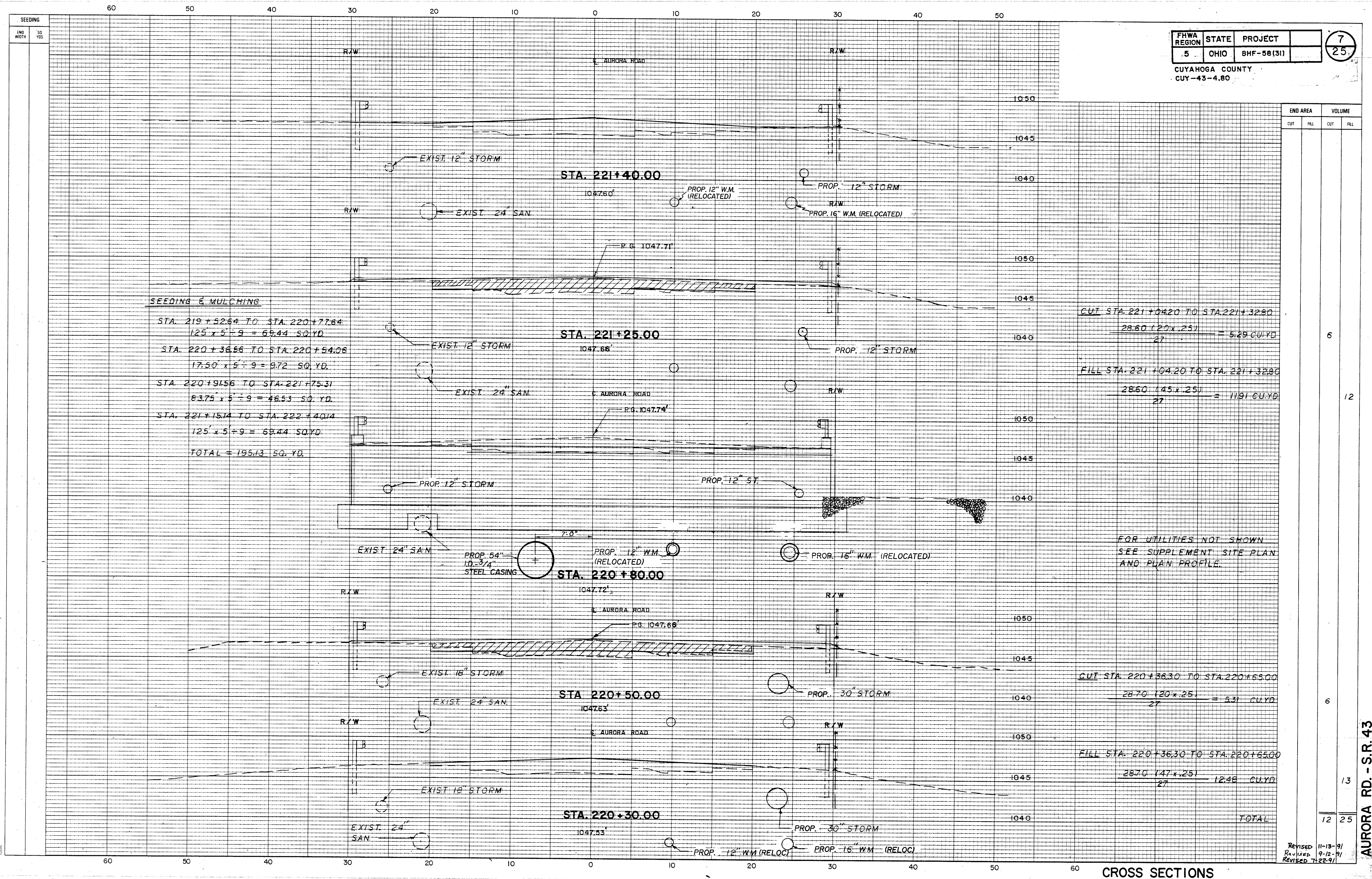
PAVEMENT																	
CENTERLINE STATION		LENGTH	WIDTH	SIDE	202	254	203	305	310	404	402	407	617	617	202	630	
					PAVEMENT REMOVED	PAVEMENT PLANING BITUMINOUS	SUBGRADE COMPACTION	8" CONCRETE BASE	6" SUBBASE	1 1/4" ASPHALT CONCRETE AC-20	1 1/2" ASPHALT CONCRETE AC-20	TACK COAT	6" COMPACTED AGGREGATE Type A	10" COMPACTED AGGREGATE Type A	FENCE REMOVED	REMOVED - SIGN And Recreated	
FROM	TO	FT.	FT.	LT/RT	SQ. YD.	SQ. YD.	SQ. YD.	SQ. YD.	CU. YD.	CU. YD.	CU. YD.	GAL.	CU. YD.	CU. YD.	LIN. FT.	EACH	
220+26.30	220+36.30	10	40			45				2		5					
220+36.30	221+32.80	96.5	40		429		429	429	72	15	21	43					
221+32.80	221+42.80	10	40			45				2		5					
220+41.00	220+57.00	16	9	LT									3				
220+92.00	221+76.00	84	9	LT									14				
219+52.64	220+76.00	124	9	RT									21				
221+12	222+40.14	128	9	RT									22				
220+67.54	221+01.66	2x34.12	9	RT-LT										19			
219+96.39	222+44.20			RT											248	2	
	TOTAL				429	90	429	429	72	19	21	53	60	19	248	2	

CENTERLINE STATION		SIDE	202	603	603	603	603	604
REF. NO.			30" CONDUIT TYPE B	18" CONDUIT TYPE B	12" CONDUIT TYPE B	6" CONDUIT TYPE B	MH-3	
FROM	TO	LT-RT	LINE FT.	LINE FT.	LINE FT.	LINE FT.	EACH	
D1	220+46	220+58	LT					
D2	220+91	221+03	LT		12			
D3	220+19	220+76	RT	69				
D4	221+10	221+94	RT			84		
D5	220+92	220+97	LT				8	
M1	220+64		RT					1
	TOTAL			69	12	96	8	1

FOR GENERAL SUMMARY SEE SHEET 5
* OVER CULVERT END SEE SHEET 3
FOR WATER WORK QUANTITIES AND LOCATIONS SEE SHEET 14A



PROFILE ALONG CENTER S.R. 43



SEEDING
END
WIDTH
SQ.
YDS.

QUANTITIES	
CALCULATED	
CHECKED	

FHWA REGION	STATE	PROJECT
5	OHIO	BHF-58(31)

CUYAHOGA COUNTY
CUY-43-4,80

8
25

END AREA		VOLUME	
CUT	FILL	CUT	FILL

1050

1045

1040

1035

DOWN STREAM CHANNEL WORK

1050

1045

1040

1035

CUT $52(111 \times .25) + 15(58 \times .25) \div 27 =$
 $1443 + 2175 \div 27 =$
61.5 CU. YD.

62

1050

1045

1040

1035

UP STREAM CHANNEL WORK

1050

1045

1040

1035

CUT $24(132 \times .25) + 30(124 \times .25) \div 27 =$
 $792 + 930 \div 27 =$
63.78 CU. YD.

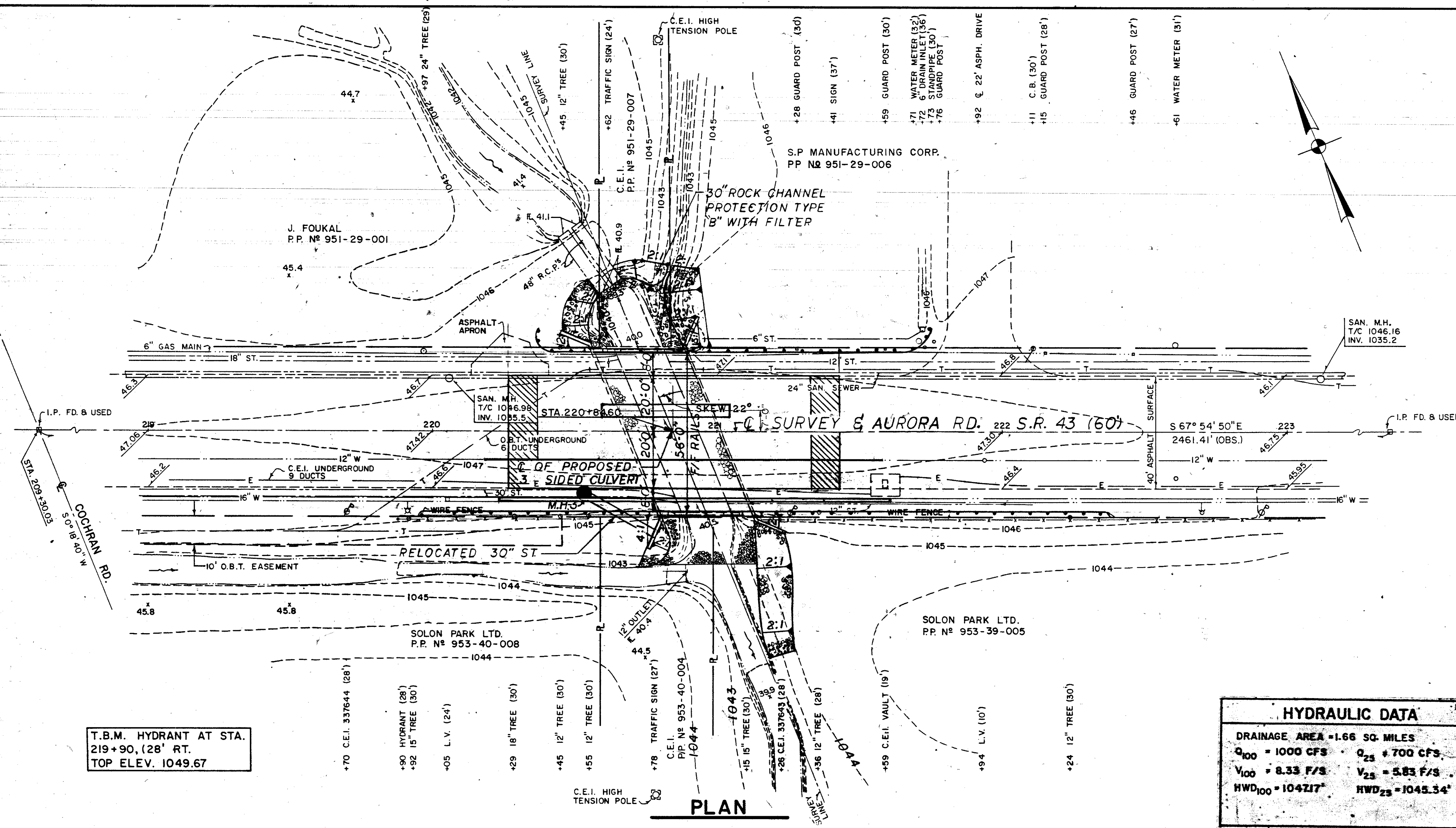
64

NORTH (IN BETWEEN
THE ABOVE TWO)

38

TOTAL

164

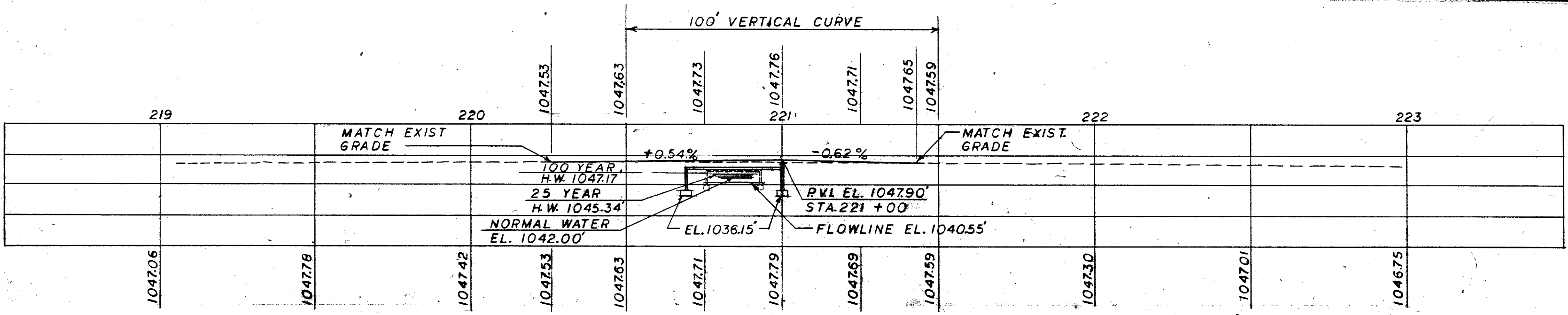


PLAN

HYDRAULIC DATA	
DRAINAGE AREA = 1.66 SQ. MILES	
Q ₁₀₀ = 1000 CFS	Q ₂₅ = 700 CFS
V ₁₀₀ = 8.33 F/S	V ₂₅ = 5.83 F/S
HWD ₁₀₀ = 1047.17'	HWD ₂₅ = 1045.34'

EXISTING BRIDGE DATA
TYPE: THREE SIDED CONCRETE CULVERT
SPAN: 17'-3" CLEAR
ROADWAY: 40'-0" EDGE TO EDGE
ALIGNMENT: TANGENT
SKEW: 22°10'
APPROACH SLAB: NONE
WEARING SURFACE: ASPHALT CONCRETE
LOAD CAPACITY: UNKNOWN
CONDITION: POOR
DATE BUILT: 1909, EXTENDED: 1934
IMPROVEMENTS: UNKNOWN
STRUCTURE FILE NO.: 1803360

PROPOSED STRUCTURE-DATA
TYPE: 30'-0" x 6'-0" PRECAST REINFORCED FLAT TOPPED THREE SIDED CONCRETE CULVERT
SPAN: 30'-0" F/F OF CULVERT WALLS
ROADWAY: 56'-0" F/F GUARDRAILS
LOADING: HS-20-44 AND ALTERNATE MILITARY LOADING
SKEW: 22° RIGHT FORWARD
ALIGNMENT: TANGENT
APPROACH SLAB: NONE



PROFILE ALONG CENTERLINE OF S.R. 43

REVISED 11-13-91
REVISED 080112-ACB 9-12-91
REVISED 7-22-91 1/9

R.P. MADISON INTERNATIONAL
ARCHITECTS-ENGINEERS-PLANNERS
2930 EUCLID AVE. CLEVELAND, OHIO 44115

SITE PLAN
STRUCTURE NO CUY-43-04.80
OVER
DRAINAGE DITCH

CUYAHOGA COUNTY
DESIGNED BY RT CHECKED BY MP REVIEWED BY Param Date 3-15-90

GENERAL NOTES

REFERENCE SHALL BE MADE TO THE FOLLOWING: STANDARD DRAWINGS: DBR-2-73, DATED APRIL 10, 1973

DESIGN SPECIFICATIONS: THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1989, AND THE OHIO "SUPPLEMENT" TO THESE SPECIFICATIONS.

DESIGN DATA: DESIGN LOADING - HS-20-44 AND THE ALTERNATE MILITARY LOADING CONCRETE, CLASS C-UNIT STRESS 1333 PSI.

REINFORCING STEEL - ASTM A615, A616 OR A617 - GRADE 60 - UNIT STRESS, 24,000 PSI.

FOUNDATION BEARING PRESSURE: FOOTING AS DESIGNED, PRODUCED A MAXIMUM BEARING PRESSURE OF 3.425 POUNDS PER SQUARE FOOT.

REMOVAL OF EXISTING STRUCTURE: WHEN NO LONGER REQUIRED TO MAINTAIN TRAFFIC, THE EXISTING STRUCTURE SHALL BE REMOVED IN STAGES (SEE SHEET 379) AND AS PER 202.03.

UTILITY LINES: ALL EXPENSES INVOLVED IN RELOCATING THE AFFECTED UTILITY LINES SHALL BE BORNE BY THE OWNERS. THE CONTRACTOR AND OWNERS ARE REQUESTED TO COOPERATE BY ARRANGING THEIR WORK IN SUCH A MANNER THAT INCONVENIENCE TO EITHER WILL BE HELD TO A MINIMUM.

ITEM SPECIAL: SEALING OF CONCRETE SURFACES: A CONCRETE SEALER SHALL BE APPLIED TO THE FOLLOWING CONCRETE SURFACES:

- INSIDE FACE, TOP AND OUTSIDE FACE OF PARAPET.
- PRECAST STRUCTURE FASCIA AND SIX INCHES UNDER RETURN. SEE THE PROPOSAL FOR SURFACE PREPARATION REQUIREMENTS, APPLICATION RATES, MATERIAL REQUIREMENTS AND APPLICATION PROCEDURES.

ITEM 503, UNCLASSIFIED EXCAVATION, AS PER PLAN: UNSUITABLE MATERIAL ENCOUNTERED BELOW THE CULVERT FOUNDATION SHALL BE REMOVED TO A DEPTH OF ONE FOOT BELOW THE PROPOSED BOTTOM OF FOOTING ELEVATION, AND TO A WIDTH OF ONE FOOT OUTSIDE THE EDGE OF THE PROPOSED FOOTINGS, AND REPLACED WITH COMPACTED NO. 57 AGGREGATE, ENCLOSED ON THREE SIDES BY GEOTEXTILE FABRIC CONFORMING TO 712.09. NO. 57 AGGREGATE SHALL BE COMPACTED AS PER THE REQUIREMENTS OF ITEM 503. EXCAVATION OF UNSUITABLE MATERIAL, BACKFILL WITH NO. 57 AGGREGATE AND GEOTEXTILE FABRIC SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 503, UNCLASSIFIED EXCAVATION, AS PER PLAN.

Item 606, Guardrail, Type 5 with Tubular Backup Shall include steel tubular backup, as per Standard Drawing DBR-2-73 and 707.10, W6x25 inlet-mounted posts as shown in the details on Sheet 779, and all items not included with Type B bridge terminal assembly shown on Standard Drawing GR-3. Rails, posts, base plates, bolts, nuts, and washers, and steel tubular backup shall be galvanized as per 711.02.

ESTIMATED QUANTITIES

COMPUTED BY: Oct
DATE: 10/89
CHECKED BY: J.P.
DATE: 10-89

ITEM	ITEM EXT.	TOTAL	UNIT	DESCRIPTION
202	11000	LUMP		STRUCTURE REMOVED
503	21101	380	CU YD	UNCLASSIFIED EXCAVATION, AS PER PLAN (See sht 11)
503	11100	LUMP		COFFERDAMS, CRIBS & SHEETING
509	11500	5887	LBS	REINFORCING STEEL, GRADE 60
509	15800	573	LBS	EPOXY COATED REINFORCING STEEL, GRADE 60
511	46500	95	CU. YD.	CLASS C CONCRETE, FOOTING
511	46000	19	CU. YD.	CLASS C CONCRETE, WINGWALLS & HEADWALL
512	44400	5	SQ. YD.	TYPE B WATERPROOFING
516	13600	26	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER
606	13010	75	LIN FT	GUARDRAIL, TYPE 5 w/tubular backup(SEE PROPOSAL NOTE)
518	21800	9	CU. YD.	POROUS BACKFILL with filter fabric
603	70001	64	LIN. FT.	CONDUIT TYPE A PRECAST
SPECIAL	512	67500	73	REINFORCED FLAT TOPPED THREE SIDED CULVERT, AS PER PLAN 30'-0" Span x 6'-0" Rise
				SEALING OF CONCRETE SURFACES(SEE PROPOSAL NOTES)

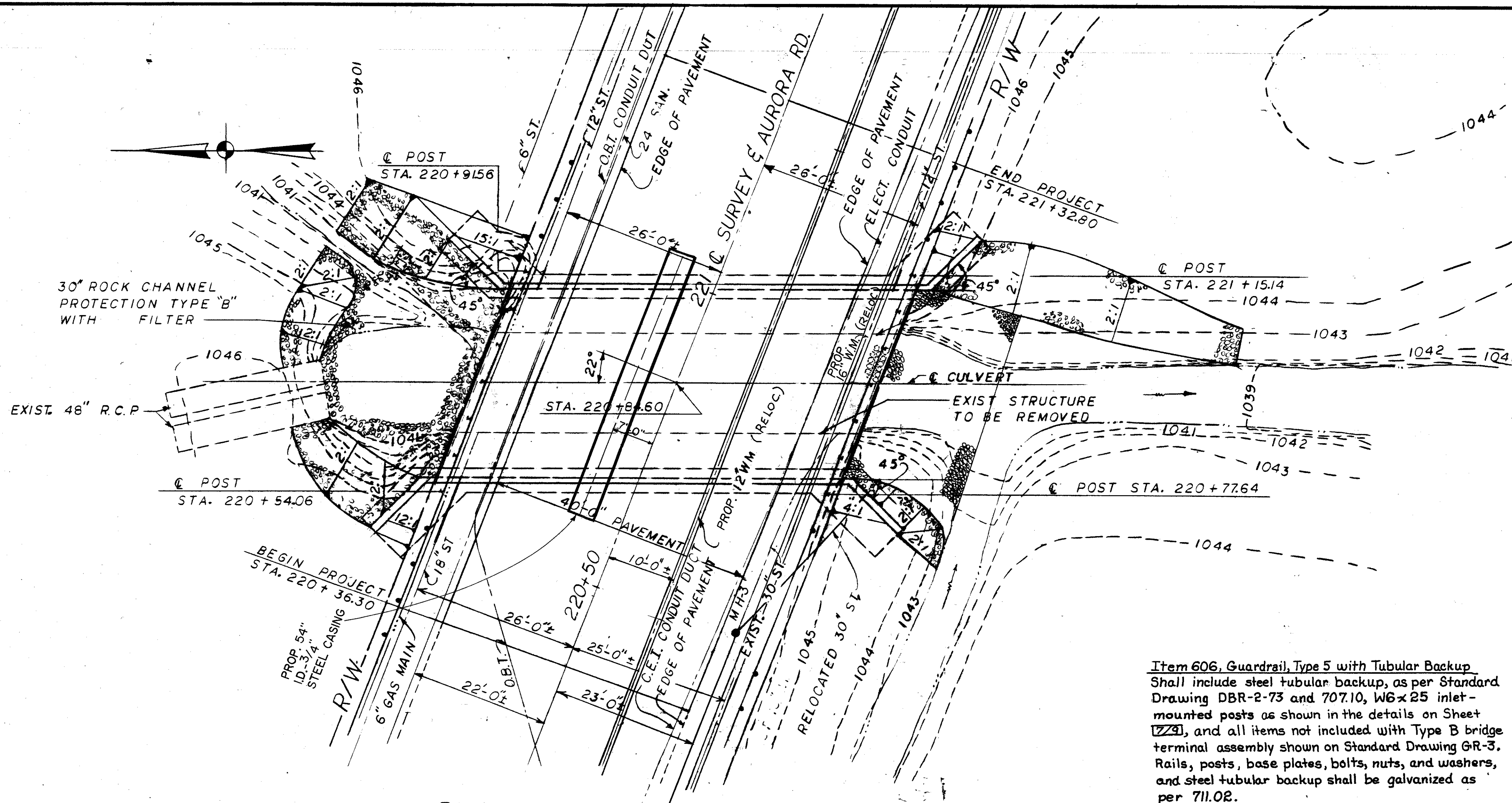
Revised 11-13-91
Revised 9-12-91
Revised 7-22-91
Revised 5-14-91

R.P. MADISON INTERNATIONAL
ARCHITECTS-ENGINEERS-PLANNERS
2930 EUCLID AVE. CLEVELAND, OHIO 44115

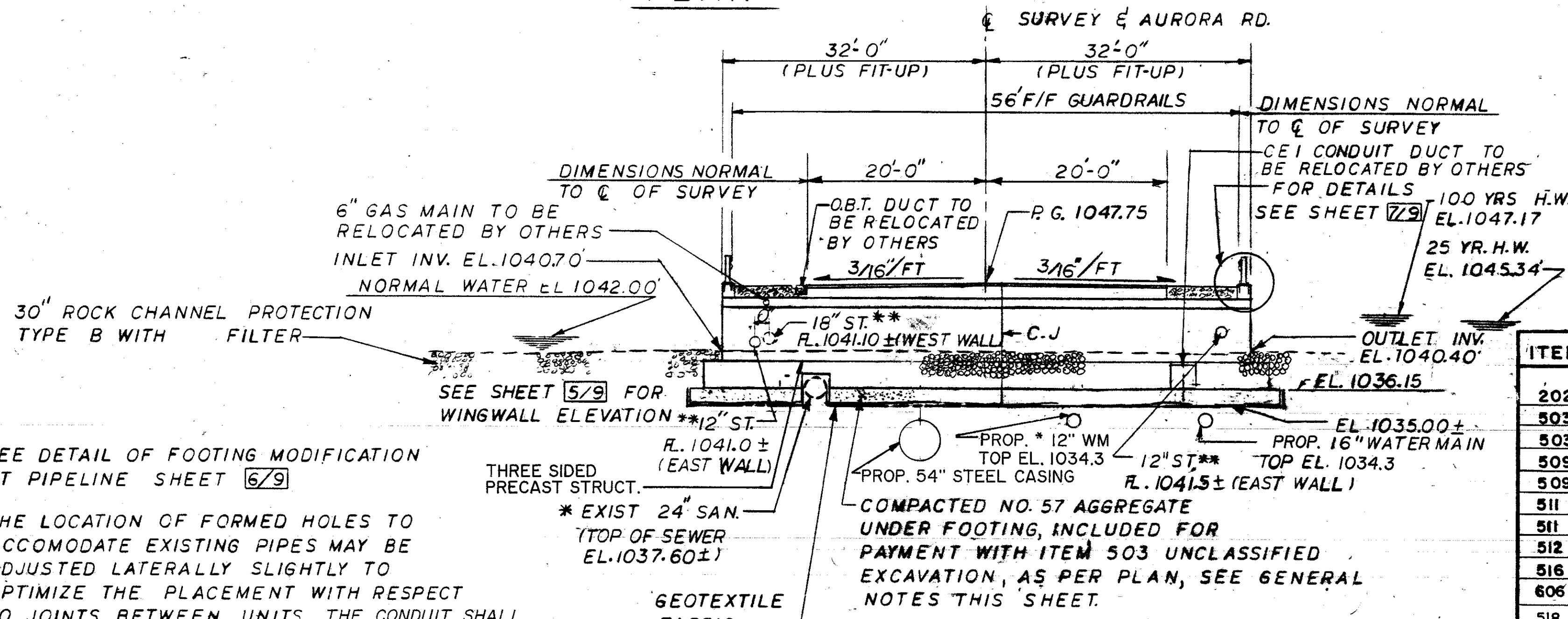
CULVERT PLAN AND PROFILE

STRUCTURE NO. CUY-43-04.80
OVER
DRAINAGE DITCH

DESIGNED: JPM DRAWN: RCO CHECKED: MP REVIEWED: P DATE: 10/90



PLAN



PROFILE ALONG CULVERT

*SEE DETAIL OF FOOTING MODIFICATION AT PIPELINE SHEET 679

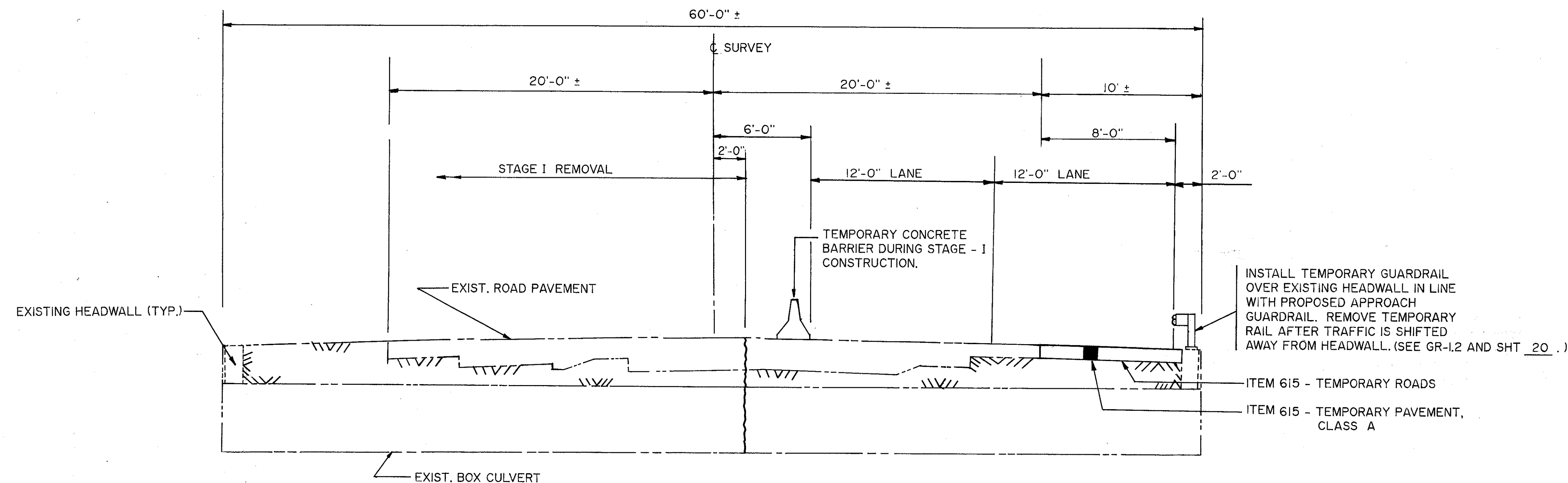
*THE LOCATION OF FORMED HOLES TO ACCOMMODATE EXISTING PIPES MAY BE ADJUSTED Laterally SLIGHTLY TO OPTIMIZE THE PLACEMENT WITH RESPECT TO JOINTS BETWEEN UNITS. THE CONDUIT SHALL EXTEND 2-INCHES INSIDE THE BOX CULVERT WALL.

THREE SIDED PRECAST STRUCT.

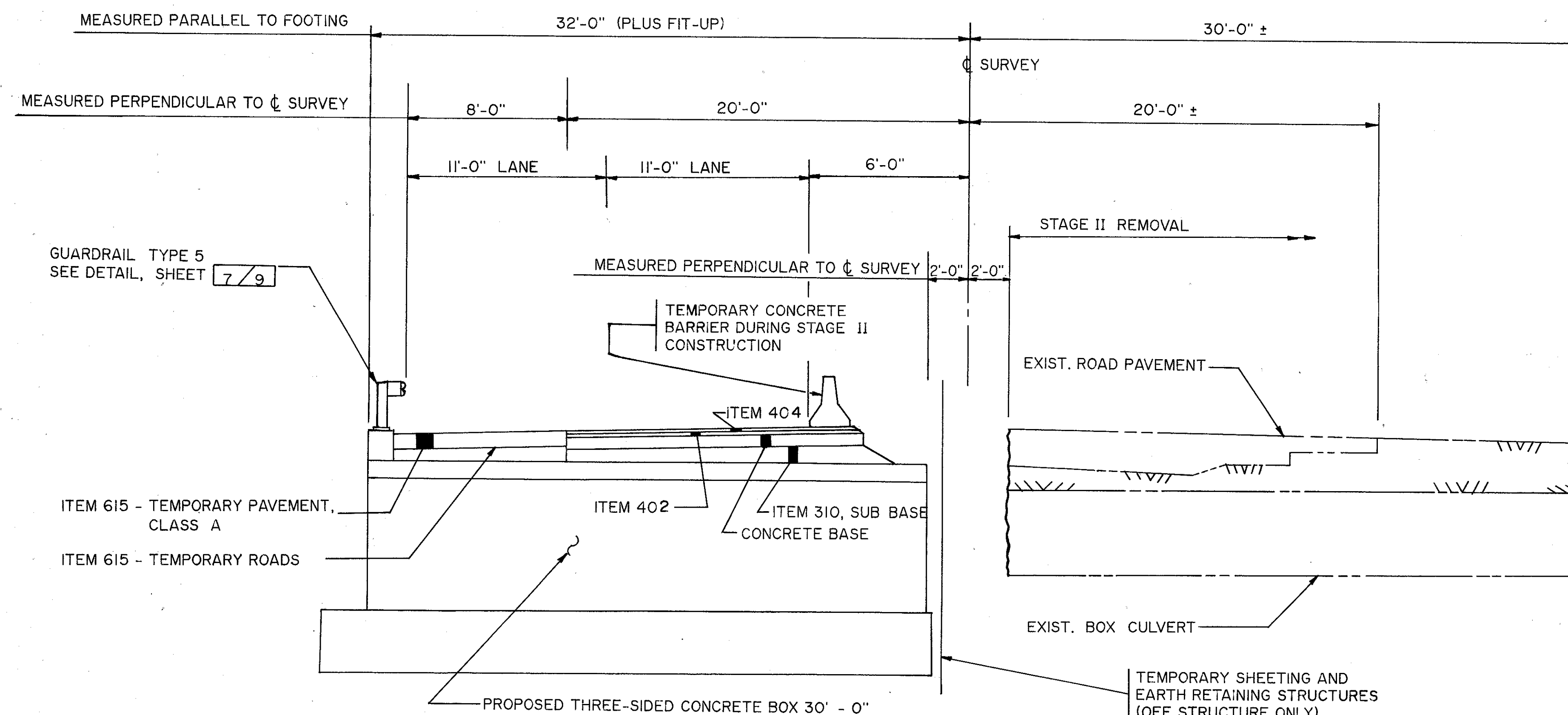
*EXIST 24" SAN. (TOP OF SEWER EL.1037.60±)

GEOTEXTILE FABRIC

COMPACTED NO. 57 AGGREGATE UNDER FOOTING, INCLUDED FOR PAYMENT WITH ITEM 503 UNCLASSIFIED EXCAVATION, AS PER PLAN, SEE GENERAL NOTES THIS SHEET.



STAGE I CONSTRUCTION



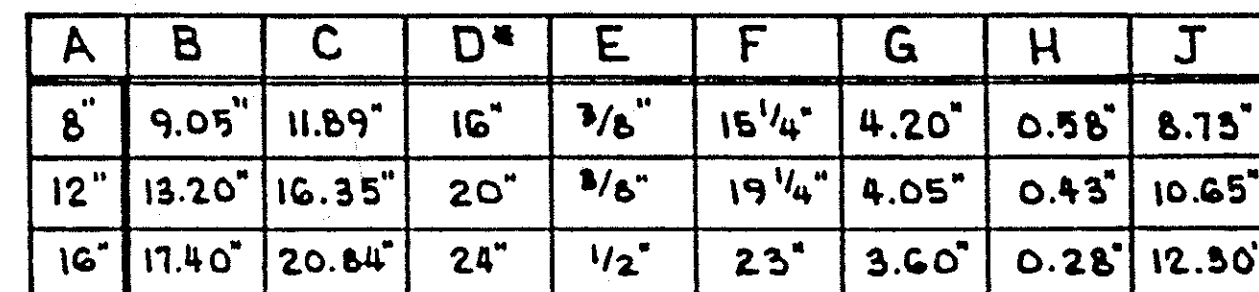
STAGE II CONSTRUCTION

CONSTRUCTION PROCEDURE NOTES :

1. MAINTAIN THE TRAFFIC AND CONSTRUCT TEMPORARY PAVEMENT ('RIGHT' SIDE).
2. PROVIDE PORTABLE CONCRETE BARRIER FOR STAGE I CONSTRUCTION.
3. TRANSFER TRAFFIC TO RIGHT SIDE.
4. PROVIDE TEMPORARY SHEETING TO PERMIT REMOVAL & CONSTRUCTION.
5. REMOVE LEFT SIDE (SHOWN AS STAGE I REMOVAL).
6. CONSTRUCT STAGE I COMPLETE INCLUDING ASPHALT CONCRETE WEARING SURFACE AND TEMPORARY PAVEMENT.
7. PROVIDE PORTABLE CONCRETE BARRIER ON STAGE II CONSTRUCTION.
8. REMOVE REMAINDER OF THE EXISTING STRUCTURE (SHOWN AS STAGE II REMOVAL).
9. CONSTRUCT STAGE II COMPLETE INCLUDING ASPHALT CONCRETE WEARING SURFACE.
10. OPEN BRIDGE TO TRAFFIC.
11. FOR PORTABLE CONCRETE BARRIER, SEE SHEET NO. 19 OF THE ROADWAY PLANS.

NOTE :

ITEM 622, PORTABLE CONCRETE BARRIER IS CARRIED IN THE MAINTENANCE OF TRAFFIC QUANTITIES.



CASING DETAIL

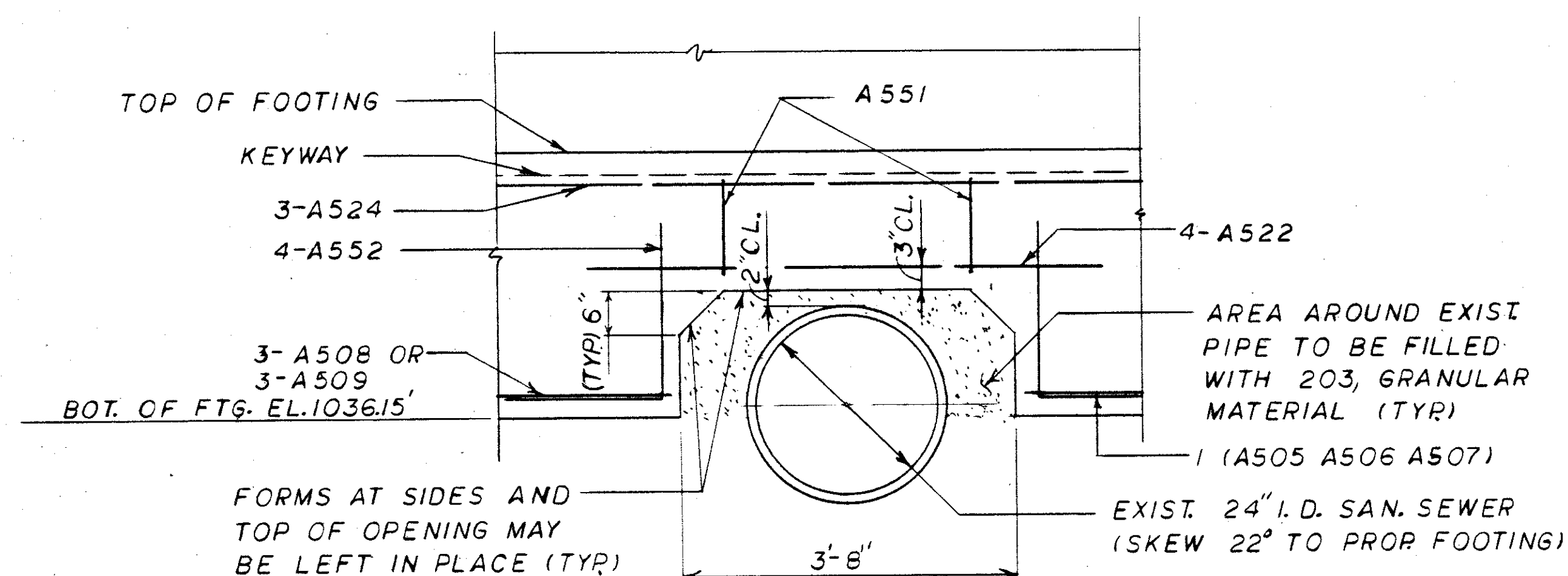


12" & 16" WATER MAIN LOWERING DETAIL

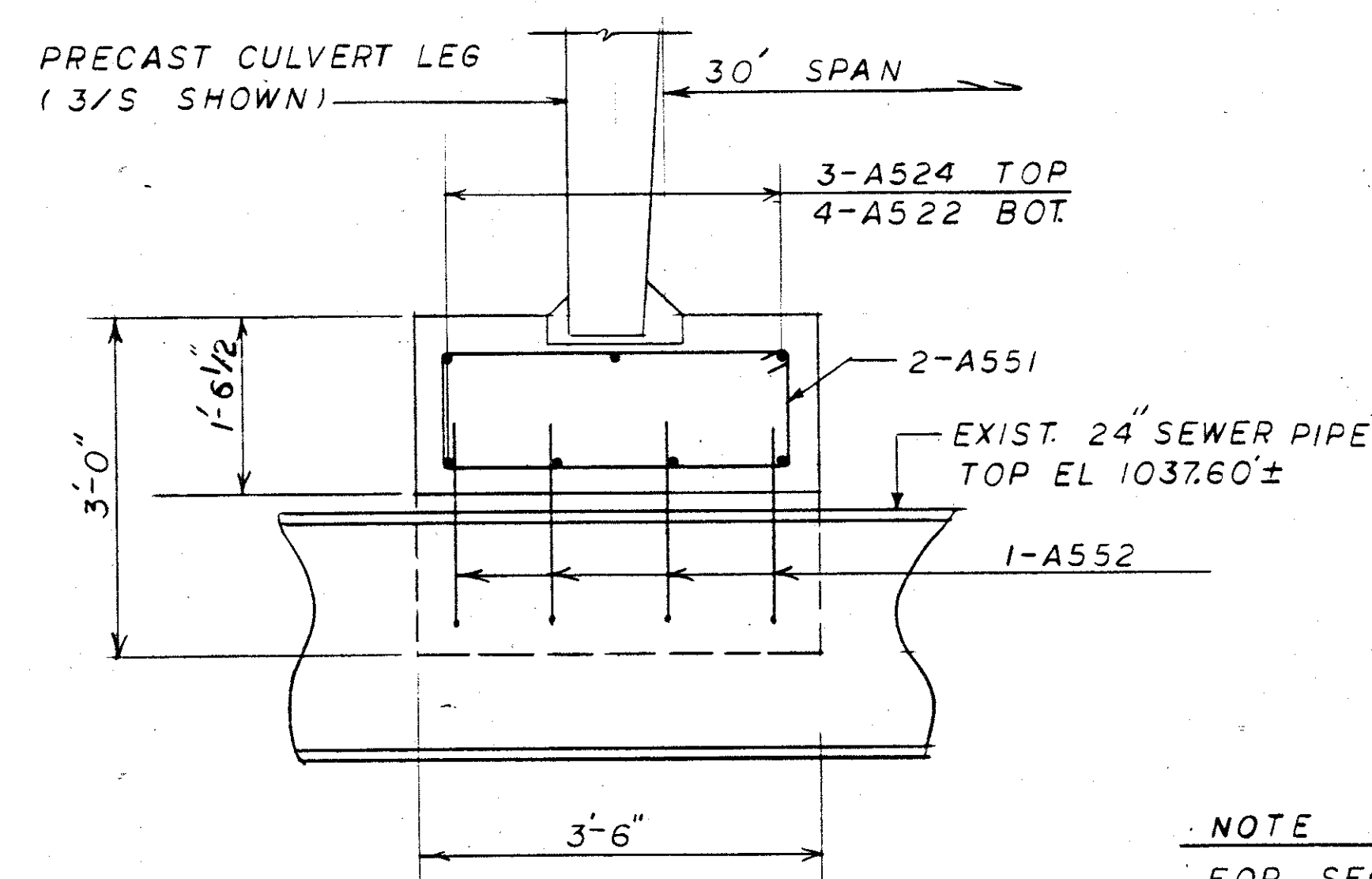
FHWA REGION	STATE	PROJECT
5	OHIO	BHF-58(31)

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DETAIL I



SECTION B-B

NOTE
FOR SECTIONS AND REINFORCING
LOCATION SEE SHEET 4/9

R.R. MADISON INTERNATIONAL
ARCHITECTS-ENGINEERS-PLANNERS
2930 EUCLID AVE. CLEVELAND, OHIO 44115

SANITARY SEWER DETAILS
STRUCTURE NO CUY-43-04.80
OVER
DRAINAGE DITCH

CUYAHOGA COUNTY

DESIGNED DRAWN CHECKED REVIEWED DATE REVISED
RT Rlw M.P. Paramo YAO

REVISED 11-13-91
REVISED ACS DDOT 9/11/91
REVISED 7-22-91

ITEM 603-Precast Reinforced Concrete Flat
Topped Three-sided Culverts

11/3/88

General

Where the plans call for "Item 603 Precast Reinforced Concrete Flat Topped Three-sided Culverts" the culverts shall be manufactured to comply with the following.

These Culverts shall be flat deck structures with a minimum span of 14 feet and a minimum rise of 4 feet; and a maximum span of 34 feet and maximum rise of 10 feet. Minimum wall and deck thicknesses shall be 10 inches and 12 inches respectively, measured under the haunch and at the centerline of the span.

These culverts are intended to be used for the conveyance of storm water, and will be subjected to earth and highway loadings. The culverts are designated by clear span, measured perpendicular to the structure walls, and opening rise. The requirements of the Construction and Material Specifications (CMS) Item 603 Type A conduit shall apply except as modified hereinafter.

Basis of Acceptance

Acceptability of the three-sided culvert produced in accordance with this note shall be determined by the results of the concrete compressive strength tests, by the material requirements described hereinafter and by inspection of the finished product. The manufacturer shall submit shop drawings for review and approval. Manufacture shall not begin until written approval of the submitted drawings has been received from the Bureau of Location and Design.

Materials

Cement - Portland cement shall conform to the requirements of AASHTO M 85.

Aggregates - Fine aggregates shall be a natural sand conforming to the CMS 703.02. Course aggregate shall have a standard size designation from a number 5 to a number 8 inclusive as specified in CMS 703.01. The quality requirements of CMS 703.02 shall apply.

Admixtures - Air entraining admixtures conforming to CMS 705.10 and Chemical admixtures conforming to CMS 705.12 Types A, B, D, or F may be used.

Steel Reinforcement - Reinforcement shall consist of welded wire fabric conforming to CMS 709.10 or 709.12, or deformed billet steel bars conforming to CMS 709.01, Grade 60. Both mats of top slab reinforcing and exterior wall mat reinforcing shall be epoxy coated as per CMS 709.00 or 709.14, unless the depth of fill on the culvert measured at the edge of roadway pavement exceeds 3 ft. In lieu of epoxy coated reinforcing, a calcium nitrile-based corrosion inhibiting concrete admixture may be used. The admixture shall conform to ASTM C 494 type C. The calcium nitrile shall be a minimum of 2% calcium nitrile solids by weight of cement. Payment will be included in the bid price for the three-sided culvert.

Design

The culvert design shall be in accordance with the AASHTO standard specifications for highway bridges. The culvert dimensions shall be as shown, subject to the permissible variations contained hereinafter. The minimum concrete compressive strength shall be 5000 p.s.i. Approved reinforcement designs for the structure sections shown are on record in the Bureau of Bridges and Structures, rating and inventory section and in the District Bridge office.

Modified and Special Designs - The manufacturer may request approval by the purchaser of modified designs which differ from the approved designs.

Placement of Reinforcement - The concrete cover dimension over reinforcement shall be a minimum of 1". When the earth cover over the culvert deck is less than 3 ft. measured at the edge of roadway pavement the minimum concrete cover dimension over the top line of reinforcement in the deck shall be 2". When calcium nitrile-based corrosion inhibiting admixture is used the minimum concrete cover over all exterior reinforcement shall be 2". The clear distance of the end circumferential wires shall not be less than 5/8 in. nor more than 2 in. from the ends of the culvert. Reinforcement shall be assembled utilizing any combination of single or multiple layers (3 maximum) of welded wire fabric or steel bars. The welded wire fabric shall be composed of circumferential and longitudinal wires meeting the spacing requirements hereinafter. The ends of the longitudinal reinforcement shall not be more than 2 in. from the ends of the culvert. The exposure of the ends of longitudinal reinforcement, and spacers used to position the reinforcement shall not be cause for rejection.

Reinforcing development, splices, and spacings
Exterior corner reinforcement shall be fully developed or extend 12 in. past the point of peak stress. For deformed steel bars (CMS 709.01) equal leg 90 degree bends with leg lengths as follows: *3-13", *4-17", *5-21", *6-34", *7-40", and *8-40" will satisfy this development criteria. The development length for welded wire fabric (CMS 709.10 or 709.12) shall conform to AASHTO standard specifications for highway bridges.

Splices in circumferential reinforcement shall be made by lapping and not by welding. Lap lengths shall be as per AASHTO standard specifications for highway bridges.
Spacing center to center of the circumferential wires in a fabric sheet shall not be less than 2 in. nor more than 4 in. The spacing center to center of the longitudinal wires or bars shall not be more than 8 in. Where circumferential reinforcement is composed of bars, crack control criteria shall be checked. Calculations performed by a registered professional engineer verifying that the proposed bar spacings meet the crack control criteria shall be submitted to the purchaser.

Joints

The precast reinforced concrete flat topped three-sided culvert sections shall be produced with a grout filled keyway. The keyway shall provide a void volume equivalent to that of 12" prestressed beam as per Std. Dwg. PSBD-1-B1. The keyway surfaces shall be given a medium sandblast, 2000 p.s.i. water blast, or a thorough wire brushing at the plant within four days prior to leaving the plant. The ends shall be of such design and the ends of the culvert sections so formed that when they are laid together they will make a continuous line of culverts with a smooth interior free of appreciable irregularities, all compatible with the permissible variations hereinafter.

Mortar for the keyway shall be a non-shrinking, non-metallic mortar having a minimum compressive strength at 28 days of 3000 p.s.i. according to the Corps of Engineers Specification CRD-C621 when prepared to a moderate fluidity (124-145% @ 5 drops). The mortar or grout shall also meet all other requirements of Specification CRD-C621. A list of approved mortars will be maintained by the ODOT Testing Laboratory located at 1600 West Broad Street in Columbus, Ohio 43223. The mortar shall be prepared, placed and cured in accordance with the manufacturer's recommendations. Before mortaring the keyway shall be thoroughly clean of all dirt, dust and other foreign matter. The keyway surfaces shall be wetted, but no free water shall be allowed to remain in the keyway.

The joint exterior shall be covered with a minimum of a 9 inch wide wrap centered on the joint. The external wrap shall be as per ASTM C-877, or Petrotac as manufactured by Phillips Fiber Corp. Care shall be exercised to keep the joint wrap in its proper location during backfilling.

Manufacture and Construction

Mixture - Aggregates, cement, and water shall be proportioned and mixed in a batch mixer to produce a homogeneous concrete, meeting the strength requirements as stated. In no case however, shall the proportion of portland cement be less than 564 lb./CY. of concrete. The concrete shall contain 4±1 percent entrained air.

Forms - The forms used shall be sufficiently rigid and accurate to maintain the culvert dimensions within the permissible variations given hereinafter. All the casting surfaces shall be of a smooth material.

Curing - The culvert shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less. Any one of the following methods or curing or combinations thereof shall be used for culvert sections

Steam Curing - The culvert sections may be low pressure, steam-cured by a system that will maintain a moist atmosphere.

Water Curing - The culvert sections may be water cured by any method that will keep the sections moist.

Forms Left in Place - An accelerated overnight cure accomplished through the use of an external heat source may be used provided moisture loss from exposed surfaces is minimized. The maximum temperature increase or decrease shall be 40 degrees Fahrenheit per hour. The initial application of the heat shall be two hours after the final placement of concrete to allow the initial set to take place.

Handling - Devices or holes shall be permitted in each culvert section for the purpose of handling. However, not more than four holes may be cast or drilled in each section. The holes shall be tapered unless drilled, and before backfilling the tapered holes shall be filled with portland cement mortar, or with precast concrete plugs which shall be secured with portland cement mortar or other approved adhesive. Drilled holes shall be filled with portland cement mortar. Holes shall be covered on the exterior with the joint wrap material. This wrap shall have a minimum length and width of 9".

Where the culvert is to be placed in a trench, a minimum trench width of 2 ft. on each side of the conduit shall be required. Where the culvert is above the existing ground, the CMS 603.03 requirement that the embankment be constructed to at least the spring-line before trenching is waived.

Physical Requirements

Test Specimen - Concrete compressive strength shall be determined from compression tests made on cores. For each continuous production run, each group of 15 culvert sections of a single size or fraction thereof shall be considered separately for the purpose of testing and acceptance. A production run shall be considered continuous if not interrupted for more than 3 consecutive days.

Compression Testing of Cores: Cores shall be obtained and tested for compressive strength in accordance with the provisions of ASTM C 497. One core shall be cut from a section selected at random from each group of 15 culvert sections or fraction thereof of a single size from each continuous production run.

Acceptability by core tests: The compressive strength of the concrete in each group of culvert sections defined above is acceptable when the core test strengths are equal to or greater than the design concrete strength.

When the compressive strength of the core tested is less than the design concrete strength, the culvert section from which that core was taken may be cored again. When the compressive strength of the new core is equal to or greater than the design concrete strength, the compressive strength of the concrete in that group of culvert sections is acceptable.

When the compressive strength of any new core is less than the design concrete strength, the culvert section from which that core was taken shall be rejected. Two culvert sections from the remainder of the group shall be selected at random and one core shall be taken from each. If the compressive strength of both cores is equal to or greater than the design concrete strength, the compressive strength of the remainder of that group of culvert sections is acceptable. If the compressive strength of either of the two cores tested is less than the design concrete strength, each culvert of the remainder of the group shall be cored and accepted individually, and any of these culvert sections that have cores with less than the design concrete strength shall be rejected.

Plugging Core Holes - The core holes shall be plugged and sealed by the manufacturer in a manner such that the culvert section will meet all of the test requirements of this proposal. Culvert sections so sealed shall be considered satisfactory for use.

Coring equipment - Every manufacturer furnishing culvert sections under this proposal shall furnish equipment and personnel necessary to obtain the cores.

Permissible Variations

Internal Dimensions - The internal dimension shall vary not more than 2 in. from the design dimensions. The haunch dimensions shall vary not more than 3/4 in. from the dimensions shown.
Deck and Wall Thickness - The deck and wall thickness shall not be less than that shown by more than 3/4 in. A thickness more than that required shall not be cause for rejection.
Length of Opposite Surfaces - Variations in laying lengths of two opposite surfaces of the culvert sections shall not be more than 1 in., except where beveled ends for laying of curves are specified.

PRECAST REINFORCED
CONCRETE FLAT TOPPED
THREE-SIDED CULVERTS

Length of Section - The under run in length shall not be more than 1/2 in. in any culvert section.

Position of Reinforcement - The maximum variation in the position of the reinforcement shall be $\pm \frac{3}{8}$ inch, except the cover over the reinforcement for the external surface of the top slab shall not be less than 2 inches for earth covers less than 3 ft. The above tolerances or cover requirements do not apply to mating surfaces of the joint.

Area of Reinforcement - The areas of steel reinforcement shall be the design steel areas per linear ft. Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM specification for that type of reinforcement.

Workmanship and Finish

The culverts shall be substantially free of fractures. All surfaces shall have a smooth finish. The ends shall be normal to the walls and center line within the limits of variations given above, except where beveled ends are specified.

Culverts may be repaired, if necessary, because of occasional imperfections in manufacture, handling damage, or construction. Repairs shall be made in accordance with CMS 519. No additional payment will be made for culvert repairs. Repairs will be acceptable if in the opinion of the purchaser the repairs are sound, properly finished and cured, and the repaired culvert conforms to the requirements contained hereinabove.

Culverts shall be subject to rejection for failure to conform to any of the requirements contained hereinabove or any of the following:

- Fractures or cracks passing through the slab or wall.
- Defects that indicate imperfect proportioning, mixing, and forming.
- Honeycombed or open texture.
- Precast Damaged ends, where such damage would prevent making a satisfactory joint.

Inspection

The quality of materials, the process of manufacture, and the finished culvert shall be subject to inspection by the purchaser.

Marking

The following information shall be clearly marked on the interior of the culvert by indentation, waterproof paint, or other approved means:

- Culvert span and rise
- Design earth cover
- Date of manufacturer
- Name or trademark of the manufacturer

Sealing

One sealer shall be applied on the top surface of the culvert and shall extend 5' vertically down the sides, except in the keyway. The sealer shall be provided for the full length of the structure. Surface preparation and application procedures shall be as recommended by the sealer manufacturer.

Sealer Alternates:

Penseal 50 as manufactured by: American Metaseal Co.
509 Washington Avenue Carlsbad, New Jersey 07072

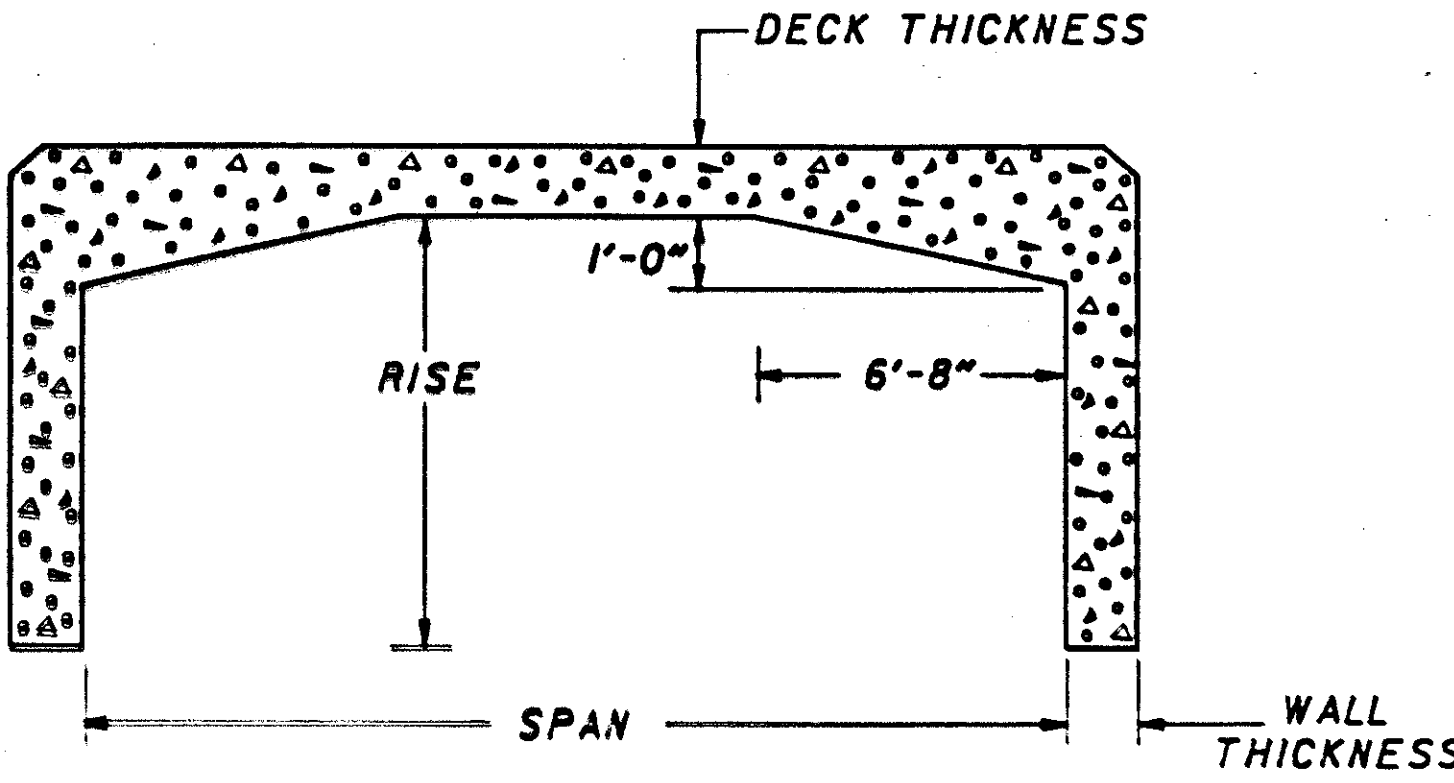
Two coats shall be applied at a rate of one gallon per 120 square feet for each coat. Prior to drying, the second coat shall be seeded with silica sand at 1 1/2 lb. per square yard. Hydrozo Clear 56 as manufactured by: Hydrozo Coatings Co.
1001 Y Street P.O. Box 80879 Lincoln, Neb. 68501

One coat shall be applied at a rate of one gallon per 100 square feet.

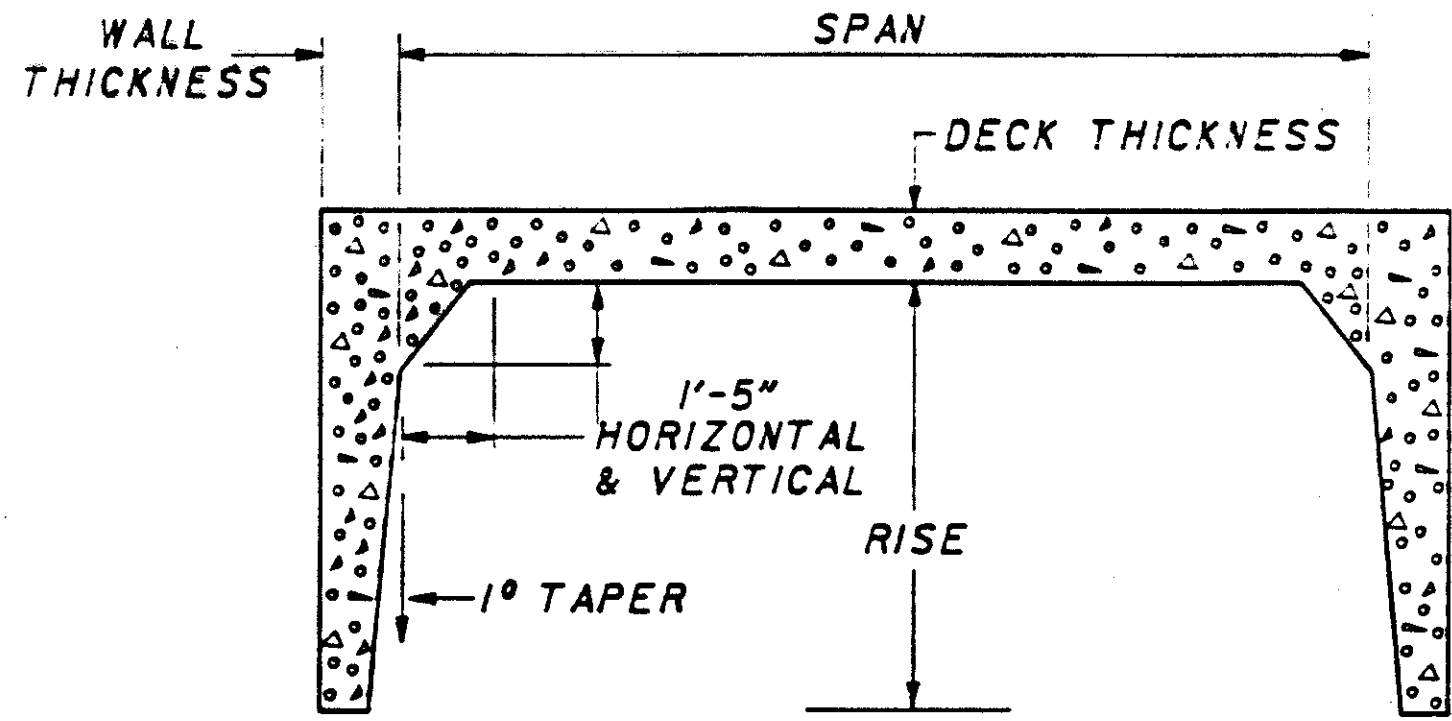
Basis of Payment

The accepted quantity of conduit of the size specified will be paid for at the contract unit price per linear foot, complete in place. Payment will be made under:

Item	Unit	Description
603	Linear Foot	30'-0" span x 6'-0" rise Conduit, Type A Precast Reinforced Concrete Flat Topped Three-sided Culvert As Per Plan.



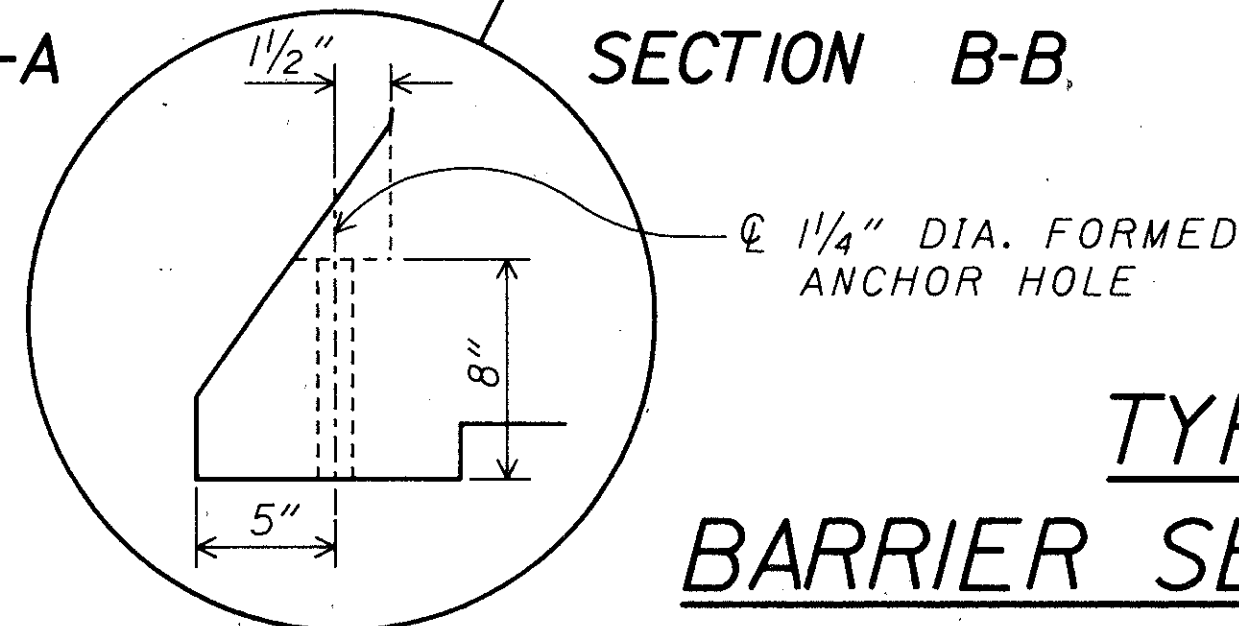
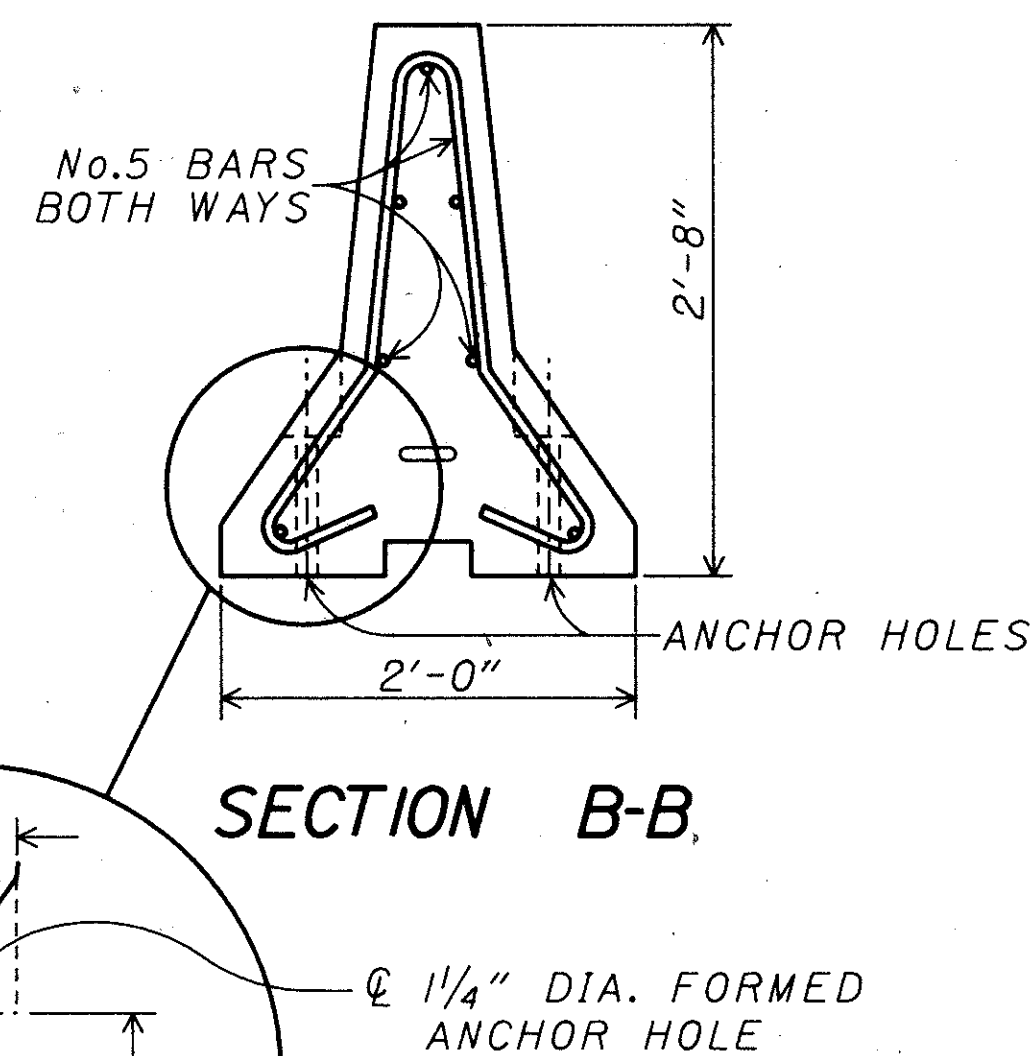
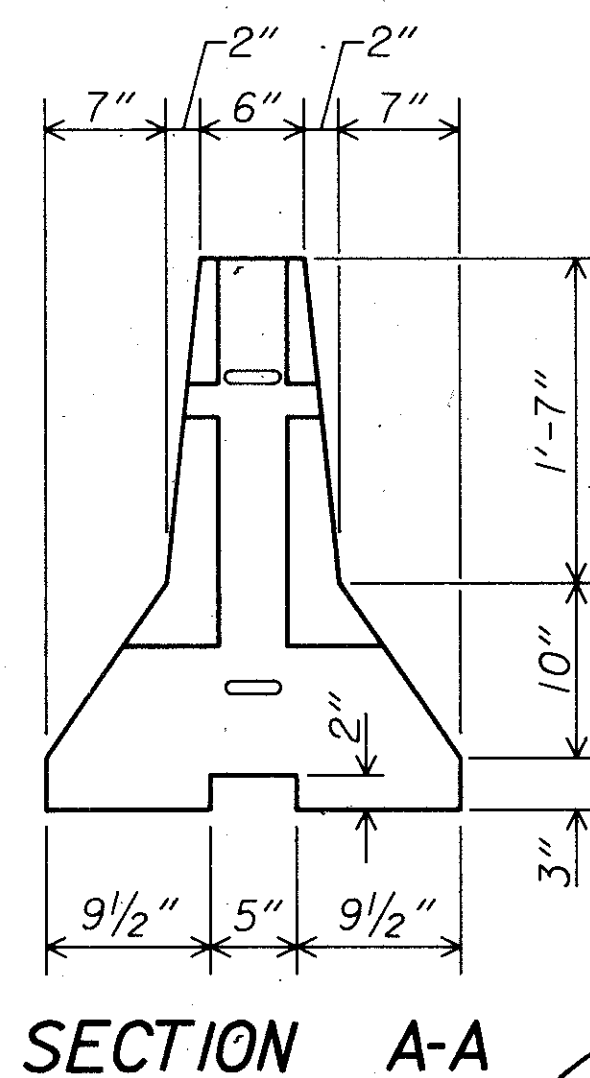
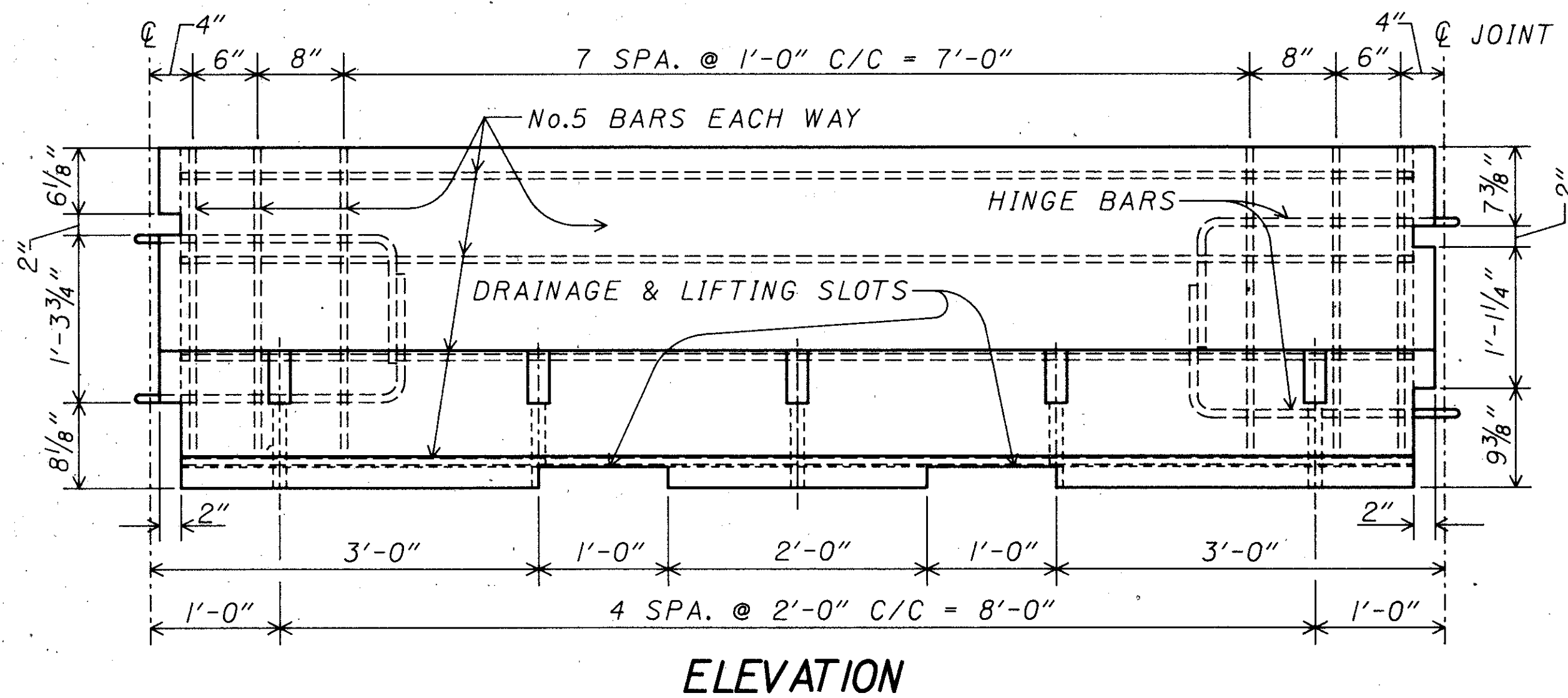
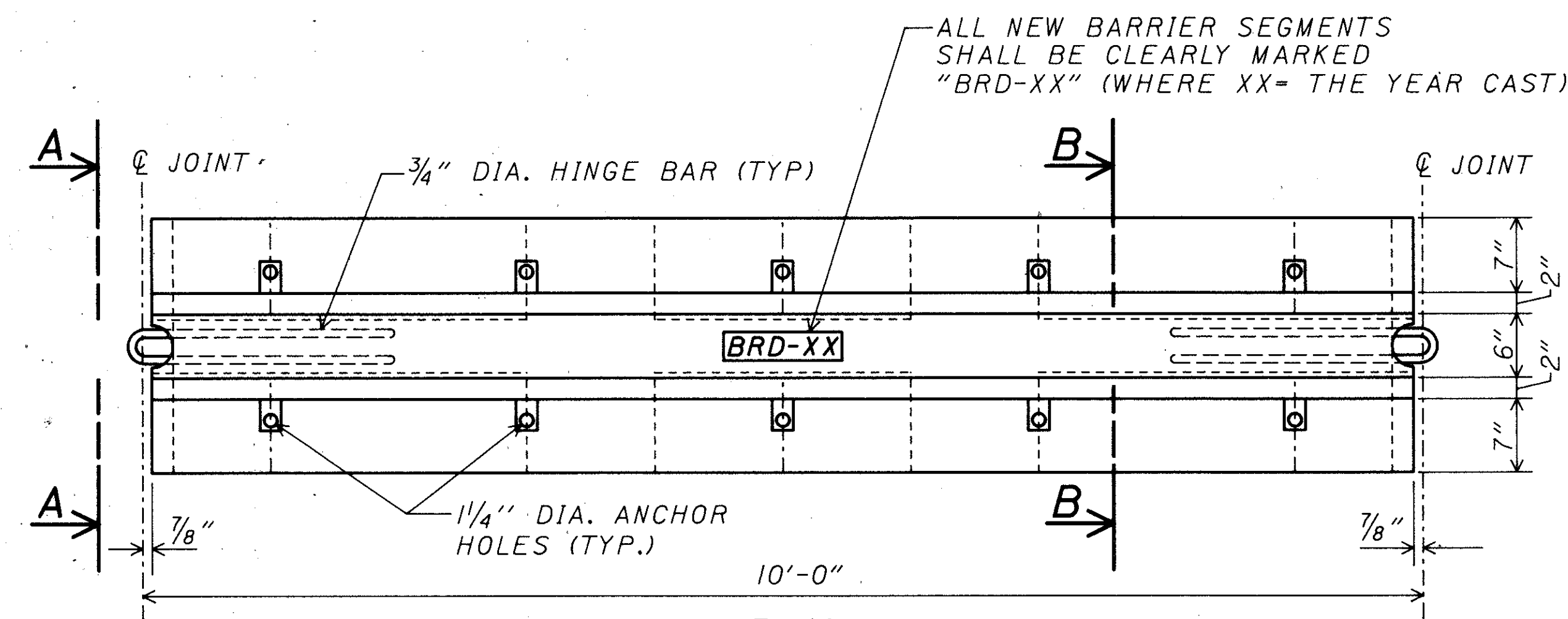
HY-SPAN
As manufactured by
HYWAY CONCRETE PIPE COMPANY
FINDLAY, OHIO



3/S BRIDGE
As manufactured by
PRICE BROTHERS COMPANY
DAYTON, OHIO

PRECAST REINFORCED
CONCRETE FLAT TOPPED
THREE-SIDED CULVERTS

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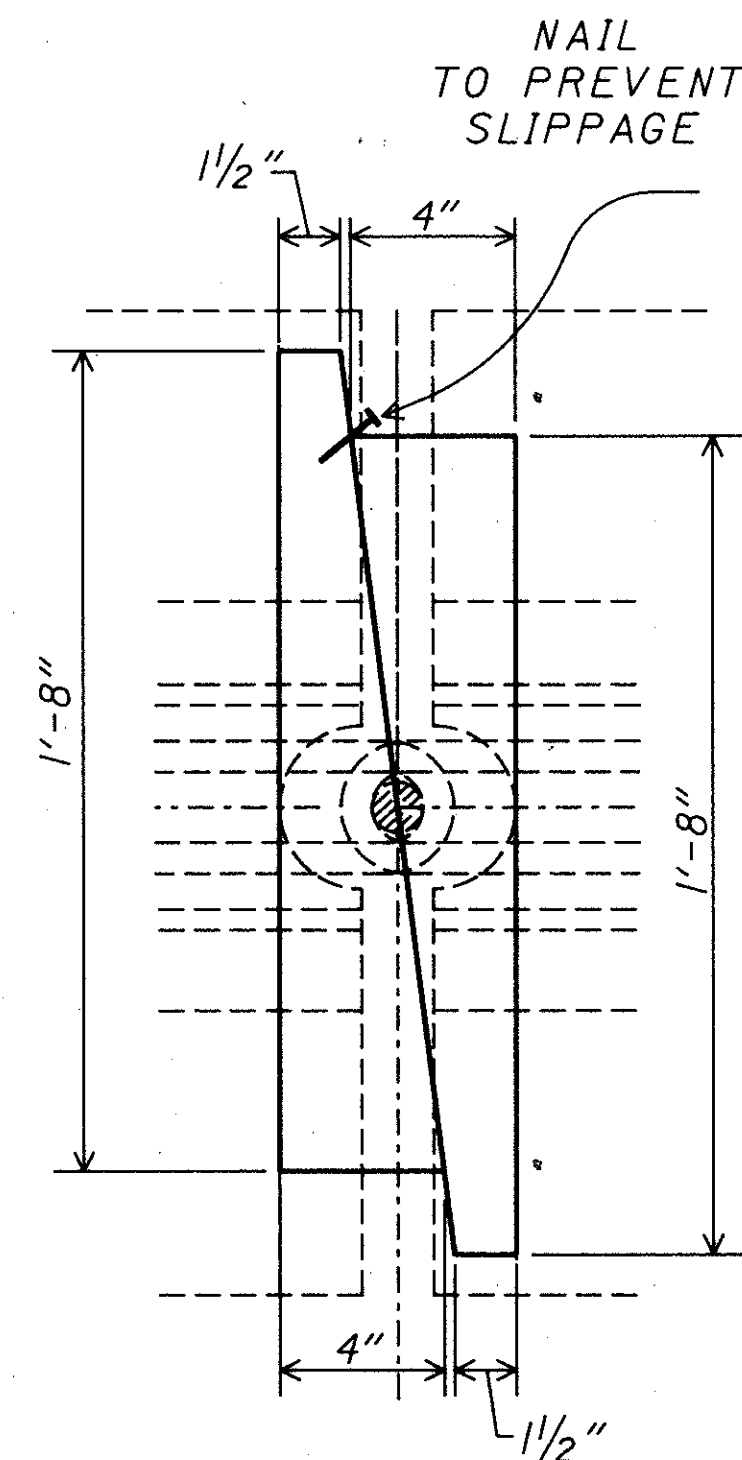
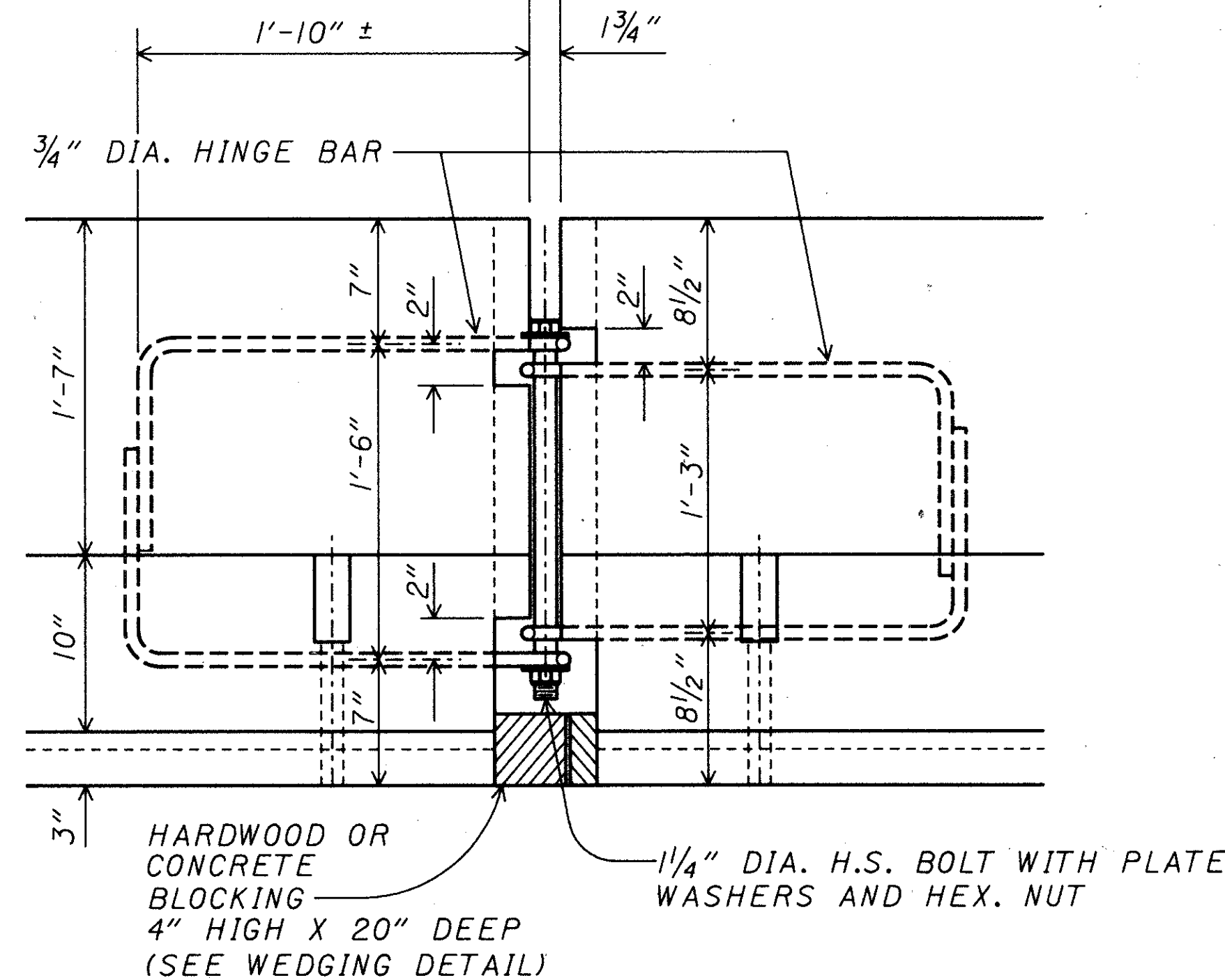


MATERIAL REQUIREMENTS:

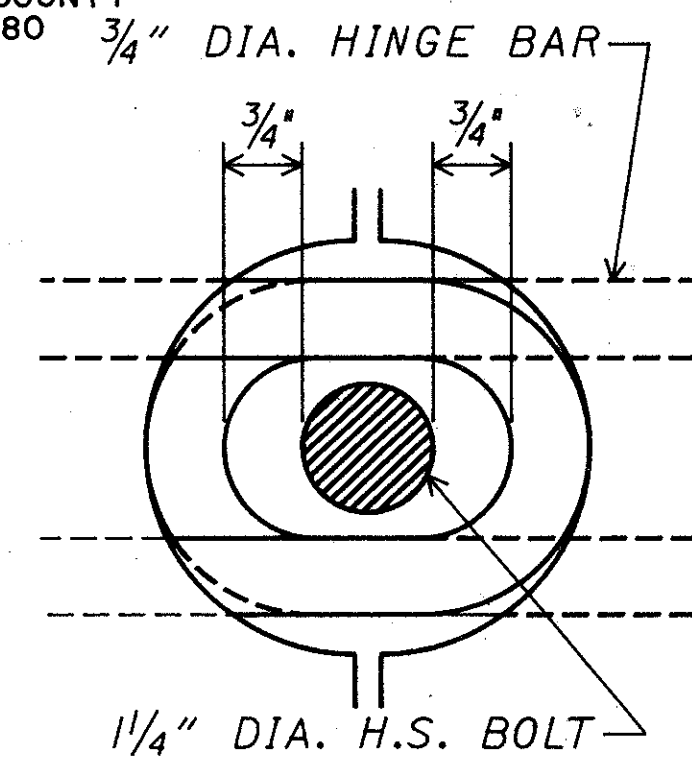
1. THE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI. AND SHALL CONTAIN A CALCIUM NITRITE CORROSION INHIBITING ADMIXTURE. THE ADMIXTURE SHALL BE ADDED TO THE CONCRETE AT THE RATE OF 4.0 GALLONS PER CUBIC YARD OF CONCRETE AND SHALL BE ADDED AS AN AQUEOUS SOLUTION, SUCH AS W.R. GRACE'S DCI CORROSION INHIBITOR (30% SOLIDS) OR APPROVED EQUAL. THE WATER IN SUCH SOLUTION SHALL BE COUNTED AS MIXING WATER FOR THE PURPOSE OF DETERMINING THE WATER TO CEMENT RATIO OF THE CONCRETE. THE CALCIUM NITRITE MUST BE ADDED TO THE MIX IMMEDIATELY AFTER THE AIR-ENTRAINING AND RETARDING ADMIXTURES HAVE BEEN INTRODUCED TO THE BATCH.
2. ALL REINFORCING STEEL AND STEEL ROD CONNECTING LOOPS SHALL BE GRADE 60 REINFORCING STEEL WITH A MINIMUM YIELD STRENGTH OF 60,000 PSI.

THIS END COMPATIBLE WITH SOME ROADWAY BARRIER SECTIONS

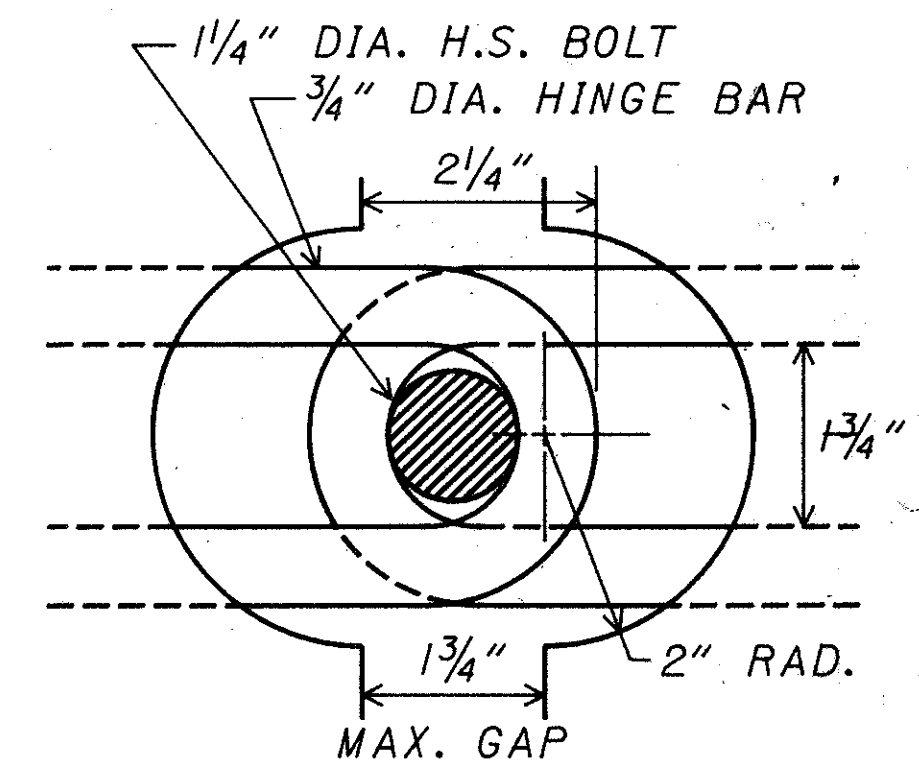
THIS END NOT COMPATIBLE WITH ROADWAY BARRIER SECTIONS



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FEDERAL PROJECT	



BARRIER SEGMENTS SHOULD INITIALLY BE PLACED CLOSER TOGETHER SO THAT BOLTS CAN BE EASILY INSERTED THROUGH HINGE BAR LOOPS.



BARRIER JOINTS MUST BE FULLY OPEN BEFORE OPENING IS BLOCKED WITH CONCRETE OR HARDWOOD.

COMMON NOTES:

ALL PORTABLE CONCRETE BARRIERS ON STRUCTURES

BRIDGE DECK SURFACE PREPARATION

1. THE BRIDGE DECK SURFACE AREA ON WHICH THE PRECAST CONCRETE BARRIER SEGMENTS WILL REST SHALL BE CLEARED OF ALL LOOSE SAND, GRAVEL, DIRT AND DEBRIS.
2. ANY IRREGULARITIES IN THE BRIDGE DECK AREA, UNLESS JUDGED BY THE ENGINEER TO BE INCONSEQUENTIAL, SHALL BE LEVELED WITH GROUT AND/OR ASPHALT.
3. ASPHALT ROLL ROOFING SHALL BE PLACED ON THOSE BRIDGE DECK AREAS, AS JUDGED BY THE ENGINEER, TO HAVE A SURFACE ROUGHNESS WHICH WOULD INHIBIT FRICTION CONTACT BETWEEN BARRIER SEGMENTS AND DECK.

BOLTED JOINT CONNECTIONS

4. WHEN STANDARD MC-9.2 BARRIER SECTIONS OR TYPE BRD BARRIER SECTIONS ARE USED ON STRUCTURES, THEY SHALL BE BOLTED TOGETHER AND BLOCKED AS SHOWN ABOVE (BOLTING AND BLOCKING DIMENSIONS FOR MC-9.2 BARRIER MAY VARY FROM THOSE SHOWN).

CONCRETE BARRIER, TYPE BRD, ANCHORED

ALL ANCHORS SHALL BE 1" DIAMETER, HIGH STRENGTH, THRU BOLTS OR APPROVED RESIN ANCHORS. WHEN RESIN ANCHORS ARE USED, THEY MUST BE EMBEDDED A MINIMUM OF 6" INTO FIRM CONCRETE. THE NUMBER OF ANCHORS SHALL BE AS SHOWN BELOW AND SHALL BE PLACED SYMMETRICALLY ABOUT THE TRANSVERSE C OF BARRIER SECTION ON THE ROADWAY SIDE OF THE BARRIER.

BRIDGE NO.	TRAFFIC CONTROL PHASE	NO. ANCHORS / 10' SECTION
CUY-43-0480	STAGE I	0
	STAGE II	0

3/30/89

REVISED 7-22-91

TEMPORARY CONCRETE BARRIERS ON STRUCTURES

STAGE II

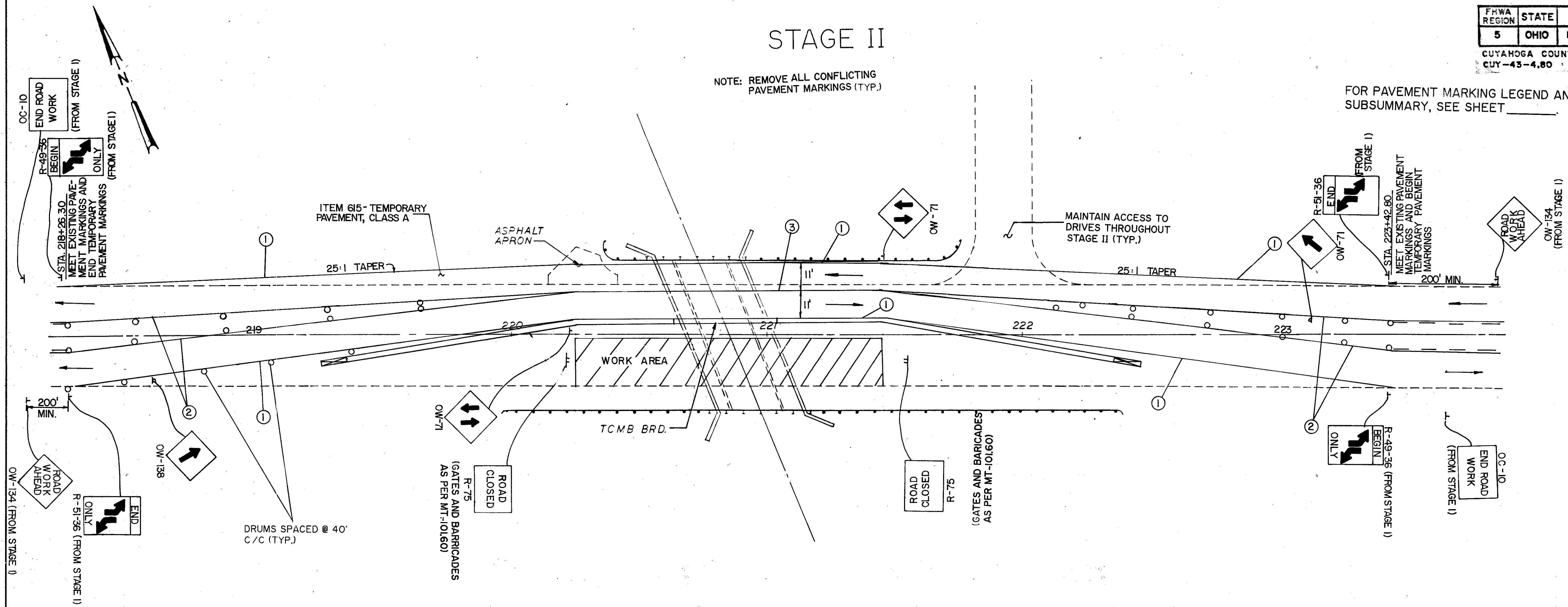
NOTE: REMOVE ALL CONFLICTING PAVEMENT MARKINGS (TYP.)

FHWA REGION	STATE	PROJECT
5	OHIO	BHF-58(31)

CUYAHOGA COUNTY
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FOR PAVEMENT MARKING LEGEND AND SUBSUMMARY, SEE SHEET _____



614 TEMPORARY RAISED PAVEMENT MARKERS

FHWA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	

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CUY - 43 - 4.80

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING, INSTALLING, MAINTAINING, AND SUBSEQUENTLY REMOVING TEMPORARY RAISED PAVEMENT MARKERS (TRPM'S). THE TRPM'S SHALL BE YELLOW OR WHITE, AS DESCRIBED IN THE PLAN.

MATERIAL

ALL UNITS SHALL BE OF SUFFICIENT STRENGTH AND PROPERLY SHAPED SO AS NOT TO BE DISLODGED OR BROKEN, OR THE REFLECTOR DISLODGED OR BROKEN, OR THE REFLECTOR DISLODGED OR DAMAGED BY IMPACTS FROM VEHICLES TIRES, INCLUDING THOSE OF HIGH PRESSURE TRUCK TIRES LOADED TO 4500 POUNDS.

RETROREFLECTORS SHALL BE PROVIDED IN ONE OR TWO DIRECTIONS ON EACH UNIT AS REQUIRED BY THE USAGE AND SHALL RETURN WHITE OR YELLOW LIGHT AS IS APPROPRIATED FOR THE APPLICATION.

THE REFLECTOR SHALL HAVE AN EFFECTIVE AREA OF 0.35 SQUARE INCH FOR TYPE A OR 3.0 SQUARE INCH FOR TYPE B. ITS BRIGHTNESS OR SPECIFIC INTENSITY (WHEN TESTED AT 0.2 DEGREE ANGLE OF OBSERVATION AND THE FOLLOWING ANGLES OF INCIDENCE) SHALL MEET OR EXCEED THE FOLLOWING:

INCIDENCE ANGLE (DEGREES)	SPECIFIC INTENSITY	
	WHITE	YELLOW
TYPE A		
0	1.0	0.6
20	0.4	0.24
45	-	-
TYPE B		
WHITE		
0	3.0	1.8
20	1.2	0.72
45	0.3	0.2

ANGLE OF INCIDENCE FORMED BY A RAY FROM LIGHT SOURCE TO THE MARKER AND THE NORMAL TO THE LEADING EDGE OF THE MARKER FACE (ALSO HORIZONTAL ENTRANCE ANGLE).

ANGLE OF OBSERVATION FORMED BY A RAY FROM LIGHT SOURCE TO THE MARKER AND THE RETURNED RAY FROM THE MARKER TO THE MEASURING RECEPTOR.

SPECIFIC INTENSITY IS THE MEAN CANDLEPOWER OF THE REFLECTED LIGHT (AT GIVEN INCIDENCE AND DIVERGENCE ANGLES) FOR EACH FOOT-CANDLE AT THE REFLECTOR (ON A PLANE PERPENDICULAR TO THE INCIDENT LIGHT).

TYPE A UNITS ARE INTENDED TO PROVIDE HIGH VISIBILITY BOTH AT NIGHT AND DURING DAYLIGHT. THEIR DAY TIME VISIBILITY SHALL BE ASSURED BY SIZE, SHAPE AND COLOR AS FOLLOWS:

1) THE UNITS SHALL BE A HIGH VISIBILITY YELLOW OR WHITE COLOR WHICH WILL NOT DEGRADE SUBSTANTIALLY DUE TO TRAFFIC WEAR AND WHICH WILL MATCH THE COLOR OF THE REFLECTOR.

2) WHEN VIEWED FROM ABOVE, THE UNITS SHALL HAVE A VISIBLE AREA OF NOT LESS THAN 14 SQUARE INCHES.

3) WHEN VIEWED FROM THE FRONT, PARALLEL TO THE PAVEMENT, AS FROM APPROACHING TRAFFIC, THE UNIT SHALL HAVE A WIDTH OF APPROXIMATELY 4 INCHES AND A VISIBLE AREA OF NOT LESS THAN 1.5 SQUARE INCHES.

TYPE B UNITS ARE INTENDED TO PROVIDE HIGH VISIBILITY AT NIGHT BY RETRO-REFLECTING AUTOMOTIVE HEADLIGHT BACK TO THE DRIVER.

INSTALLATION: THEY SHALL BE ATTACHED TO CLEAN, DRY PAVEMENT BY A BUTYL ADHESIVE PAD, A BITUMINOUS ADHESIVE OR OTHER CONSTRUCTION GRADE ADHESIVES (SUCH AS FRANKLIN PANEL AND METAL ADHESIVE) SUITABLE TO ANCHOR THE UNIT UNDER THE ABOVE CONDITIONS. WHEN IT IS NECESSARY TO ATTACH UNITS TO NEW CONCRETE WITH CURING COMPOUND REMAINING, THE CURING COMPOUND MEMBRANE SHALL BE REMOVED BY SANDBLASTING OR OTHER MECHANICAL CLEANING METHOD. THEY SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

THE CONTRACTOR SHALL IMMEDIATELY REPLACE, AT HIS COST, ANY UNITS WHICH FAIL (BROKEN HOUSING, HOUSING WORN TO THE EXTENT THAT DAYTIME VISIBILITY IS SIGNIFICANTLY DIMINISHED OR OF AN UNACCEPTABLE COLOR, DETACHED OR BROKEN REFLECTOR, HOUSING DETACHED FROM ADHESIVE).

TRPM'S ARE LIKELY TO BE REMOVED BY SNOW PLOWING OPERATIONS, THUS THEY ARE NOT CONSIDERED SUITABLE FOR USE DURING THE PERIOD FROM OCTOBER 15 UNTIL APRIL 30. THE CONTRACTOR IS ADVISED TO SCHEDULE HIS WORK AND/OR THE USE OF THESE DEVICES TO AVOID THIS PERIOD. SHOULD THE CONTRACTOR CHOOSE TO USE TRPM'S DURING THIS PERIOD AND THEY ARE SUBSEQUENTLY REMOVED OR DESTROYED BY SNOW AND ICE CONTROL ACTIVITIES, THE CONTRACTOR SHALL IMMEDIATELY, AT HIS COST, PROVIDE A SUBSTITUTE TRAFFIC GUIDANCE SYSTEM EFFECTIVE DURING LIGHT AND DARK AND WHICH IS ACCEPTABLE TO THE ENGINEER.

THE UNITS SHALL BE PLACED ACCURATELY TO DEPICT STRAIGHT OR UNIFORMLY CURVING LINES. WHEN USED TO SUPPLEMENT TEMPORARY PAVEMENT MARKINGS, THEY MAY BE PLACED ON OR IMMEDIATELY ADJACENT TO THE PAVEMENT MARKING. LOCATIONS SHALL BE ADJUSTED UP TO ONE FOOT LONGITUDINALLY OR SIX INCHES LATERALLY TO AVOID PLACEMENT ON JOINTS, CRACKED OR DETERIORATED PAVEMENT. THEY SHALL NOT BE PLACED DIRECTLY ON PAVEMENT MARKINGS IF THIS WILL DETRACT FROM THEIR ABILITY TO REMAIN ATTACHED TO THE PAVEMENT.

APPLICATION

1) WHEN REQUIRED TO SUPPLEMENT PAVEMENT MARKING; THEY SHALL BE PLACED AS FOLLOWS:

LINE	TYPE	SPACING
EDGE LINE	A OR B	20' C/C
LANE LINE	A OR B	40' C/C*
CENTER LINE (SINGLE/BROKEN)	A OR B	40' C/C *
CENTER LINE (DOUBLE/SOLID)	A OR B	2 UNITS SIDE BY SIDE 4 INCHES APART 20' C/C
CHANNELIZING LINE (INCLUDES EXIT GORE NOSE)	A OR B	10' C/C

* CENTERED IN GAP

2) WHEN USED TO SIMULATE (REPLACE) PAVEMENT MARKING THEY SHALL BE PLACED AS FOLLOWS:

LINE	TYPE	SPACING
EDGE LINE	A	5' C/C
LANE LINE	A	4@3.33' C/C 30' GAP (40' CYCLE)
CENTER LINE (DOUBLE SOLID)	A	2 UNITS SIDE BY SIDE 5' C/C
CENTER LINE (SINGLE BROKEN)	A	4@3.33' C/C 30' GAP (40' CYCLE)
CHANNELIZING LINE (INCLUDES EXIT GORE NOSE)	A	5' C/C
EDGE LINE (TWO COLOR) (WHITE/YELLOW)	A	BACK TO BACK 5' C/C

YELLOW TRPM'S USED TO SEPARATE OPPOSITE FLOWS OF TRAFFIC (CENTER LINES) SHALL INCLUDE REFLECTIONS FOR BOTH DIRECTIONS. ALL OTHER YELLOW TRPM'S AND WHITE TRPM'S SHALL PROVIDE RETROREFLECTIVITY FOR ONE DIRECTION.

REMOVAL

REMOVAL SHALL BE ACCOMPLISHED IN A MANNER THAT LITTLE OR NONE OF THE ADHESIVE REMAINS ON THE PAVEMENT AND PERMANENT PAVEMENT SURFACES SHALL NOT BE SCARRED, BROKEN OR ROUGHENED SIGNIFICANTLY.

PAYMENT

BASIS OF PAYMENT SHALL BE AT THE CONTRACT UNIT PRICE PER EACH TRPM AND SHALL INCLUDE ALL LABOR, EQUIPMENT, HARDWARE AND INCIDENTALS REQUIRED TO PERFORM THE WORK. IT SHALL ALSO INCLUDE REPLACEMENT AT NO ADDITIONAL COST OF ALL TRPM'S WHICH, IN THE JUDGEMENT OF THE ENGINEER, FAIL FOR ANY REASON, EXCEPT DUE TO FAILURE OF THE PAVEMENT TO WHICH THEY ARE ATTACHED.

ITEM	UNIT	DESCRIPTION
614	EACH	TEMPORARY RAISED PAVEMENT MARKERS

STATIONING (FROM-TO) (SIDE)	SPACING	TYPE A			TYPE B			REMARKS (LINE TYPE)
		W	Y	Y/Y	W	Y	Y/Y	
STA. 218+ 74.60 TO	5' C/C	85	85					EDGE LINE
STA. 222+ 94.60 (L)								
STA. 220+ 24.60 TO	5' C/C	25	25					NEAR TEMP. CONC.
STA. 221+ 44.60								BARRIER , STAGE I
STA. 220+ 24.60 TO	5' C/C	25	25					NEAR TEMP. CONC.
								BARRIER , STAGE II
TOTALS	*	135	135					
		270						

* QUANTITY SHOWN ON SHEET NO. 5

R.P. MADISON INTERNATIONAL
ARCHITECTS-ENGINEERS-PLANNERS
2930 EUCLID AVE. CLEVELAND, OHIO 44115

STATE OF CHIO
DEPARTMENT OF TRANSPORTATION

614 TEMPORARY RAISED
PAVEMENT MARKERS

DESIGNED	DRAWN	CHECKED	DATE	REVISED
			5-12-87	

REVISED 7-22-91

614 BARRIER REFLECTORS

ITEM 614 BARRIER REFLECTORS

THESE REFLECTORS AND THEIR MOUNTING SHALL CONFORM TO SUPPLEMENTAL SPECIFICATION 802 EXCEPT THAT THE SPACING SHALL BE SHOWN IN THE SUBSUMMARY TABLE.

[illegible]

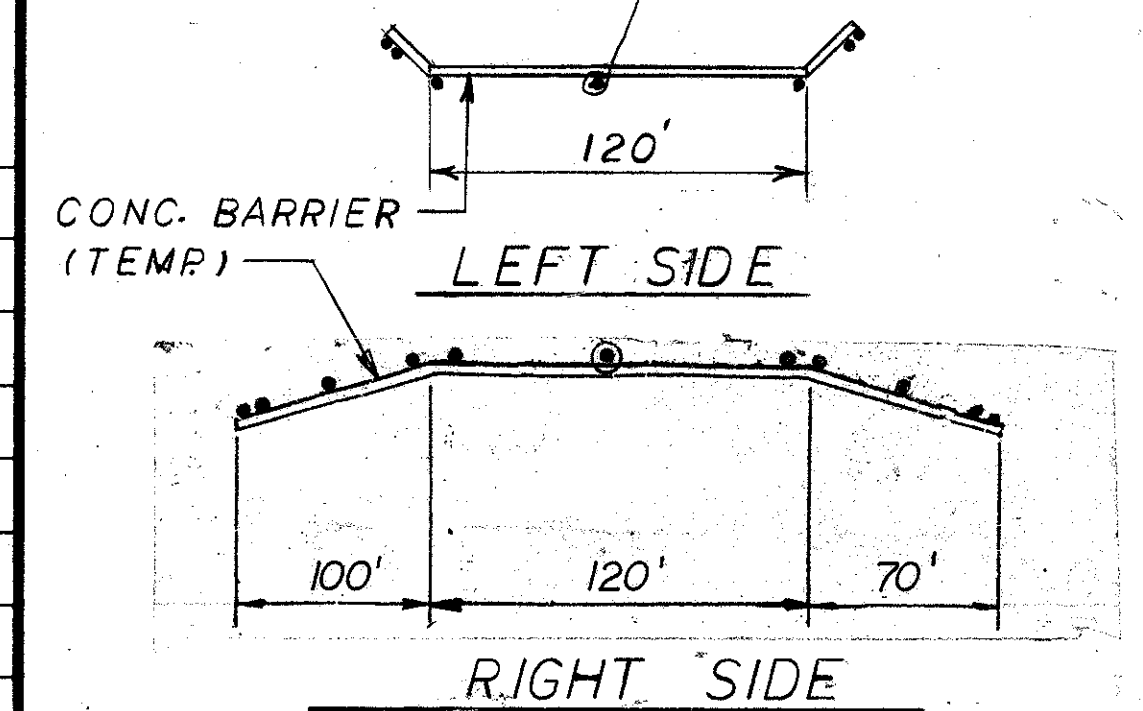
Quantities carried to the General Summary			
ITEM	TOTAL	UNIT	DESCRIPTION
614	25	EA.	BARRIER REFLECTORS, TYPE-B2
614	5	EA.	BARRIER REFLECTORS, TYPE-A2
802	6	EA.	BARRIER REFLECTORS, TYPE-A

FHWA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	

23

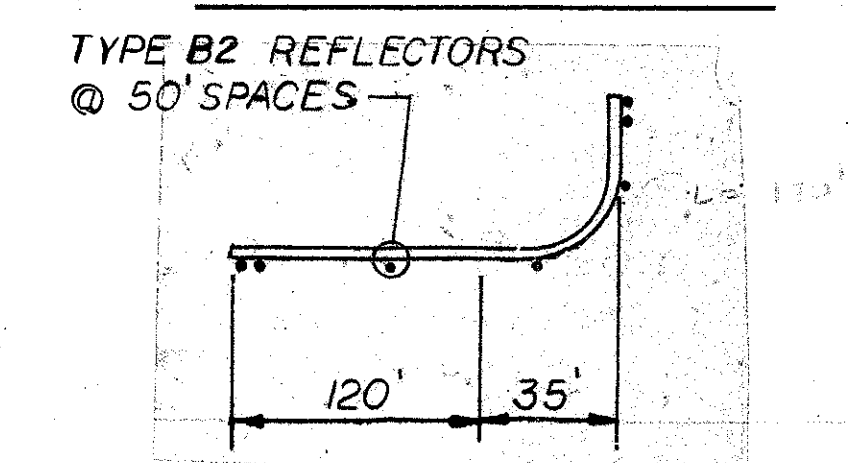
25

CUYAHOGA COUNTY TYPE B2 REFLECTORS
CUI-43-4.80 @ 50 SPACES



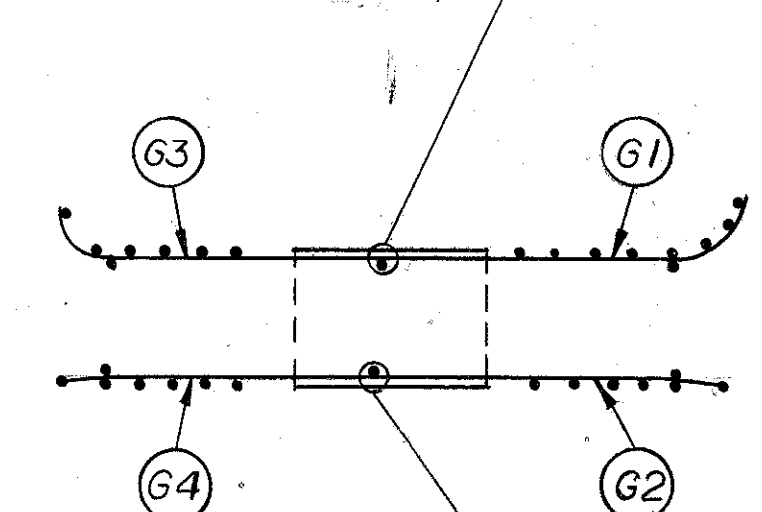
BARRIER REFLECTORS

STAGE I



BARRIER REFLECTORS STAGE II

TYPE A REFLECTORS
@ 100' ON NORTH G.R.—



TYPE A2 REFLECTORS
@ 100' ON SOUTH G.R.—

GUARDRAIL REFLECTORS

R.P. MADISON INTERNATIONAL
ARCHITECTS-ENGINEERS-PLANNERS
2930 EUCLID AVE. CLEVELAND, OHIO 44115

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DISTRICT THREE

614 BARRIER
REFLECTORS

DESIGNED	DRAWN	CHECKED	REVIEWED	DATE	REVISED 7-87
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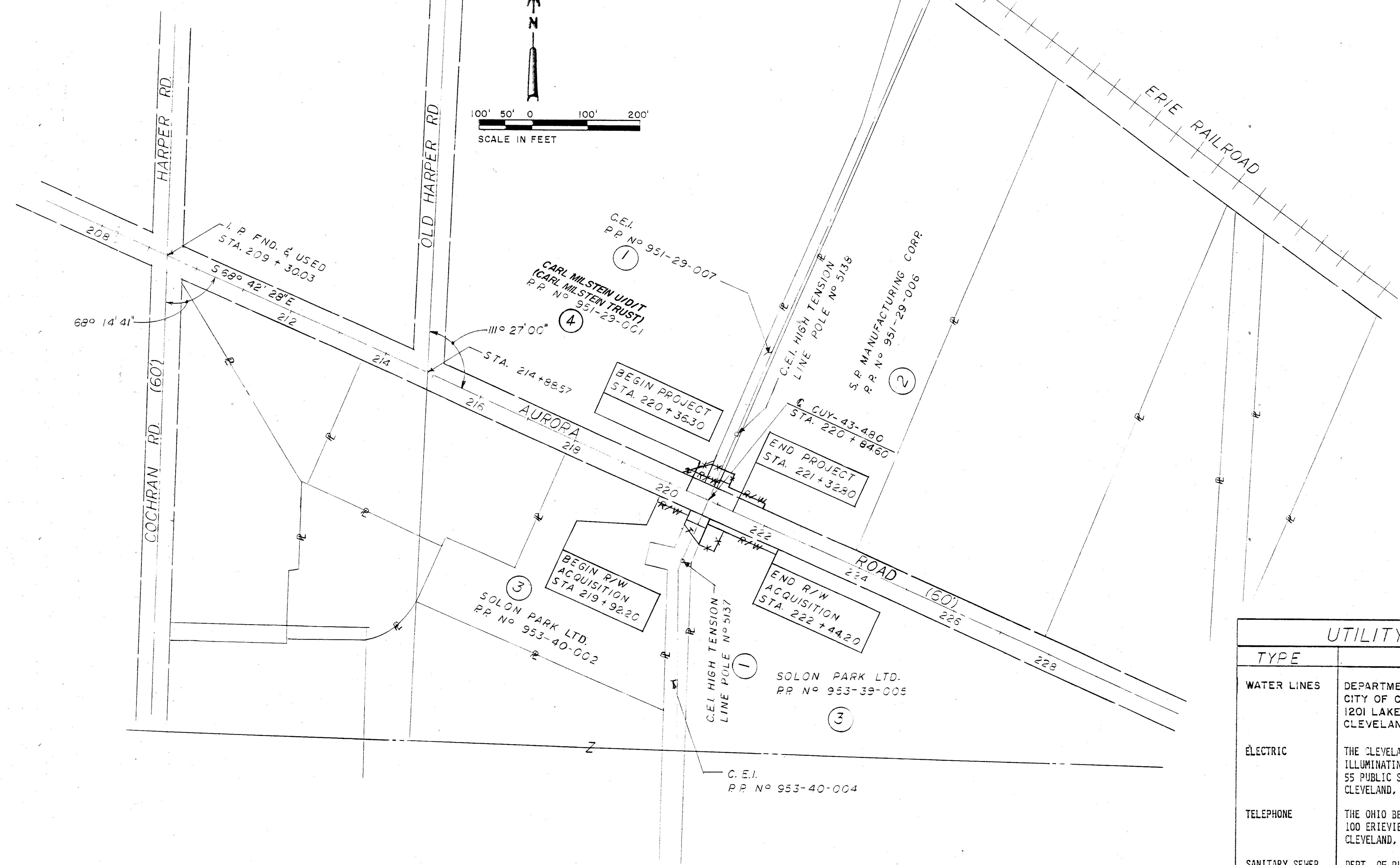
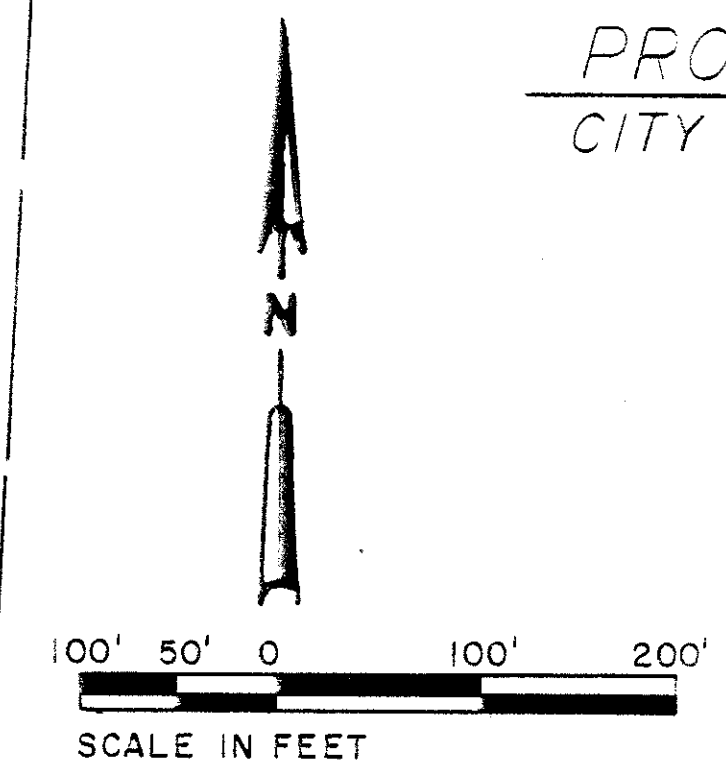
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FHWA REGION	STATE	PROJECT	
5	OHIO	BHF-58(31)	

CUYAHOGA COUNTY
CUY-43-4.80

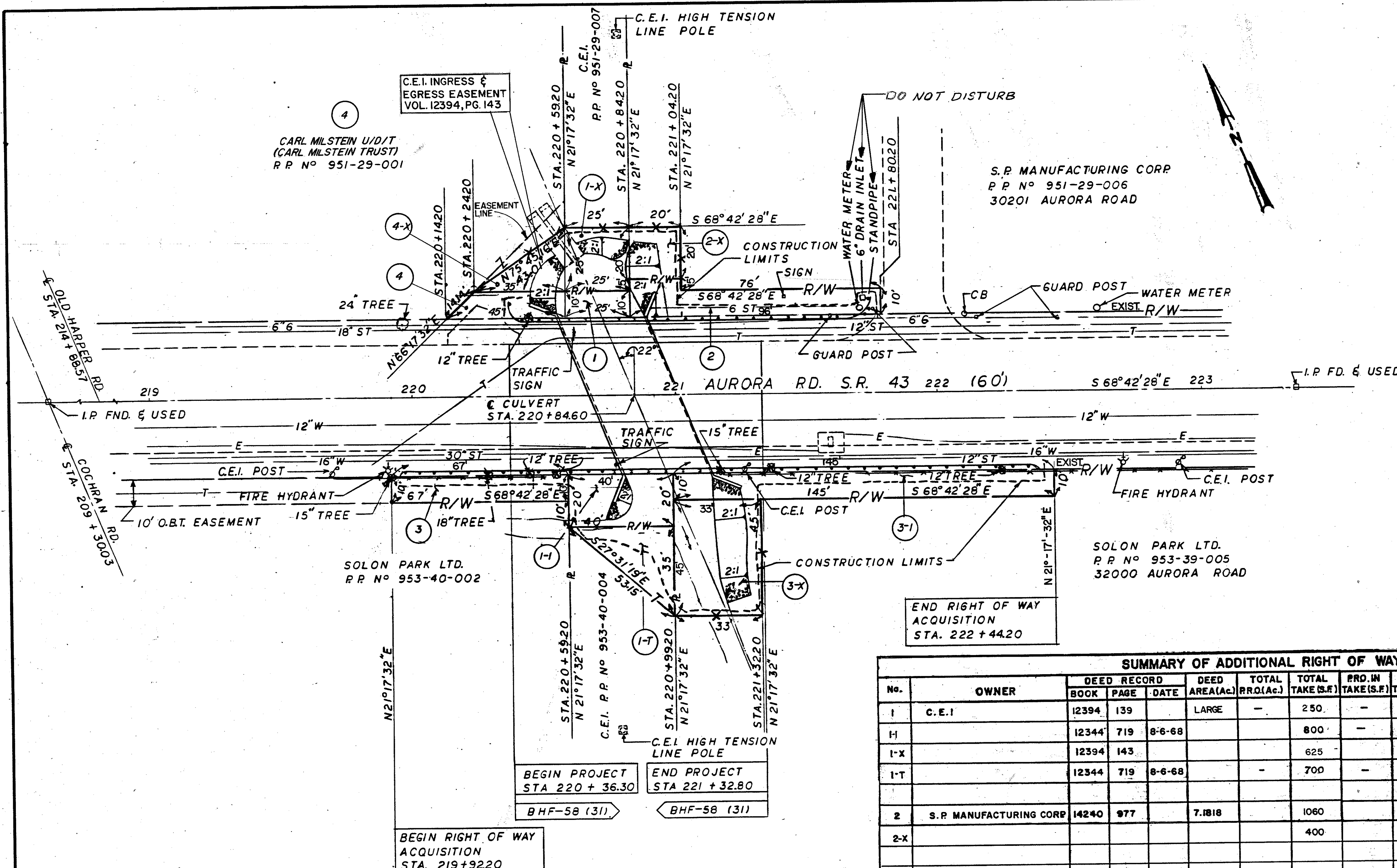
R/W 1/2

PROPERTY MAP CITY OF SOLON



UTILITY OWNERS	
TYPE	NAME & ADDRESS
WATER LINES	DEPARTMENT OF PUBLIC UTILITIES CITY OF CLEVELAND 1201 LAKESIDE AVENUE CLEVELAND OHIO 44114 (216) 664-3349
ELECTRIC	THE CLEVELAND ELECTRIC ILLUMINATING COMPANY ILLUMINATING BUILDING 55 PUBLIC SQUARE CLEVELAND, OHIO 44113 (216) 361-9000
TELEPHONE	THE OHIO BELL TELEPHONE CO. 100 ERIEVIEW PLAZA CLEVELAND, OHIO 44114 (216) 822-9000
SANITARY SEWER & STORM SEWER	DEPT. OF PUBLIC UTILITIES CITY OF SOLON 6315 S.O.M. CENTER ROAD SOLON, OHIO 44139 (216) 248-1155

REV	DATE	DESCRIPTION
1	3-19-91	ADDED PARCEL 4 & OWNERSHIP CHANGE



SUMMARY OF ADDITIONAL RIGHT OF WAY REQUIRED														
No.	OWNER	DEED RECORD			DEED AREA(Ac.)	TOTAL PRO.(Ac.)	TOTAL TAKE(S.F.)	PRO.IN TAKE(S.F.)	NET TAKE(S.F.)	RES.LT. (Ac.)	RES.RT. (Ac.)	BLDGS.TO BE ACQ'D	SHT N ^o	REMARKS
		BOOK	PAGE	DATE										
1	C.E.I	12394	139		LARGE	-	250	-	250	LARGE	-	-	2	HIGHWAY EASEMENT
1-I		12344	719	8-6-68			800	-	800	-	-	-	2	" "
1-X		12394	143				625		625	-	-	-	2	CHANNEL EASEMENT
1-T		12344	719	8-6-68		-	700	-	700	-		-	2	CHANNEL WORK
2	S.R MANUFACTURING CORP	14240	977		7.1818		1060		1060	7.1818	-	-	2	HIGHWAY EASEMENT
2-X							400		400		-	-	2	CHANNEL EASEMENT
3	SOLON PARK LTD.	15487	977	4-11-79	13.0		670		670	-	13.0	-	2	HIGHWAY EASEMENT
3-I		15043	19	4-11-79			1450		1450	-		-	2	" "
3-X		15043	19	4-11-79			1485		1485	-		-	2	CHANNEL EASEMENT
4	CARL MILSTEIN U/D/T	90-5316	7	8-27-90	34.68*	-	400	-	400	34.68	-	-	2	HIGHWAY EASEMENT
4-X		88-2716	16	-	-	-	438	-	438	-	-	-	2	CHANNEL EASEMENT

* CALCULATED

2	8-28-91	ADDED "DO NOT DISTURB"
1	3-19-91	ADDED PARCEL 4-4-X * REVISED PARCEL 1 TAKES
REV.	DATE	DESCRIPTION