STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

HAM-471-0.24
PART ONE

I-471-2(8)02

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO	I-471-2(8)02	

HAMILTON COUNTY
HAM-471-0.24
PART ONE

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660 Rod
(I-85)

1979 SPECIFICATIONS

HAMILTON COUNTY
CITY OF CINCINNATI

THE STANDARD SPECIFICATION OF THE STATE OF OHIO DEPARTMENT OF TRANSPORATION 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 SET FORTH IN THESE PLANS AND ESTIMATES.

Sheets 134, 142 revised 3-18-80 EBL
Sheet 73 revised 3-18-80 EBL
Sheet 129 revised 7-1-80 CPD
Sheet 129 revised 8-1-80 CPD
Sheet 129AA added 8-1-80 CPD
Sheet 135 revised 7-15-80 CPD
Sheet 85, 117 and 129C revised 8-19-80 CPD
⚠ Sheet 99, 134 and 143 revised 11-10-80, CPD.
Sheet 133 revised 2-6-81 EBL
Sheets 87 & 88 revised 5-5-81 EBL
Sheet 32A supersedes Sheet 32, 5-5-81 EBL
Sheet 150A added 11-5-81 EBL

APPROVED _____
DATE 3-13-79 DISTRICT DEPUTY DIRECTOR OF TRANSPORTATION

APPROVED Robert B Pfeifer MPB
DATE 5-14-79 ENGINEER, BUREAU OF BRIDGES & STRUCTURAL DESIGN

APPROVED _____
DATE 7-24-79 CHIEF ENGINEER, PLANNING & DESIGN OR CHIEF ENGINEER, OPERATIONS

APPROVED _____
DATE 7-24-79 DIRECTOR, DEPARTMENT OF TRANSPORTATION

APPROVED _____
DATE 2/28/79 COUNTY ENGINEER, HAMILTON COUNTY

APPROVED _____
DATE 2/27/79 DIRECTOR OF PUBLIC WORKS, CITY OF CINCINNATI

BY, FOR, ON BEHALF OF, AND IN THE NAME OF THE COUNTY OF HAMILTON, AND UNDER THE AUTHORITY OF ITS BOARD OF COUNTY COMMISSIONERS BY VIRTUE OF SECTION 305.03 REVISED CODE OF OHIO, AND THE RESOLUTION ADOPTED JANUARY 7, 1963, AND ENTERED IN THE JOURNAL OF SAID BOARD.

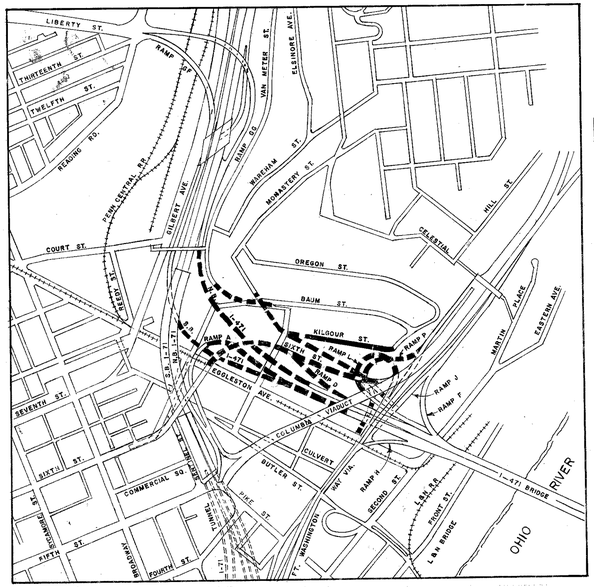
APPROVED _____
DATE 2-28-79 COUNTY ADMINISTRATOR

CONVENTIONAL SIGNS

CENTER LINE
PROPERTY LINE
FENCE ---- EXISTING ---- PROPOSED ----
RAILROAD ---- OR ----
POLES ---- TELEPHONE ---- POWER ---- LIGHT
GUARD RAIL ---- EXISTING ---- PROPOSED
DRAIN OR SEWER PIPE ---- EXISTING ---- PROPOSED
CATCH BASIN ---- EXISTING ---- ADJUSTED TO GRADE ---- PROPOSED
MANHOLES ---- EXISTING ---- ADJUSTED TO GRADE ---- PROPOSED
VALVE CHAMBERS ---- EXISTING ---- ADJUSTED TO GRADE ---- PROPOSED
TELEPHONE CHAMBERS ---- EXISTING (T) OR (T)
ELECTRIC CHAMBERS ---- EXISTING (E) OR (E)
GAS MAIN G.M.
WATER MAIN ---- EXISTING W.M.
TELEPHONE CONDUIT ---- EXISTING T
ELECTRIC CONDUIT ---- EXISTING E
EXISTING RIGHT OF WAY ---- EXIST. R/W
LIMITED ACCESS L/A
PROPOSED RIGHT OF WAY R/W
PROPOSED LIMITED ACCESS RIGHT OF WAY L/A R/W
TREES OR STUMPS ---- EXIST. ---- TO BE REMOVED

INDEX OF SHEETS

Sheet Nos. 60 & 61 Not Used



LOCATION MAP

SCALE OF FEET 500 1000 2000 3000

PORTION TO BE IMPROVED
PORTION TO BE IMPROVED UNDER A SEPARATE CONTRACT

SCALES

PLAN
PROFILE HORIZONTAL 0 8 16 24 32 40
PROFILE VERTICAL 0 2 4 6 8 10
CROSS SECTIONS 0 4 8 12 16 20

LINE DATA

BEGIN WORK STA. 20+30 Van Meter St.
END WORK STA. 10+47 Ramp P
LENGTH OF WORK 1812 Lin. Ft. or 0.343 Mi.
LENGTH OF PROJECT 0 Lin. Ft. or 0.000 Mi.

PLANS PREPARED BY
HAZELET & ERDAL — CONSULTING ENGINEERS
CINCINNATI, OHIO

FILE NO.
HAMILTON COUNTY
HAM-471-0.24 PART ONE
DATE OF LETTING _____ 19____
CONTRACT NO. _____

STANDARD DRAWING

		MC-2	6-1-65
		MC-3	6-1-73
BP-5	4-16-79	MC-4	7-26-76
		MC-5	6-12-75
BP-7	12-6-76		
BP-12	8-11-75		
CB-5	5-1-79		
CB-8	5-1-79	HL-1	9-6-73
CB-45B A	5-1-79		
GR-1	12-6-76		
GR-2C	12-6-76		
L-1	6-1-73		

SUPPLEMENTAL SPECIFICATIONS

1001	1-3-77
836	3-12-75

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

_____ DIVISION ADMINISTRATOR

_____ DATE

Rev. 8-21-79

INDEX OF SHEETS

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GENERAL PLAN

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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HAMILTON COUNTY
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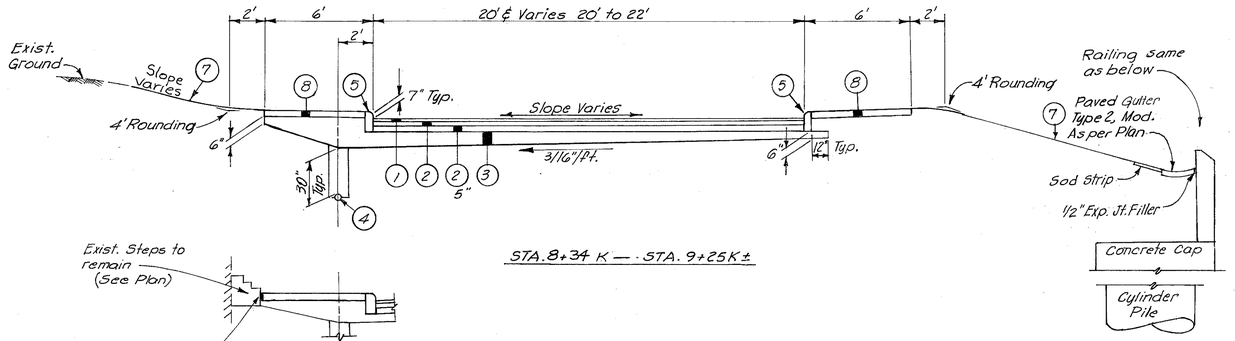
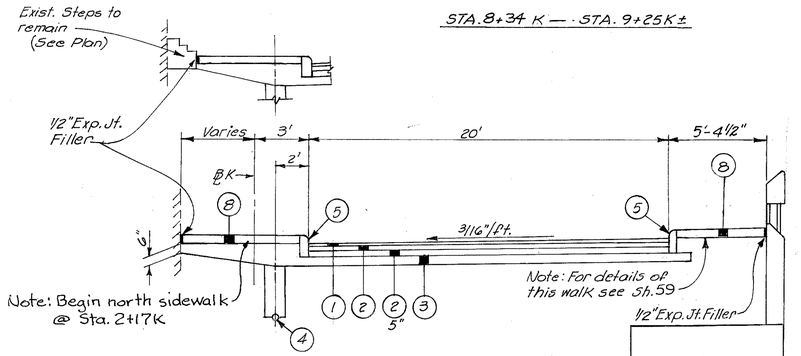
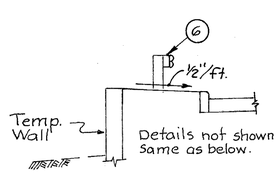
PART ONE

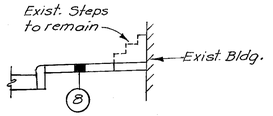
PAVEMENT LEGEND		
NO.	ITEM	DESCRIPTION
1	402	1" Asphalt Concrete (AC-20)
2	301	3" (except as noted) Bituminous Aggregate Base: 702.01 (AC-20) or 702.09, RT-11 or RT-12
3	310	6" (except as noted) Subbase, Type II
4	605	6" Shallow Pipe Underdrain
5	609	Concrete Curb, Standard Type 6
6	606	Guard Rail, Type 4
7	659	Seeding & Mulching
8	608	4" Concrete Walk

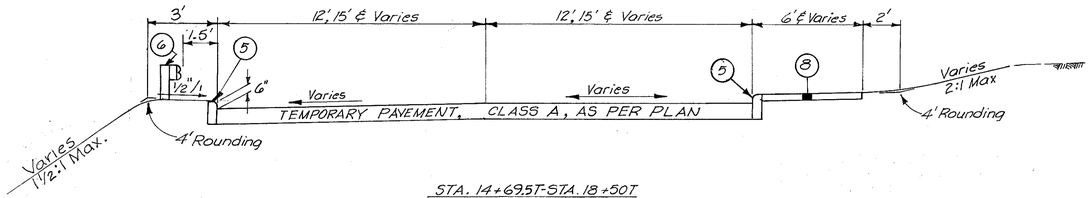
Note: Item 404 - Asphalt Concrete on Kilgour Street will be constructed by the HAM-471-0.24 Part 2 Contractor.









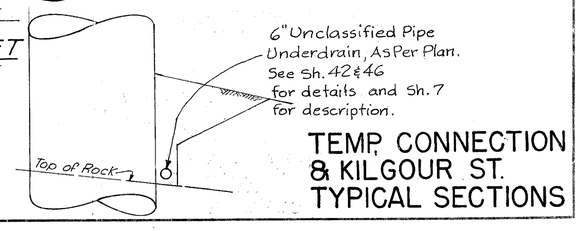


STA. 14+69.5T - STA. 18+50T

TEMPORARY CONNECTION

STA. 3+00K — STA. 8+34K

KILGOUR STREET



TEMP. CONNECTION & KILGOUR ST. TYPICAL SECTIONS

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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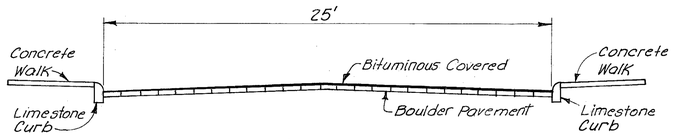
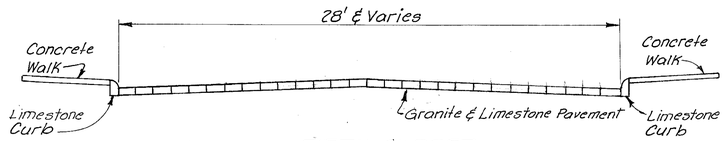
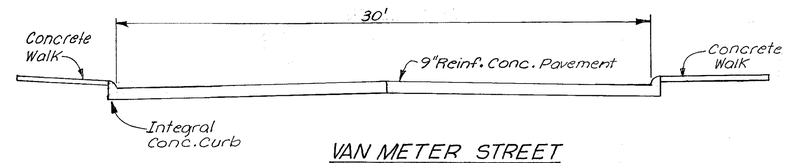


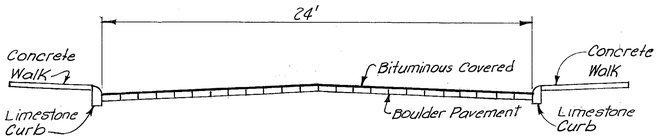
KILGOUR STREET



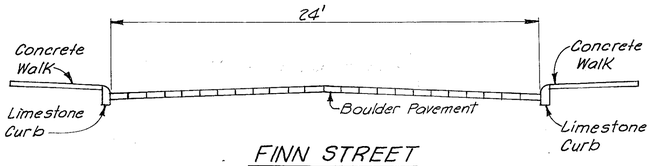
FIFTH STREET



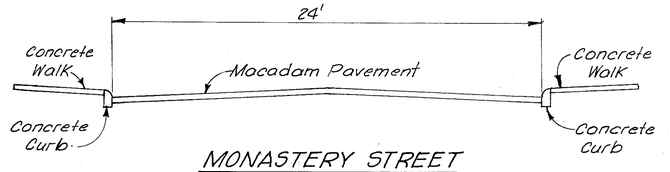
VAN METER STREET



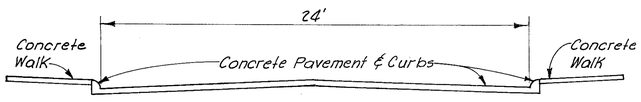
BAUM STREET



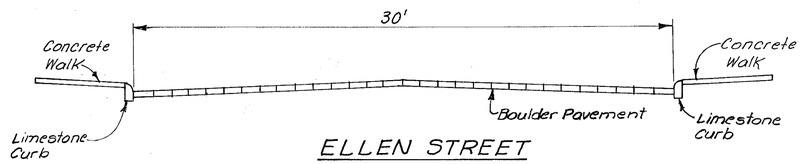
FINN STREET



MONASTERY STREET



OREGON STREET



ELLEN STREET

EXISTING ROADWAY SECTIONS

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
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HAMILTON COUNTY
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GENERAL

ELEVATION DATUM

ALL ELEVATIONS ARE BASED ON U.S.C.&G.S. DATUM.

FIELD OFFICE

THE CONTRACTOR SHALL PROVIDE A SUITABLE FIELD OFFICE HAVING A MINIMUM OF *800 SQ. FT. OF FLOOR SPACE.

* SINGLE OFFICE OR 2 OFFICE TRAILERS WITH 400 SQ. FT. PER TRAILER MINIMUM.

WORK TO BE DONE BY THE CITY

THE CITY WILL RAZE AND REMOVE ALL THE EXISTING BUILDINGS, SHEDS, GARAGES AND OTHER SIMILAR STRUCTURES UNLESS OTHERWISE SHOWN ON PLANS WITHIN THE LIMITS OF CONSTRUCTION. BUILDINGS WILL BE REMOVED TO THE TOP OF THE FOUNDATION WALLS AND ALL THE RESULTING DERBIS REMOVED, UNLESS OTHERWISE NOTED ON THE PLANS. THE CONTRACTOR WILL BE EXPECTED TO FIELD CHECK THE SITE TO VIEW EXISTING CONDITIONS AS MOST OF THE REMOVALS WILL HAVE BEEN COMPLETED BEFORE CONSTRUCTION BEGINS.

WATER AND GAS SHUT-OFF BOXES

THE WATER AND GAS SHUT-OFF BOXES GENERALLY LOCATED BEHIND THE EXISTING CURB ARE SHOWN ON THE PLAN SHEETS AND DESIGNATED BY THE FOLLOWING SYMBOLS:

oG . . . . . .GAS BOX
oW . . . . . .WATER BOX

ESTIMATED QUANTITIES

SPECIFIC LOCATIONS AND USAGE OF ESTIMATED QUANTITIES SET UP ON THIS PLAN TO BE USED "AS DIRECTED BY THE ENGINEER" SHALL BE MADE A MATTER OF RECORD BY INCORPORATION INTO THE FINAL CHANGE ORDER GOVERNING COMPLETION OF THIS PROJECT. ESTIMATED QUANTITIES OF MATERIALS SHALL NOT BE ORDERED FOR DELIVERY TO THE PROJECT UNLESS AUTHORIZED BY THE ENGINEER.

ITEM SPECIAL-IMPACT ATTENUATOR (HI-DRO CUSHION).

This work shall consist of furnishing and placing an Impact Attenuator Unit and Backup Assembly supplied by Energy Absorption Systems Inc., One Ibm Plaza, Chicago, Illinois in accordance with the Manufacturer's Specifications and Plan Detail Sheets and in reasonably close conformity with lines, grades, thicknesses and typical sections shown on the Plans or established by the Engineer.
Included in the Cost of the Impact Attenuator shall be all concrete necessary to costruct the Installation Pad and Cable Anchorage Plate according to the Applicable Detail Design Sheets. Concrete for the Installation Pad and Cable Anchorage Plate shall be 499, Class C.
Also included in the Attenuator cost are any other related Incidental Items necessary to construct a complete and functional HI-DRO Cushion Impact Attenuator.
To prevent freezing, 40% by weight Ethylene Glycol shall be mixed with the water used to fill the Tubes; or 2.5 lbs. of 95% Flake Calcium Chloride (Ca.Cl.) shall be mixed with each gallon of Water used to fill the Tubes. When CaCl is used the mixing shall take place in a separate Container because of the significant heat generated during the mixing process.
The Safety-Flex Belt Assembly on the Nose of the Attenuator shall be marked with 4 evenly spaced 4" wide vertical Stripes of white reflective material in vertical Stripe 4" in width. Center of the Stripe shall be located 6" from the Rear Edge of each Panel.
The accepted Quantity of Impact Attenuators will be paid for at the Contract Unit Price per each Installation under Item Special-Impact Attenuator (8-BAY HI-DRO CUSHION).

These assemblies shall be installed as one of the first items of work in this contract.

PARKING

THE CONTRACTOR SHALL NOT PERMIT REVENUE PRODUCING PARKING OF MOTOR VEHICLES WITHIN THE RIGHT OF WAY OF THIS PROJECT.

CONTRACTOR'S MAINTENANCE RESPONSIBILITY

ON THIS PROJECT, THE CONTRACTOR'S RESPONSIBILITY FOR MAINTENANCE OF THE EXISTING PAVEMENT PER ITEM 614 SHALL BE LIMITED TO THOSE PORTIONS OF THE EXISTING PAVEMENT LYING WITHIN THE PROPOSED WORK LIMITS.

HAUL ROADS

THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER AND THE CITY ENGINEER, IN WRITING, AT LEAST TEN DAYS BEFORE USING ANY STREET FOR THE PURPOSE OF HAULING MATERIAL OR EQUIPMENT TO OR FROM THE PROJECT, OF HIS INTENT TO USE THE STREETS. THE CONTRACTOR SHALL INCLUDE IN HIS REPORT THE LIMITS OF THE STREETS WITHIN WH ICH HE INTENDS TO OPERATE. THE CONTRACTOR MAY NOT USE A STREET FOR HAULING PURPOSES WITHOUT APPROVAL OF THE DIRECTOR OF HIGHWAYS AND THE CITY MANAGER, CITY OF CINCINNATI.

COOPERATION BETWEEN CONTRACTORS

THE CONTRACTORS' ATTENTION IS CALLED TO THE EXISTANCE OF A FUTURE SEPARATE PROJECT (HAM-471-0.24 PART 2) ADJACENT TO THIS PROJECT. THE CONTRACTOR SHALL COORDINATE HIS OPERATIONS TO THE FULLEST EXTENT WITH THE ADJOINING CONTRACTOR IN A MANNER THAT WILL RESULT IN A MINIMUM OF INTERFERENCE.

ALL UNDERGROUND WORK SHALL BE SCHEDULED AND COMPLETED AT SOME PLANNED TIME, AGREEABLE TO ALL PARTIES CONCERNED, THAT WILL CAUSE THE LEAST AMOUNT OF INTERFERENCE WITH THE MOVEMENT OF TRAFFIC.

CONSTRUCTION SCHEDULE

THE NUMBER INDICATES THE ORDER OF WORK AND ITEMS WITH THE SAME NUMBER MAY BE PERFORMED CONCURRENTLY.

OTHER CONSTRUCTION WORK MAY BE DONE AT THE CONTRACTOR'S DISCRETION WITH THE APPROVAL OF THE PROJECT ENGINEER BUT MUST BE IN ACCORDANCE WITH THE REQUIREMENTS FOR "MAINTAINING TRAFFIC".

* 1. CONSTRUCT CYLINDER PILE WALL AND TUNNEL WHILE MAINTAINING EXISTING SEWER IN FIFTH, KILGOUR, FINN AND ELLEN STREETS AND GAS & WATER LINES IN KILGOUR AND OREGON STREETS.
2. CONSTRUCT KILGOUR STREET SEWER (SEE SHEET 8).
* 3. INSTALL TIE BACK TENDONS.
4. GRADE AREA IN FRONT OF WALL, CONSTRUCT RAMP P AND MONASTERY STREET SEWER AND DIVERT SEWER FLOW.
5. CONSTRUCT VAN METER-EGGLESTON AVENUE SEWER CONNECTION.
6A. CONSTRUCT NORTH PORTION OF TEMPORARY CONNECTION (20-FOOT MINIMUM WIDTH) WHILE MAINTAINING TRAFFIC ON BAUM STREET.
6B. CONSTRUCT TEMPORARY PEDESTRIAN WALK & STEPS FROM FIFTH AND LOCK STREETS TO KILGOUR STREET (SEE SHEET NO.18&42).
7. REROUTE TRAFFIC TO TEMPORARY FACILITIES.
8. CONSTRUCT TEMPORARY WALL FOR BUTTRESS FILL AND COMPLETE TEMPORARY CONNECTION.
9. CONSTRUCT BUTTRESS FILL AND COMPLETE WORK.

* FOR MORE DETAILED CONSTRUCTION SCHEDULE FOR THE CYLINDER PILE WALL SEE SHEET NO.95-164

ROADWAY

ROUNDING OF CORNERS SHOWN ON CROSS SECTIONS

THE ROUNDED CORNERS SHOWN ON THE TYPICAL SECTIONS, APPLY TO ALL CROSS SECTIONS EVEN THOUGH OTHERWISE SHOWN ON THESE PLANS.

CONCRETE SIDEWALK

WHEREVER THE PROPOSED CONCRETE SIDEWALK ADJOINS OR ABUTS AN EXISTING SIDEWALK, THE EXISTING WALK SHALL BE SAWED AND TRIMMED TO A NEAT LINE AS SHOWN ON THE PLANS. PAYMENT FOR SAWING AND TRIMMING SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE FOOT FOR ITEM 608, CONCRETE SIDEWALKS.

UNDERGROUND UTILITIES

THE LOCATIONS OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS HAVE BEEN OBTAINED BY DILIGENT FIELD CHECKS AND SEARCHES OF AVAILABLE RECORDS. IT IS BELIEVED THAT THEY ARE ESSENTIALLY CORRECT, BUT THE STATE OF OHIO MAKES NO GUARANTEE AS TO THEIR ACCURACY OR COMPLETENESS.

ITEM 202, STRUCTURES REMOVED AS PER PLAN

THIS ITEM SHALL CONSIST OF THE REMOVAL OF FOUNDATIONS, WALLS, WALKS, STEPS, MASONRY AND ANY OTHER OBSTRUCTIONS NOT SPECIFICALLY IDENTIFIED FOR REMOVAL AS A PAY ITEM IN THE PLANS BUT REQUIRED TO BE REMOVED FOR THE CONSTRUCTION OF THIS PROJECT. THE EXTENT OF REMOVAL WILL BE LIMITED TO THAT PORTION NECESSARY FOR THE CONSTRUCTION AS DETERMINED BY THE ENGINEER.

THE CITY WILL CLAIM AND HAUL FROM THE PROJECT PARKING METERS, STREET SIGNS, FIRE HYDRANTS, STEEL LIGHT POLES, AND TRAFFIC POLES, WHICH ARE TO BE REMOVED AND STORED BY THE CONTRACTOR.

PAYMENTS FOR ALL THE ABOVE WILL BE MADE AT THE CONTRACT LUMP SUM PRICE BID FOR ITEM 202, STRUCTURES REMOVED, AS PER PLAN, AND SHALL CONSTITUTE FULL PAYMENT FOR ALL NECESSARY MATERIALS, TOOLS AND LABOR REQUIRED TO COMPLETE THIS ITEM.

ITEM 615, TEMPORARY ROADS AND PAVEMENTS AS PER PLAN

ALL SECTIONS OF THIS ITEM APPLY EXCEPT THAT THE CONTRACTOR WILL NOT BE REQUIRED TO REMOVE THE TEMPORARY ROADS AND PAVEMENT, GUARD RAIL AND SIDEWALK.

THE CURBS CONSTRUCTED WITH THE PAVEMENT ARE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD OF TEMPORARY PAVEMENT, CLASS A, AS PER PLAN.

ITEM 203, EMBANKMENT

ALL SECTIONS OF THIS ITEM APPLY EXCEPT THAT THE EMBANKMENT BEHIND THE CYLINDER PILE WALL SHALL BE CONSTRUCTED AFTER THE TIEBACKS HAVE BEEN INSTALLED AND TENSIONED.

ITEM 203, EXCAVATION, NOT INCLUDING EMBANKMENT CONSTRUCTION

ALL SECTIONS OF THIS ITEM APPLY EXCEPT AS AUGMENTED OR MODIFIED BELOW.

NO BLASTING WILL BE ALLOWED.

IF WATER IS ENCOUNTERED IN THE EXCAVATION FOR THE TIE BACKS IN FRONT OF TEMPORARY AND/OR CYLINDER PILE WALL, DEWATERING SHALL BE DONE BY PUMPING.

GENERAL NOTES

N-24103

QUANTITIES
BY C.B.B. DATE 2-20-79
CHECKED W.W.C. DATE 2-21-79

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HAMILTON COUNTY
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ROADWAY

ITEM 202 PAVEMENT REMOVED, AS PER PLAN

THIS ITEM SHALL CONSIST OF CAREFULLY REMOVING ALL BRICK AND/OR GRANITE BLOCK PAVEMENT ENCOUNTERED IN ANY STREET WHERE THE PLANS INDICATE PAVEMENT TO BE REMOVED AND SHALL INCLUDE HAULING THEM TO THE STORAGE YARD. ALSO INCLUDED IN THIS ITEM IS THE REMOVAL AND DISPOSAL OF THE CONCRETE BASE IN ACCORDANCE WITH ITEM 202 OF THE SPECIFICATIONS.

THE SALVAGED BRICK AND/OR GRANITE BLOCK DELIVERED TO THE STORAGE AREA MAY INCLUDE THE ASPHALT SURFACING BUT NOT THE CONCRETE BASE MATERIAL. THE BRICK AND/OR GRANITE BLOCK SHALL BE DELIVERED BY THE CONTRACTOR TO THE CITY OF CINCINNATI, HIGHWAY MAINTENANCE YARD LOCATED ON THE EAST SIDE OF WM. P. DOOLEY BY-PASS AND THE SOUTH SIDE OF THE LUDLOW AVENUE VIADUCT AND STORED IN THE DESIGNATED AREA.

THE ENGINEER SHALL NOTIFY THE CITY'S HIGHWAY MAINTENANCE DIVISION AT PHONE 352-3360 BEFORE THE CONTRACTOR HAULS THE SALVAGED MATERIAL TO THE STORAGE YARD.

PAYMENT WILL BE MADE AT THE UNIT PRICE BID PER SQUARE YARD FOR ITEM 202 PAVEMENT REMOVED, AS PER PLAN AND SHALL CONSTITUTE FULL PAYMENT FOR ALL NECESSARY MATERIAL, TOOLS, EQUIPMENT AND LABOR REQUIRED TO COMPLETE THIS ITEM.

WATER POLLUTION, SOIL EROSION AND SILTATION CONTROL

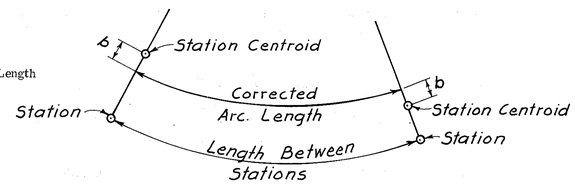
THE FOLLOWING ESTIMATED QUANTITIES ARE TO BE USED AS DIRECTED BY THE ENGINEER FOR EROSION AND SILTATION CONTROL MEASURES.

207 TEMPORARY SEEDING AND MULCHING	2600 S.Y.
207 TEMPORARY SLOPE DRAINS	170 L.F.
207 TEMPORARY BENCHES, DIKES, DAMS & SEDIMENT BASINS	850 C.Y.
207 STRAW OR HAY BALES	48 EACH

CORRECTION OF ARC LENGTH FOR EARTHWORK COMPUTATIONS

ARC LENGTHS FOR EARTHWORK COMPUTATIONS HAVE BEEN CORRECTED IN ACCORDANCE WITH THE DIAGRAM SHOWN ON THIS SHEET. CORRECTED LENGTHS BETWEEN CENTROIDS ARE SHOWN ON THE CROSS SECTION SHEETS.

Diagram Showing
Correction of Arc Length



SURPLUS EXCAVATION WASTE AREA

A WASTE AREA FOR SURPLUS EXCAVATION IS LOCATED ON CITY OF CINCINNATI LUNKEN AIRPORT PROPERTY IN A LOW AREA BOUNDED BY THE AIRPORT LEVEE ALONG KELLOGG AVENUE AND THE LITTLE MIAMI RIVER, TAXIWAY "C" AND EXISTING BUILDINGS AT THE SOUTHERLY END OF AIRPORT ROAD. CINCINNATI WILL PREPARE THE NECESSARY PLANS REQUIRED BY SECTION 105.151 AND OBTAIN ANY PERMITS REQUIRED IF THE CONTRACTOR ELECTS TO USE THIS WASTE AREA. THERE IS APPROXIMATELY 260,000 CU. YDS. OF WASTE FROM THE EXCAVATION FOR THE BUTTRESS FILL AREA, CYLINDER PILE WALL, TIE-BACKS AND TUNNEL.

FOR ADDITIONAL INFORMATION CONTACT TOM STITT OF THE CITY OF CINCINNATI, ENGINEERING DIVISION AT 352-3425.

BUTTRESS CONSTRUCTION

THE BUTTRESS SHALL CONSIST OF A CLEAN GRANULAR BASAL DRAINAGE BLANKET OVERLAIN BY GRANULAR FILL AND CAPPED WITH A MINIMUM 2-FOOT THICK IMPERMEABLE CLAY BLANKET TO EXCLUDE SURFACE MOISTURE FROM THE BUTTRESS. THE FOUNDATION FOR THE BUTTRESS SHALL BE FULLY EXCAVATED AND BENCHED INTO IN-PLACE CLAYSTONE, BELOW THE SLIDE PLANE, AS DETERMINED BY THE ENGINEER.

DRAINAGE BLANKET

THE BUTTRESS DRAINAGE BLANKET MATERIAL (POROUS BACKFILL, AS PER PLAN) SHALL BE PLACED ON A ROCK SURFACE WHICH HAS BEEN WELL CLEANED BY SUITABLE MEANS, SUCH AS WITH HIGH PRESSURE AIR OR AIR AND WATER, TO REMOVE ALL SOFT, SLAKED AND LOOSE ROCK DEBRIS AND ANY TEMPORARY ROADBED OR CONTAMINATED GRANULAR MATERIALS.

THE ENTIRE BASE OF THE BUTTRESS SHOULD BE PROVIDED WITH A BLANKET DRAIN OF GRANULAR MATERIAL. THE BLANKET DRAIN SHALL CONSIST OF A MINIMUM 4-FOOT THICK COMPOSITE LAYER OF GRADED SAND AND GRAVEL. THE BOTTOM AND TOP ONE-FOOT MINIMUM LAYERS SHALL BE FINE AGGREGATE, 703.02, WITH MATERIAL PASSING THE NO. 200 SIEVE BEING NON PLASTIC. THE MIDDLE TWO-FOOT LAYER SHALL BE NO. 78 COARSE AGGREGATE, 703.01.

THE MATERIAL FOR THE DRAINAGE BLANKET WILL TRANSMIT AN ESTIMATED MAXIMUM OF 1,300 GALLONS OF WATER PER DAY PER LINEAR FOOT OF BUTTRESS. FLOWS FROM THE BUTTRESS FOUNDATION SHOULD BE EVALUATED DURING EXCAVATION TO DETERMINE THAT THE ANTICIPATED DRAINAGE REQUIREMENTS WILL NOT BE EXCEEDED. DRAINAGE MATERIAL SHALL BE ADJUSTED BY THE ENGINEER IF ESTIMATED FLOW IS EXCEEDED.

BUTRESS FILL

THE BUTTRESS FILL MATERIAL (EMBANKMENT B, AS PER PLAN) PLACED ABOVE THE SAND AND GRAVEL FILTER SHALL CONSIST OF A MIXTURE OF SAND, GRAVEL AND/OR SILT FILL WITH LESS THAN 15% CLAY-SIZE PARTICLES (LESS THAN 0.005mm SIZE) AND SHALL HAVE AN EFFECTIVE FRICTION ANGLE OF GREATER THAN 30 DEGREES WHEN COMPACTED TO 90% OR GREATER OF MODIFIED PROCTOR MAXIMUM DENSITY. (ITEM 310 SUBBASE MAY BE USED FOR THIS MATERIAL).

THE UPPER 2 FEET OF THE BUTTRESS FILL (EMBANKMENT A, AS PER PLAN) SHALL CONSIST OF AN IMPERMEABLE CLAY LAYER PLACED TO EXCLUDE SURFACE MOISTURE FROM THE BUTTRESS. *SOIL AS IDENTIFIED AS OHIO CLASSIFICATION A-7-6 OR A-6B SHALL BE CONSIDERED SUITABLE FOR THE IMPERMEABLE CLAY LAYER.*

BUTTRESS MATERIAL ACCEPTANCE

THE CONTRACTOR SHALL SUBMIT A MINIMUM OF FOUR (4) SETS OF REPRESENTATIVE GRAIN SIZE ANALYSES AND MODIFIED PROCTOR MOISTURE-DENSITY COMPACTION CURVES FOR EACH OF THE FILL AND FILTER MATERIALS FROM HIS PROSPECTIVE BORROW SOURCES FOR PRELIMINARY EVALUATION BY THE ENGINEER. AFTER TENTATIVE APPROVAL OF THE MATERIALS BY THE ENGINEER, THE CONTRACTOR SHALL SUPPLY TO THE ENGINEER A MINIMUM OF FIVE (5) REPRESENTATIVE BULK SAMPLES OF EACH MATERIAL TYPE FOR FURTHER TESTING. ALL SAMPLES SHALL BE OBTAINED IN THE PRESENCE OF THE ENGINEER'S REPRESENTATIVE. THE ENGINEER AND HIS REPRESENTATIVE SHALL PERFORM A MINIMUM OF FIVE (5) SETS OF GRAIN SIZE ANALYSES (ASTM D 422), ATTERBERG LIMITS ON THE FINES CONTENT (ASTM D 423 AND ASTM D 424), FOUR (4) POINT MODIFIED PROCTOR MOISTURE-DENSITY CURVES (ASTM D 1557), AND TRIAXIAL COMPRESSION TESTS (ASSHO T 234-70, SECTION 11 FOR DRAINED TESTS) ON EACH MATERIAL TYPE TO DETERMINE THAT THE PHYSICAL PROPERTIES FOR EACH INDIVIDUAL MATERIAL DO NOT VARY SIGNIFICANTLY OR FALL BELOW THE REQUIRED PHYSICAL PROPERTIES. IN ADDITION TO THE PREVIOUS TESTS, PERMEABILITY TESTS (ASTM D 2434) SHALL BE PERFORMED ON THREE (3) REPRESENTATIVE SAMPLES OF NO. 78 COARSE AGGREGATE TO DETERMINE THAT ITS PERMEABILITY COEFFICIENT IS NOT LESS THAN 300 FT/DAY. ADDITIONAL SAMPLES SHALL BE SUBMITTED AND TESTS PERFORMED IF THE TEST VALUES FOR ANY MATERIAL VARY SIGNIFICANTLY.

COMPACTION REQUIREMENTS

THE FILL AND FILTER MATERIAL SHALL BE COMPACTED TO AT LEAST 95% MODIFIED PROCTOR MAXIMUM DENSITY (ESTIMATED AT APPROXIMATELY 102% OF STANDARD PROCTOR MAXIMUM DENSITY FOR THE SITE SILTS) WITHIN 2H:1V SLOPE BENEATH ALL STRUCTURES OR ROADWAYS. ELSEWHERE, FILL AND FILTER MATERIAL SHALL BE COMPACTED TO NOT LESS THAN 90% MODIFIED PROCTOR.

FILL AND FILTER LAYERS SHALL BE PLACED IN MAXIMUM 8-INCH LOOSE LIFTS PRIOR TO COMPACTION. THINNER LIFTS MAY BE REQUIRED IF FIELD TESTS INDICATE INADEQUATE COMPACTION. THE ENGINEER SHALL OBSERVE ALL FILL PLACEMENT AND MAKE REGULAR FIELD DENSITY TESTS TO VERIFY THAT THE FILL IS BEING PLACED AND COMPACTED IN ACCORDANCE WITH SPECIFIED REQUIREMENTS.

MANHOLE ABANDONED, AS PER PLAN

This item shall consist of abandoning the manhole at Sta. 0+16 K (②) after the conduit from Sta. 0+20 K to Sta. 2+24 P is operational. This shall be accomplished by filling the manhole and drop pipe with granular material and Class C concrete as detailed on sheet No. 23.

Payment for all the above, including maintaining sewer flow while the portion of the manhole is being abandoned, shall be included in the unit price bid per each, item 202 Manhole Abandoned, as per plan.

DRAINAGE SYSTEM

A 12-INCH PERFORATED UNDERDRAIN PIPE SHALL BE INSTALLED ON THE ROCK BENCH AT THE TOE OF THE BUTTRESS, RUNNING FOR ITS ENTIRE LENGTH. THE PIPE SHALL BE SO LAID THAT THE PERFORATIONS ARE IN THE BOTTOM HALF OF THE PIPE AND SHALL BE INSTALLED AT A MINIMUM GRADE OF 0.33%.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

EXCAVATION SHALL BE MEASURED AND PAID FOR UNDER "ITEM 203, EXCAVATION, NOT INCLUDING EMBANKMENT CONSTRUCT, AS PER PLAN" AND SHALL INCLUDE BENCHING INTO INTACT, IN-PLACE ROCK, BELOW THE SLIDE PLANE AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

THE MATERIAL FOR THE DRAINAGE BLANKET SHALL BE MEASURED, IN CUBIC YARDS IN THE COMPLETED POSITION AND PAID FOR UNDER "ITEM 518, POROUS BACKFILL, AS PER PLAN".

THE UNDERDRAIN SHALL BE MEASURED AND PAID FOR UNDER "ITEM 605, 12" PIPE UNDERDRAIN, AS PER PLAN". EXCAVATION AND BACKFILL WILL BE PAID FOR SEPARATELY.

EMBANKMENT SHALL BE MEASURED IN THE COMPLETED POSITION AND PAID FOR UNDER "ITEM 203, EMBANKMENT A (OR B), AS PER PLAN".

PROTECTION OF EXISTING MONITORING DEVICES

EXISTING INCLINOMETERS AND PIEZOMETERS ARE LOCATED WITHIN THE PROJECT AREA, AS SHOWN ON PLAN SHEETS NOS. 17, 18, and 19, AND ARE BEING READ BY THE STATE ON A REGULAR SCHEDULE.

WHEREVER THESE MONITORING DEVICES WILL BE DISTURBED BY CONSTRUCTION THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PRESERVE THEM AS DIRECTED BY THE ENGINEER.

WHEN THE ELEVATION OF THE EXISTING GROUND, SIDEWALK, PAVEMENT, ETC. IS BEING CHANGED, THE CONTRACTOR SHALL ADJUST THE LENGTH OF THE TUBE AS REQUIRED AND AS DIRECTED BY THE ENGINEER.

IN THOSE AREAS WHERE THE TUBES WILL BE LOCATED IN NEW PAVEMENT OR SIDEWALK, ACCESS RECETACLES, TYPE 3 OR 4, AS SHOWN ON SHEET 128, SHALL BE INSTALLED.

ALL THE ABOVE WORK, INCLUDING LABOR, MATERIALS AND INCIDENTALS SHALL BE MEASURED AND PAID FOR UNDER THE LUMP SUM PRICE BID FOR "ITEM SPECIAL, PROTECTION OF EXISTING MONITORING DEVICES".

WATERING AND MOWING PERMANENT SEEDING 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	14 M Gal.
659 Mowing	30 M Sq Ft.

GENERAL NOTES

QUANTITIES
BY G.J.T. DATE 8-78
CHECKED W.W.C DATE 9-78

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
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DRAINAGE

REVIEW OF DRAINAGE FACILITIES

BEFORE ANY WORK IS STARTED ON THE PROJECT, AND AGAIN BEFORE FINAL ACCEPTANCE BY THE STATE, REPRESENTATIVES OF THE STATE AND THE CONTRACTOR ALONG WITH LOCAL REPRESENTATIVES 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. IN ADDITION TO THOSE SEWERS WITHIN THE WORK LIMITS, SEWERS IN MONASTERY STREET (SOUTH OF OREGON STREET), OREGON STREET, VAN METER STREET (BETWEEN STA. 18+25 AND STA. 20+65), AND BAUM STREET (EAST OF MONASTERY STREET) SHALL ALSO BE INSPECTED. THE CONDITION OF THE EXISTING CONDUITS AND THEIR APPURTENANCES SHALL BE DETERMINED FROM FIELD OBSERVATIONS. RECORDS OF THE INSPECTION SHALL BE KEPT IN WRITING BY THE STATE.
THE METROPOLITAN SEWER DISTRICT WILL PROVIDE, AT NO COST TO THE CONTRACTOR, TELEVISION TAPING EQUIPMENT AND PERSONNEL TO PERFORM THE ABOVE MENTIONED INSPECTIONS. THE CONTRACTOR WILL, HOWEVER, BE REQUIRED TO FURNISH THE NECESSARY VIDEO TAPE FOR THIS SERVICE. THE TYPE OF TAPE REQUIRED IS SONY, SERIAL NUMBER V-30H, BEING ONE-HALF INCH IN WIDTH AND GOOD FOR THIRTY MINUTES OF RECORDING. THE NUMBER OF REELS REQUIRED CAN BE ESTIMATED BY ASSUMING THAT ONE REEL WILL PROVIDE APPROXIMATELY 400 LINEAR FEET OF SEWER SURVEILLANCE.

ALL NEW CONDUITS, INLETS, CATCH BASINS AND MANHOLES CONSTRUCTED AS A 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 REASONABLE COMPARABLE TO THAT DETERMINED BY THE ORIGINAL INSPECTION. ANY CHANGE IN THE CONDITION RESULTING FROM THE CONTRACTOR'S OPERATIONS SHALL BE CORRECTED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER AT NO COST TO THE PROJECT.

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

CROSSING AND CONNECTIONS TO EXISTING PIPES AND UTILITIES

WHERE THE PLANS PROVIDE FOR PROPOSED CONDUIT TO BE CONNECTED TO, OR TO CROSS EITHER OVER OR UNDER AN EXISTING SEWER OR UNDERGROUND UTILITY, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE THE EXISTING PIPES OR UTILITIES BOTH AS TO LINE AND GRADE BEFORE HE STARTS TO LAY THE PROPOSED CONDUIT.

IF IT IS DETERMINED THAT THE ELEVATIONS OF THE EXISTING CONDUIT OR EXISTING APPURTENANCE TO BE CONNECTED TO DIFFERS FROM THE PLAN ELEVATION OR RESULTS IN A CHANGE IN THE PLAN CONDUIT SLOPE, THE PROJECT ENGINEER SHALL BE NOTIFIED BEFORE THE CONSTRUCTION ON ANY PORTION OF THE PROPOSED CONDUIT WHICH WILL BE AFFECTED BY THE VARIANCE IN THE EXISTING ELEVATIONS.

IF IT IS DETERMINED THAT THE PROPOSED CONDUIT WILL INTERSECT AN EXISTING SEWER OR UNDERGROUND UTILITY, IF CONSTRUCTED AS PER PLAN, THE PROJECT ENGINEER SHALL BE NOTIFIED BEFORE THE CONSTRUCTION OF ANY PORTION OF THE PROPOSED CONDUIT WHICH WILL BE AFFECTED BY THE INTERFERENCE WITH AN EXISTING FACILITY.

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

ITEM 603 - 36" CONDUIT, RADIUS, TYPE B, AS PER PLAN

THIS WORK SHALL BE DONE IN ACCORDANCE WITH ITEM 603 EXCEPT AS MODIFIED BELOW.

CONDUIT BENDS OF THE APPROPRIATE ANGLE MAY BE SUBSTITUTED FOR RADIUS CONDUIT. SEE DETAILS ON SHEET NO. 20.

TILE FOR SUBGRADE DRAINAGE

6 INCH DRAIN TILE, SECTION 706.07 OR 706.09 SHALL BE FURNISHED AND PLACED BY THE CONTRACTOR IN MANHOLES, CATCH BASINS AND INLETS FOR SUBGRADE DRAINAGE, WHERE AND AS DESCRIBED BY THE ENGINEER. PAYMENT FOR SAME SHALL BE INCLUDED IN PRICE BID PER "EACH" FOR ITEM 604 MANHOLES, CATCH BASINS AND INLETS.

SEWER HOUSE DRAINS

EXISTING HOUSE DRAINS: ALL EXISTING HOUSE DRAINS, WHICH INCLUDE SANITARY, YARD ROOF, BASEMENT OR OTHER SIMILAR PIPE DRAINS, NOW IN USE WHICH ARE DISTURBED BECAUSE OF THE HIGHWAY IMPROVEMENT, SHALL BE REPLACED BY THE CONTRACTOR. CARE SHALL BE TAKEN THAT NO DRAINS CARRYING SANITARY FLOW ARE CONNECTED TO STORM DRAINS. IF THE EXISTING SEWER IS TO BE ABANDONED, THEN A SATISFACTORY HOUSE CONNECTION SHALL BE PROVIDED. PAYMENT FOR THIS WORK SHALL BE AT THE CONTRACT UNIT PRICE BID PER LINEAR FOOT OF PERTINENT PIPE ITEM. UNRECORDED HOUSE DRAINS THAT ARE ENCOUNTERED DURING CONSTRUCTION AND REQUIRED TO BE REPLACED UNDER THE DIRECTION OF THE ENGINEER SHALL BE PAID FOR AS SPECIFIED.

PROPOSED HOUSE CONNECTIONS: THE CITY OF CINCINNATI WILL NOTIFY PROPERTY OWNERS IN ADVANCE OF CONSTRUCTION THAT, IF THEY CONTEMPLATE NEW HOUSE CONNECTIONS TO THE PROPOSED SEWER, THE PROPERTY OWNER MUST FURNISH, AT HIS SOLE COST, TEES OF THE PROPER SIZE AND MATERIAL TO THE CONTRACTOR. THE CONTRACTOR WILL THEN INSTALL THE TEES AS HE PROCEEDS WITH LAYING THE SEWER AND PAYMENT FOR THE WORK INVOLVED WILL BE AT THE SAME RATE AS THOUGH HE WERE FURNISHING AND LAYING STRAIGHT PIPE.

TO OBTAIN A HOUSE CONNECTION TO EITHER AN EXISTING SEWER THAT IS TO REMAIN OR TO A PROPOSED SEWER THE PROPERTY OWNER OR HIS AGENT, AT HIS SOLE COST, SHALL FURNISH ALL MATERIAL AND LABOR REQUIRED TO INSTALL HOUSE CONNECTION FROM THE CARRIER SEWER TO A POINT BEYOND THE LIMITS OF ROADWAY CONSTRUCTION.

UNRECORDED CONNECTIONS

ANY UNRECORDED ACTIVE CONNECTIONS TO A SEWER, ENCOUNTERED IN CONSTRUCTION, SHALL BE RECONNECTED TO THE EXISTING SEWERS AS DIRECTED BY THE ENGINEER. PAYMENT FOR THIS WORK, EXCEPT FOR WORK COVERED IN ITEM 202, SHALL BE AT THE CONTRACT PRICE BID FOR THE FOLLOWING ITEMS.

THE FOLLOWING ESTIMATED QUANTITIES OF THE VARIOUS ITEMS HAVE BEEN INCLUDED FOR USE, UNDER THE DIRECTION OF THE ENGINEER, TO REPLACE UNRECORDED HOUSE CONNECTIONS AND DRAINS ENCOUNTERED IN THE WORK AND REQUIRED TO BE REPLACED. NONE OF THIS MATERIAL SHALL BE ORDERED UNLESS DIRECTED BY THE ENGINEER.

ITEM 603	30'-6" CONDUIT, TYPE "B", 706.01 OR 706.08, WITH 706.11 OR 706.12 JOINTS
ITEM 603	30'-8" CONDUIT, TYPE "B", 706.01, 706.02 OR 706.08, WITH 706.11 OR 706.12 JOINTS
ITEM 603	20'-12" CONDUIT, TYPE "B", 706.01, 706.02 OR 706.08, WITH 706.11 OR 706.12 JOINTS
ITEM 602	1 CU. YD. CONCRETE MASONRY

PAYMENT FOR BENDS, BRANCHES AND STACKS SHALL BE INCLUDED IN THE PERTINENT 603 ITEM.

ANY NECESSARY CONNECTIONS TO COMPLETE THE WORK INVOLVED SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 603 CONDUIT TYPE "B".

COOPERATION BETWEEN CONTRACTOR AND PROPERTY OWNER

THE CONTRACTOR MUST COOPERATE WITH THE PROPERTY OWNER OR HIS AGENT TO GIVE SAID PROPERTY OWNER OR HIS AGENT AMPLE OPPORTUNITY FOR EXTENDING SAID SEWER CONNECTION FROM THE TEE BRANCH OR EXISTING SEWER TO A POINT BEYOND ROADWAY CONSTRUCTION LIMITS. THE NECESSARY HOUSE CONNECTIONS SHALL BE INSTALLED BY THE PROPERTY OWNER OR HIS AGENT AT NO COST TO THE CONTRACTOR, OTHER THAN THE COST OF COOPERATION IN SCHEDULING HIS WORK WHICH SAID COST SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THE VARIOUS PIPE ITEMS.

PRECAST CATCH BASINS

PRECAST CATCH BASINS WILL NOT BE PERMITTED IN THIS CONTRACT.

SEWER DETAILS

SHEETS NO. 53 THRU NO. 58 (SEWER DETAILS) CONTAIN SOME INFORMATION THAT DOES NOT APPLY TO THIS CONTRACT. THE CONTRACTOR SHOULD ONLY USE THOSE DETAILS SPECIFICALLY CALLED FOR IN THE PLANS.

REMOVAL OF PIPE, CATCH BASINS, MANHOLES AND INLETS

THE REMOVAL OF ALL PIPE DRAINS, CATCH BASINS, MANHOLES AND INLETS WHICH WOULD NORMALLY BE REMOVED IN VARIOUS EXCAVATION ITEMS SHALL BE INCLUDED FOR PAYMENT IN THE UNIT PRICES BID FOR THE RESPECTIVE EXCAVATION ITEMS, UNLESS OTHERWISE ITEMIZED IN THE PLANS.

REMOVAL OF EXISTING HOUSE DRAINS

THE REMOVAL, WHERE REQUIRED, OF ALL EXISTING HOUSE CONNECTIONS, WHICH INCLUDE SANITARY, YARD, ROOF, BASEMENT OR OTHER SIMILAR PIPE DRAINS WITHIN THE CONSTRUCTION LIMITS SHALL BE INCLUDED IN THE PRICE BID FOR ITEM 203 - EXCAVATION, NOT INCLUDING EMBANKMENT, UNLESS OTHERWISE ITEMIZED FOR PAYMENT IN THE PLANS.

STEPS IN INLETS AND CATCH BASINS

STEPS SHALL BE PROVIDED IN ALL INLETS OR CATCH BASINS WITH MINIMUM INTERIOR DIMENSIONS OF 2'-8" AND HAVING A DEPTH OF 4 FT. OR GREATER, OR AT THE DIRECTION OF THE ENGINEER. PAYMENT FOR THESE ITEMS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER EACH ITEM 604. THE STEPS SHALL BE BUILT IN ACCORDANCE WITH OSHA STANDARDS AS OF THE DATE OF THIS CONTRACT.

PIPE CUT-OFFS

WHEN BELL AND SPIGOT PIPE IS USED, ANY NECESSARY PIPE CUT-OFFS WILL BE MADE AT THE SPIGOT END OF THE LENGTH OF PIPE ADJACENT TO THE END LENGTH. WHEN TONGUE AND GROOVE PIPE IS USED, THE LENGTH OF PIPE NEXT TO THE END LENGTH SHALL BE CUT AND BUTT JOINT FORMED WITH A COLLAR AS DETAILED IN STANDARD DRAWING NO. MC-4. THE COST OF THE JOINT AND COLLAR SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID FOR THE PERTINENT 603 CONDUIT ITEM.

SEALING OF NEW PIPES

PLUGGING OR SEALING OF NEW PIPES WHERE REQUIRED, SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OUTLINED UNDER "PLUGGING OR SEALING SEWERS". PAYMENT FOR THIS WORK SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE PER LINEAR FOOT OF THE PERTINENT 603 CONDUIT ITEM.

SEWERS, MANHOLES AND CATCH BASINS

ALL EXISTING SEWERS, MANHOLES AND CATCH BASINS THAT ARE TO BE ABANDONED OR REMOVED AS PART OF THIS PROJECT ARE NOTED ON THE PLANS. EXISTING CATCH BASINS ARE GENERALLY 3 TO 4 FEET DEEP WITH CONNECTING PIPE FROM 3 TO 7 FEET DEEP. APPROXIMATE MANHOLE DEPTHS ARE SHOWN ON THE SUB SUMMARY SHEET. NO EXTRA PAYMENT WILL BE MADE IN THE EVENT THAT ADDITIONAL DEPTH IS ENCOUNTERED.

SEWERS THAT ARE TO BE ABANDONED SHALL BE SEALED IN ACCORDANCE WITH THE REQUIREMENTS OUTLINED UNDER "PLUGGING OR SEALING SEWERS".

PAYMENT FOR SEALING AND ABANDONING EXISTING SEWERS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID FOR ITEM 203, EXCAVATION. PAYMENT FOR REMOVAL OF EXISTING SEWERS, WHERE INDICATED ON THE PLANS OR DIRECTED BY THE ENGINEER, SHALL BE AT THE CONTRACT UNIT PRICES BID FOR ITEM 202, PIPE REMOVED, WHICH PRICE SHALL ALSO INCLUDE PLUGGING OR SEALING WHEN REQUIRED.

ITEM 605-6" UNCLASSIFIED PIPE UNDERDRAIN, AS PER PLAN

THIS WORK SHALL BE DONE IN ACCORDANCE WITH ITEM 605 EXCEPT AS MODIFIED AND AUGMENTED BELOW.

PIPE SHALL BE SLOTTED 6-INCH TYPE II POLYVINYL CHLORIDE, A.S.T.M. DESIGNATION D1785. SLOTS SHALL BE 0.020 INCH WIDE, 46 PER FOOT AND ARRANGED IN THREE ADJACENT ROWS. PIPE SHALL BE AS MADE BY HYDROPHILIC INDUSTRIES OR APPROVED EQUAL AND SHALL BE FURNISHED WITH ALL NECESSARY FITTINGS REQUIRED FOR CONNECTIONS TO THE 2" VERTICAL DRAINS BEHIND THE CYLINDER PILE WALL. PIPE SHALL BE INSTALLED WITH THE SLOTS ON THE UPPER HALF.

EXCAVATION FOR THE UNDERDRAIN SHALL NOT BE MADE UNTIL AFTER THE TIEBACKS FOR THE CYLINDER PILE WALL ARE INSTALLED AND TENSIONED. EXCAVATED MATERIAL SHALL BE STOCKPILED ADJACENT TO THE TRENCH AND NOT REMOVED UNTIL ALL BACKFILLING OPERATIONS ARE COMPLETE.

LOCATION AND SIZE OF EXISTING PIPE

THE LOCATION, TYPE, DEPTH AND SIZE OF ALL EXISTING PIPE AND HOUSE CONNECTIONS AFFECTED BY THIS PROJECT ARE SHOWN AS NEARLY EXACT AS AVAILABLE INFORMATION WILL PERMIT. THE STATE OF OHIO WILL NOT BE RESPONSIBLE FOR ANY VARIATION FOUND DURING CONSTRUCTION.

N24103

QUANTITIES
BY J.L.K. DATE 8-78
CHECKED W.W.C DATE 9-78

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM-471-0.24
PART ONE

DRAINAGE

PLUGGING OR SEALING SEWERS

SEWERS WHICH ARE TO BE ABANDONED SHALL BE PLUGGED OR SEALED WHERE THEY JOIN MANHOLES OR CATCH BASINS. ALL EXISTING SEWERS ENCOUNTERED IN CONSTRUCTION OPERATIONS, THAT ARE INACTIVE OR ARE TO BE ABANDONED AS DETERMINED BY THE ENGINEER, SHALL BE PLUGGED OR SEALED AT BOTH ENDS WHERE BROKEN INTO BEFORE PROCEEDING WITH BACKFILLING.

WHERE PLUGGING OR SEALING IS REQUIRED, PIPE SEWERS 12 INCHES OR LESS IN DIAMETER SHALL BE PLUGGED BY THE INSTALLATION OF A SUITABLE PRECAST CONCRETE OR VITRIFIED CLAY STOPPER. MASONRY AND PIPE SEWERS LARGER THAN 12 INCHES IN DIAMETER SHALL BE SEALED AT THE REQUIRED LOCATIONS BY THE CONSTRUCTION OF MASONRY BULKHEADS OF BRICK, STONE OR CONCRETE, HAVING A THICKNESS OF ONE-HALF OF THE SEWER DIAMETER, EXCEPT THAT THE MINIMUM THICKNESS SHALL BE 12 INCHES AND THE MAXIMUM THICKNESS SHALL BE 2 FEET.

PAYMENT FOR PLUGGING OR SEALING SEWERS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID FOR ITEM 203 EXCAVATION, NOT INCLUDING EMBANKMENT, UNLESS OTHERWISE SPECIFIED FOR PAYMENT IN THE PLANS.

INLET CONNECTIONS

12 INCH AND 15 INCH INLET CONNECTIONS AND CONNECTIONS FOR STRUCTURE DRAINAGE SHALL BE CONDUIT TYPE "B", 706.01, 706.02 OR 706.08, UNLESS OTHERWISE SHOWN ON THE PLANS.

VITRIFIED BRICK

WHERE CALLED FOR ON THE PLANS, VITRIFIED BRICK FOR SEWERS SHALL BE IN ACCORDANCE WITH SEC. 704.011 OF THE CITY OF CINCINNATI SUPPLEMENT TO STATE OF OHIO, DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS DATED JANUARY 1, 1979, A COPY OF WHICH IS ON FILE WITH THE ADMINISTRATOR OF CONTRACT SALES, DEPARTMENT OF TRANSPORTATION, 25 S. FRONT STREET, COLUMBUS, OHIO 43215.

CONNECTING OF PROPOSED CONDUIT TO EXISTING CONDUIT

WHERE A PROPOSED CONDUIT IS CONNECTED TO AN EXISTING CONDUIT, CONNECTIONS SHALL BE MADE BY USE OF A CONCRETE COLLAR AS PER MC-4 OR REINFORCED CONCRETE COLLAR AS PER PLAN.

KILGOUR STREET SEWER

THIS WORK SHALL BE DONE IN ACCORDANCE WITH ITEM 603 EXCEPT AS MODIFIED AND AUGMENTED BELOW.

THE TRENCH FOR THE SEWER ADJACENT TO THE CYLINDER PILE WALL SHALL BE SHEETED AND BRACED ON THE UPHILL SIDE. ITS WIDTH SHALL NOT EXCEED 12 INCHES BEYOND THE UPHILL SIDE OF THE SEWER WITH THE CYLINDER PILE WALL AND CAP SERVING AS THE DOWNHILL SIDE OF THE TRENCH AND ALSO AS A SUPPORT FOR THE BRACING.

THE SEWER SHALL BE CONSTRUCTED IN 32 FOOT INCREMENTS AFTER THE PILES AND CAP ARE CONSTRUCTED BUT BEFORE THE TIEBACKS ARE INSTALLED AND TENSIONED WITHIN THE SAID 32' UNIT.

GRANULAR MATERIAL SHALL BE USED FOR BACKFILL BETWEEN THE WALL AND UPHILL SIDE OF TRENCH (OR VERTICAL EXTENSION THEREOF IN FILL) AND SHALL EXTEND FROM BOTTOM OF TRENCH (OR EXISTING GROUND) TO TOP OF PROPOSED GRADING LIMIT. NO WATER SHALL BE USED IN ANY BACKFILLING OPERATION.

MAINTAINING TRAFFIC

THE CONSTRUCTION SCHEDULE AND REQUIREMENTS FOR MAINTAINING TRAFFIC SHOWN IN THESE GENERAL NOTES ARE INTENDED TO PROVIDE MINIMUM INCONVENIENCE TO TRAFFIC AT ALL TIMES. THE ORDER OF CONSTRUCTION WHERE SHOWN, INDICATES THE ORDER IN WHICH VARIOUS PHASES OF WORK SHALL BE UNDERTAKEN AND COMPLETED. SOME OF THE OPERATIONS CAN BE CARRIED ON SIMULTANEOUSLY. ANY MODIFICATIONS OF THE AFOREMENTIONED CONSTRUCTION SCHEDULE AND REQUIREMENTS FOR MAINTAINING TRAFFIC MUST BE APPROVED BY THE CITY MANAGER OF THE CITY OF CINCINNATI AND THE DIRECTOR IN WRITING.

THE CONTRACTOR SHALL MAINTAIN THE EXISTING PAVEMENTS WITHIN THE LIMITS OF THE WORK BY MAKING NECESSARY REPAIRS WITH BITUMINOUS MATERIAL WHEN REQUESTED BY THE ENGINEER. AN ESTIMATED AMOUNT OF ASPHALT CONCRETE, 404, HAS BEEN PROVIDED FOR THIS PURPOSE. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY ROADWAYS WHERE REQUIRED AND AS DIRECTED BY THE ENGINEER FOR THE PURPOSE OF MAINTAINING TRAFFIC. AN ESTIMATED AMOUNT OF ASPHALT CONCRETE, 404, AND AN ESTIMATED AMOUNT OF AGGREGATE BASE, ITEM 304, HAS BEEN PROVIDED FOR THIS PURPOSE. THE ASPHALTIC CONCRETE AND AGGREGATE BASE SHALL BE PAID FOR AT THE UNIT PRICE BID FOR ITEMS 404 AND 304. IN LIEU OF 404, AN APPROVED BITUMINOUS PRE-MIXED SURFACE COURSE FOR MAINTAINING TRAFFIC MAY BE USED AND PLANT INSPECTION IS WAIVED FOR EITHER OF THESE ITEMS.

LOCAL TRAFFIC ON ALL STREETS WITHIN THE LIMITS OF WORK AND ON ALL ADJACENT AND INTERSECTING STREETS SHALL BE MAINTAINED IN A MANNER CAUSING THE LEAST AMOUNT OF INCONVENIENCE TO THE ABUTTING PROPERTY OWNERS. TEMPORARY DRIVEWAYS SHALL BE CONSTRUCTED, MAINTAINED AND REMOVED BY THE CONTRACTOR AS DIRECTED BY THE ENGINEER. AGGREGATE AND CHLORIDE USED FOR MAINTAINING LOCAL TRAFFIC SHALL BE APPLIED ON TEMPORARY ROADWAYS AS DIRECTED AND IN THE AMOUNT REQUESTED BY THE ENGINEER AND SHALL BE PAID FOR AT THE UNIT PRICE BID FOR RESPECTIVE 410 AS PER PLAN AND 616 ITEMS. THE HARDNESS AND SOUNDNESS REQUIREMENTS OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS SHALL BE WAIVED FOR THE TRAFFIC COMPACTED SURFACE COURSE.

ESTIMATED QUANTITIES CARRIED TO GENERAL SUMMARY

ITEM 304	AGGREGATE BASE	25 CU. YD.
ITEM 410	TRAFFIC COMPACTED SURFACE TYPE A OR B, AS PER PLAN	25 CU. YD.
ITEM 410	TRAFFIC COMPACTED SURFACE TYPE C, AS PER PLAN	25 CU. YD.
ITEM 404	BITUMINOUS CONCRETE FOR MAINTAINING TRAFFIC	25 CU. YD.
ITEM 616	WATER	50 M. GAL.
ITEM 616	CALCIUM CHLORIDE	1 TON

PEDESTRIAN TRAFFIC SHALL BE MAINTAINED AT ALL TIMES ON KILGOUR STREET, OREGON STREET, AND BAUM STREET EAST OF MONASTERY STREET, AND BAUM STREET OR THE TEMPORARY CONNECTION, WEST OF MONASTERY STREET, BY USE OF THE EXISTING WALKS, PROPOSED WALKS OR TEMPORARY WALKS.

PEDESTRIAN TRAFFIC ON FIFTH STREET, BETWEEN EGGLESTON AVENUE AND KILGOUR STREET SHALL BE MAINTAINED AT ALL TIMES BY USE OF EXISTING WALKS OR THE TEMPORARY WALK AND STEPS AS SHOWN ON SHEET NO. 18 & 42.

TEMPORARY WALKS SHALL BE AT LEAST FIVE FEET WIDE AND MAY BE CONSTRUCTED OF WOOD, ASPHALTIC CONCRETE OR CONCRETE. STEPS SHALL BE CONSTRUCTED OF WOOD WITH RAILINGS ON BOTH SIDES. WALKS AND STEPS SHALL BE PROPERLY LIGHTED, BARRICADED AND KEPT CLEAN DURING THEIR ENTIRE PERIOD OF USE.

THROUGH TRAFFIC SHALL BE MAINTAINED ON FULL WIDTH OF STREETS AT ALL TIMES DURING THE CONSTRUCTION PERIOD EXCEPT AS PROVIDED IN THESE GENERAL NOTES.

KILGOUR STREET

KILGOUR STREET MAY BE CLOSED TO THRU TRAFFIC DURING CONSTRUCTION WORK IN THIS AREA. HOWEVER, AT LEAST ONE LANE MUST BE KEPT OPEN AT ALL TIMES FOR ACCESS BY THE POLICE AND FIRE DEPARTMENTS AND OTHER SERVICE VEHICLES.

FIFTH STREET

FIFTH STREET NORTH OF KILGOUR STREET MAY BE CLOSED PERMANENTLY WHEN REQUIRED FOR CONSTRUCTION WORK IN THIS AREA. FIFTH STREET BETWEEN EGGLESTON AVENUE AND KILGOUR STREET SHALL BE KEPT OPEN UNTIL THE CYLINDER PILE WALL IS CONSTRUCTED ACROSS FIFTH STREET AT WHICH TIME THIS PORTION OF THE STREET MAY BE CLOSED PERMANENTLY.

BAUM STREET

BAUM STREET WEST OF MONASTERY STREET MAY BE CLOSED PERMANENTLY WHEN REQUIRED FOR CONSTRUCTION WORK IN THIS AREA. HOWEVER, THE TEMPORARY CONNECTION TO VAN METER STREET MUST BE PARTIALLY COMPLETED (20-FOOT MINIMUM WIDTH) AND OPENED TO TRAFFIC BEFORE CLOSING BAUM STREET WEST OF MONASTERY STREET.

DURING CONSTRUCTION WORK AT THE INTERSECTION OF BAUM STREET, MONASTERY STREET AND THE TEMPORARY CONNECTION TO VAN METER STREET AT LEAST ONE 10-FOOT LANE OF USABLE PAVEMENT WIDTH SHALL BE KEPT OPEN TO TRAFFIC AT ALL TIMES.

MONASTERY STREET

TWO WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES EXCEPT DURING CONSTRUCTION WORK AT THE INTERSECTION WITH BAUM STREET AND THE TEMPORARY CONNECTION TO VAN METER STREET AT WHICH TIME TRAFFIC CAN BE REDUCED TO ONE 10-FOOT LANE OF USABLE PAVEMENT WIDTH.

OREGON STREET

TWO WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES EXCEPT DURING CONSTRUCTION WORK AT THE INTERSECTION WITH KILGOUR STREET WHEN TRAFFIC CAN BE REDUCED TO ONE 10-FOOT LANE OF USABLE PAVEMENT WIDTH.

WESTBOUND FORT WASHINGTON WAY

ONE WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES. DURING CONSTRUCTION WORK ON RETAINING WALL NO. 2 AT LEAST TWO 10-FOOT LANES OF USABLE PAVEMENT WIDTH SHALL BE KEPT OPEN TO TRAFFIC AT ALL TIMES. WESTBOUND FORT WASHINGTON WAY SHALL BE REOPENED FOR ITS FULL WIDTH AS SOON AS RETAINING WALL NO. 2 HAS BEEN COMPLETED.

PAYMENT FOR ALL THE ABOVE WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614, MAINTAINING TRAFFIC.

12" ALLOY STEEL, 707.11, OR GALVANIZED STEEL, 707.08, CONDUIT WITH WELDED JOINTS

WELDED JOINTS SHALL BE GROUND SMOOTH BEFORE PAINTING. WELDED JOINTS SHALL BE PAINTED IN ACCORDANCE WITH SECTION 514 FOR ALLOY STEEL PIPE. WELED JOINTS FOR GALVANIZED STEEL SHALL BE GIVEN TWO COATS OF AN APPROVED ZINC-RICH PAINT. THIS CONDUIT SHALL BE INSTALLED BY DRILLING THE ROCK OR OTHER MEANS AS APPROVED BY THE ENGINEER.

IN LIEU OF THE ABOVE REQUIREMENTS, THE CONTRACTOR MAY PLACE A 12" CONDUIT IN A 30" MIN. DIA. PREBORED HOLE. THE CONDUIT SHALL MEET THE REQUIREMENTS OF 707.05 OR 707.15 AND THE VOID OUTSIDE OF THE CONDUIT SHALL BE FILLED WITH GROUT CONSISTING OF 4 PARTS SAND TO 1 PART CEMENT.

PAYMENT FOR THIS ALTERNATE METHOD SHALL BE MADE AT THE UNIT PRICE BID PER LIN. FT. FOR ITEM 603 12" CONDUIT, ALLOY STEEL, 707.11 OR GALVANIZED STEEL, 707.08, WITH WELDED JOINTS, AS PER PLAN.

GENERAL NOTES

SUMMARY OF QUANTITIES
DRAINAGE

QUANTITIES
BY WWC DATE 5-78
CHECKED JLK DATE 5-78

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
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Sheet No.	M.H. to M.H., C.B. to C.B. or C.B. to M.H. Note:( ) denotes Metropolitan Sewer District responsibility.	ITEM 604 EACH: MANHOLE: A or P Double Drop	MANHOLE: A or P	MANHOLE: A or P Drop	MANHOLE: U	MANHOLE: M.H. Reconst. To Grade	MANHOLE: Remodel Bottom of Exist. M.H.	MANHOLE: Manhole Special W/ Sluice Gate	CATCH BASIN: C	CATCH BASIN: A-2	CATCH BASIN: V	CATCH BASIN: Std. 5B	CATCH BASIN: Std. 8	CATCH BASIN: M	CATCH BASIN: Special	202: Manhole Abandoned, as per plan	12" Type B 706.02 2500 D-Load W/706.11 Joints	15" Type C 706.02	12" Type C 706.02	15" Type B 706.02	12" Type B 706.02	12" Type B 706.02, 2500 D-Load	18" Type B 706.02, 1750 D-Load	14" Ductile Iron A.W.W.A Spec. C-151 (Thickness Class 56) W/Reinf. Conc Key Blocks @ Ea. Joint	24" Type B 706.02, W/706.11 Joints	12" Alloy Steel, 707.11 or Galv. Steel 707.08 W/ Welded Joints as Per Plan	36" Type B 706.02 1250 D-Load W/706.11 Joints	36" Radius Type B 706.02 1250 D-Load W/706.11 Joints As Per Plan	6" Type B 706.01 or 706.08 W/706.11 or 706.12 Joints	8" Type B 706.01, 706.02 or 706.08 W/706.11 or 706.12 Joints	12" Type B 706.01, 706.02 or 706.08 W/706.11 or 706.12 Joints	12" Type B, 706.02 W/706.11 Joints	24" Ductile Iron A.W.W.A. Spec. C-151 (Thickness Class 56)	24" Type B, 706.02 W/706.11 Joints	15" Type B 706.02, With 706.11 Joints	ITEM 602: Concrete Masonry Cu. Yds.
18	(1 to 2), 2A, 2B			(1)												(1)						8			(115)											
18	(2 to 3) & 3A		(1)									1										46			(100)											
18	(3 to 4) & 4A		(1)																			4			(98)											
18	(4 to 5), 5A (& House Conn.)	(1)							1													15			(243)				(36)							
18&19	(5 to 6 & House Conn.)		(1)																										(126)			(233)				
19	6 to 6A									1												15														
19	(6 to 15 & House Conn.)		(1)																										(90)			(142)				
18	(5 to 7)		(1)																														(16)	(82)		
18-20	(7 to 8), 8A & 8B		(1)																	4		4												(112)		
20	(8 to 9), 9A, 9B & 9C		(1)										1									64												(90)		
20	(9 to 10) & 10A		(1)																			4			(105)											
20	10 to 16, 16A & 16B		1																	4		4		30												
20	(10 to 11), 11A, & 11B		(1)																			8					(97)	(40)								
20	(11 to 12)					(1)	(1)																				(85)	(24)								
19	(27 to 13 to 14) & 14A			(1)		(1)	(1)										(48)					69			(23)											
19	15 to 15B to 15A									1	1								35			76														
19&20	16 to 17 & 17A							1														4	116													
19	17 to 18, 17 to 19		1												1				82							170										
17	20 to 21 & 21A			(1)																		4			(109)										(378)	
17	21 to 22		1																																	
17	24 to 23, 23C & 23D		1																	4		4		206												
17	23A to 23B to 23												1						97	113																
17	23 to 25		1																	112																
18	7 to 26, 26A & 26B		1																8	45																
18	26 to 26C, 26D & 26E												1					84	8																	
7	General Notes																												(30)	(30)	(20)					(1)
	TOTALS																																			
	Metropolitan Sewer District	1	9	2	1	2	2	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	132	661	0	132	64	282	30	20	375	16	284	378	1
	City of Cinti. Dept of Public Works	0	6	0	0	0	0	1	1	2	1	1	1	2	1	0	0	84	230	282		329	116	236	0	0	170	0	0	0	0	0	0	0	0	0	0

SUMMARY OF QUANTITIES

QUANTITIES
BY W.W.C. DATE 5-78
CHECKED J.L.K. DATE 5-78

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM-471-024
PART ONE

ITEM 202 REMOVED OR ABANDONED

Manhole Removal Designation on Plan Sheet	Location		See Sheet No.	Each	Depth
M1	Kilgour St. Sta. 2+90K	10'Rt.	18	(1)	12.1
M2	Kilgour St. Sta. 4+13K	10'Rt.	18	(1)	11.4
M3	Kilgour St. Sta. 8+86K	3'Lt.	19	1	8.7
M4	Kilgour St. Sta. 5+53K	9'Rt.	19	(1)	12.2
M5	Kilgour St. Sta. 6+41K	9'Rt.	19	(1)	11.6
M6	Monastery St. Sta. 9+93M	1'Rt.	18	(1)	12.7
	Sub Totals				
	Metropolitan Sewer District			(5)	
	City of Cincinnati Dept. of Public Works			1	
	Total to General Summary			6	

Note: ( ) denotes Metropolitan Sewer District responsibility.

Catch Basin Removal Designation on Plan Sheet	Location		See Sheet No.	Each
C1	Kilgour St. Sta. 3+85K	26'Rt.	18	1
C2	Kilgour St. Sta. 4+36K	27'Rt.	18	1
C3	Kilgour St. Sta. 4+15K	4'Rt.	18	1
C4	Kilgour St. Sta. 8+71K	8'Rt.	19	1
C5	Kilgour St. Sta. 8+89K	8'Rt.	19	1
C6	Oregon St. Sta. 9+01K	8'Lt.	19	1
C7	Kilgour St. Sta. 5+57K	3'Rt.	19	1
	Total to General Summary			7

Pipe Removal Designation on Plan Sheet	Location	Sheet No.	Pipe Removal Lin. Ft. 24" & Under	Pipe Removal Lin. Ft. Over 24"
P1	Monastery St. Sta. 9+93M - Sta. 10+00Rt.	18	30	
	Total to General Summary		(30)	

UNDERDRAINS

Symbol Designation Shown on Plan Sheet	Location Station to Station		Side	Sheet	12" Pipe As Per Plan (Lin. Ft.) Item 605 Underdrain	12" Pipe As Per Plan (Lin. Ft.) Item 603 Type F	6" Shallow Pipes (Lin. Ft.) Item 605 Underdrain	6" Shallow Pipes (Lin. Ft.) Item 603 Type F	6"X6"X60° Bend	12"X12"X90° Bend	6" Unclassified Pipe (Lin. Ft.) As Per Plan Item 605
U1	Kilgour St.	Sta. 2+15K - Sta. 4+50K	Lt.	18			235	3	1		
U2	Kilgour St.	Sta. 4+50K - Sta. 9+09K	Lt.	18 & 19			475	3	1		
U3	N.B. 471	Sta. 145+00N - Sta. 145+87N	Rt.	17	75	30				1	
U4	N.B. 471	Sta. 143+50N - Sta. 145+00N	Rt.	17	173	10					
U5	Cylinder Pile Wall	Sta. 3+36W - Sta. 10+85W	Lt.	18 & 19							749
U6	Cylinder Pile Wall	Sta. 10+85W - Sta. 14+35W	Rt.	19							350
	Total to General Summary				248	40	710	6			1099

ITEM 625 - LIGHTING

Location	1 1/2" Duct - Cable with 3 - #4 AWG 600 Volt Cables Lin. Ft.	Trench 24" Deep Lin. Ft.
145+70N to 146+90N, Rt.	130	120
146+90N to 148+59N, Rt.	172	162
148+59N to 150+28N, Rt.	172	162
Totals to General Summary	474	444

EARTHWORK C.Y.

Cross Sections	Sheet No.	Item 203 Embankment "A" As Per Plan	Item 203 Embankment "B" As Per Plan	Item 203 Embankment	Item 203 Excavation, Not Incl. Emb. Const.	Item 518 Porous Backfill As Per Plan
N.B. 471 Sta. 143+00 - Sta. 147+50	36-40	3,770	51,840		114,010	15,610
Kilgour St. Sta. 0+00 - Sta. 9+00	41-50			6,000	126,010	
Ramp P Sta. 7+50 - Sta. 10+47.11	51-52			1,210	4,500	
Totals to General Summary		3,770 C.Y.	51,840 C.Y.	7,210 C.Y.	244,520 C.Y.	15,610 C.Y.

Item 601 - Paved Gutter Type 2 Modified As Per Plan			Item 660 - Sodding		
Sh. No.	Location	Lin. Ft.	Sh. No.	Location	Sq. Yd.
19	8+64K, 24'Rt. to 10+47.10P, 8'Lt.	365	18	1+35K, 72'Rt. to 3+75K, 137'Rt.	222
17	145+92N to 149+43N, 24'Rt.	338	18&19	6+77M, 87'Rt. to 10+20M, 28'Rt.	332
			17&19	Along Paved Gutter: 1.5X703÷9	117
	Total to General Summary	703		Total to General Summary	671

Rev. 8-21-79

SUMMARY OF QUANTITIES

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
HAM-471-0.24
PART ONE

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QUANTITIES
BY WWC DATE 6-77 & 5-78
CHECKED REF. DATE 6-77
JLK 5-78

ITEM 402 - ASPHALT CONCRETE

Kilgour St.

Sta. 3+00.00K - Sta. 8+11.39K	511.39 X 20 =	= 10,228
Sta. 8+11.39K - Sta. 8+80.02K	75.64 x 11%00 X 20	= 1664
Sta. 8+80.02K - Sta. 9+25±K	44 X 0.5(20+22)	= 924
Deduct area of C.B.	3(4 X 15)	= -180
		12,636 S.F.

Volume = 12,636 X 1/12 X 1/27 = 39.0 C.Y.

Total to General Summary = 39 C.Y.

ITEM 301 - BITUMINOUS AGGREGATE BASE

Area from Item 402 calculations = 12,636 S.F.

Volume = 12,636 X 8/12 X 1/27 = 312.0 C.Y.

Total to General Summary = 312 C.Y.

ITEM 609 - CONCRETE CURB, STANDARD TYPE 6

Kilgour St.

Left Curb:	511.4 + 75.6 + 43.7	= 630.7 L.F.
Right Curb:	511.4 + 90.8 + 43.7	= 645.9
		1276.6 L.F.

Total to General Summary = 1277 L.F.

ITEM 310 - SUBBASE, TYPE II

Area from Item 402 calculations = 12,636 S.F.

Add for area under & beyond right Curb

1.50 (512 + 91+44) = 970

13,606 S.F.

Volume of 6" thick = 13,606 X 6/12 x 1/27 = 252 C.Y.

Area under left walk & Curb

8' Walk : 0.5 X8 + 6 X 0.5 X1 + 1.50 X1 = 8.50 S.F.

7' Walk : 0.5 X 7 + 5 X 0.5 X1 + 1.50 X 1 = 7.50

6' Walk : 0.5 X 6 + 4 X 0.5 X1 + 1.50 X1 = 6.50

8.50 X 500	= 4250 C.F.
7.50 X 68	= 510
6.50 X 145	= 943
	5703 x 1/27 = 211 C.Y.
Deduct volume under steps 6.2 X 0.5 X 0.5 X 6 X 1/27	= -4
	459 C.Y.

Total to General Summary = 459 C.Y.

ITEM 608 - CURB RAMP

N.W. Corner Temporary Connection & Monastery St.	1 Each
N.E. Corner Baum St. & Monastery St.	1
	2 Each

Total to General Summary = 2 Each

ITEM 608 - 4" CONCRETE WALK

Kilgour St.

Left walk:	Sta. 2+17K	- Sta. 7+17±K	500 X 7.5 ± = 3750 S.F.
	Sta. 7+17±K	- Sta. 7+85±K	68 X 6.5 ± = 442
	Sta. 7+85±K	- Sta. 8+80.02K	102 X 5.5 = 561
Right walk:	Sta. 3+00K	- Sta. 8+11.39K	511.39 x 4.88 = 2496
	Sta. 8+11.39K	- Sta. 8+96K	93 X 5.50 = 512
	Deduct Planting Areas		20 X 6 X 4.88 = -586
Oregon St. Walks:			2 X 43 X 5.50 = 473
Deduct Area of Driveway in Kilgour St.			7.5 X 0.5 (8+11) = -71
Deduct Area of Steps & cellar doors in Kilgour St. 8+12+8+16+15+10+15+12+16+10+4+19+6			= -151
Temporary Connection Sta. 16+93.58M - Sta. 18+50T 5.5(104.60 x 132/150+99) + 6.5(43 x 3.14 x 126.75/360)			= 1,360
N.E. corner Baum & Monastery 8 X 18 + 1/2 X 20 X 9 + 2/3 X 22 X 3 + 31 X 8 + 50 x 8			= 926
Deduct Steps 5 X 3 + 4 X 3 + 4 X 3 + 4 x 2 + 4 x 2			= -55
			9,657 S.F.

Total to General Summary 9,657 S.F.

ITEM 615 - TEMPORARY PAVEMENT, CLASS A, AS PER PLAN

Temporary Connection Sta. 15+70.29T - Sta. 18+50T	279.71 X 31	= 8,671 S.F.
N.W. corner Temporary & Monastery	11 X 0.5(49+51) + $\sqrt{24.5^2}$ X 0.889	= 1,116
Temporary Connection Sta. 14+63.5T - Sta. 15+70.29T	100.79 X 25±	= 2,520
N.E. Corner Baum & Monastery	11 X 0.5(18+27) + $\sqrt{24.5^2}$ X 0.037	= 270
		12,577 S.F.
		= 1397.4 S.Y.

Total to General Summary = 1398 S.Y.

ITEM 608 - 7" CONCRETE WALK, AS PER PLAN

Kilgour St.

Sta. 6+63K 7.5 X 0.5 (8+11) = 71.3 S.F.

Total to General Summary = 72 S.F.

ITEM 203 - SUBGRADE COMPACTION

Kilgour St.

Area of Item 402 = 12,636 S.F.

Area under curb

Right	0.50(511.4 + 90.8 + 43.7)	= 323
Left	0.50(511.4 + 75.6 + 43.7)	= 315
		13,274 S.F.
		= 1,475 S.Y.

Total to General Summary = 1,475 S.Y.

ITEM 606 - GUARD RAIL, TYPE 4

Temporary Connection
Sta. 14+80 - Sta. 18+45 = 381 L.F.

Total to General Summary = 387.5 L.F.

ITEM 202 - PAVEMENT REMOVED, AS PER PLAN

Fifth St. 28 X 300 = 8400 S.F.

Total to General Summary = 933 S.Y.

ITEM 202 - SIDEWALK REMOVED

Kilgour St.

Sta. 2+17K - Sta. 7+17K, Lt:	500 X 8 ±	= 4,000 S.F.
Sta. 7+17K - Sta. 7+85K, Lt.	68 X 7 ±	= 476
Sta. 7+85K - Sta. 8+06K, Lt.	20 X 14 + 1/2 X 7 X 2	= 287
Deduct Area of steps & cellar doors (See 608 Calc.)		= -151
Oregon St. Left	41 X 5	= 205
Right	52 X 5	= 260
N.E. Corner Baum & Monastery (See 608 Calc.)	526 - 39	= 487
		5,564 S.F.

Total to General Summary = 5,564 S.F.

ITEM 202 - CURB REMOVED

Oregon St., Kilgour St. to Baum St.		130 L.F.
Kilgour St. Left curb - Sta. 3+00K - Sta. 8+75K		579
Right curb - Sta. 3+00K - Sta. 3+97K		102
Right curb - Sta. 4+22K - Sta. 5+73K		159
N.E. Corner Baum & Monastery		70
Monastery St.	Sta. 16+05M - Sta. 16+93.58M, Lt.	89
Baum St.	Sta. 14+69.5 Sta. 15+10T, Lt.	41
		1,170 L.F.

Total to General Summary = 1,170 L.F.

ITEM 202 - PAVEMENT REMOVED

Oregon St.	57± X 24±	= 1368 S.F.
Parking Area & Drive, Corner Oregon & Kilgour 17X3+18X5+20X6+20X18+35X21+1/2 X 25 X 7 =		1,444
		2,812 S.F.
		= 313 S.Y.

Total to General Summary = 313 S.Y.

ITEM 202 - GUARD RAIL REMOVED

Kilgour St.

Sta. 8+13K - Sta. 9+00K 87.5 L.F.

Total to General Summary 87.5 L.F.

ITEM 659 - SEEDING AND MULCHING

Area at corner Kilgour & Oregon between walls & walk	(Planimeter)	= 4560 S.F.
Area between Oregon St. walk (or wall) & paved gutter to Sta. 10+50P±		15,600
		20,160 S.F.
Area from Kilgour St. Cross Sections		= 2,240 S.Y.
Area from N.B. 471 Cross Sections		= 4,136
		= 6,589
Total to General Summary 12,965 S.Y.		12,965 S.Y.

ITEM 659 - COMMERCIAL FERTILIZER

Rate of Application = 20 lbs per 1000 S.F. of Seeded Area

12,965 X 9 X 20 / 1000 X 2000 = 1.17 Ton

Total to General Summary = 1.17 Ton

ITEM 659 - AGRICULTURAL LIMING

Rate of Application = 100 lbs. per 1000 S.F. of Seeded Area

12,965 X 9 X 100 / 1000 X 2000 = 5.85 Ton

Total to General Summary 5.85 Ton

ITEM 615 - TEMPORARY ROADS, AS PER PLAN

Total to General Summary = Lump Sum

QUANTITIES
V.W.S. DATE 1-15-79
CHECKED WWC DATE 2-26-79

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM-471-0.24
PART ONE

GENERAL SUMMARY

ITEM	QUANTITY	UNIT	DESCRIPTION	CALC. SHEET NO.
			ROADWAY	
			TYPE CODE 7221	
202	933	Sq.Yd.	Pavement Removed, As Per Plan	11
202	5564	Sq. Ft.	walk Removed	11
202	1170	Lin. Ft.	Curb Removed	11
202	313	Sq. Yd.	Pavement Removed	11
202	87.5	Lin. Ft.	Guard Rail Removed	11
202	Lump Sum	Lump Sum	Structures Removed, As Per Plan	5
203	3770	Cu. Yd.	Embankment "A" As Per Plan	10
203	51840	Cu. Yd.	Embankment "B" As Per Plan	10
203	7210	Cu. Yd.	Embankment	10
203	244,520	Cu. Yd.	Excavation, Not Including Embankment Construction, As Per Plan	10
203	1475	Sq. Yd.	Subgrade Compaction	11
304	25	Cu. Yd.	Aggregate Base	8
404	25	Cu. Yd.	Bituminous Concrete for Maintaining Traffic	8
410	25	Cu. Yd.	Traffic Compacted Surface Type A or B, As Per Plan	8
410	25	Cu. Yd.	Traffic Compacted Surface Type C, As Per Plan	8
608	72	Sq. Ft.	7" Concrete Walk, As Per Plan	11
608	9657	Sq. Ft.	4" Concrete Walk	11
518	15610	Cu. Yd.	Porous Backfill, As Per Plan	10
606	387.5	Lin. Ft.	Guard Rail, Type 4	11
608	2	Ea	Curb Ramp	11
615	1398	Sq. Yd.	Temporary Pavement, Class A, As Per Plan	11
615	Lump Sum	Lump Sum	Temporary Roads, As Per Plan	11
Special	Lump	Lump	Protection of Existing Monitoring Devices	6
616	50	M. Gal.	Water	8
616	1	Ton	Calcium Chloride	8
			EROSION CONTROL	
			TYPE CODE Y005	
601	703	Lin. Ft.	Paved Gutter Type 2, Modified As Per Plan	10
659	14	M Gal.	Water	6
659	30	M Sq. Ft.	Mowing	6
659	12,965	Sq. Yd.	Seeding & Mulching	11
659	1.17	Ton	Commercial Fertilizer	11
659	5.85	Ton	Agricultural Liming, As Per Plan	11
660	671	Sq. Yd.	Sodding	10
207	2600	Sq. Yd.	Temporary Seeding & Mulching	6
207	170	Lin. Ft.	Temporary Slope Drains	6
207	850	Cu. Yd	Temporary Benches, Dikes, Dams & Sediment Basins	6
207	48	Each	Straw or Hay Bales	6

QUANTITIES
BY W.W.S. DATE 1-15-79
CHECKED WWC DATE 2-26-79

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
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PART ONE

GENERAL SUMMARY

ITEM	QUANTITY	UNIT	DESCRIPTION	90% FEDERAL 5% STATE and 5% METROPOLITAN SEWER DISTRICT	90% FEDERAL 5% STATE and 5% CITY OF CINCINNAI DEPARTMENT OF PUBLIC WORKS	CALC. SHEET NO.
			DRAINAGE			
			TYPE CODE 7221			
202	30	Lin. Ft.	Pipe Removed, 24" and under	30	—	10
202	6	Each	Manhole Removed	5	1	10
202	7	Each	Catch Basin Removed	—	7	10
603	48	Lin. Ft.	12" Conduit, Type B, 706.02 2500 D-Load with 706.11 Joints	48	—	9
603	40	Lin. Ft.	12" Conduit, Type F	—	40	10
603	6	Lin. Ft.	6" Conduit, Type F	—	6	10
603	116	Lin. Ft.	12" Conduit, Type B 706.02 2500 D-Load	—	116	9
603	375	Lin. Ft.	12" Conduit, Type B 706.02 with 706.11 Joints	375	—	9
603	84	Lin. Ft.	15" Conduit, Type C, 706.02	—	84	9
603	329	Lin. Ft.	12" Conduit, Type B, 706.02	—	329	9
603	230	Lin. Ft.	12" Conduit, Type C, 706.02,	—	230	9
603	170	Lin. Ft.	12" Conduit, Alloy Steel, 707.11, or Galvanized Steel, 707.08, with welded Joints, As Per Plan	—	170	9
603	282	Lin. Ft.	15" Conduit, Type B, 706.02	—	282	9
603	132	Lin. Ft.	14" Conduit, Ductile Iron A.W.W.A. Spec. C-151 with Reinforced Concrete Key Block's at each Joint, Class 56	132	—	9
603	236	Lin. Ft.	18" Conduit, Type B, 706.02, 1750 D-Load	—	236	9
603	661	Lin. Ft.	24" Conduit, Type B, 706.02, with 706.11 Joints	661	—	9
603	132	Lin. Ft.	36" Conduit, Type B, 706.02, 1250 D-Load with 706.11 Joints	132	—	9
603	64	Lin. Ft.	36" Conduit, Radius, Type B, 706.02, As Per Plan, 1250 D-Load with 706.11 Joints	64	—	9
604	1	Each	Manhole Special with Sluice Gate	—	1	9
604	15	Each	Manhole, Type A or P	9	6	9
604	2	Each	Manhole, Type A or P Drop	2	—	9
604	1	Each	Manhole, Type A or P, Double Drop	1	—	9
604	1	Each	Manhole Type U	1	—	9
604	2	Each	Manhole Reconstructed to Grade	2	—	9
604	1	Each	Catch Basin, Special	—	1	9
604	1	Each	Catch Basin, Type V	—	1	9
604	1	Each	Standard No. 8 Catch Basin	—	1	9
604	1	Each	Catch Basin, Type C	—	1	9
604	2	Each	Catch Basin, Type A-2	—	2	9
604	1	Each	Standard No. 5B Catch Basin	—	1	9
604	2	Each	Catch Basin, Type M	—	2	9
604	2	Each	Remodel Bottom of Existing Manhole	2	—	9
605	710	Lin. Ft.	6" Shallow Pipe Underdrain	—	710	10
605	248	Lin. Ft.	12" Pipe Underdrain, As Per Plan	—	248	10
605	1099	Lin. Ft.	6" Unclassified Pipe Underdrain, As Per Plan	—	1099	10
603	284	Lin. Ft.	24" Conduit, Type B 706.02 with 706.11 Joints	284	—	9
603	16	Lin. Ft.	24" Conduit, Ductile Iron A.W.W.A. Spec. C-151, Class 56	16	—	9
603	378	Lin. Ft.	15" Conduit, Type B 706.02 with 706.11 Joints	378	—	9
202	1	Each	Manhole Abandoned, as per plan	1		9
			SANITARY SEWERS			
			TYPE CODE Y060			
602	1	Cu. Yd.	Concrete Masonry	1	—	9
603	282	Lin. Ft.	6" Conduit, Type B, 706.01 or 706.08 with 706.11 or 706.12 Joints	282	—	9
603	30	Lin. Ft.	8" Conduit, Type B, 706.01, 706.02 or 706.08 with 706.11 or 706.12 Joints	30	—	9
603	20	Lin. Ft.	12" Conduit, Type B, 706.01, 706.02 or 706.08 with 706.11 or 706.12 Joints	20	—	9

CHECKED Y.W.S. DATE 1-15-79
CHECKED W.W.C. DATE 2-26-79

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
HAM-471-0.24
PART ONE

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GENERAL SUMMARY

ITEM	QUANTITY	UNIT	DESCRIPTION	CALC. SHEET NO.
			PAVEMENT	
			TYPE CODE 7221	
301	312	Cu. Yd.	Bituminous Aggregate Base: AC-20 RT-11 or RT-12	11
310	459	Cu. Yd.	Subbase, Type II	11
402	39	Cu.Yd.	Asphalt Concrete (AC-20)	11
609	1277	Lin. Ft.	Concrete Curb, Standard Type 6	11
			LIGHTING	
625	444	Lin.Ft.	Trench, 24" Deep	10
625	474	Lin.Ft.	1½" Duct Cable with 3 #4 AWG 600 Volt cables	10
614	Lump Sum	Lump Sum	Maintaining Traffic	
619	Lump Sum	Lump Sum	Field Office	
623	Lump Sum	Lump Sum	Construction Layout Stakes	
624	Lump Sum	Lump Sum	Mobilization	
			WALLS	
			For Estimated Quantities for Retaining Wall No.2 see Sh. No. 63	
			For Estimated Quantities for Retaining Wall No.9 see Sh. No. 68	
			For Estimated Quantities for Cylinder Pile Wall see Sh. No.100	
			For Estimated Quantities for Temporary Wall see Sh. No. 79	
			For Estimated Quantities for Tie Backs to Exist. Oregon St. Wall see Sh. No. 71	
			For Estimated Quantities for Retaining Wall No.1 see Sh. No.166	
			WATER WORKS	
			For Estimated Quantities See Sh. No. 31	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
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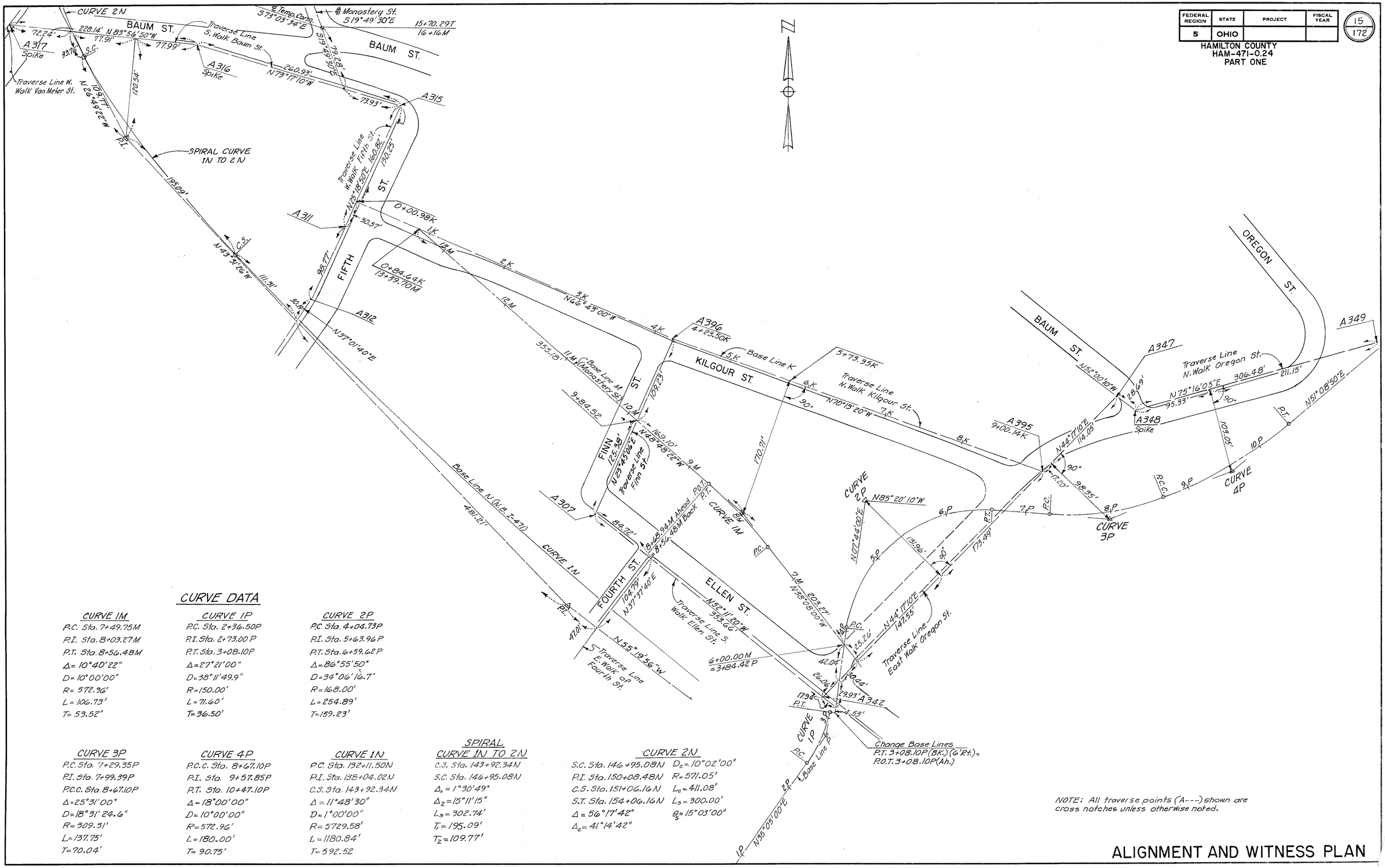
PART ONE



CURVE DATA

CURVE 1M
P.C. Sta. 7+49.75M
P.I. Sta. 8+03.27M
P.T. Sta. 8+56.48M
Δ = 10°40'22"
D = 10°00'00"
R = 572.96'
L = 106.73'
T = 53.52'

CURVE 1P
P.C. Sta. 2+36.50P
P.I. Sta. 2+73.00 P
P.T. Sta. 3+08.10P
Δ = 27°21'00"
D = 38°11'49.9"
R = 150.00'
L = 71.60'
T = 36.50'

CURVE 2P
P.C. Sta. 4+04.73P
P.I. Sta. 5+63.96P
P.T. Sta. 6+59.62P
Δ = 86°55'50"
D = 34°06'16.7"
R = 168.00'
L = 254.89'
T = 159.23'

CURVE 3P
P.C. Sta. 7+29.35P
P.I. Sta. 7+99.39P
P.C.C. Sta. 8+67.10P
Δ = 25°31'00"
D = 18°31'24.6"
R = 309.31'
L = 137.75'
T = 70.04'

CURVE 4P
P.C.C. Sta. 8+67.10P
P.I. Sta. 9+57.85P
P.T. Sta. 10+47.10P
Δ = 18°00'00"
D = 10°00'00"
R = 572.96'
L = 180.00'
T = 90.75'

CURVE 1N
P.C. Sta. 132+11.50N
P.I. Sta. 138+04.02N
C.S. Sta. 143+92.34N
Δ = 11°48'30"
D = 1°00'00"
R = 5729.58'
L = 1180.84'
T = 592.52

SPIRAL CURVE 1N TO 2N
C.S. Sta. 143+92.34N
S.C. Sta. 146+95.08N
Δ1 = 1°30'49"
Δ2 = 15°11'15"
Ls = 302.74'
T1 = 195.09'
T2 = 109.77'

CURVE 2N
S.C. Sta. 146+95.08N
P.I. Sta. 150+08.48N
C.S. Sta. 151+06.16N
S.T. Sta. 154+06.16N
Δ = 56°17'42"
Δc = 41°14'42"
Dc = 10°02'00"
R = 571.05'
Lc = 411.08'
Ls = 300.00'
θs = 15°03'00"

NOTE: All traverse points (A---) shown are cross notches unless otherwise noted.

ALIGNMENT AND WITNESS PLAN

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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HAMILTON COUNTY
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BENCH MARKS

LOCATION	ELEVATION
N.E. Corner Concrete Step P.L. Entrance No. 391 Baum St.	612.02
S.W. Corner Bottom Concrete P.L. Entrance step, S. Entrance No. 344 Kilgour St.	566.61
S.E. Corner Sandstone Window Sill No. 915 Monastery St.	636.22
N.W. Corner Concrete Footer of First Light Standard S. of Pedestrian Bridge at Court St. Eastside I-71	565.69
S.W. Corner Concrete Footer of 8" Metal Light Standard, N.E. Corner Eggleston Ave. & Sentinel St.	521.23

LEGEND

	Item 402	1" Asphalt Concrete (AC-20)
	Item 301	3" (except as noted) Bituminous Aggregate Base: 702.01 (AC-20) or 702.09, RT-11 or RT-12
	Item 310	6" (except as noted) Subbase, Type II
	Item 608	4" Concrete Walk
	Item 608	7" Concrete Walk, As Per Plan
M1	Indicates	Manhole to be removed or abandoned
C1	Indicates	Catch Basin or Inlet to be removed
P1	Indicates	Pipe to be removed
U-2	Indicates	Underdrain

UTILITY OWNERS

UTILITY	OWNER	ADDRESS
Gas & Electric	Cincinnati Gas & Electric Co.	4th & Main St. Cincinnati, 2 Ohio
Water	Cincinnati Water Works	4747 Spring Grove Ave. Cincinnati, Ohio
Storm Sewers	Division of Engineering	City Hall, Cincinnati, 2 Ohio
Telephone	Cincinnati Bell	225 E. 4th. St. Cincinnati, 2 Ohio
Sanitary and Combined Sewers	The Metropolitan Sewer District of Greater Cincinnati	1600 Gest St. Cincinnati, 4 Ohio

UTILITIES, BENCH MARKS & LEGEND

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
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PART ONE

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N

MONASTERY ST.

TEMP. CONN. CURVE DATA
℄ R=150'
Δ=39°57'21"
L=104.60'
T=54.53'

℄ Exist. Bracket Arm on Wall-Sta. 150+28N

VAN METER ST.

172 L.F. Duct-Cable

149N

CONST. LIMIT

℄ Exist. Light Pole on Wall Sta. 148+59N

148N

Ex. Ret. Wall No. 9

172 L.F. Duct-Cable

Prop. 14" Cond.

Prop. 12" Cond. Type B (4 L.F.)

Ex. 4" G.M.

Exist. St. Wall

Exist. R/W

Temp. R/W

4" G.M. Above Ground

Exist. St. Wall

Exist. R/W

CONST. LIMIT

P.C.C. 18+50 Van Meter

P.T. 17+45.90T

Built Joint as per Std. Dwg. BP-5

Plug & Abandon

Ex. 15" P.S.

TEMPORARY CONNECTION

Temporary Wall (See Sh. 78)

FUTURE VAN METER ST.

Ex. 15" P.S.

BAUM ST.

Meet. Exist.

Ex. 18" P.S.

Built Joint as per Std. Dwg. BP-5

#902 3.5ft. Br.

#512 2.5ft. Br.

16+16.14M 15+70L.29T

R=25'

4" G.M. above Ground

Ex. 15" P.S.

Built Joint as per Std. Dwg. BP-5

14+69.5T

Conc. Wall

St. Wall

Ex. 24" P.S.

Ex. 12" P.S.

Ex. 15" P.S.

R=25'

193.58M

+46.36ct

Type 2 Curb Ramps as per Std. Dwg. BP-12

Guard Rail Type 4

3" G.M.

W.V.B.

Ex. 12" P.S.

C.W.

FUTURE MONASTERY ST.

Ex. 30" Br. S.

W.V.B.

F.H.

St. Wall

Ex. 6" G.M.

Ex. 3" G.M.

Ex. 6" W.M.

Ex. 12" P.S.

Ex. 6" W.M.

Ex. 4" G.M.

W.V.B.

M.H.

KILGOUR ST.

C.B.

C.B.

Cylinder Pile Wall (See Sh. 95)

#393-9 1St. Sh. Razed

▲ Existing Inclinometer or Piezometer

BUTTRESS FILL
For Cross Sections see Sh. 36-40

Prop. 12" Cond. Type B (4 L.F.)

G.W.M.

G.G.M.

See Detail A on Sh. No. 59

Plug

Ex. 12" P.S.

147N

℄ Future Light Pole on Wall Sta. 146+90N

For Continuation See Sh. No. 22

130 L.F. Duct-Cable

Type 2 Modified Paved Gutter

Ret. Wall No. 9 (See Sh. 65)

Plug End

Rock Bench Elev. 530±

Rock Bench Elev. 520±

Prop. 12" Cond. Type C (37 L.F.)

12" Underdrain As Per Plan (See Sh. 36-40)

U-3

U-4

146N

145+70N, 15' Rt.- Install 18" Sq. Conc. Pull Box (Furnished by the State) Incidental to Duct Cable.

FUTURE N.B. I-471

145N

144N

143N

Footing for Future Sixth St. Bridge

Footing for Future Ret. Wall No. 13

Prop. 15" Cond.

Prop. 15" Cond. (113 L.F.)

CONST. LIMIT

Prop. 12" Cond. Type B (4 L.F.)

Prop. 15" Cond. Type B (4 L.F.)

Plug Ends

Prop. 1 St Cond.

For continuation see Insert A at left

FUTURE RAMP A

To 24

CONST. LIMIT

FIFTH Moe Pavt.

Conc. Curb

Conc. Curb

C.W.

C.B.

Notes: For Ret. Wall No. 9 Plans see Sh. 65
For Temp. Wall Plans see Sh. 78
For Sewer Profiles See Sh. 22-26
For Temp. Conn. Profile See Sh. 21
For Quantities see Sh. 9-11

▲ A-6

INSERT A

To 23

Prop. 1St Cond.

CONST. LIMIT

Remove 4 L.F. 15" Conduit

Exist. 15" Conduit

Exist. Catch Basins

FUTURE S.B. I-471

142 S

141 S

VAN METER ST. – BAUM ST
TEMPORARY CONNECTION

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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HAMILTON COUNTY
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PART ONE

18/172

BAUM ST.

KILGOUR ST.

ST.

E. FIFTH

FINN ST.

FUTURE N.B. I-471

FUTURE MONASTERY ST.

TUNNEL (See Sh. 95)

Note: Construction Limit shown is for surface work only.

Note: This sewer is to be maintained until proposed conduit in Kilgour St., Monastery St. and Ramp P is operational.

NOTES
For Sewer Profiles See Sh. 22-26
For Quantities See Sh. 9-11

N. CURB CURVE DATA
$D_c = 3°00'$
$R = 1909.86'$
$\Delta = 3°30'20''$
$T = 58.44'$
$L = 116.85'$

KILGOUR ST.
STA. 0+00 TO STA. 5+50

FEDERAL REGION 5
STATE OHIO
PROJECT
FISCAL YEAR
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HAMILTON COUNTY
HAM-471-0.24
PART ONE
BAUM ST.
OREGON ST.
W.B. FT. WASHINGTON WAY
E.B. FT. WASHINGTON WAY
COLUMBIA PARKWAY
Note: Modify C.B. 6A & adjust 12"conduit as required to miss exist. 8"WM.
TUNNEL (See Sh. 95)
Exist. R/W
Razed
Prop. 6"Cond. Type B with 706.11 or 706.12 Joints (18 L.F.) Typ for House Connection
Ex. House Conn. (Typ.)
Prop. 12"Cond. (15 L.F.)
Seal & Abandon
Exist. Soldier Pile Wall Bracing- HP14 x 117 (Buried)
6" Underdrain (Unclassified) As Per Plan
Exist. 3'-4' wide sheet Pile Reaction
Note: This existing Soldier Pile & bracing to be removed. For Sequence of removal and removal Quantities See Sh. 102 & 127)
Exist. Soldier Piles @6'Ctrs.-HP14 x 117 with 3" wood lagging
Conc. Cylinder Piles (Typ.)
Remove Exist. Guard Rail
Remove Conc. Wall
Remove Conc. Pav't.
P.T. 8+80.02 K 24.27' Lt.
P.C. 8+11.39 K 3' Rt.
Butt Joint as per Std. Dwg. BP-5
Meet Exist. Pav't. Curbs & Sidewalks (See Sh. 59 for location)
Metal Plate Over G.M. C-1
Remove Ex. Asp. Curb.
Ventilation Shaft & Building (For Details see Sh. 162)
Remove 65' conc. railing from ex. ret. wall (incl. in "Structures Removed, As Per Plan."
Ex. 12" C.I. Pipe encased in concrete under wall.
Prop. 14" Cond. Contractor to maintain flow while cylinder piles 148 & 149 are being constructed.
Prop. 12" Cond. (69 L.F.)
CONST. LIMIT
END WORK
Ret. Wall No. 2 (See Sh. 62)
P.T. 10+47.10P
P.C.C. 8+67.10P
P.C. 7+29.35P
P.T. 6+59.62P
Type 2 Modified Paved Gutter
Wall Ref. Line W
Reconst. to Grade, Remodel Bottom
Beam Guard Rail on Barrels
Remove exist. ret. wall. See Sh. 62-64 & 72 for pay item & sequence of const.
℄ & Curb Line Future Ramp P
NOTE: Underdrains U-5 & U-6 in front of Cylinder Pile Wall to be installed @ +0.2 % east and west of M.H. 19. However if top of rock along front of wall is sloping at a steeper grade, install underdrains along top of Rock.
For details of Underdrains U-5 & U-6 see Sh. 42 & 46
CURVE DATA KILGOUR & OREGON ST.
North Curb
R = 100'
Δ = 43°20'14"
T = 39.73'
L = 75.64'
8' Min. Sodding
Drainage Ditch
Prop. 24" Cond.
NOTES
For Sewer Profiles see Sh. 22-26
For Quantities see Sh. 9-11
KILGOUR ST.
STA. 5+50 TO STA. 9+00


FEDERAL REGION | STATE | PROJECT | FISCAL YEAR
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HAMILTON COUNTY
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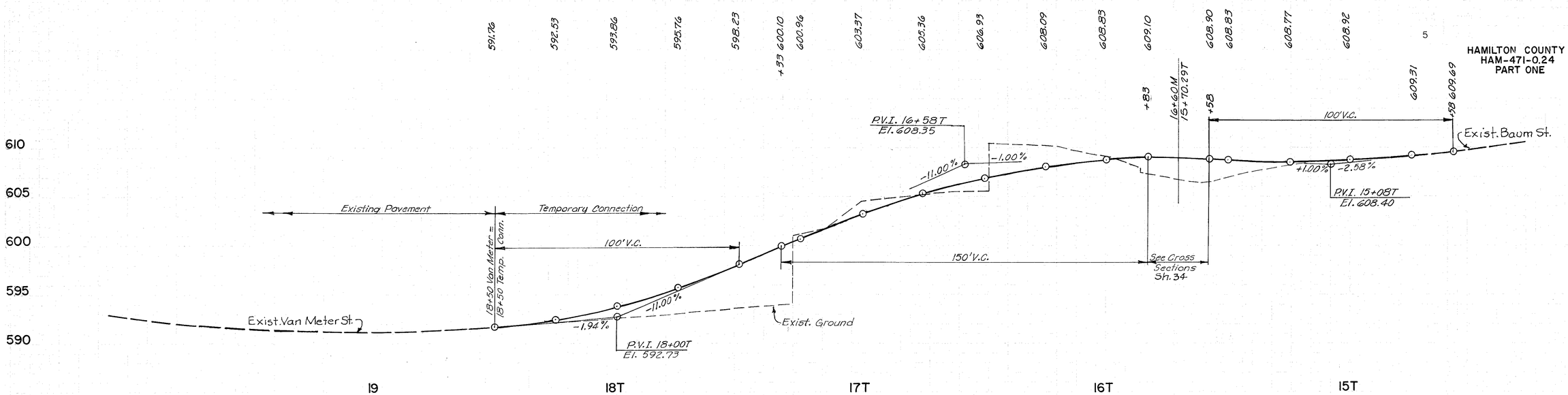
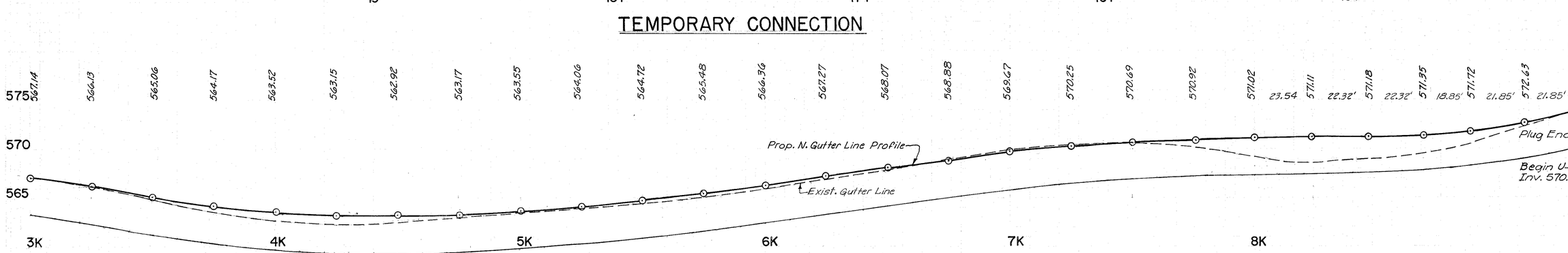
PART ONE
FINN ST.
Ex.12" P.S.
C.W.
M.H.
CONST. LIMITS
Limest. Curb
St. Wall
Aband. 6" W.M.
Ex. 12" P.S.
WVB
ELLEN ST.
Mac. Pavt.-Conc. Curbs
Aband. 3" G.M.
C.H.
Sign
P.T. 8+56.48 Back=
8+68.94 Ahead
Prop. 12" Cond. (4L.F.)
Prop. 15" Cond. (4L.F.)
8A
8
8B
8M
FUTURE
MONASTERY ST.
Drainage Ditch
8' Min. Sodding
Prop. 24" Cond.
Prop. 12" Cond.
(56L.F.)
9
9C
9A
9B
P.C. 7+49.75M
Prop. 12" Cond. (4L.F.)
7M
Prop. 24" Cond.
Prop. 12" Cond.
(4L.F.)
Prop. 12" Cond. (4L.F.)
Prop. 12" Cond.
Prop. 15" Cond.
(4L.F.)
16A
16B
16
Prop. 18" Cond.
P.C. 4+04.73P
10
10A
Plug
(Typ.)
4P
5P
6M
6+00.00M
3+84.42P
Prop. 36" Cond.
Note: This sewer is to be maintained until proposed conduit in Monastery St. and Ramp P is operational.
Ex. 12" P.S.
Prop. 12" Cond.
4 L.F.
11
11A
11B
M.H.
P.T. 3+08.10P
3P
6'
CONST. LIMITS
CURVE DATA FOR *
36" CONDUIT @ M.H. 10
P.I. 6+03.46M, 5' Rt.
Δ = 45°52' T = 21.16'
R = 50' L = 40.03'
Ex. Conc. Ditch
Existing Piers for Columbia Parkway (Typ.)
FUTURE
RAMP L
Exist.
Abut.
Ex. 12" P.S.
W.B. FT. WASH. WAY
Ex. 27" P.S.
Exist. Abut. Ft. Wash. Way
Ex. 15" P.S.
5M
Ex. 18" P.S.
Ex. 30" P.S.
4M
Existing Piers for Ft. Washington Way (Typ.)
Remodel M.H. Bottom,
Reconstruct to Grade
CURVE DATA FOR *
36" CONDUIT @ M.H. 12
P.I. 2+55.37P, 17' Rt.
Δ = 27°21' T = 12.17'
R = 50' L = 23.87'
139N
138N
137N
136N
135N
134N
133N
N.B. 471
TEMPORARY ROAD
N.B. 471
135 S
134 S
133 S
132 S
131 S
130 S
S.B. 471
TEMPORARY ROAD
S.B. 471
Exist. Shoulder & Curb
Ex. 18" P.S.
Ex. 15" P.S.
C.B.
Ex. 15" Cond.
Exist. Abutment for HAM-471-0000
P.C. 2+36.50P
12
Ex. 12" Cond.
2P
1P
FUTURE RAMP P
Ex. 36" Cond.
Exist. Piers for HAM-471-0000
Ex. 36" P.S.
130J
129J
130+31.89 J
3+27.45M
RAMP J
FUTURE MONASTERY ST.
℄ Prop. 24" Cond.
M.H. #10
℄ Prop. 36" Cond.
Sta. 6+13.13M, 5' Rt.
P.I. 11°28' Bend
Sta. 6+07.23M, 3.80' Rt.
P.I. 11°28' Bend
6.02'
Sta. 6+01.68M, 1.46' Rt.
P.I. 11°28' Bend
Sta. 5+96.72, 1.94' Rt.
P.I. 11°28' Bend
M.H. #11
Sta. 2+56.48P, 16.78' Rt.
P.I. 13°40'30" Bend
℄ Prop. 36" Cond.
7.19'
Sta. 2+50.08P, 17.69' Rt.
P.I. 13°40'30" Bend
M.H. #12
FUTURE RAMP P
℄ Exist. 36" Cond.
* ALLOWABLE BENDS IN PLACE OF RADIUS PIPE
NOTES
For Sewer Profiles See Sh. 22-26
For Quantities See Sh. 9-11
MONASTERY ST.
& RAMP P

HAMILTON COUNTY
HAM-471-0.24
PART ONE



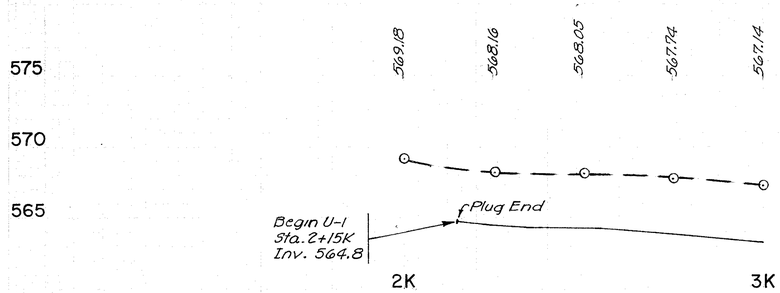
TEMPORARY CONNECTION



KILGOUR STREET

Outlet U-1 @ C.B. 5A Inv. 559.1

Outlet U-2 @ C.B. 5A Inv. El. 559.1



TEMPORARY CONNECTION & KILGOUR STREET

HAMILTON COUNTY
HAM-471-0.24
PART ONE

EGGLESTON AVE.
VAN METER ST.
LOCK ST.
BAUM ST.
RELOCATED VAN METER ST.
FUTURE S.B. I-471
FUTURE N.B. I-471
143 S
144 S
145 S
147 N
148 N
Ex. 12" P.S.
Ex. 24" P.S.
Ex. 12" W.M.
Aband. 20" W.M.
Ex. 20" W.M.
Ex. 36" P.S.
Ex. 48" W.M.
Ex. 12'-0" Storm Sewer
Ex. Penn. R.R. Tracks
Ex. Elec. Cond.
Ex. Tel. Cond.
Ex. Tel. M.H.
Ex. Elec. M.H.
C.G.&E.Co. Box
Canal Race
Conc. Walk
Conc. Curb
Ex. 20" G.M.
Ex. 4' Br. S.
Aband. 3" G.M.
Aband. 6" W.M.
Aband. 40" W.M.
Aband. 4" G.M.
Aband. 6" W.M.
Ex. 12" P.S.
Ex. 24" P.S.
Ex. 24" W.M.
Traffic Controller
Tel. M.H.
Ex. Tel. Cond.
Ex. Ramp A Pier Cols.
Ex. Ramp A Abut & Wings
Ex. 15" P.S.
Conc. Walk
Drive
St. Wall
Conc.
Ex. 3" G.M.
Macadam Pavt. W/ Conc. Curbs
Ex. 6" W.M.
Ex. 24" P.S.
Ex. 24" P.S.
Ex. 6" G.M.
Plug
Prop. 15" Conduit
Prop. 14" Conduit
Ex. Ret. Wall No. 9
Type 2 Mod. Paved Gutter
Ex. Guard Rail
Ex. Conc. Walk
Ex. Conc. Port. & Curbs
Ex. 15" P.S.
Ex. Conc. Walk
St. Walls
Ex. 4" G.M.
4" G.M. Above Ground
1.5 Ft. Ff.
Mac.
Ref. Wall No. 9 (See Sh. 65)
Prop. 12" Cond. Type B (4 L.F.)
Ex. 4" W.M.
Ex. 12" P.S.
Ex. 3" G.M.
Mac. Pavt. W/ Conc. Curbs
Aband. 12" P.S.
Temporary Wall For Buttress Fill
Conc. Walk
Ex. 15" P.S.
M.H.
℄ Van Meter St.
Seal & Abandon
T/C 592.09
Top of Rock
M.H. A or P
18+25 Van Meter (10'R)
Inv. 14" 578.65
Inv. Ex. 15" 578.65
Retaining Wall No. 9
T.C. 548.54
1 Ft. min. clearance with sand cushion
M.H. U
147+45, N.B. I-471 (13'Rt.)
Inv. 14" 532.87
Inv. 15" 532.79
Inv. 12" 535.04
378 L.F. 15" @ 6.20%
Type B 706.02, 1500 D-Load, with 706.11 Joints
109 L.F. 14" @ 42.0%
Ductile Iron Pipe
A.W.W.A. Spec. C-151, with Reinf. Conc. Key Blocks @ every Joint.
Ex. Ground
Future Grading
VAN METER ST.
BAUM ST.
S.B. I-471
N.B. I-471
T/C 519.37
EGGLESTON AVE.
Ex. M.H.
23+09 Eggleston (25'Rt.)
Inv. 15" In 509.35
Inv. Ex. 48" Out 499.18
Ex. 48"
590
580
570
560
550
540
530
520
510
500

VAN METER ST.-EGGLESTON AVE.
SEWER CONNECTION

5

HAMILTON COUNTY
HAM-471-0.24
PART ONE

1 2 3 4 5

115 L.F. 24" @ 11.10 %
Type B 706.02,

100 L.F. 24" @ 8.40 %
Type B 706.02,

98 L.F. 24" @ 9.00%
Type B 706.02,

243 L.F. 24" @ 2.10%
Type B 706.02,

590 580 570 560 550 540

Ex. 24" @ 9.73 %

T/C 583.68

Note: Use 706.11 Joints for conduit between M.H. 1 and M.H. 5

Stage I flow

Stage II flow

T/C 575.15

T/C 569.12

Exist. Fifth St.

Abandon this portion of manhole after conduit is operational to M.H. 12 See Detail at right.

Exist. Ground

Exist. Kilgour St.

Prop. Grade

T/C 563.34

24" Conduit

M.H. A or P
1+09K (9' Rt.)
Inv. 24" 563.54
Inv. 12"(E) 568.08

Approximate House Conn.

Form channel in conc. slab

PLAN

9" Min. Cl. C Conc. Slab

Abandon Manhole (Fill Cavity) with granular material

ELEVATION

M.H. A or P
2+05K (18' Rt.)
Inv. 24" 554.72
Inv. 12"(N) 562.12

Ex. M.H.
-0+02K (142' Lt.)
Inv. Ex. & Prop. 24"
El. 584.59

M.H. A or P Drop
0+16K (30' Lt.)
Inv. 24" 571.94
Inv. Ex. 30" (N & S) 559.09
Inv. 12" 576.68 E
Inv. 12" 576.68 NW

M.H. A or P Double Drop
4+47.50K (18' Rt.)
Inv. 12"(E) 549.13
Inv. 24"(W) 549.63
Inv. 24"(S) 537.12
Inv. 12"(N) 556.15

24 23 25

206 L.F. 18" @ 1.40%
Type B 706.02,
1750 D-Load

112 L.F. 15" @ 1.00 %
Type B 706.02,

T/C 535.29

T/C 531.00

FUTURE RAMP A

FUTURE N.B. I-471

Exist. Ground

Prop. Ground

Future Grading

Remove 4 LF 15" Conduit

23 C

23 D

23 B

FUTURE S.B. I-471

Exist. C.B.

535 530 525 520 515

Exist. C.B.
145+10N (200' Lt.)
Inv. 18" 513.59

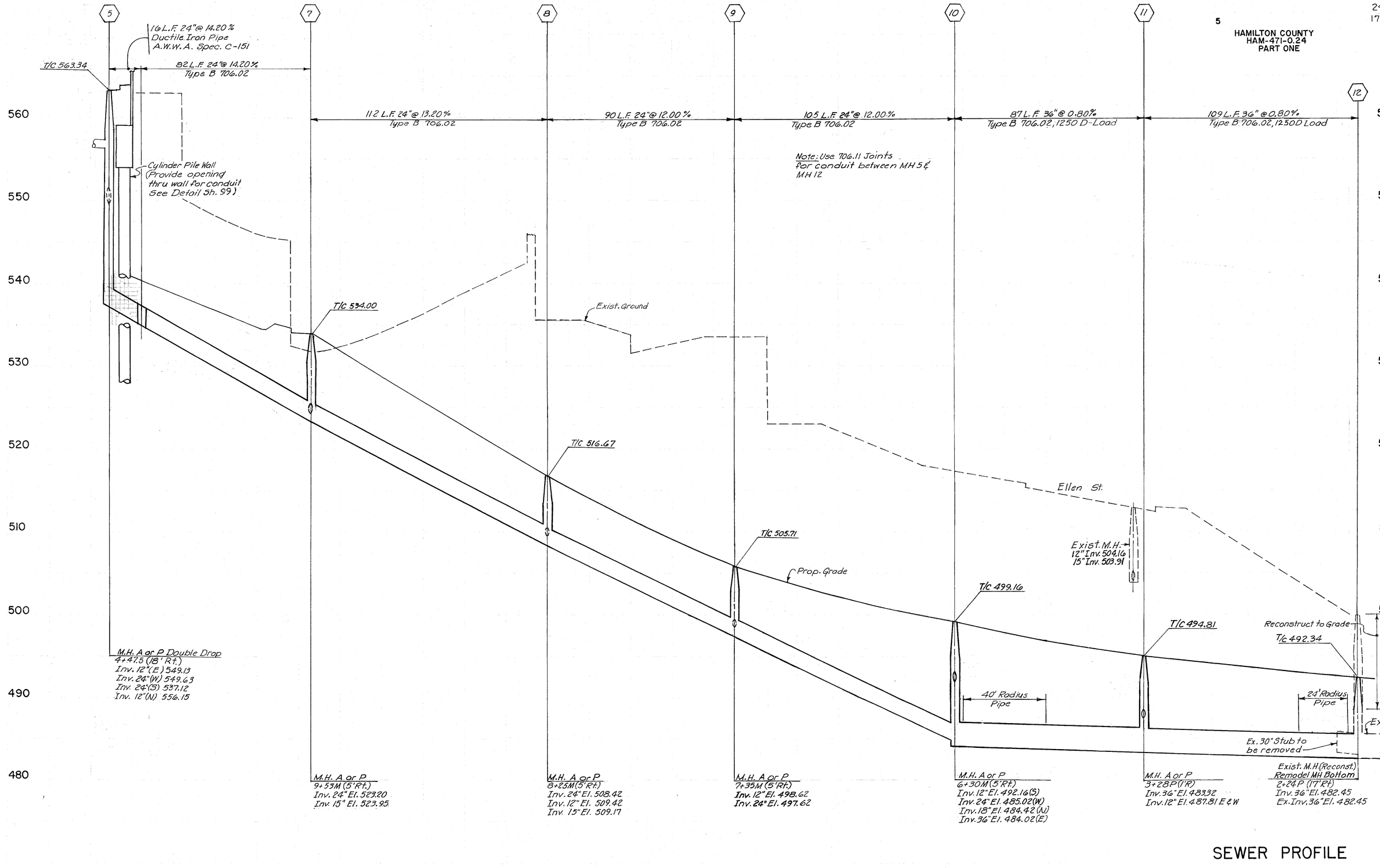
M.H. A or P
144+00N (36' Lt.)
Inv. 15" 516.72
Inv. 12"(NW) 524.00-C
Inv. 15"(N) 521.15 -B
Inv. 15"(E) 521.15 -D
Inv. 18" 516.47

M.H. A or P
145+00N (15' Rt.)
Inv. 15" (S) 517.84
Inv. 12" Underdrain 518.0

SEWER PROFILE

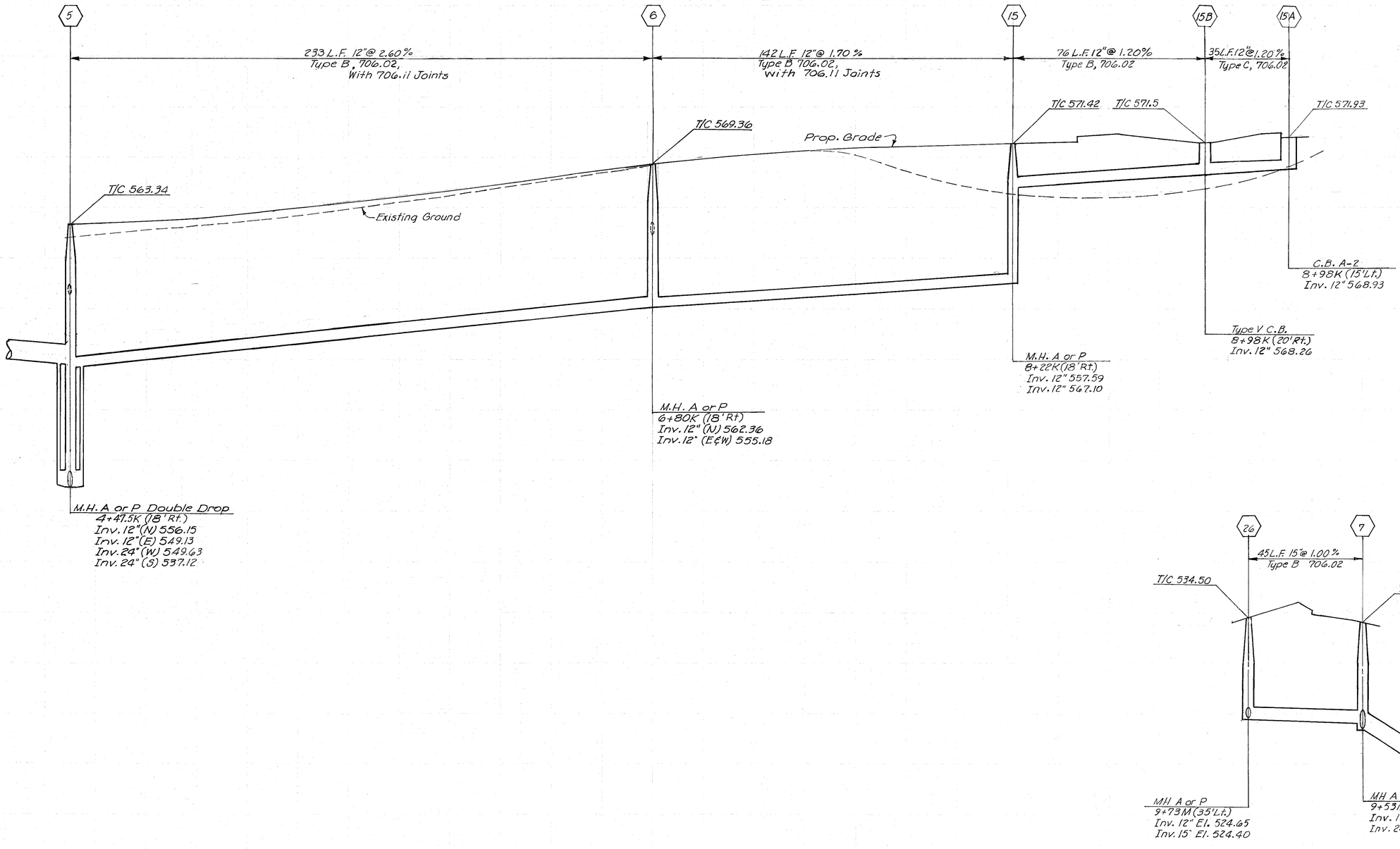
5

HAMILTON COUNTY
HAM-471-0.24
PART ONE



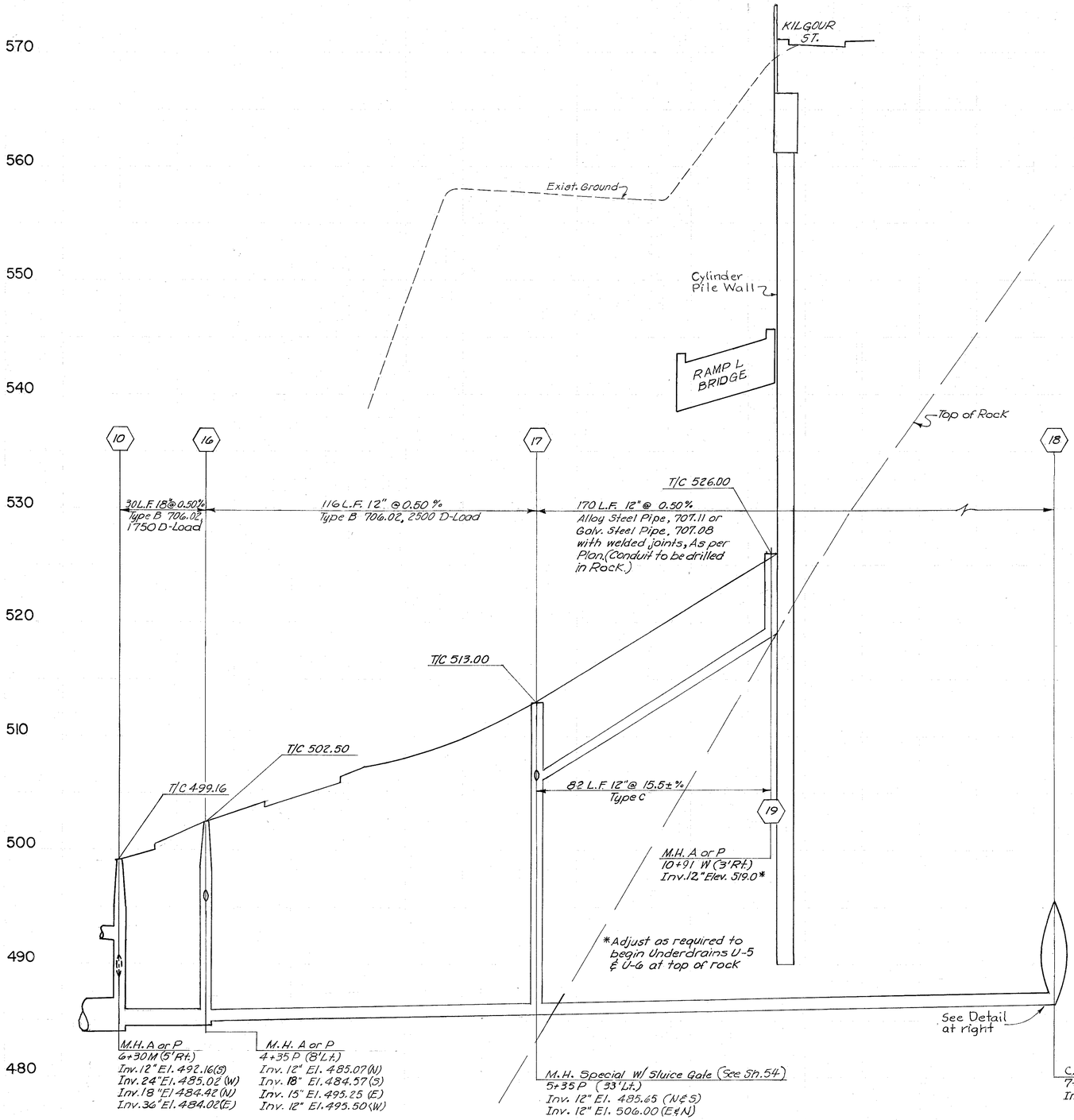
SEWER PROFILE

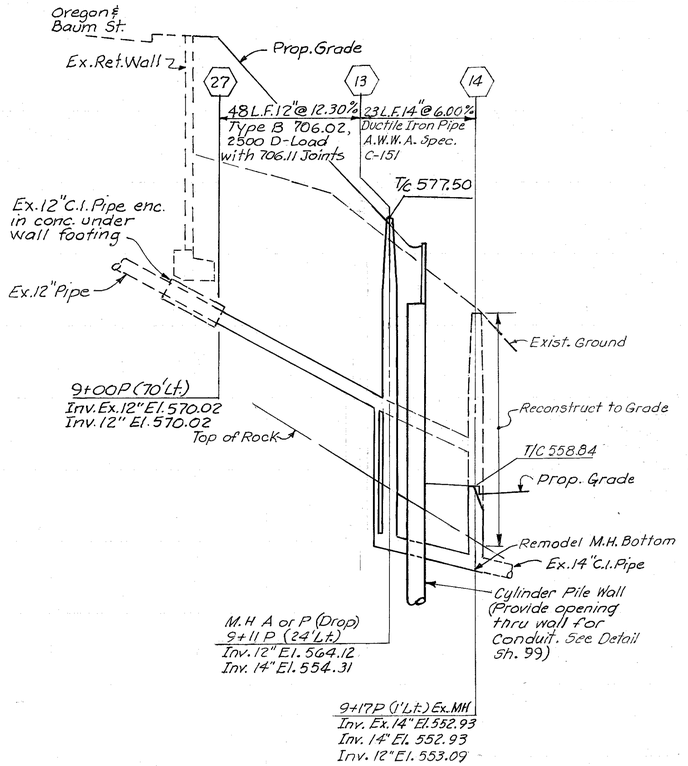
HAMILTON COUNTY
HAM-471-0.24
PART ONE

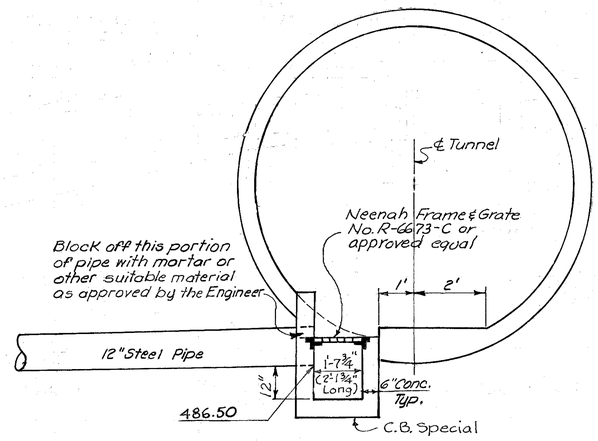


SEWER PROFILE

HAMILTON COUNTY
HAM-471-0.24
PART ONE







DETAIL OF PIPE OUTLET FROM TUNNEL

SEWER PROFILES

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
HAM-471-0.24
PART ONE

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MANHOLE NO.	TYPE	PLAN SH. NO.	PROFILE SH. NO.	STREET	STATION	FLOW LINE ELEVATION	RIM ELEV.	CATCH BASIN	TYPE	STREET	STATION	FLOW LINE ELEVATION	GRATING ELEVATION	FLOW LINE ELEVATION AT M.H. C.B. OR SEWER
1	Exist.	18	23	Kilgour St.	-0+02K 142'L.	584.59	24" 589.97							
2	A or P Drop & Manhole Abandoned	18	23	Kilgour St.	0+16K 30'L	24" 571.94 Ex. 30" 559.09 12" 576.68	24" 583.68	2A 2B	Stub Stub	Kilgour St. Kilgour St.	0+19K 35'L 0+11K 32'L	12" 577.42 12" 578.08	12" — 12" —	576.68 576.68
3	A or P	18	23	Kilgour St.	1+09K 9'R.	563.54 568.08	24" 575.15 12"	3A	Std.5B	Kilgour St.	1+50K	569.00	12" 572.00	568.08
4	A or P	18	23	Kilgour St.	2+05K 18'R.	554.72 562.12	24" 569.12 12"	4A	Stub	Kilgour St.	2+05K 125'R	563.46	12"	562.12
5	A or P Double Drop	18	23	Kilgour St.	4+75 18'R.	549.13 549.63 551.12 556.15	12'E 563.34 24'W 24'S 12'N	5A	C	Kilgour St.	4+50K 3'R	558.43	12" 562.93	556.15
6	A or P	19	25	Kilgour St.	6+80 18'R	555.18 562.36	12" 569.36 12'N	6A	A-2	Kilgour St.	6+80K 3'R.	565.95	12" 568.95	562.36
7	A or P	18	24	Monastery St.	9+53M 5'R	523.20 523.95	24" 534.00 15"							
8	A or P	20	24	Monastery St.	8+25M 5'R	508.42 509.42 509.17	24" 516.67 12" 15"	8A 8B	Stub Stub	Monastery St. Monastery St.	8+25M 1'L 8+25M 11'R.	509.62 511.63	15" 12"	509.17 509.42
9	A or P	20	24	Monastery St.	7+35M 5'R	497.62 498.62	24" 505.71 12"	9A 9B 9C	Stub Std.B Stub	Monastery St. Monastery St. Monastery St.	7+35M 1'L 6+95M 43'R. 7+37M 10'R	499.28 498.97 499.60	12" 12" 12"	498.62 498.62 498.62
10	A or P	20	24	Monastery St.	6+30M 5'R	485.02 484.42 492.16	24"W 181'N 36"E 12'S	10A	Stub	Monastery St.	6+30M 1'L	492.83	12" —	492.16
11	A or P	20	24	Ramp P	3+28P 1'R	483.32 487.81	36" 494.81 12"E&W	11A 11B	Stub Stub	Ramp P Ramp P	3+28P 5'L 3+28P 7'R	488.76 488.74	12" — 12" —	487.81 487.81
12	Exist. Reconst. & Remodel Bottom	20	24	Ramp P	2+24P 17'R	482.45 482.45	36" 492.34 Ex. 36"							
13	A or P Drop	19	26	Ramp P	9+11 P 24'L	564.12 554.31	12" 577.50 14"							
14	Exist. Reconst. & Remodel Bottom	19	26	Ramp P	9+17P 1'Lt	552.93 552.93 553.09	Ext. 14" 558.84 14" 12"	14A	Struct.	Ramp P	9+86P 3'L	561.75	12" —	553.09
15	A or P	19	25	Kilgour St.	8+22K 18'R	567.10 557.59	12"E 571.42 12"W	15A 15B	A2 V	Kilgour St. Kilgour St.	8+98K 15'L 8+98K 20'R	568.93 568.26	12" 571.93 571.50	568.26 567.10
16	A or P	20	26	Ramp P	4+35P 8'L	494.57 485.07 495.50 495.25	18"S 502.50 12"W 12"W 15"E	16A 16B	Stub Stub	Ramp P Ramp P		496.10 495.62	12" 15"	495.50 495.25
17	Special W/Sluice Gate	19	26	Ramp P	5+35P 3'L	485.65 506.00	12"NE 513.00 12"E&W	17A	Stub	Ramp P	5+38 30'L	506.72	12" —	506.00
		19	26					18	Special	Killgour St.	7+45K 56'L	486.50	12" 487.3±	485.65
19	A or P	19	26	Cylinder Pile Wall	10+91 W 3'R	519.0	12" 526.00							
20	Exist.	22	22	Eggleston Ave.	23+09 23'P	509.35 499.18	15" 519.37 Ex. 48"							
21	U	22	22	N.B. I-471	14+45N 19'R	532.87 532.79 537.74	14" 548.54 15" 12"	21A	Stub	N.B. I-471	147+39N 13'R	537.86	12" —	537.74
22	A or P	22	22	Van Meter St.	18+25 10'R	578.45 578.65	14" 592.09 Ex.15"							
23	A or P	17	23	N.B. I-471	1+44+00N 36'L	516.72 516.47 524.00 521.15NEE	15" 531.00 18" 12" 15"	23A 23B 23C 23D	Struct. M Stub Stub	N.B. I-471 N.B. I-471 N.B. I-471 N.B. I-471	145+86N 24'L 144+96N 24.25'R 144+06N 36'L 143+97N 33'L	537.00 528.77 524.49 521.27	12" — 15" 533.27 12" — 15" —	529.08 521.15 524.00 521.15
24	Ex. C.B.	17	23	N.B. I-471	145+10W 200'L	513.59	18"							
25	A or P	17	23	N.B. I-471	145+00N 15'R	517.84 518.00	15" 535.29 12"	25A 25B 25C	Stub Stub M	Monastery St. Monastery St. Monastery St.	9+73M 41'L 9+75M 41'L 10+57M 35'L	527.49 527.89 528.76 528.51	12" — 12" — 12" 532.75 15"	524.65 524.65 524.40
26	A or P	18	25	Monastery St.	9+73M 35'L	524.65 524.40	12" 535.50 15"	26D 26E	Stub Stub	Monastery St. Monastery St.	10+63M 33'L 10+59M 30'L	529.51 530.72	12" — 12" —	528.76 528.76

SEWER TABULATIONS

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

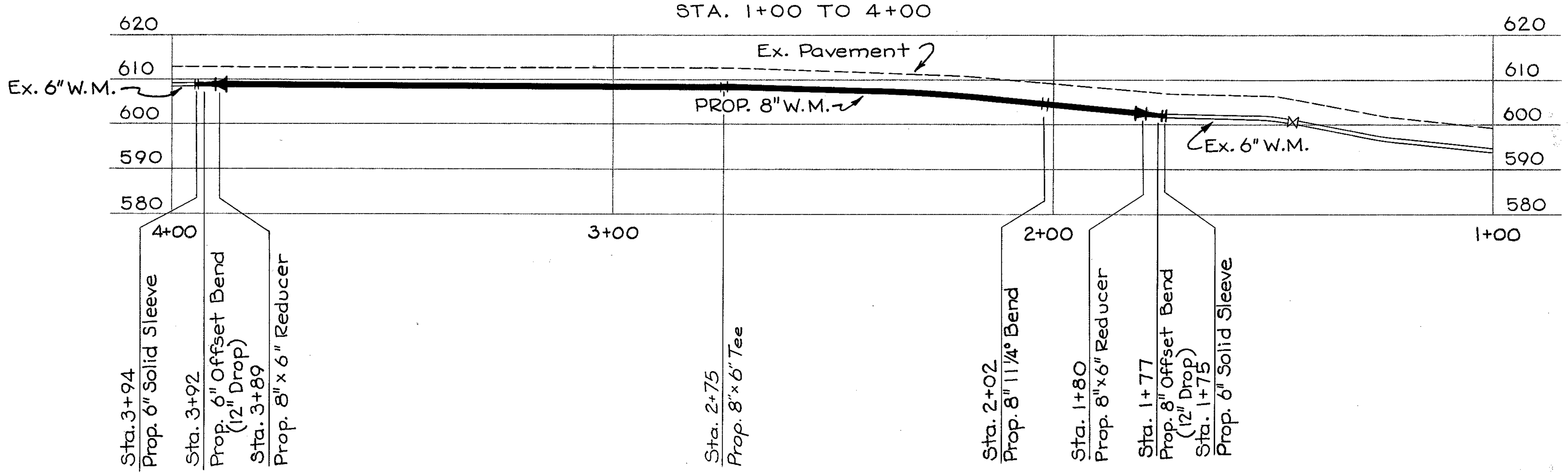
28/172

HAMILTON COUNTY
HAM-471- 0.24
PART ONE

REVISED DRS JAN. 1979

* NOTE: 6" Water Main Was Abandoned Due To Hillslide.

PROFILE BAUM ST.
STA. 1+00 TO 4+00



STATE CONTRACT

NEWPORT BRIDGE CONNECTION

KILGOUR STREET
BAUM STREET
PROP. 8" WATER MAIN

STATE OF OHIO RICHARD J. KOOPMAN E-35570 REGISTERED PROFESSIONAL ENGINEER

APPROVED:

SCALE: 1" = 20'

Richard J. Zumwalde
C.F.D.

Richard J. Koopman
SUPERVISING ENGINEER

Wm. S. Alexjun
DISTRIBUTION DIVISION

CALC. F.C. DATE 10-24-77
CHK'D. A.L.D. DRS DATE 11-9-77

CINCINNATI WATER WORKS
DISTRIBUTION DIVISION

SURVEYED	BY	R.B.
PLATTED	BY	D.R.H
DRAWN	BY	J.
DESIGNED	BY	F.G.C.
CHECKED	BY	A.L.D.

WATER WORKS PLANS PROFILE-BAUM ST. STA. 1+00 TO 4+00 D-1310-G MAY 1978 SHEET 1 of 6

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM-471-0.24
PART ONE

1-10"x 6" Tee 3M.J.
1-6" 90° Bend 2M.J.
1-6" Valve M.J.
1-Valve Box Complete
2-10" Solid Sleeves P.J.

VAN METER ST.

MONASTERY ST.

TEMPORARY CONNECTION

Ex. 8"G.M.

Ex. 6"G.M.

Ex. 4"G.M.

18T

17T

16T

Ex. 15"P.S.?

Prop. 15" Cond.

30'

℄ FUTURE PROP. 8" W.M.

FUTURE CURB

2-Plug Ex. 10"x 10" Cross M.

Temporary Wall

Fill & Abandon Ex. Valve Box

Ex. 6" W.M. To Be Abandoned

FUTURE VAN METER

BAUM ST.

Ex. 12"P.S.?

Ex. 6" W.M.

2-10" Plugs-P.J.
2-10" Plug Clamps

1-Fill & Abandon Ex. Valve Chamber
1-Relocate Ex. Fire Hydrant

1-Adjust Ex. Valve Chamber To Grade

Temporary Wall

#902

Ex. 10" W.M.

Ex. 15"P.S.?

BAUM ST.

MATCH STA. 15+50

#510 H-08185 M-025948 Ex. 3/4" Br.
#512
#508 H-030717 M-118463 Ex. 3/4" Br.
#506 H-030716 M-052139 Ex. 3/4" Br.
#504 H-013944 M-105327 Ex. 3/4" Br.
#500

Ex. 12"P.S.?

Ex. 4"G.M.

Ex. G" W.M.

9.0'

℄ FUTURE PROP. 8" W.M.

Ex. Elec. Cond.

1-Reset Ex. Valve Box Complete

15T

Ex. 15"P.S.?

Ex. 15"P.S.?

Conc. Wall

St. Wall?

Ex. 24"P.S.?

℄ FUTUEE PROP. 8" W.M.

Ex. 6" W.M. (To Be Abandoned)

FUTURE M.M.A. STERY

5.25'

Conc. Gutter?

BAUM
#393-9

#391

ST.
#389

St. Wall?

#635
H-25508 *
Ex. 5/8" Br.
F.O.D. 6-27-73

1-Fill And Abandon Ex. Valve Box
1-Relocate Ex. Fire Hydrant (Sta 2+75 Baum St.)

#638
* H-18942 F.O.D. 10-16-73
#636
* H-19396 F.O.D. 1-11-73

#633
H-19994 *
F.O.D. 6-27-73

#631
H-34546 Ex. 5/8" Br. *
F.O.D. 12-3-70

#627
H-15516 *
F.O.D. 11-17-72

#625 FUTURE CURB
H-13562 *
F.O.D. 4-12-73

ST.

Prop. 24" Cond.

Ex. 30" Br. S.

Ex. G" W.M. (To Be Abandoned)

#634
H-18904 *
F.O.D. 8-26-71

#632
H-22571 *
F.O.D. 9-14-72

#630
H-23806 *
Ex. 5/8" Br.
F.O.D. 4-22-71

#628
H-7523 *
Ex. 5/8" Br.
F.O.D. 5-18-71

E. FIFTH

MATCH STA. 15+50

KILGOUR

Prop. 12" Cond.

Ex. 12" P.S.?

1-8" Plug-C.J.

St. Wall?

#366

ST.

5.25'

Prop. 8" W.M.

Ex. 12"P.S.?

℄ Future Prop. 8" W.M.

Abandon Ex. G" W.M.

Prop. 24" Cond.

St. Wall?

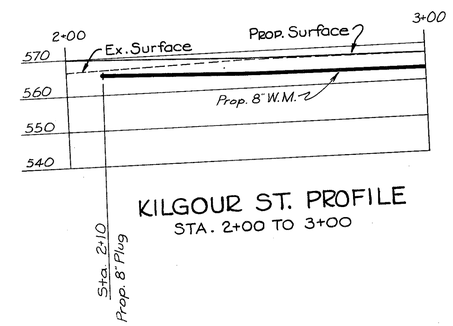
Abandon Ex. Valve Chamber And Valve Box.

*Abandon Branches

#365
H-41294
Ex. 5/8" Br.
F.O.D. 7-21-72
Abandon

#363
H-14724
F.O.D. 3-24-72
Abandon

MATCH STA. 3+00



KILGOUR ST. PROFILE
STA. 2+00 TO 3+00

CALC. F.C. DATE 10-24-72
CHK'D. QFQ DATE 11-9-72
HRS

WATER WORKS PLANS

KILGOUR ST. STA. 2+00 TO 3+00

D-1310-G SHEET 2 of 6

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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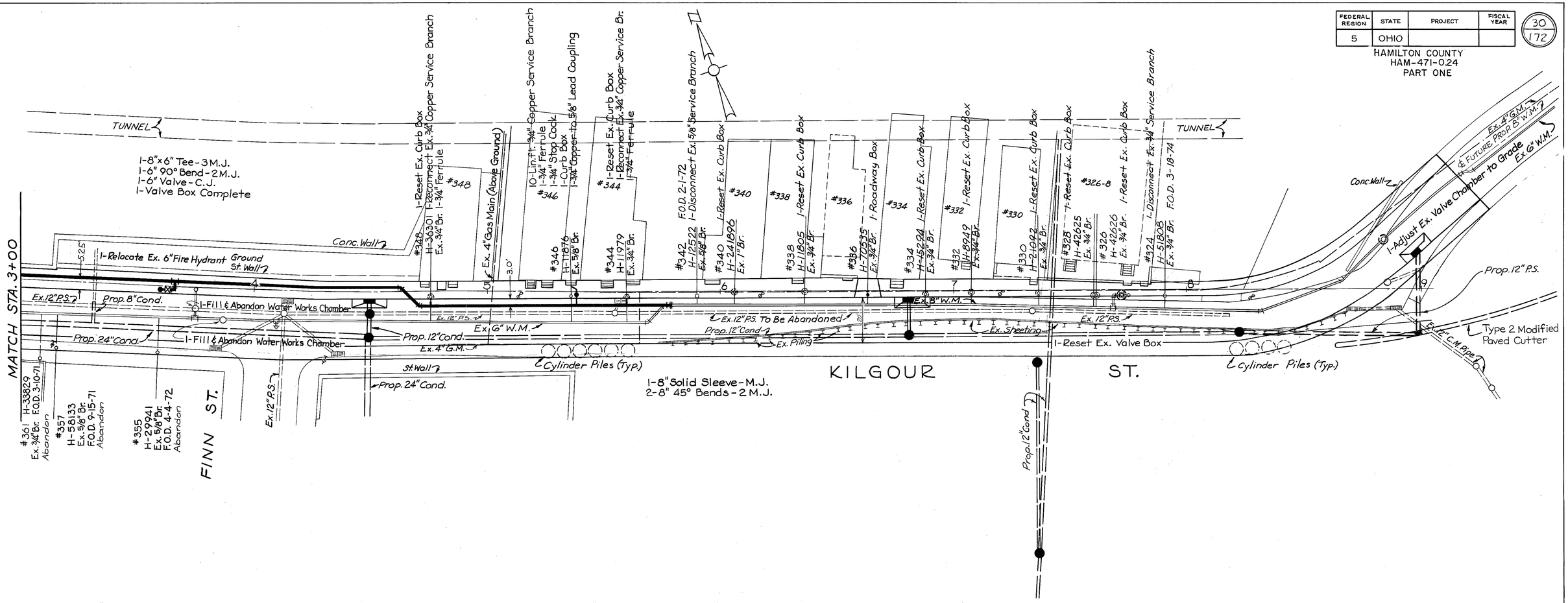
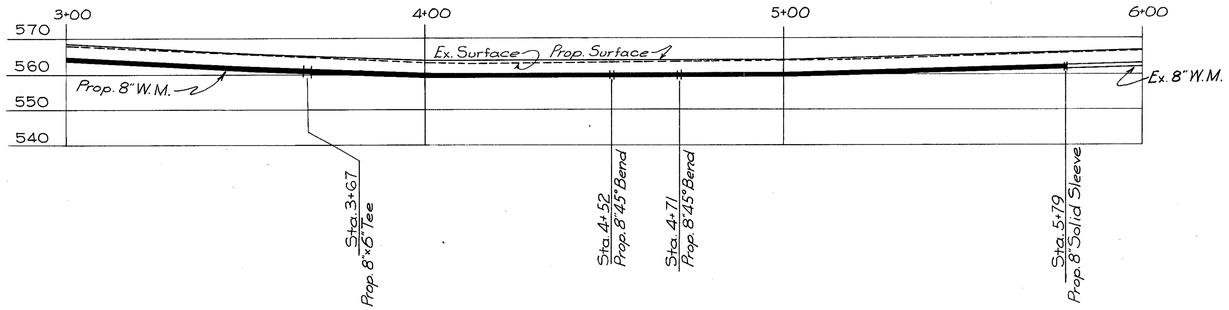
HAMILTON COUNTY
HAM-471-0.24
PART ONE



KILGOUR ST. PROFILE
STA. 3+00 TO 6+00



CALC. TC DATE 10-24-17
CHK'D. APE DATE 11-9-17
DRS

WATER WORKS PLANS

KILGOUR ST. STA. 3+00 TO 6+00

D-1310-G SHEET 3 of 6

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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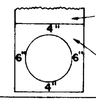
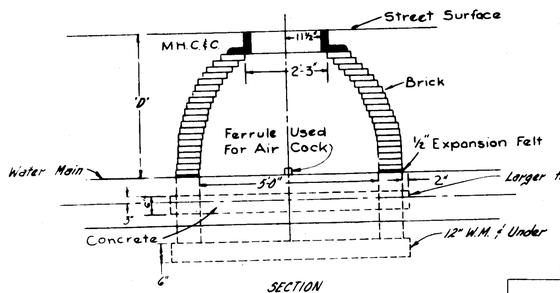
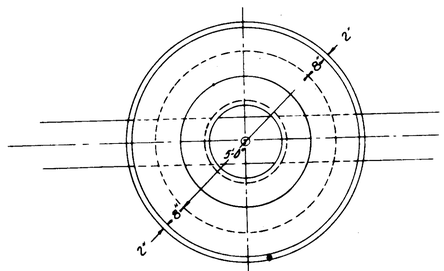
HAMILTON COUNTY
HAM-471-0.24
PART ONE

TYPICAL BACKFILL REQUIREMENTS

BACKFILL CROSS SECTION	METHOD DESIGNATION	FOR NOMINAL PIPE SIZES	PIPE AREA	BALANCE OF BACKFILL
	A	UNDER 12"	EMBEDMENT MATERIAL	BACKFILL GRAVEL
	B	UNDER 12"	EMBEDMENT MATERIAL	COARSE FILL



SECTION



PLAN

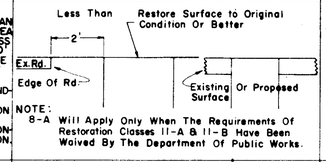
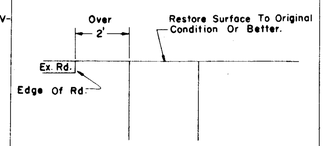
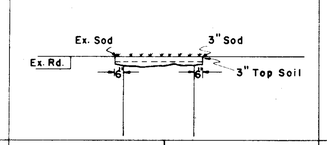
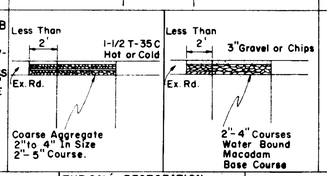
When 'D' distance is greater than indicated the contractor will be compensated for additional brickwork under item #602.

For Estimate Only

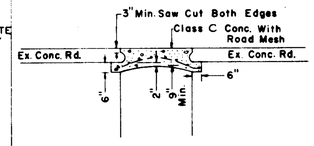
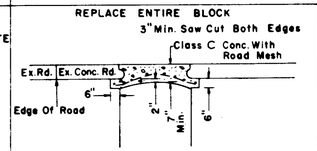
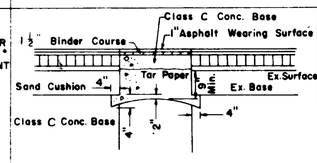
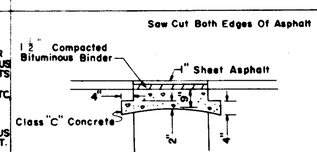
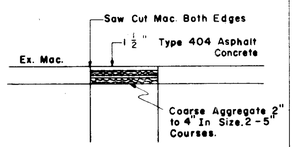
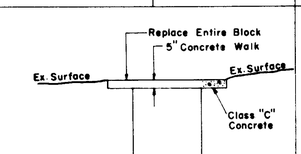
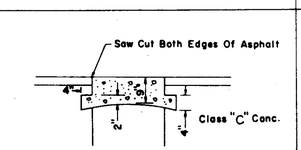
Water Main Size	Size Of Ferrule	Cu. Yd. Conc.	Cu. Yd. Brick	'D'
12" W.M. & Under	1"	0.6	1.6	3'-6"

AIR COCK CHAMBER

CWW STANDARD DRAWING APPROVED 104-2

Restoration Class	TYPICAL RESTORATION SECTIONS	Backfill
8-A OTHER THAN PAVED AREA, DITCH LESS THAN 2.0' FROM THE ROADWAY ALSO STREET UNDER CONSTRUCTION OR PROPOSED CONSTRUCTION.	 NOTE: 8-A Will Apply Only When The Requirements Of Restoration Classes II-A & II-B Have Been Waived By The Department Of Public Works.	A
8-B UNIMPROVED.		A or B
9 SODDED AREAS		A or B
II-A&II-B OTHER THAN PAVED AREA DITCH LESS THAN 2.0' FROM THE ROADWAY.		A

TYPICAL RESTORATION SECTIONS WITHIN CINCINNATI CORP. LIMITS SURFACE RESTORATION AND BACKFILL REQUIREMENTS
CWW STANDARD DRAWING APPROVED 106-1 2 OF 2

Restoration Class	TYPICAL RESTORATION SECTIONS	Backfill
1-R CONCRETE ROADWAY		A
1-D CONCRETE DRIVE		A
2 BRICK OR BLOCK PAVEMENT		A
3 ASPHALT OR OTHER BITUMINOUS PAVEMENTS ON CONCRETE ETC. BASE OR MACHINE PAVED BITUMINOUS PAVEMENT.		A
4-R BITUMINOUS ON STONE BASE OR SURFACE TREATED OR OILED MACADAM STREET OR DRIVE.		A
5-R LOW TYPE PAVEMENT PLAIN MACADAM, GRAVEL ETC. NOT TREATED OR OILED. 5-D GRAVEL SURFACE DRIVE	R. Restore Surface And Base Course, If Any, To Original Condition Or Better. Ex. Pav't. Asphalt Shingle Water Bound Macadam, Gravel, Etc. D. 3"Gravel Or Chips 2-4"Courses Water Bound Macadam Base Course	A
6 SIDEWALKS OF CEMENT, BRICK, FLAGSTONE ETC.		A
7 CONCRETE BASE ONLY OR ANY SIMILAR MATERIAL USED AS A BASE INCIDENT TO THE RESURFACING OF A STEET UNDER CONTRACT OR BY CITY FORCES.		A

TYPICAL RESTORATION SECTIONS WITHIN CINCINNATI CORP. LIMITS- SURFACE RESTORATION REQUIREMENTS
CWW STANDARD DRAWING APPROVED 106-1 1 OF 2

Note:
All Proposed Water Mains Will Be Hydrostatically Tested for Leakage In Accord With 1101.054, Hydrostatic Test for Leakage, Of Item 1101, "Laying Pipe And Fittings." This Test Will Be Conducted By The Contractor.

CALC. J.C. DATE 10-24-77
CHK'D. Q.E.D. DRS DATE 11-9-77

(Suggested) BILL OF MATERIAL Furnished By Contractor

Quan.	Unit	Description
34	Each	18' Lengths 8" Ductile Iron Pipe CL.55
4	Each	18' Lengths 6" Ductile Iron Pipe CL.55
2	Each	3' Pieces 10" Ductile Iron Pipe CL.56
2	Each	8" 45° Bends - 2 M.J.
1	Each	8" 11¼° Bend - 2 M.J.
2	Each	6" Offset Bends - M.J. x P.E. (12" Drop)
3	Each	6" 90° Bends - 2 M.J.
2	Each	10" Plugs - P.J.
1	Each	8" Plug - C.J.
2	Each	10" Plug Clamps
2	Each	6" Valves - C.J.
3	Each	Valve Boxes Complete
2	Each	8" x 6" Reducers - 2 P.E.
2	Each	10" Solid Sleeves - P.J.
1	Each	8" Solid Sleeve - M.J.
2	Each	6" Solid Sleeves - P.J.
1	Each	10" x 6" Tee - 3 M.J.
2	Each	8" x 6" Tee - 3 M.J.
1	Each	27" x 20' Polyethylene Tube
37	Each	24" x 20' Polyethylene Tubes
5	Each	20" x 20' Polyethylene Tubes
5	Each	100' Roll Polyethylene Tape
10	Each	¾" Copper Service Pipes*
3	Each	¾" Ferrules *
1	Each	¾" Stop Cock *
1	Each	¾" Copper x 5/8" Lead Coupling *
1	Each	Curb Box Complete *
1	Each	6" Valve - M.J.
1	Each	Roadway Box Complete *

The above list is a suggested bill of material necessary to perform the water main and branch relocation work as proposed on the drawings. The contractor shall furnish additional material where needed. No allowance will be made for unused material nor will any extra payment be made for additional specials required to complete the water main work. The contractor is responsible for making his own field measurements before ordering material.

** Service branch material will be furnished by the Cincinnati Water Works.*

GENERAL PROVISIONS

Water main items are to be constructed in accordance with the provisions of the State of Ohio, Department of Transportation, Construction and Material Specifications, dated January 1, 1979, and modified by the City of Cincinnati Supplement to said State of Ohio Specifications, effective January 1, 1979 and any supplements or changes thereto.

A cushion of 12" shall be maintained between the proposed water main and the existing sewers, inlet connections, and drains. If a greater clearance is desired, it will be so designated. Building sewer laterals are not to be disturbed or trapped. Existing drains, sewers, and culverts are not to be disturbed. If the water main is to be under culverts or pipe sewers, they shall be tunneled and backfilled with Class "T" concrete.

It shall be the contractor's responsibility to arrange for removal and replacement of any poles and guys necessary for the installation of the proposed water mains, and any cost connected thereto shall be his expense.

All pipe and specials shall be in accordance with City of Cincinnati Specification 40-110-76.

All backfill to be Method "A" except where otherwise noted.

No part of any fire hydrant setting shall be installed closer than five feet to any driveway, inlet, utility pole, or guy wire anchor.

The Cincinnati Water Works shall furnish all ferrules. The contractor will be responsible for their proper installation.

No extra payment will be made for lead joints.

Request for permission to restore any surfaces outside the improvement limits shall be made to the Highway Maintenance Division in writing. Address: Mr. James D. Jester, Superintendent
Highway Maintenance Division
3300 Colerain Avenue
Cincinnati, Ohio 45225

Copies of the State specifications are on file at the Office of Contract Sales of the State of Ohio, Department of Transportation, 25 South Front St., Columbus, Ohio, and at the Offices of the City Engineer of Cincinnati, Ohio.

All instructions shall be worked through the project engineer. All water main work shall be done under the direction, supervision, and inspection of the Cincinnati Water Works and the project engineer.

All Valves to be purchased from the Cincinnati Water Works.

LABOR SUMMARY 100% PROJECT COST (90% Federal, 5% State, 5% Cincinnati Water Works)

City of Cincinnati Specific.	Quan.	Unit	Description
204	1	Cu.Yd.	Special Excavation
509	625	Lbs.	Reinforcing Steel
602	1	Cu.Yd.	Brick Masonry
604	2	Each	Adjusting Existing Valve Chamber to Grade
626	1	MFBM	Sheeting And Bracing Ordered Left in Place
1101	10	Lin.ft.	Furnishing And Laying 10" Ductile Iron Pipe & Fittings
1101	600	Lin.ft.	Furnishing And Laying 8" Ductile Iron Pipe & Fittings
1101	55	Lin.ft.	Furnishing And Laying 6" Ductile Iron Pipe & Fittings
1105	2	Each	Furnishing And Install 10" Plugs In Existing 10" W.M. & Fittings
1110	4	Cu.Yds.	Concrete, Class 'C' High Early Strength
1110	2	Cu.Yds.	Concrete, Class 'C'
1110	2	Cu.Yds.	Concrete, Class 'T'
1113	3	Each	Relocate Existing Fire Hydrants
1116	3	Each	Furnish And Install Valve Box
1119	1	Cu.Yd.	Additional Excavation
1121	7	Cu.Yds.	Filling Abandoned Water Works Chambers
1122	1	Each	Remove Existing M.H.C.& C.
1122	1	Each	Remove Existing Valve Box
1123	10	Lin.ft.	Changing Pipe Sewers, 12" & Under
1125	2	Each	Reset Existing Valve Box Complete
1126	10	Lin.ft.	Hauling, Installing, And Connecting ¾" Copper Service Pipe
1128	2	Each	Reconnect 5/8" to 1" Service Branches
1130	2	Each	Disconnect Existing 5/8" to 2" Service Branches
1131	2	Each	Hauling & Installing Curb & Roadway Boxes
1132	9	Each	Reset Existing Curb And Roadway Boxes

Item Special

WATER WORKS PLANS

LABOR SUMMARY, BILL OF MATERIAL
STANDARDS AND RESTORATION

D-1310-G SHEET 4 of 6

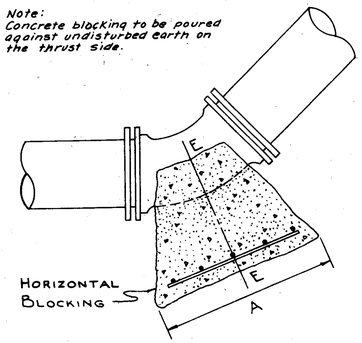
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

32/172

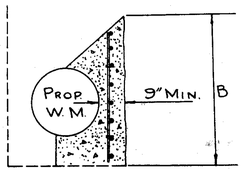
HAMILTON COUNTY
HAM-471-0.24
PART ONE

Note:
Pressure ranges as shown are operating pressures. Concrete and steel quantities are calculated using operating pressure plus 50 P.S.I.

Note:
Concrete blocking to be poured against undisturbed earth on the thrust side.



3/4" Reinforcing Bars To Be Placed On Thrust Side 6" O.C.

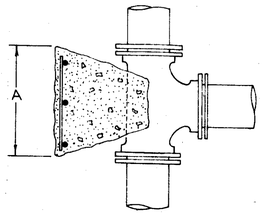


HORIZONTAL SECTION E-E

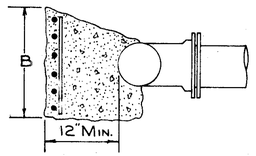
SIZE	DEGREE BEND	125 TO 200 P.S.I. A	B	CU.YDS. CONC.	LBS. STEEL
6	11 1/4	1'-6"	1'-6"	0.1	14
	22 1/2	1'-6"	1'-6"	0.1	14
	45	2'-0"	1'-6"	0.1	16
8	11 1/4	1'-6"	1'-9"	0.1	17
	22 1/2	1'-6"	1'-9"	0.1	17
	45	2'-6"	2'-0"	0.2	24
10	11 1/4	1'-6"	1'-6"	0.1	14
	22 1/2	2'-0"	2'-0"	0.2	24
	45	3'-0"	2'-6"	0.4	40

TYPICAL BLOCKING DETAIL
CAST IRON BENDS
HORIZONTAL

CWW STANDARD DRAWING APPROVED 101-1



Conc. Block To Be Poured Against Solid Ground.



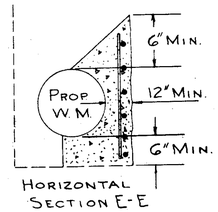
SIZE RUN	SIZE BRANCH	125 TO 200 P.S.I. A	B	CU.YDS. CONC.	LBS. STEEL
6	6	2'-0"	2'-0"	0.2	21
8	6	2'-0"	2'-0"	0.2	21
12	6	2'-0"	2'-0"	0.2	21
16	6	2'-0"	2'-0"	0.2	21
20	6	2'-0"	2'-0"	0.2	21
8	8	3'-0"	2'-3"	0.2	32
10	8	3'-0"	2'-3"	0.2	32

TYPICAL BLOCKING DETAIL
CAST IRON TEES

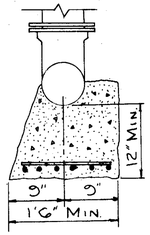
CWW STANDARD DRAWING APPROVED 101-5

3/4" Reinforcing Bars To Be Placed On Thrust Side 6" O.C.

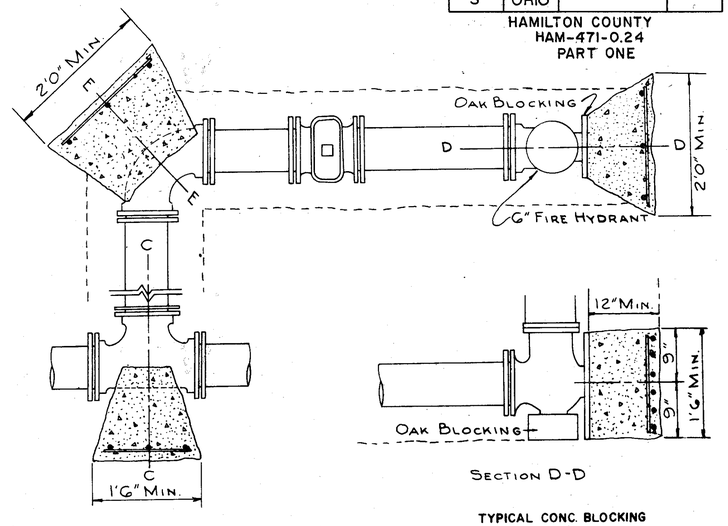
Note:
Pressure ranges as shown are operating pressures. Concrete and steel quantities are calculated using operating pressure plus 50 P.S.I.
Note:
Concrete blocking to be poured against undisturbed earth on the thrust side.



HORIZONTAL SECTION E-E



SECTION C-C



SECTION D-D

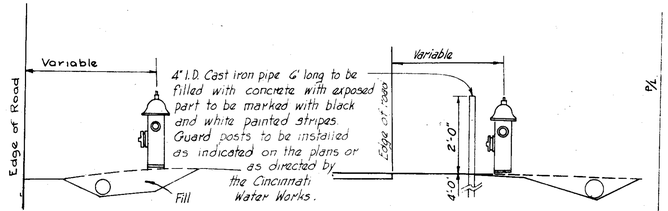
Note:
Refer to Blocking Of Tees for placement of reinforcing steel in all blocking shown on this sheet.

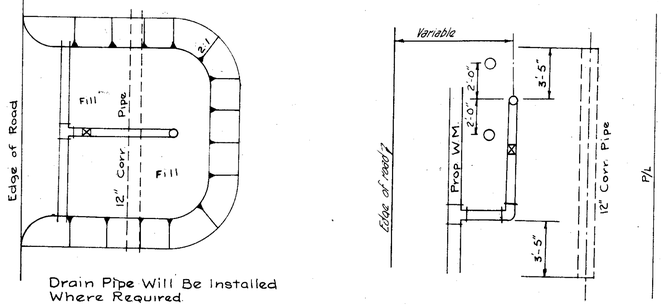
Note:
Concrete blocking to be poured against undisturbed earth on the thrust side.

TYPICAL CONC. BLOCKING FOR FIRE HYDRANT SETTING

CWW STANDARD DRAWING APPROVED 101-7

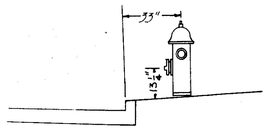
SETTINGS ON ROADWAYS WITHOUT CURBS

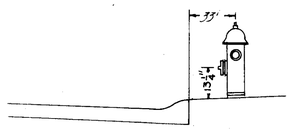




Drain Pipe Will Be Installed Where Required.

Note:
Concrete blocking to be poured against undisturbed earth on the thrust side.

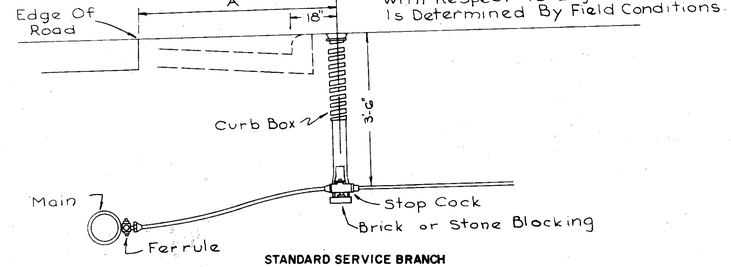




No Part Of Any Fire Hydrant Setting Shall Be Closer Than Five(5'-0") Ft To Any Drive Way, Sewer Inlet, Utility Pole, Or Anchor Wire.

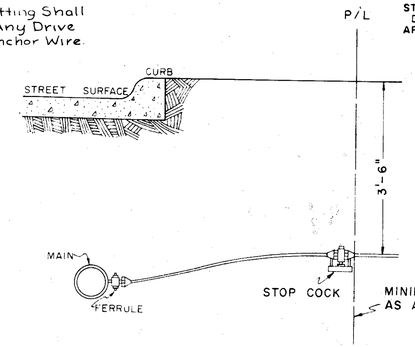
FIRE HYDRANT SETTING MEASUREMENTS

CWW STANDARD DRAWING APPROVED 103-1



STANDARD SERVICE BRANCH INSTALLATION WITH CURB BOX

CWW STANDARD DRAWING APPROVED 107-1



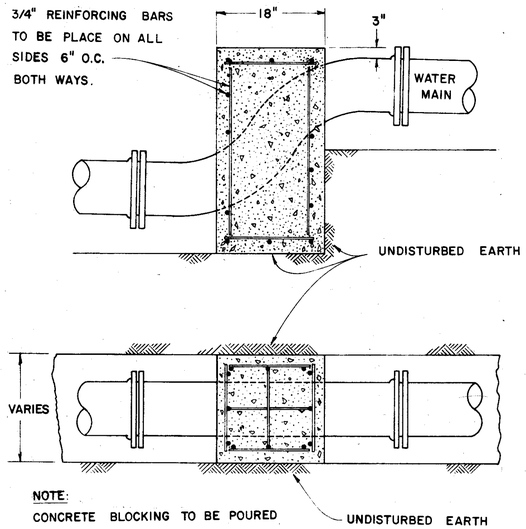
STANDARD SERVICE BRANCH INSTALLATION WITHOUT CURB BOX

CWW STANDARD DRAWING APPROVED 107-2

MINIMAL DISTANCE TO PROPERTY LINE AS APPROVED BY THE WATER WORKS.

CALC. F.C. DATE 10-24-77
CHK'D. QEP DATE 11-9-77
DRS

3/4" REINFORCING BARS TO BE PLACE ON ALL SIDES 6" O.C. BOTH WAYS.



NOTE:
CONCRETE BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.

CONCRETE BLOCKING FOR OFFSET BENDS IN A HORIZONTAL POSITION REFER TO STANDARD DRAWING 101-1.

FOR ESTIMATING ONLY

PIPE SIZE	CU. YD. CONC.	LBS. STEEL
6"	.2	69
8"	.2	69
10"	.25	83

TYPICAL BLOCKING DETAIL FOR CAST IRON OFFSET BENDS

CWW STANDARD DRAWING APPROVED 101-6

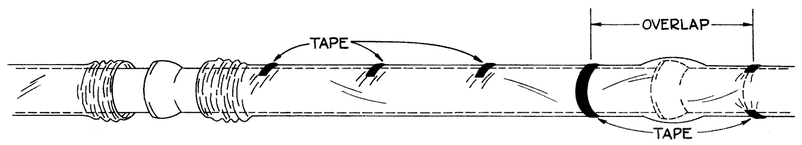
FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
HAM-471-0.24
PART ONE

33
172

TAPE MATERIAL

POLYETHYLENE TAPE 1-½" WIDE AS RECOMMENDED BY THE FILM MANUFACTURER.



MATERIAL SPECIFICATIONS

IN ACCORDANCE WITH ASTM D-1248
TYPE I, CLASS A OR C, GRADE E-1
FLOW RATE 0.4 MAX. DIELECTRIC
STRENGTH VOLUME RESISTIVITY
MIN. OHM-CM^3 = 10^{15}

POLYETHYLENE FILM THICKNESS 8 MILS

TENSILE STRENGTH	1200 P.S.I. MIN.
ELONGATION	300% MIN.
DIELECTRIC STRENGTH	800 VOLTS/MIL

THE FOLLOWING METHOD ILLUSTRATES THE PROCEDURE FOR APPLYING POLYETHYLENE:

CUT POLYETHYLENE TUBE TO A LENGTH APPROXIMATELY TWO FEET LONGER THAN THE LENGTH OF THE PIPE SECTION, SLIP THE TUBE AROUND THE PIPE, CENTERING IT TO PROVIDE A ONE-FOOT OVERLAP ON EACH ADJACENT PIPE SECTION, AND BUNCHING IT ACCORDION FASHION LENGTHWISE UNTIL IT CLEARS THE PIPE ENDS.

LOWER THE PIPE INTO THE TRENCH AND MAKE UP THE PIPE JOINT WITH THE PRECEDING SECTION OF PIPE, A SHALLOW BELL HOLE MUST BE MADE AT JOINTS TO FACILITATE INSTALLATION OF THE POLYETHYLENE TUBE.

AFTER ASSEMBLING THE PIPE JOINT, MAKE THE OVERLAP OF THE POLYETHYLENE TUBE, PULL THE BUNCHED POLYETHYLENE FROM THE PRECEDING LENGTH OF PIPE, SLIP IT OVER THE END OF THE NEW LENGTH OF PIPE AND SECURE IN PLACE. THEN OF THE FIRST WRAP UNTIL IT OVERLAPS THE JOINT AT THE END OF THE PRECEDING LENGTH OF PIPE, SECURE THE OVERLAP IN PLACE, TAKE UP THE SLACK WIDTH TO MAKE SNUG, BUT NOT TIGHT, FIT ALONG THE BARREL OF PIPE, SECURING THE FOLD AT QUARTER POINTS.

REPAIR ANY RIPS, PUNCTURES, OR OTHER DAMAGE TO THE POLYETHYLENE WITH ADHESIVE TAPE OR WITH A SHORT LENGTH OF POLYETHYLENE TUBE CUT OPEN, WRAPPED AROUND THE PIPE, AND SECURED IN PLACE. PROCEED WITH INSTALLATION OF THE NEXT SECTION OF PIPE IN THE SAME MANNER.

PIPE SHAPED APPURTENANCES:

BEND, REDUCERS, OFFSETS AND OTHER PIPE-SHAPED APPURTENANCES SHALL BE COVERED WITH POLYETHYLENE IN THE SAME MANNER AS THE PIPE.

JUNCTIONS BETWEEN WRAPPED AND UNWRAPPED PIPE:

WHERE POLYETHYLENE WRAPPED PIPE JOINTS A PIPE WHICH IS NOT WRAPPED, EXTEND THE POLYETHYLENE TUBE TO COVER THE UNWRAPPED PIPE A DISTANCE OF AT LEAST TWO FEET, SECURE THE END WITH CIRCUMFERENTIAL TURNS OF TAPE.

ODD SHAPED APPURTENANCES:

VALVES, TEES, CROSSES AND OTHER ODD-SHAPED PIECES WHICH CANNOT BE WRAPPED PRACTICALLY IN A TUBE SHALL BE WRAPPED WITH A FLAT SHEET OR SPLIT LENGTH OF POLYETHYLENE TUBE, THE SHEET SHALL BE PASSED UNDER THE APPURTENANCE AND BROUGHT UP AROUND THE BODY. SEAMS SHALL BE MADE BY BRINGING THE EDGES TOGETHER, FOLDING OVER TWICE, AND TAPING DOWN, SLACK WIDTH AND OVERLAPS AT JOINTS SHALL BE HANDLED AS DESCRIBED ABOVE, TAPE POLYETHYLENE SECURELY IN PLACE AT VALVE STEM AND OTHER PENETRATIONS.

OPENINGS IN ENCASEMENT:

OPENINGS FOR BRANCHES, SERVICE TAPS, BLOW-OFFS, AIR VALVES, AND SIMILAR APPURTENANCES SHALL BE MADE BY MAKING AN X-SHAPED CUT IN POLYETHYLENE AND TEMPORARILY FOLDING THE FILM BACK. AFTER THE APPURTENANCE IS INSTALLED, TAPE THE SLACK SECURELY TO THE APPURTENANCE AND REPAIR THE CUT, AS WELL AS ANY OTHER DAMAGED AREAS IN THE POLYETHYLENE, WITH TAPE.

BACKFILL FOR POLYETHYLENE WRAPPED PIPE:

BACKFILL MATERIAL SHALL BE THE SAME AS SPECIFIED FOR PIPE WITHOUT POLYETHYLENE WRAPPING, SPECIAL CARE SHOULD BE TAKEN TO PREVENT DAMAGE TO THE POLYETHYLENE WRAPPING WHEN PLACING BACKFILL, BACKFILL MATERIAL SHOULD BE FREE FROM CINDERS, REFUSE, BOULDERS, ROCKS, STONES OR OTHER MATERIAL THAT COULD DAMAGE POLYETHYLENE.

TUBE SIZE REQUIRED	
PIPE DIAMETER	MIN. FLAT TUBE WIDTH (inches)
4	16
6	20
8	24
10	27
12	30
16	37
20	45

CALC. RL DATE 10-24-77
CHK'D. RLG DATE 11-9-77
DRS

WATER WORKS PLANS

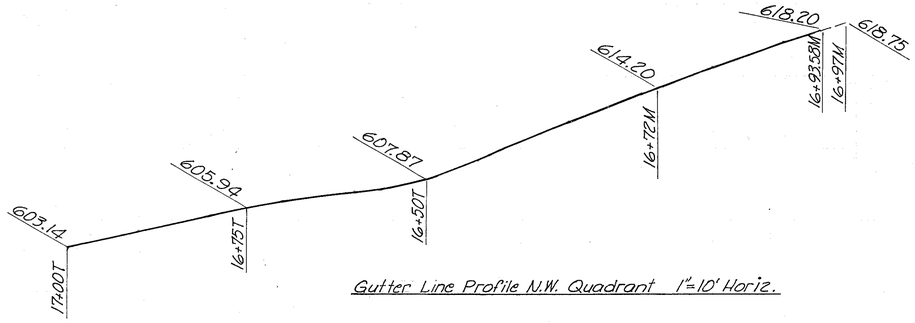
POLYETHYLENE ENCASEMENT STANDARD

D-1310-G

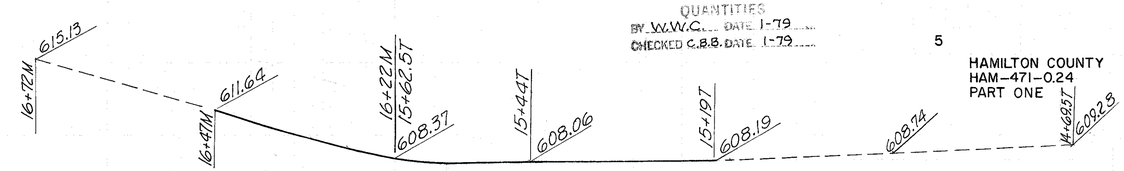
QUANTITIES
BY W.W.C. DATE 1-79
CHECKED C.B.B. DATE 1-79

5

HAMILTON COUNTY
HAM-471-0.24
PART ONE

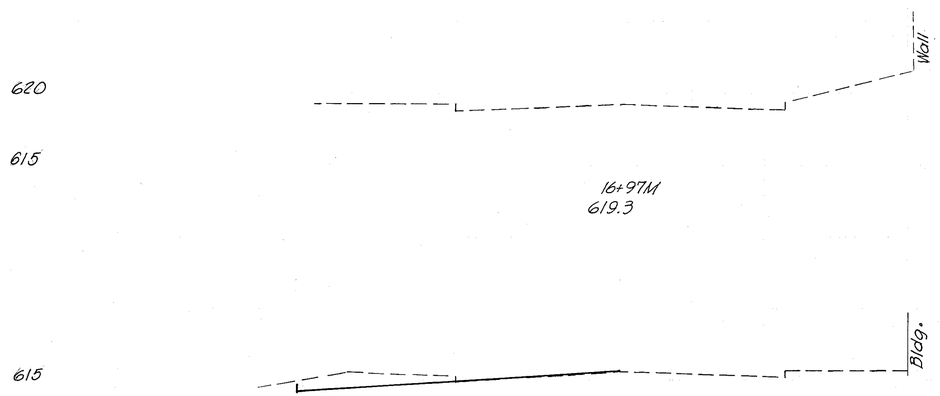


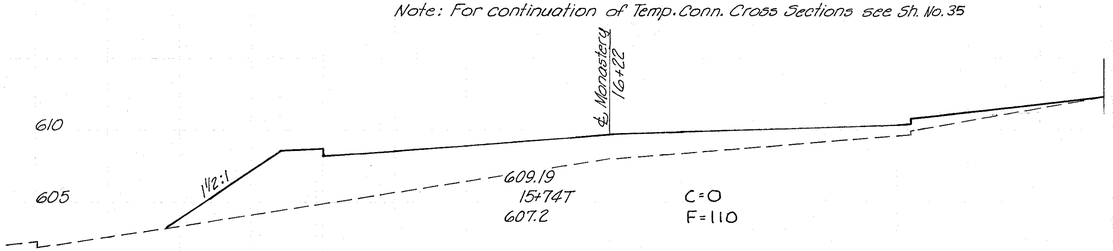
Gutter Line Profile N.W. Quadrant 1"=10' Horiz.

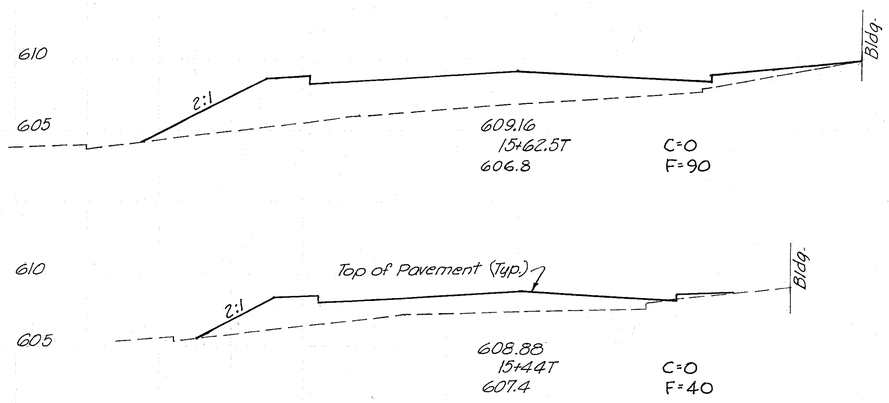


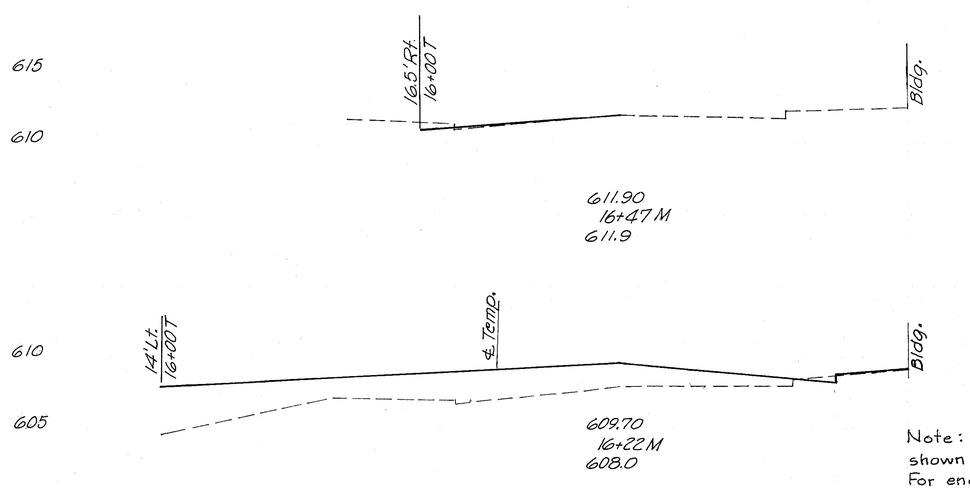
Gutter Line Profile N.E. Quadrant 1"=10' Horiz.

Note: For continuation of Temp. Conn. Cross Sections see Sh. No. 35



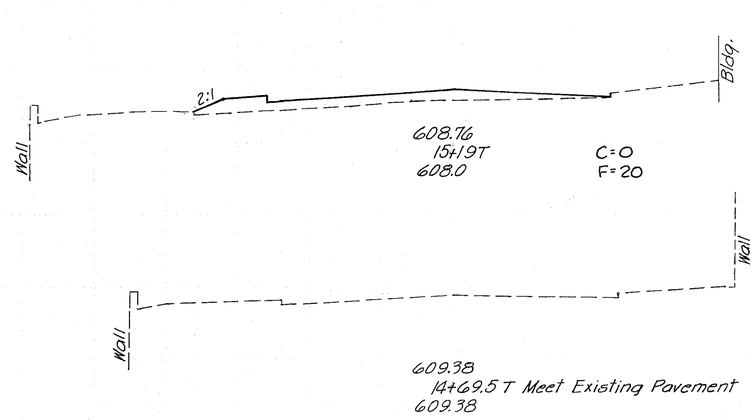






Note: Monastery St. sections shown for information only. For end areas see Temp. Conn. Sections.

MONASTERY ST. SECTIONS
1"=5' H ℄ V



TEMP. CONN. SECTIONS
1"=5' H ℄ V

TEMPORARY CONNECTION
AND MONASTERY STREET

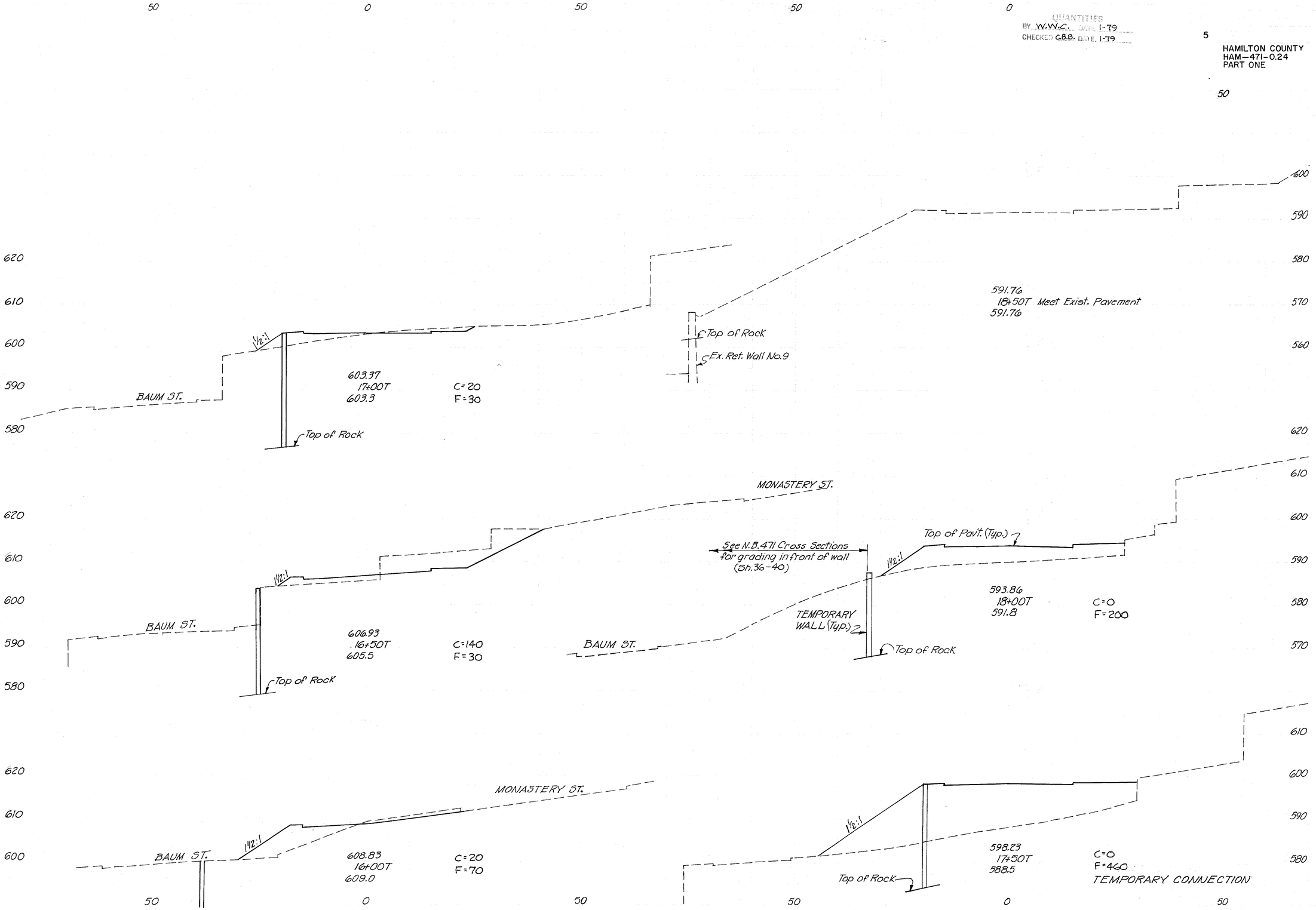
30 20 10 ℄ 10 20 30 20 10 ℄ 10 20 30

QUANTITIES
BY W.W.C. DATE 1-79
CHECKED C.B.B. DATE 1-79

5

35
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



BY CNB DATE 2-79
CHECKED CBB DATE 2-79

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172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

Grading by Others
Ped. Walk & Wall by Others
2' Embankment A As Per Plan
Exist. Ground
Embankment B As Per Plan
TEMP. WALL
10'
Grading by Others
Limits of Excavation
Porous Backfill, As Per Plan
RAMP A
N.B. 471
2:1
Ret. Wall No. 13 (By Others)
Embankment B As Per Plan
12" underdrain, As Per Plan
Top of Rock
Base of Steps is to coincide with top of distinct Limestone interbeds as identified by the Engineer during construction. The vertical distance between rock benches is anticipated to range from four to ten feet, with an average of seven feet. The minimum rock bench width shall be not less than approximately 15 ft. (Typical all sections for Buttress fill)

143+50
547.6

SIXTH ST.
Exist. Ground
Ret. Wall No. 13 (By Others)
Embankment B As Per Plan
Grading by Others
N.B. 471
Limits of Excavation
4:1
Cylinder Pile Wall

143+00
541.4

Top of Rock

2' Embankment A As Per Plan

A 150
B 4970
P 780

Corr. Arc Lgth.
49.3 14540
49' A 240
49' B 8280
49' P 710

6850
A 120
B 4160
P 0

Corr. Arc Lgth.
49.3 6250
49' A 110
49' B 3770
– P 0

Note: A denotes Embankment A, As Per Plan
B denotes Embankment B, As Per Plan
P denotes Porous Backfill, As Per Plan

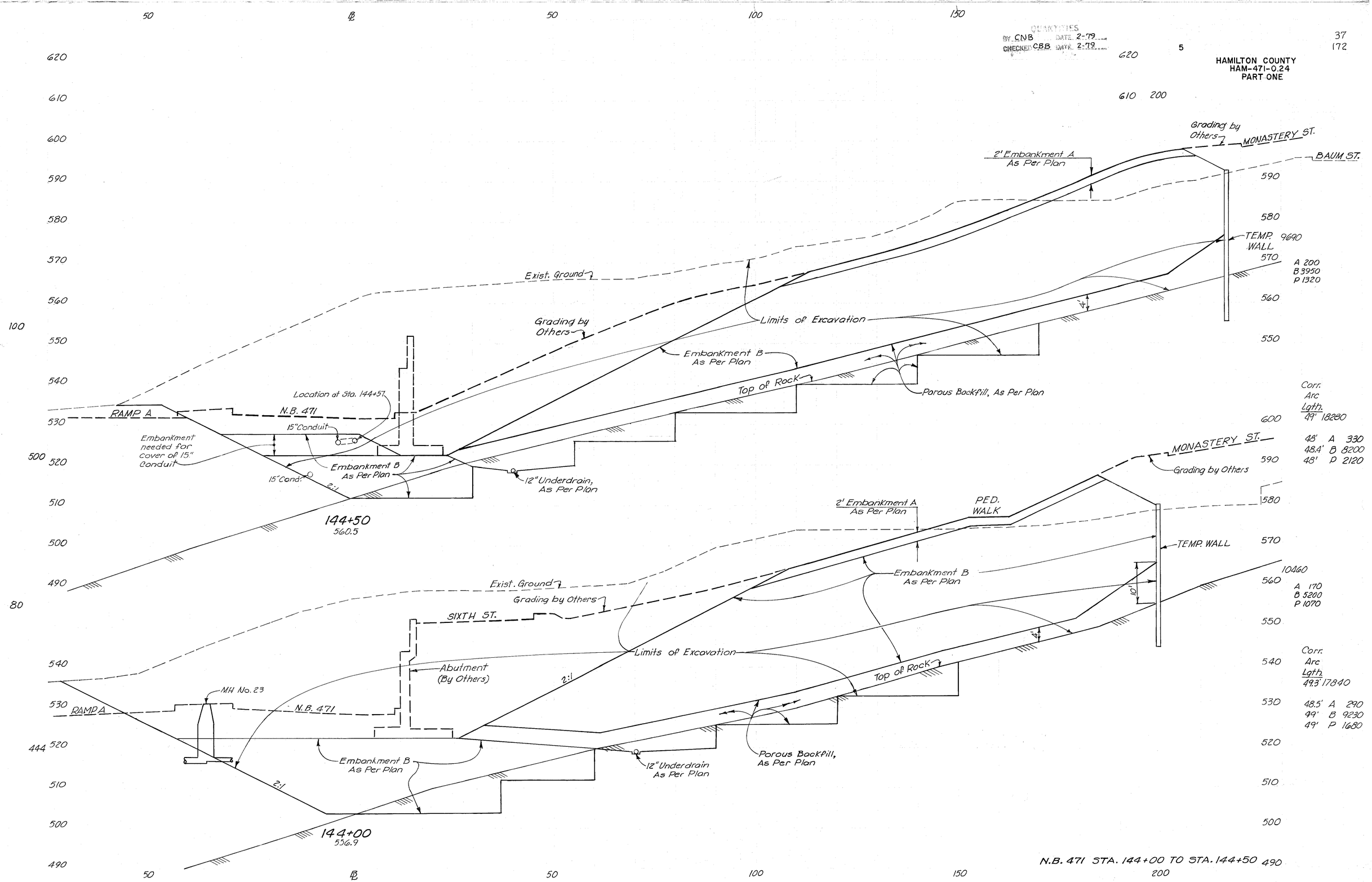
Sta. 142+50
A 0
B 0
P 0

N.B. 471 STA. 143+00 TO STA. 143+50

QUANTITIES
BY CNB DATE 2-79
CHECKED CBB DATE 2-79

37
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



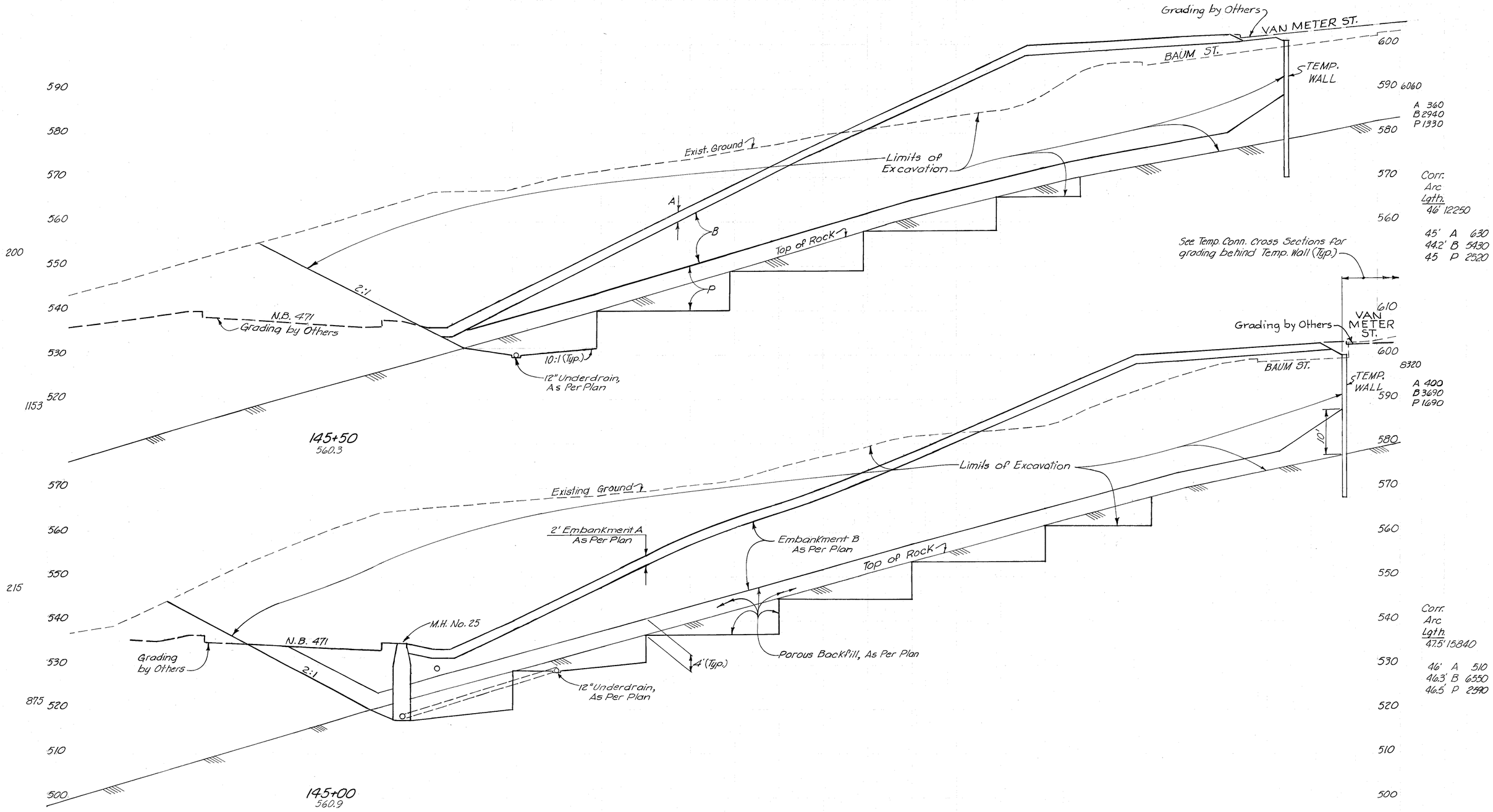
N.B. 471 STA. 144+00 TO STA. 144+50

QUANTITIES
BY CNB DATE 2-79
CHECKED CBB DATE 2-79

5

38
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



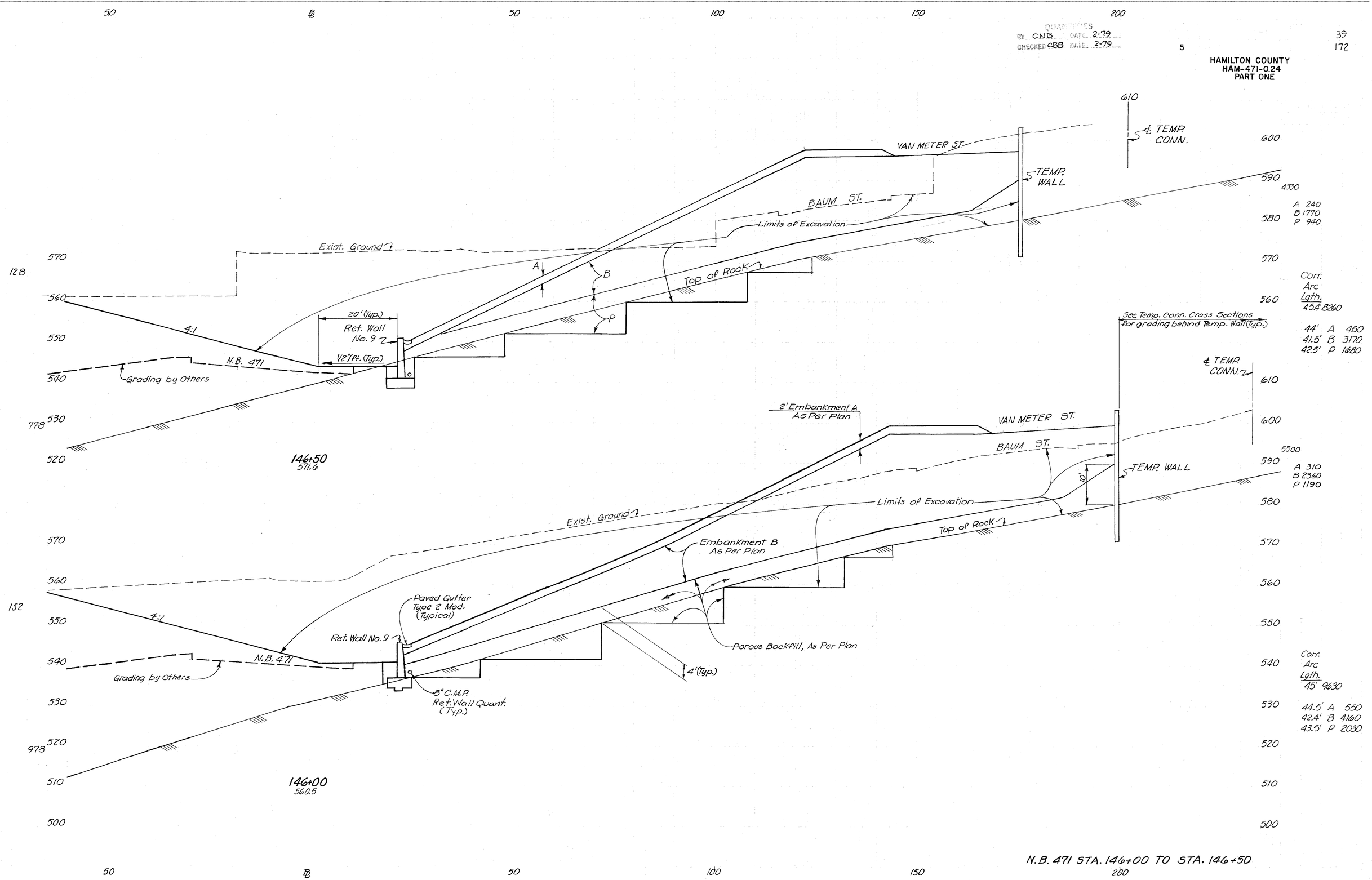
N.B. 471 STA. 145+00 TO STA. 145+50

QUANTITIES
BY CNB DATE 2-79
CHECKED CBB DATE 2-79

5

39
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

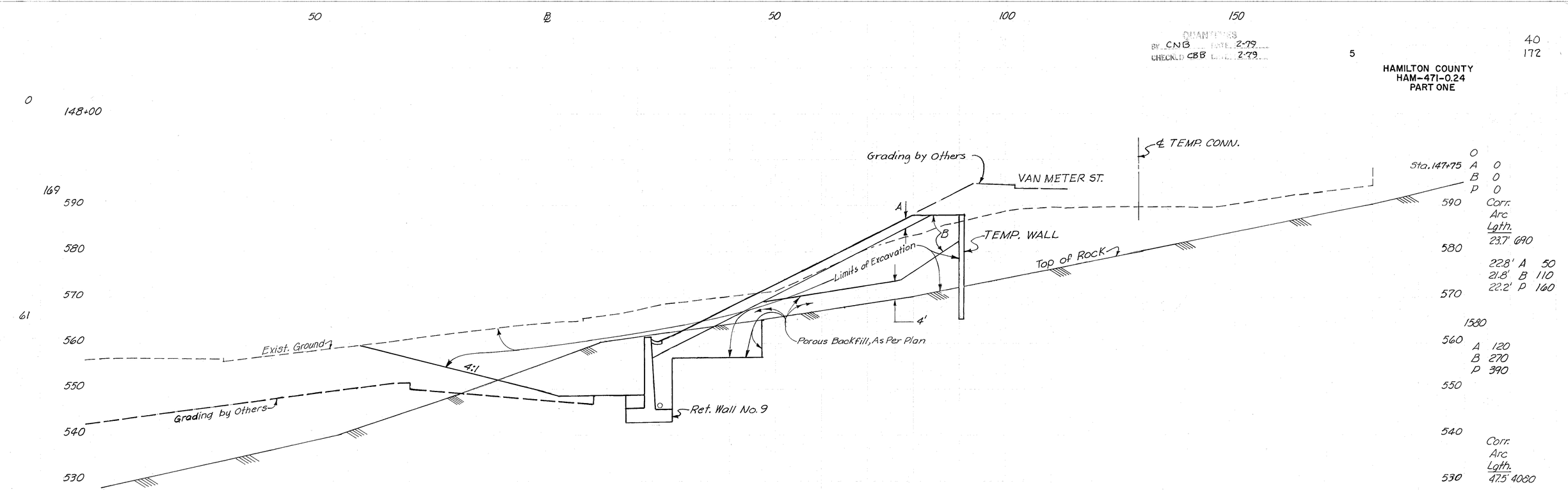


N.B. 471 STA. 146+00 TO STA. 146+50

QUANTITIES
BY CNB DATE 2-79
CHECKED CBB DATE 2-79

5

HAMILTON COUNTY
HAM-471-0.24
PART ONE



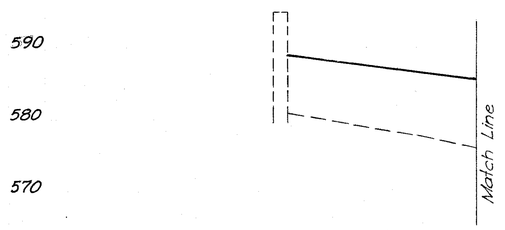
N.B. 471 STA. 147+00 TO STA. 147+50

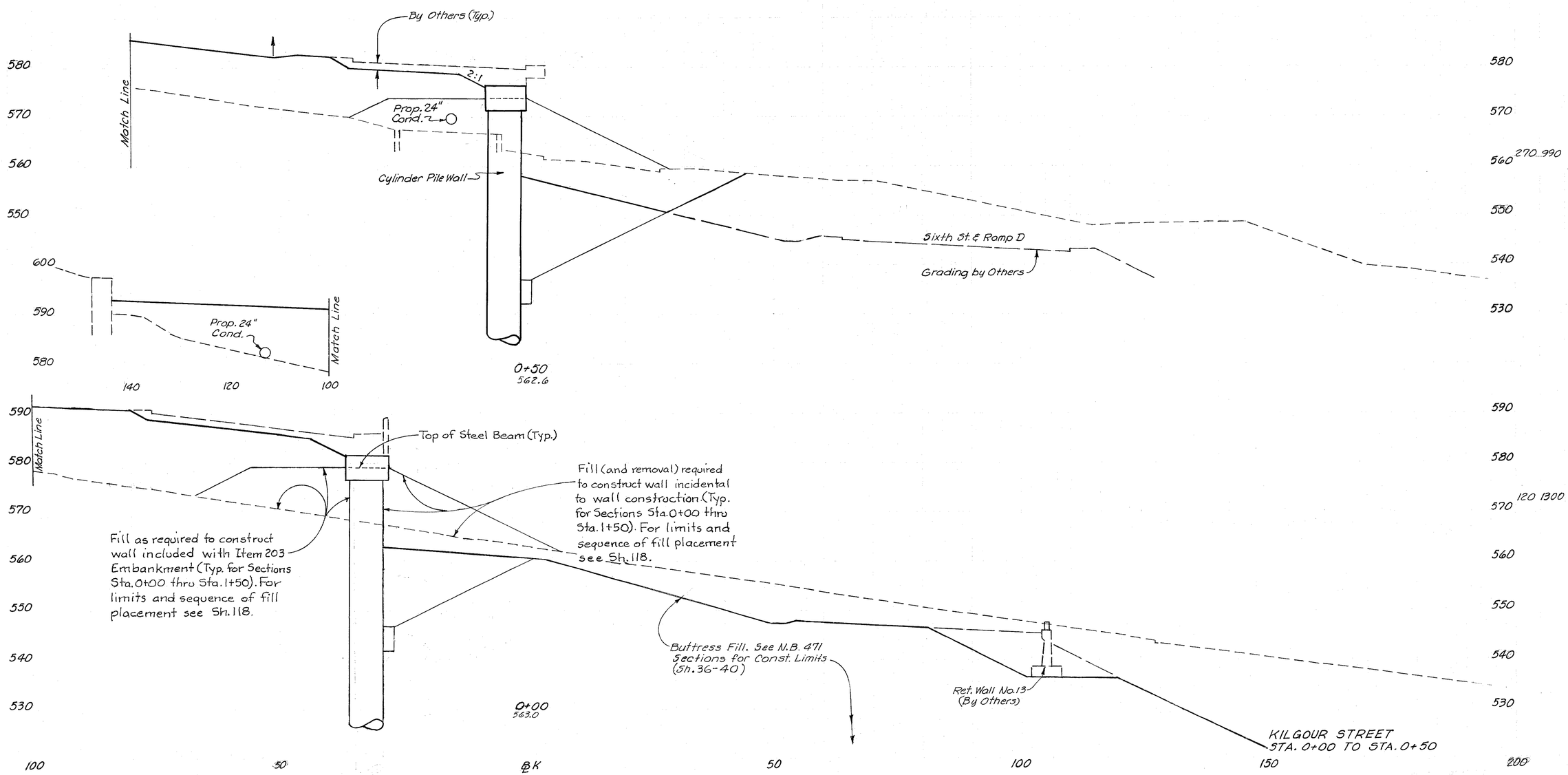
QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

HAMILTON COUNTY
HAM-471-0.24
PART ONE

730 1650





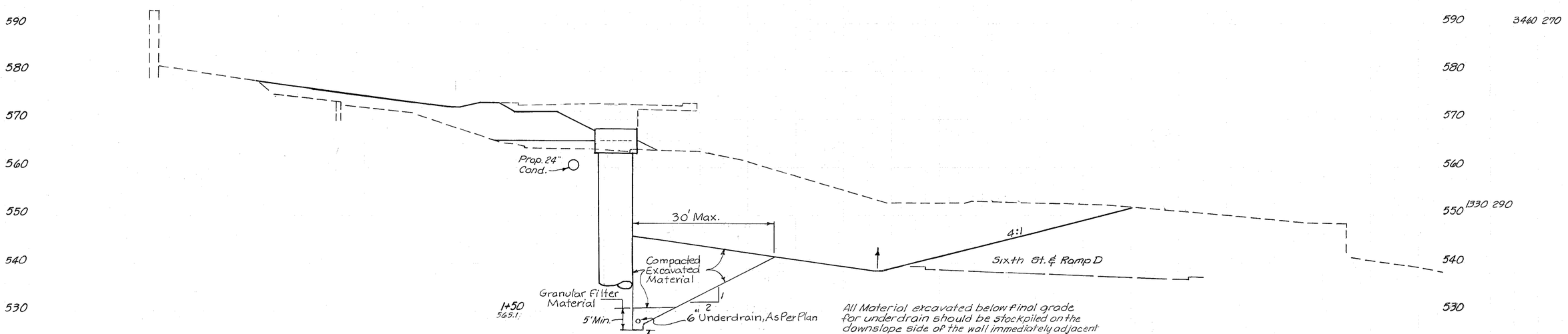
100 50 ℄K 50 100 150

QUANTITIES
BY S.C.C. DATE 5-78
CH. BY C.B.B. DATE 6-78

5

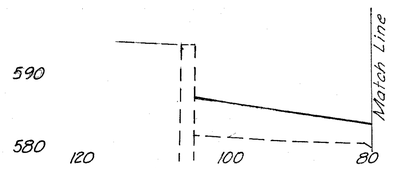
42
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

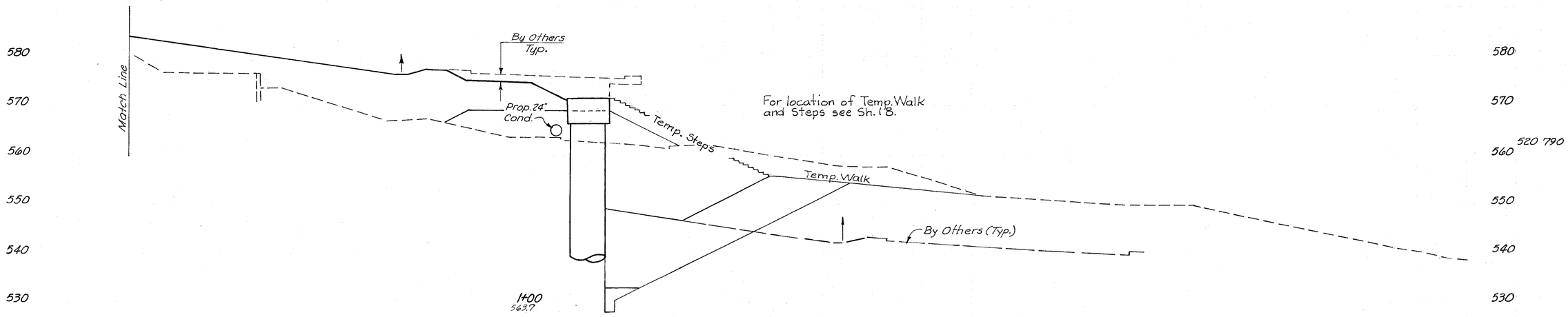


All Material excavated below final grade for underdrain should be stockpiled on the downslope side of the wall immediately adjacent to the excavation and should not be removed from the site until all work for underdrain is completed.

TYPICAL DETAIL
OF DRAIN IN
FRONT OF WALL
STA. 0+00 TO STA. 5+00



1710 1000



For location of Temp. Walk and Steps see Sh. 18.

KILGOUR STREET
STA. 1+00 TO STA. 1+50

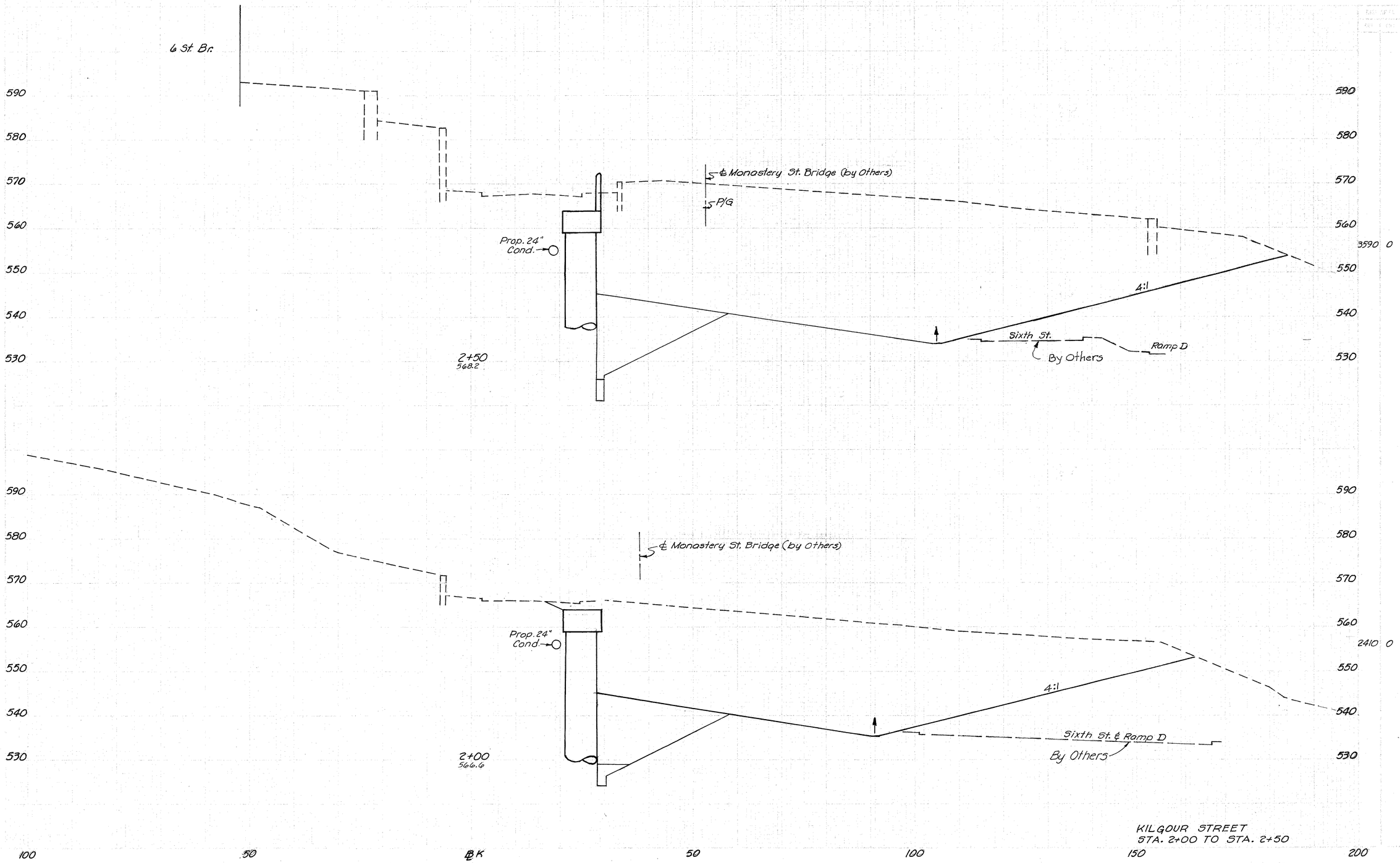
100 50 ℄K 50 100 150 200

QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

43
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



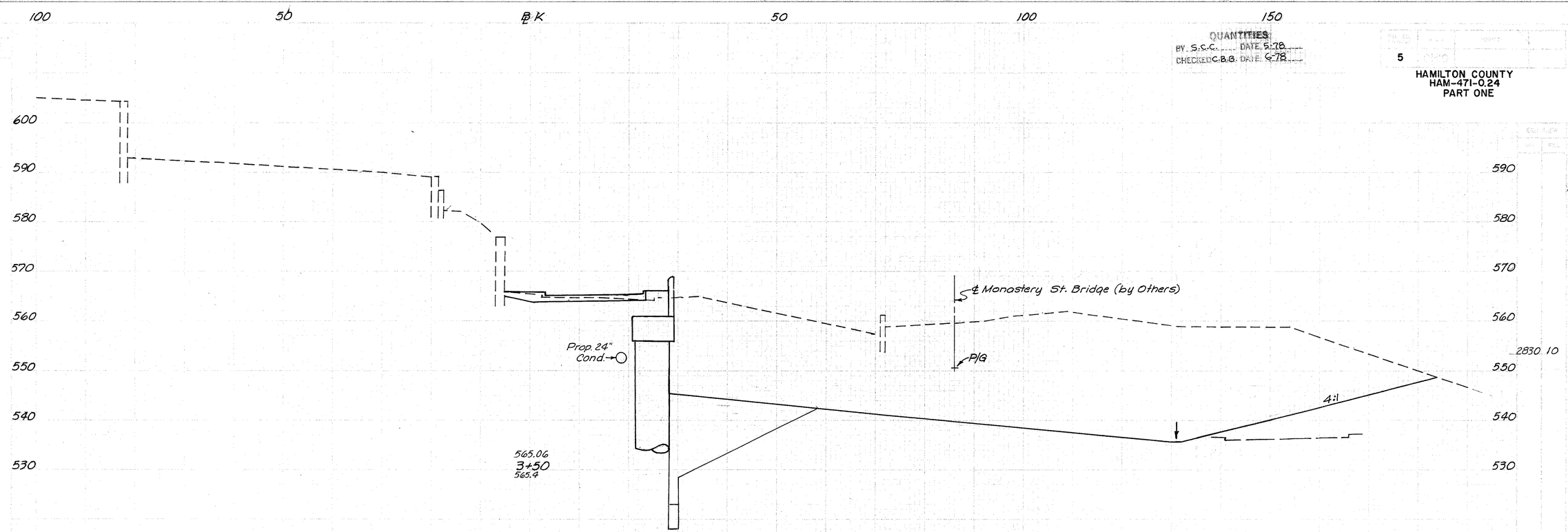
KILGOUR STREET
STA. 2+00 TO STA. 2+50

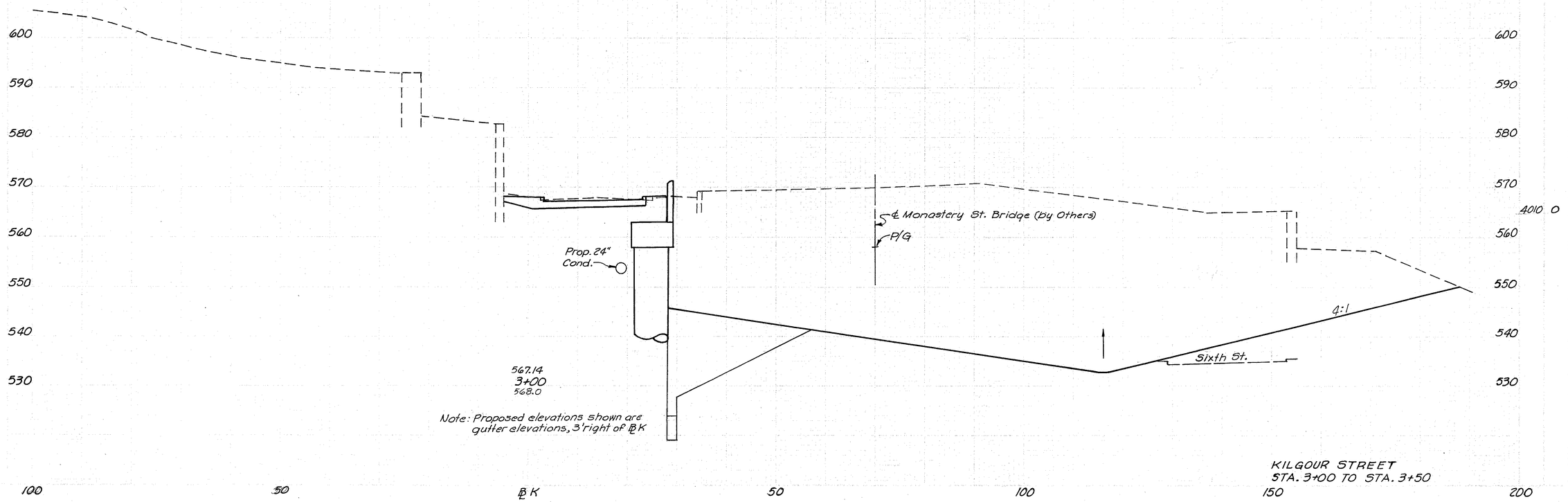
QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

44
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE





KILGOUR STREET
STA. 3+00 TO STA. 3+50

100 50 ℄K 50 100 150

QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

45
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

600
590
580
570
560
550
540
530

58

269

Prop. C.B.
Prop. 12" Conduit
Prop. 24" Conduit West
Prop. 12" Conduit East
Prop. MH @ Sta. 4+47.50 S
562.92
4+50
563.3
Prop. 24" Conduit
℄ Monastery St.
P/G
Ellen St.
4200 20
1450 10
2390 30

3½ St. Br.

39

Prop. 24" Cond.
Finn St.
℄ Monastery
Seed between sodded ditch and wall, Sta. 4+00 to Sta. 7+50
P/G
563.52
4+00
563.4
1130 20

KILGOUR STREET
STA. 4+00 TO STA. 4+50

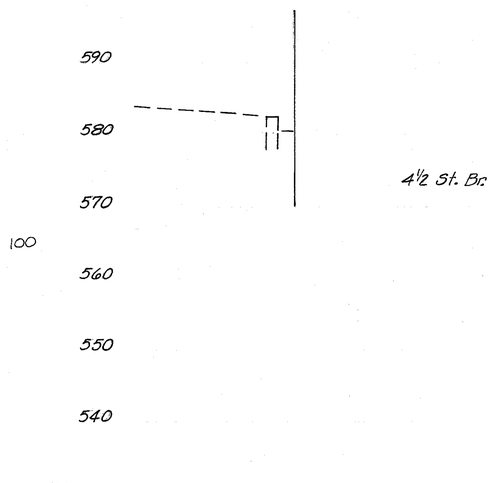
100 50 ℄K 50 100 150 ~ 200

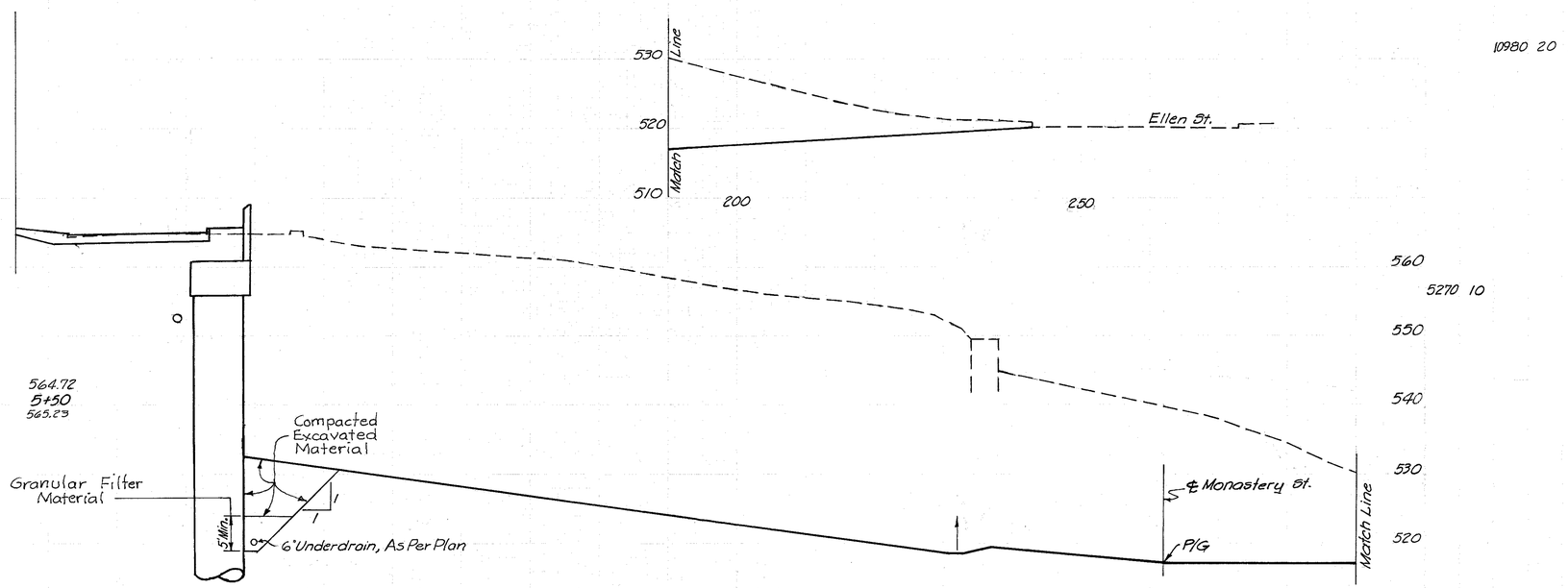
QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

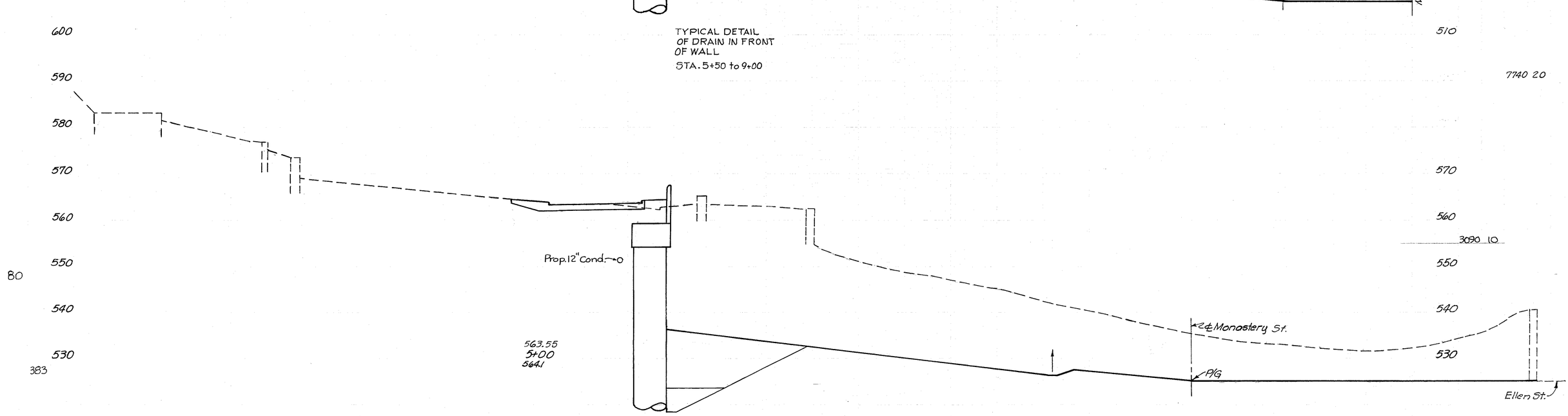
HAMILTON COUNTY
HAM-471-0.24
PART ONE

100 50 ℄K 50 100 150





TYPICAL DETAIL
OF DRAIN IN FRONT
OF WALL
STA. 5+50 to 9+00



KILGOUR STREET
STA. 5+00 TO STA. 5+50

100 50 ℄K 50 100 150 200

QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

HAMILTON COUNTY
HAM-471-0.24
PART ONE

100 50 ℄ K 50 100 150

590 580 570 560 550 540 530

2 St. Br.

157

786

590 580 570 560 550 540 530

3 St. Br.

126

627

100 50 ℄ K 50 100 150

530 520 510 500

Ellen St.

℄ Monastery

PIG

200 250 300

15540 20

568.07
6+50
568.6

560 550 540 530 520 510 500

7790 10

530 520 510

Ellen St.

200 250 300

13320 20

Prop. 12" Cond. → o

566.36
6+00
566.7

560 550 540 530 520 510 200

6590 10

℄ Monastery St.

KILGOUR STREET
STA. 6+00 TO STA. 6+50

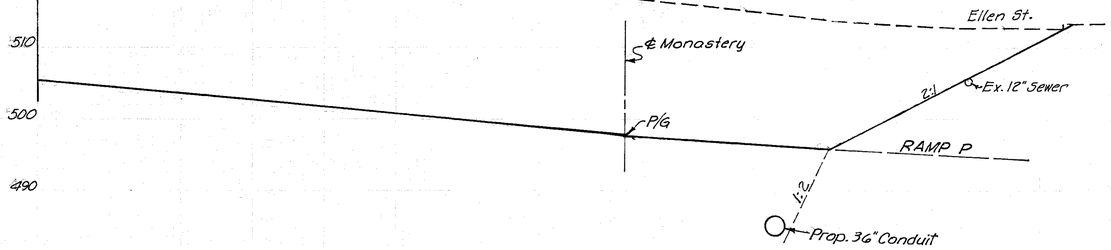
PIG

QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

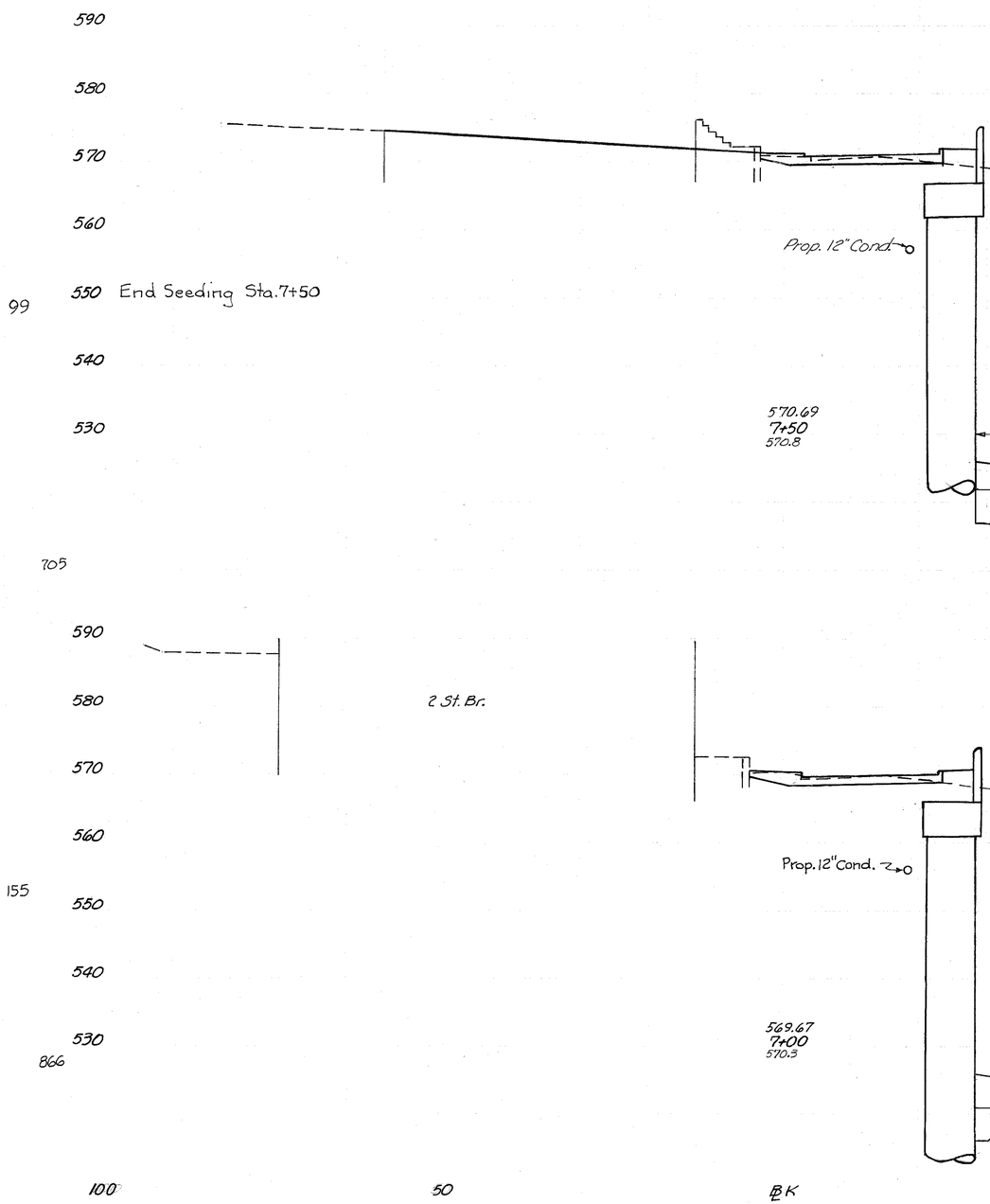
5

48
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



12510 70



9260 10

16900 20

8990 10

100 50 BK 50 100 150

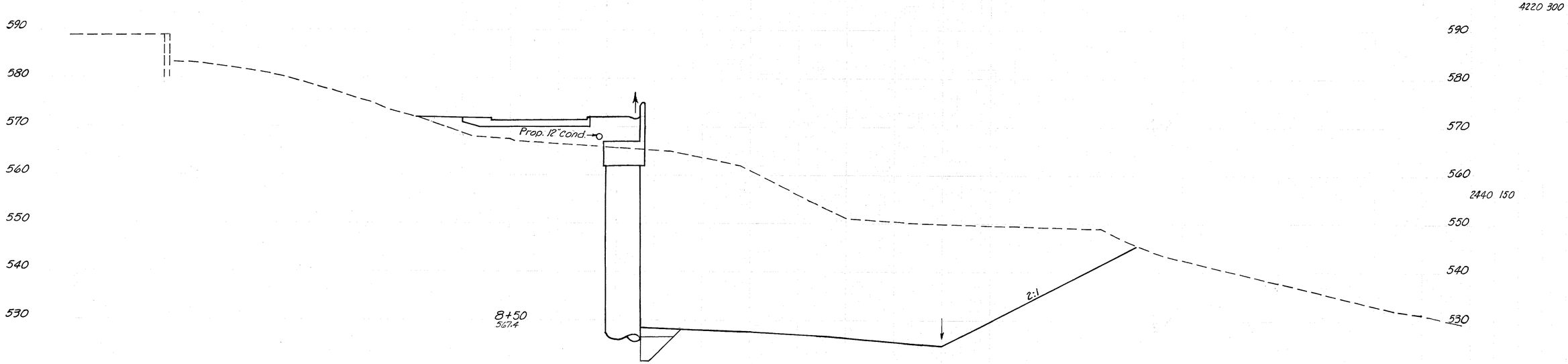
100 50 ℄K 50 100 150

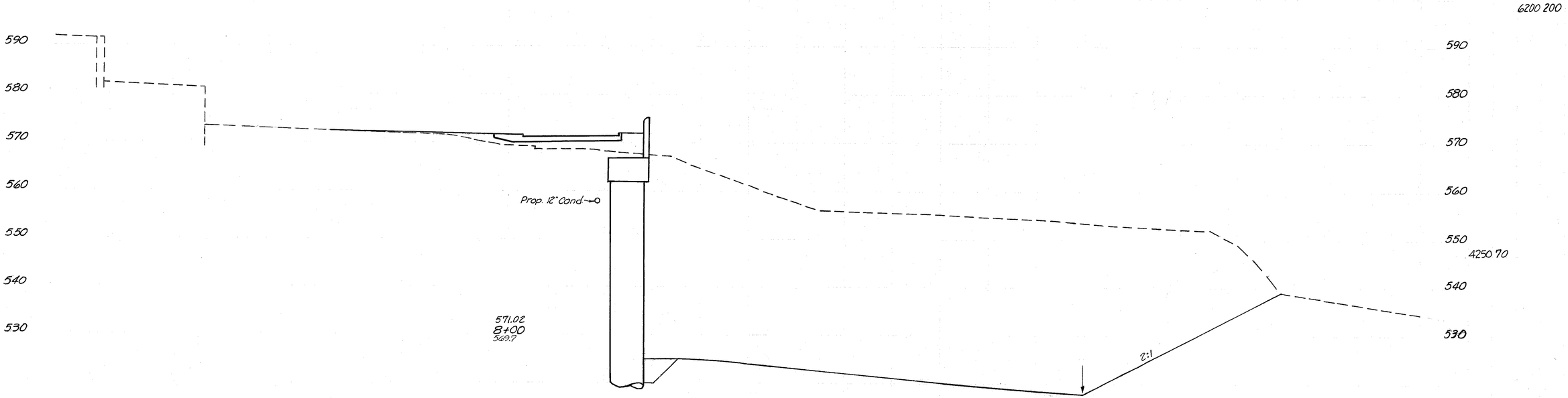
QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

49
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE





100 50 ℄K 50 100 150 200

KILGOUR STREET
STA. 8+00 TO STA. 8+50

100 50 ℄K 50 100 150

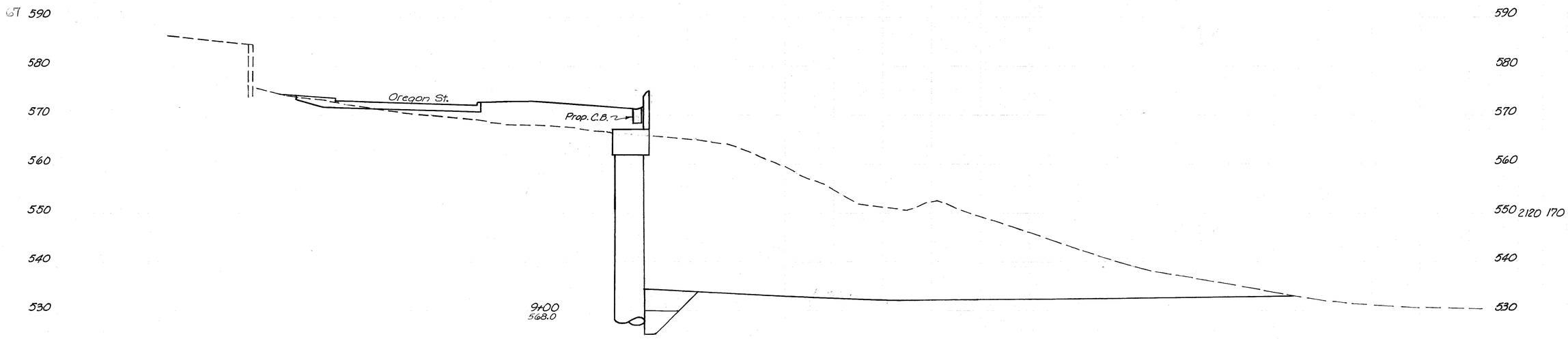
QUANTITIES
BY S.C.C. DATE 5-78
CHECKED C.B.B. DATE 6-78

5

50
172

HAMILTON COUNTY
HAM-471-0.24
PART 1

3150 200



KILGOUR STREET
STA. 9+00

100 50 ℄K 50 100 150 200

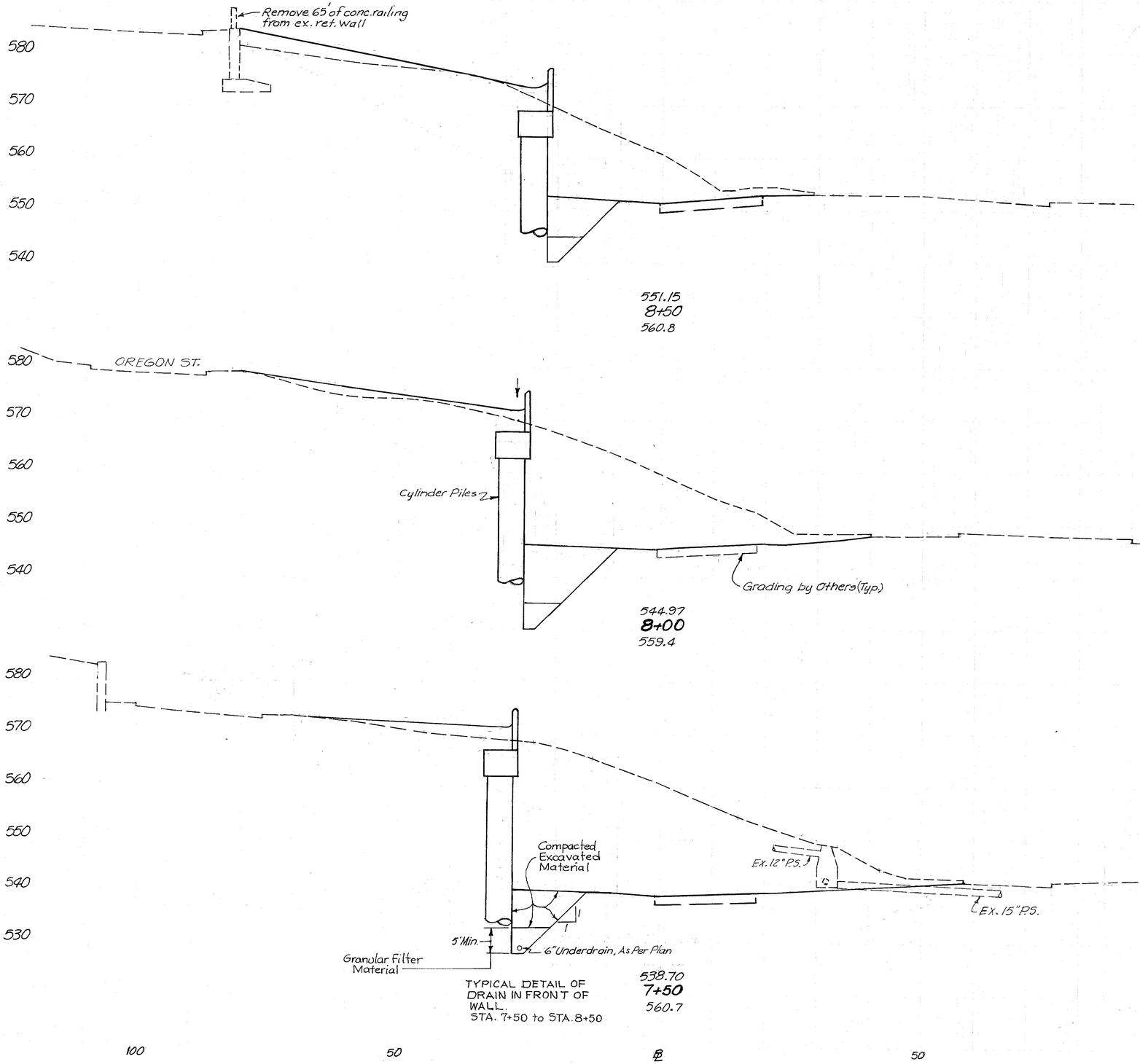
100 50 ℄ 50 100

QUANTITIES
BY S.C.C. 5-78
CHECKED C.B.B. 6-78

5

51
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



580 150
570 670 250
560
550 390 90
540
1030 130
580
570
560 720 50
550
540
1850 90
580
570
560 1280 50
550
540
530

End Areas
Volume Calc.
Volume Chkd.

100 50 ℄ 50 100 150

RAMP P
STA. 7+50 TO STA. 8+50

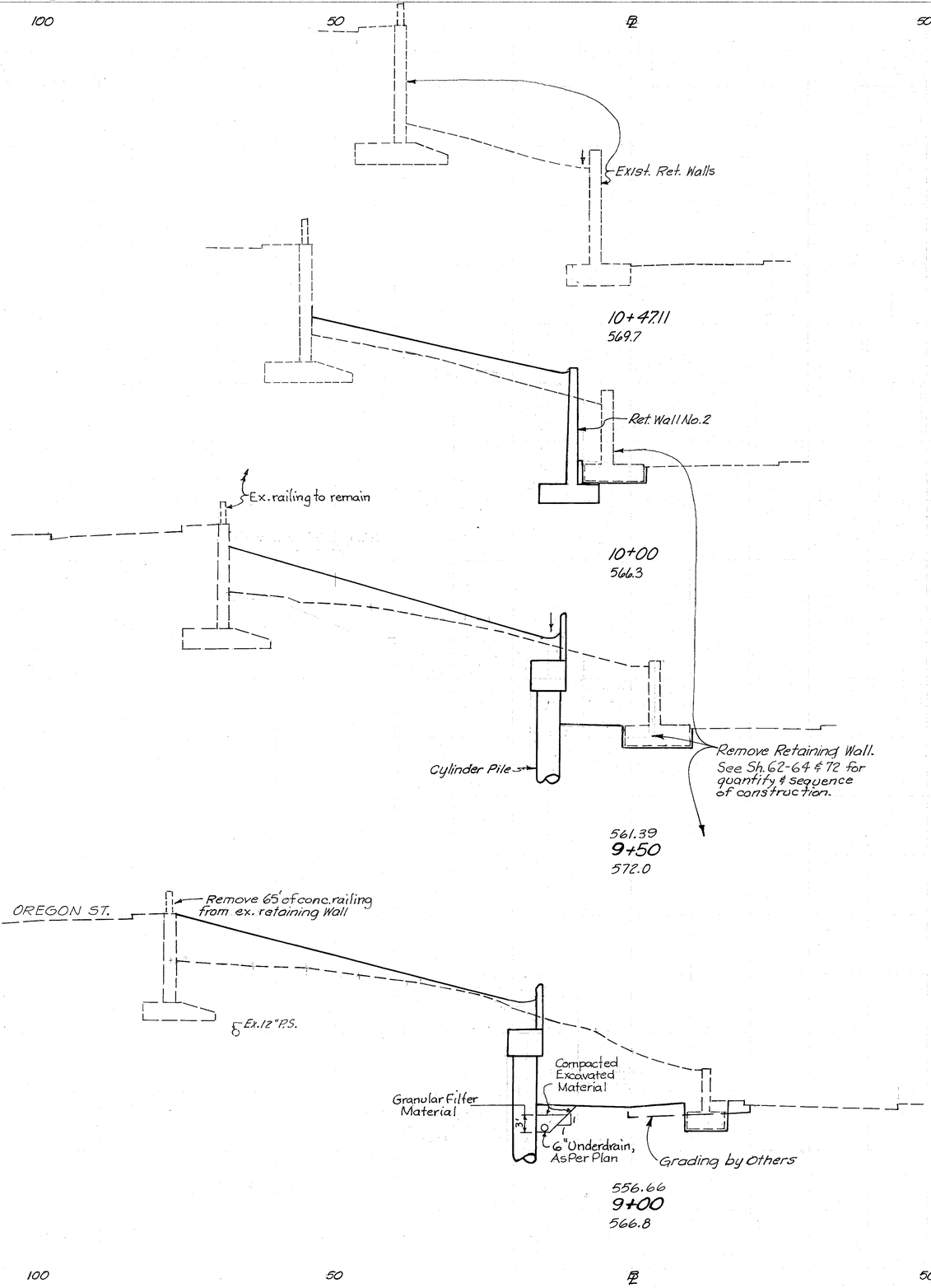
100 50 50 100

QUANTITIES
BY S.C.C. 5-78
CHECKED C.B.B. 6-78

5

52
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



100 50 50 100

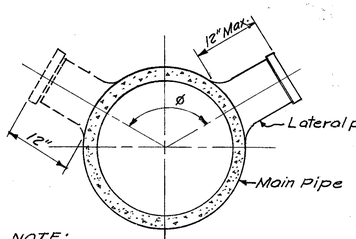
RAMP P
STA. 9+00 TO STA. 10+47.11

150

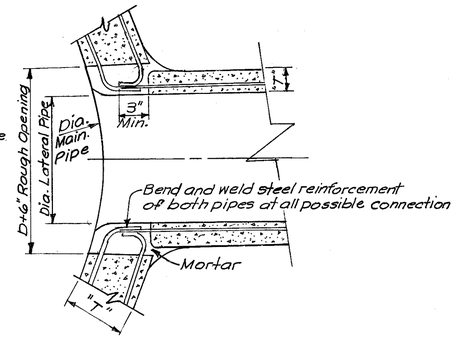
FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

53
1'72

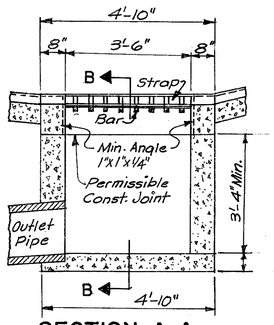
HAMILTON COUNTY
HAM-471-0.24
PART ONE



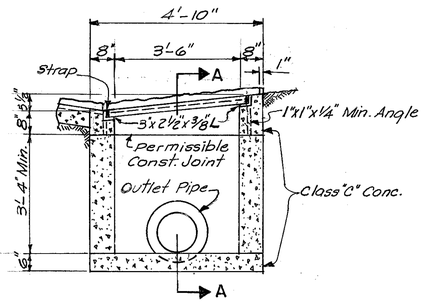
NOTE:
Concrete for grouting shall be the same as that specified for pertinent pipe.



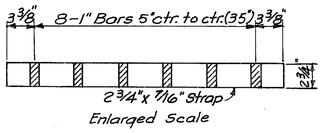
PRE-FABRICATED "T" CONNECTION



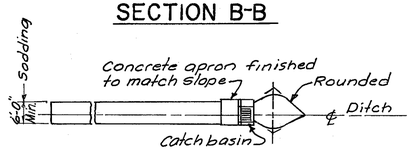
SECTION A-A



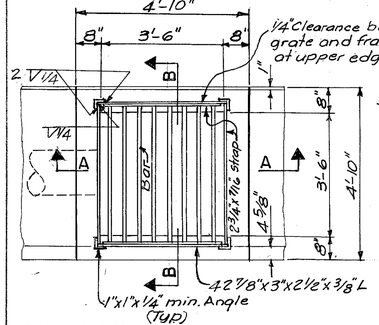
SECTION B-B



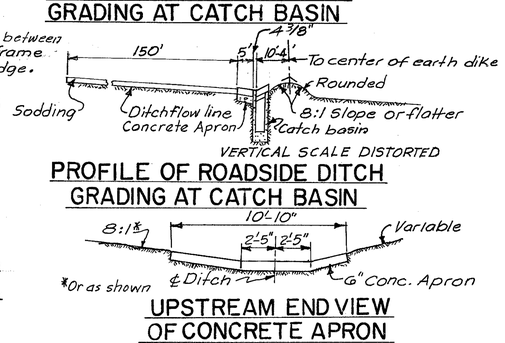
SECTION THRU GRATE



PLAN OF ROADSIDE DITCH GRADING AT CATCH BASIN



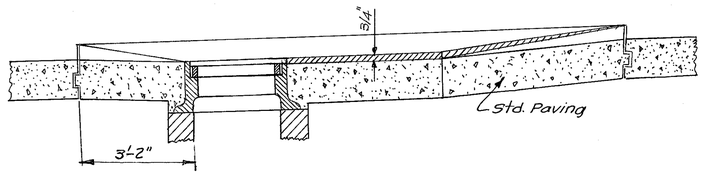
PLAN OF CATCH BASIN



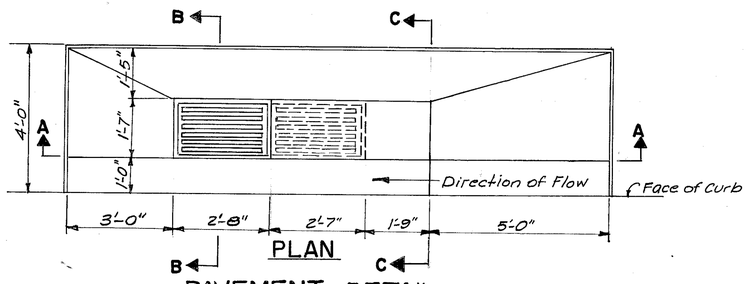
PROFILE OF ROADSIDE DITCH GRADING AT CATCH BASIN

UPSTREAM END VIEW OF CONCRETE APRON

TYPE M CATCH BASIN



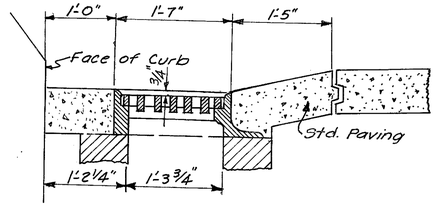
SECTION A-A



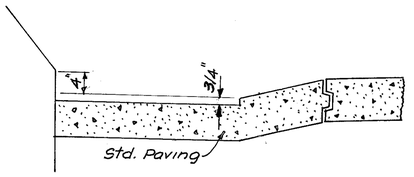
PLAN

PAVEMENT DETAIL

TYPE P MODIFIED CATCH BASIN



SECTION B-B



SECTION C-C

NOTES:
Brick or concrete block may be used in wall construction between the concrete base and the permissible construction joint.
The wall thickness shall be 8" nominal if brick or concrete is used.
If upper box is precast Set in bed of mortar.
Concrete to be Class "C."
Grating and frame shall be of Structural steel in accordance with 711.01 and 513. Minium weight of grate 322 pounds. Minium weight of frame 84 pounds. Grate shall be depressed 3" below the upstream end of the concrete apron at the centerline of the ditch.
Sodding: Provide a 150 foot length of sodding as shown. Installation and payment for sodding shall conform with 660.

Basins in sag: When catch basin is placed in a sag, omit the earth dike and longitudinal slope of grate, also provide concrete apron and sodding on each side of basin.
Cost: The cost of concrete apron and downstream dike to be included in the unit price bid for item 604.
Concrete Apron: To be adjusted in such a manner that the outside edges be at equal elevations.

City of Cincinnati Acc. No. 49042

WALL HORIZONTAL REINFORCING STEEL	
DEPTH	BAR SPACING
4' to 8'	#5 @ 16"
8 to 12'	#5 @ 12"
12' to 16'	#5 @ 8"

NOTES:
All bars shall clear interior face of wall by 2".
Bar lengths shall be 4'-7". Vertical reinforcing bars shall be #5 and placed 2'± OC. Four of these shall be located at the corners of the chamber.

Type P Modified catch basin.
Frame and Grating Acc. No. 49014

NOTE:
Payment for all labor and material required to construct the standard pavement shall be included in the unit price bid for Item 604, Type P Modified Catch Basin

SEWER DETAILS

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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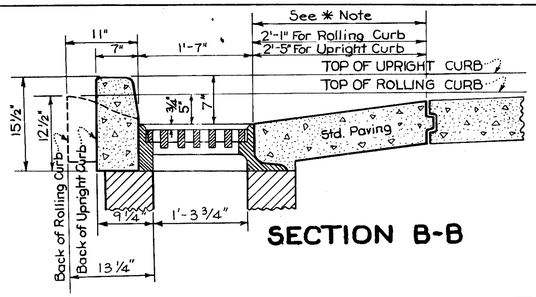
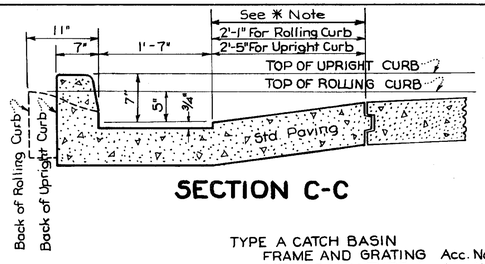
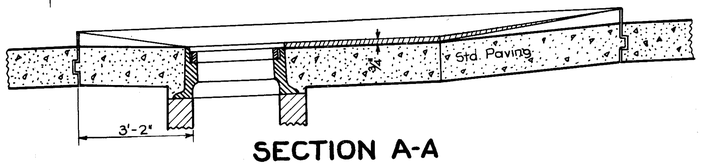
HAMILTON COUNTY
HAM-471-0.24
PART ONE



SECTION B-B



SECTION C-C

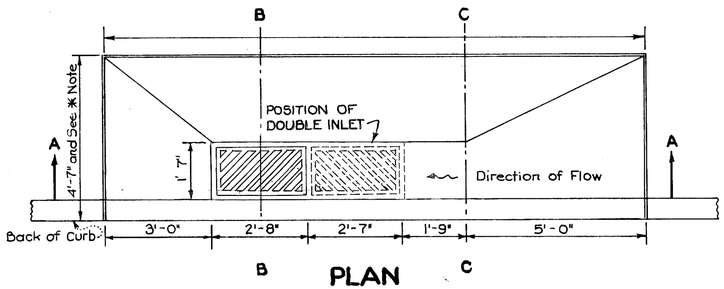


SECTION A-A

TYPE A CATCH BASIN
FRAME AND GRATING Acc. No. 49012
CATCH BASIN TYPE A Acc. No. 49011

TYPE A-2 CATCH BASIN
FRAME AND GRATING Acc. No. 49014
CATCH BASIN TYPE A-2 Acc. No. 49013

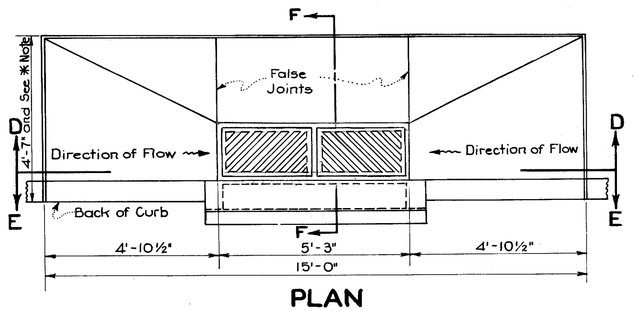
TYPE K CATCH BASIN
FRAME AND GRATING Acc. No. 49014
CATCH BASIN TYPE K Acc. No. 49010



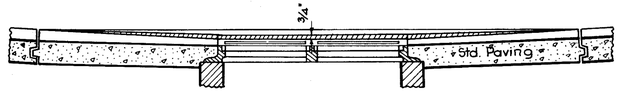
PLAN

* NOTE: Alter this dimension to meet Edge of Concrete Paving for Bituminous paved shoulder of 5' width & under. Otherwise construct as shown.

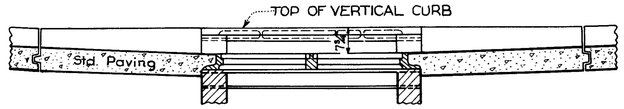
* NOTE: Payment for all labor and material required to construct the standard pavement shall be included in the Unit price bid for Item 604 Type A, A-2, K, C or P Catch Basins.



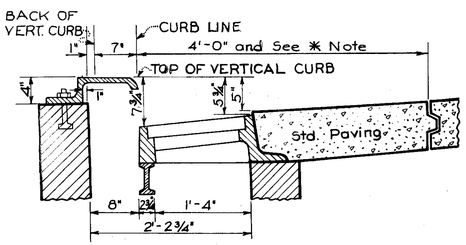
PLAN



SECTION D-D



SECTION E-E



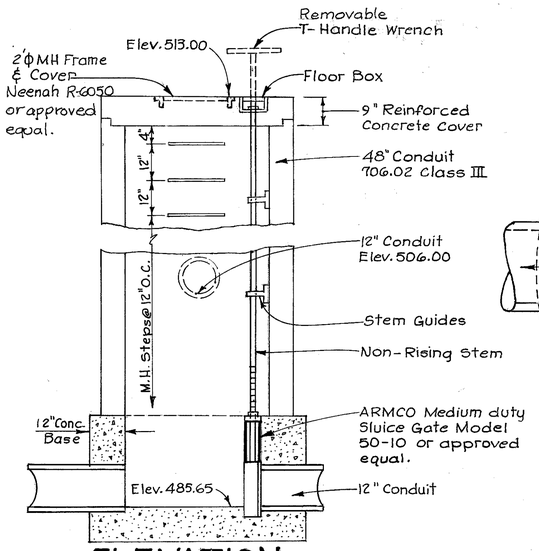
SECTION F-F

TYPE C CATCH BASIN
FRAME AND GRATING Acc. No. 49017
CATCH BASIN TYPE C Acc. No. 49016

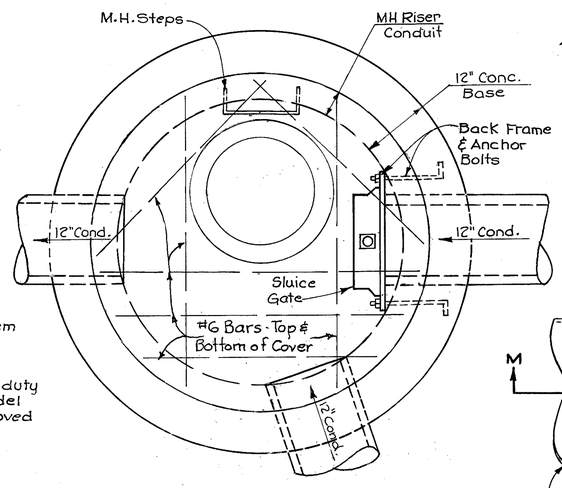
City of Cincinnati Acc. No. 49018

STANDARD PAVEMENT DETAIL FOR TYPE A, A-2, & P CATCH BASINS

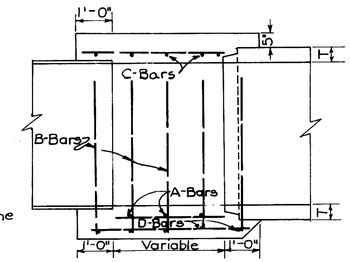
City of Cincinnati Acc. No. 49015



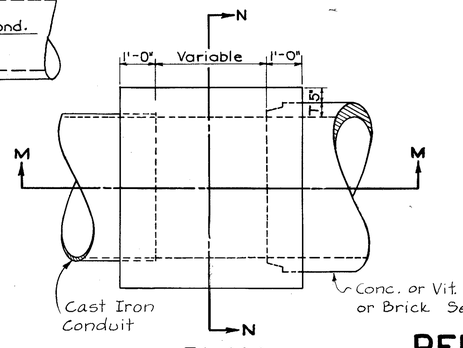
ELEVATION



PLAN



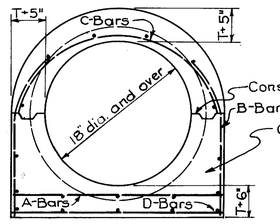
SECTION M-M



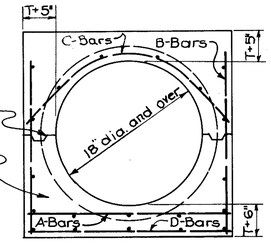
PLAN

STANDARD PAVEMENT DETAIL FOR TYPE C CATCH BASIN

Invert Steel - 3" cl.
All other Steel - 2" cl.
Bar Lap - 30 times the bar diameter



OPTIONAL SECTION N-N



SECTION N-N

A-B-C and D Bars @ 12" o.c.
A-B-C { #5 Bars for 18" to 60" Sewer
#6 Bars for 66 to 78" Sewer
#7 Bars for 84" to 108" Sewer
D-Bar #5 Bars for 18" to 108" Sewer
Not less than 3 transverse bars in any gap.
All longitudinal steel - #5 Bars @ 18" o.c.

City of Cincinnati Acc. No. 49031

REINF. CONCRETE COLLAR

Note: Collar symmetrical about centerline joining same type of conduit. Reinforcing steel is incidental to concrete.

M.H. SPECIAL WITH SLUICE GATE

SEWER DETAILS

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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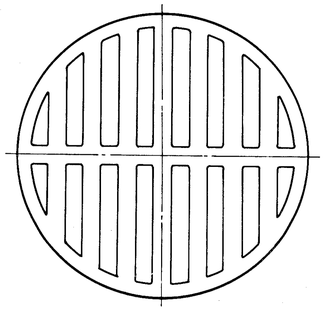
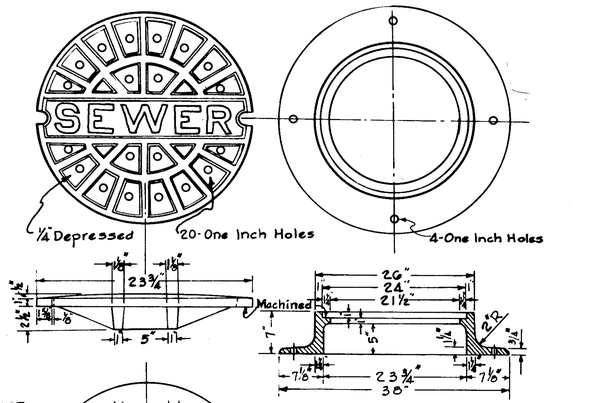
HAMILTON COUNTY
HAM-471-0.24
PART ONE



City of Cincinnati Acc. No. 49007

Note: For use with standard manhole frame, Acc. No. 49005 Approx. Wt. 105 lbs.

STANDARD GRATING MANHOLE COVER

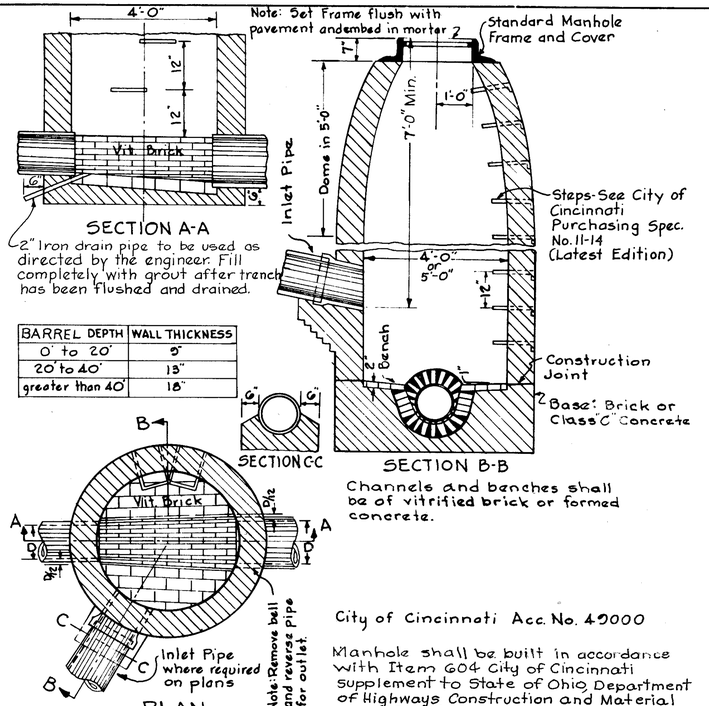


COMPUTED WEIGHTS

Frame	332 lbs.
Cover	155 lbs.
Total	487 lbs.

City of Cincinnati Acc. No. 49005

STANDARD MANHOLE FRAME AND COVER



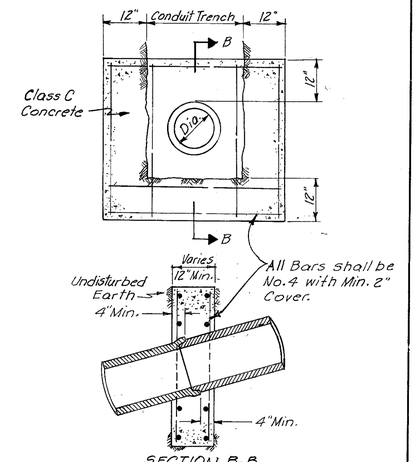
BARREL DEPTH	WALL THICKNESS
0' to 20'	9"
20' to 40'	13"
greater than 40'	18"

Channels and benches shall be of vitrified brick or formed concrete.

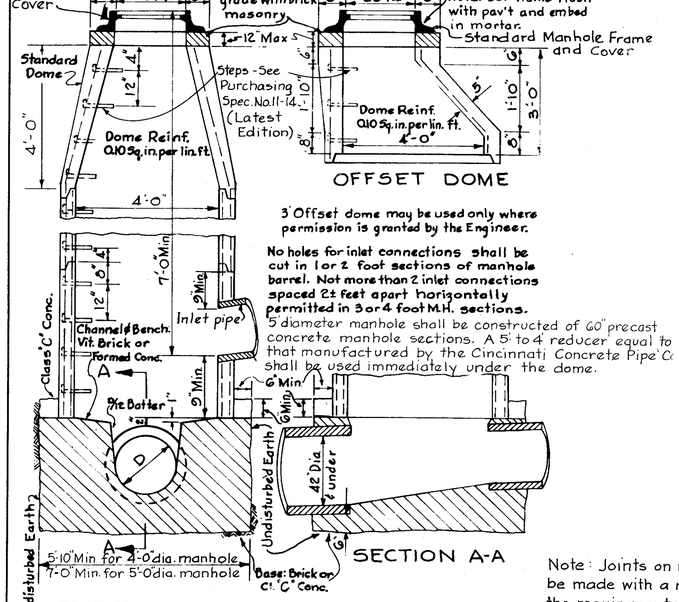
City of Cincinnati Acc. No. 49000

Manhole shall be built in accordance with Item 604 City of Cincinnati supplement to State of Ohio Department of Highways Construction and Material Specifications.

MANHOLE TYPE A

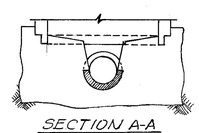


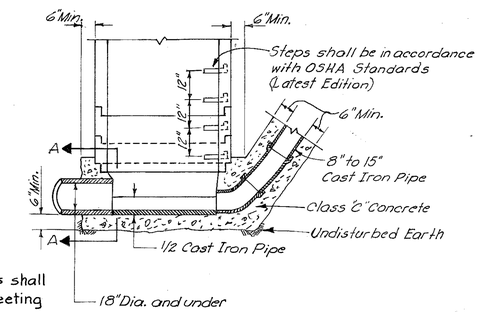
REINFORCED CONCRETE KEY BLOCK



MANHOLE TYPE P

City of Cincinnati Acc. 49001



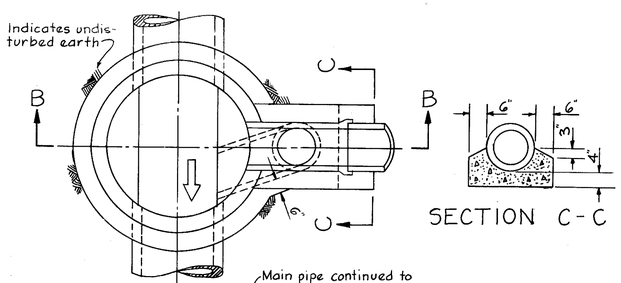


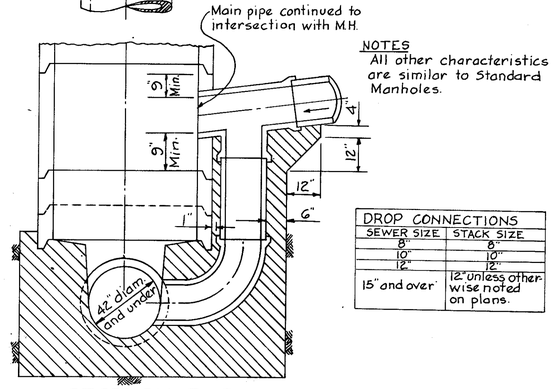
Note: Joints on manhole sections shall be made with a rubber gasket meeting the requirements of ASTM C-443 except that only "O" Ring and "Tylox CR" gaskets are acceptable.

MANHOLE TYPE U

Notes: All construction shall be accordance with Acc. No. 49037

Cast Iron Pipe may be rotated to left or right at manhole base to accomplish angular entry where necessary.

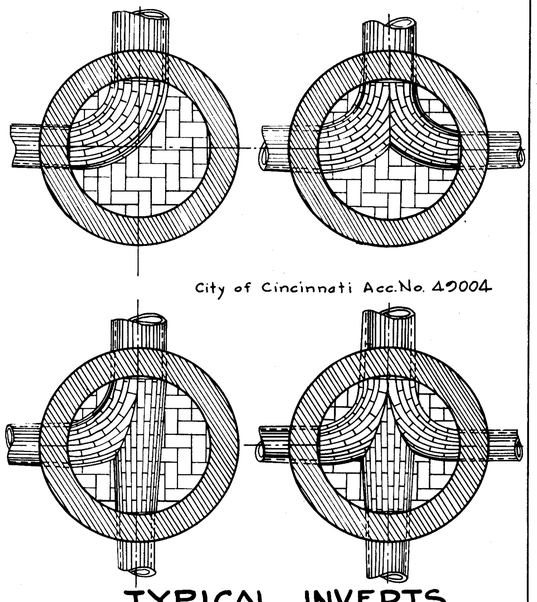




NOTES
All other characteristics are similar to Standard Manholes.

DROP CONNECTIONS	
SEWER SIZE	STACK SIZE
8"	8"
10"	10"
12"	12"
15" and over	12" unless otherwise noted on plans.

MANHOLE TYPE A OR P (DROP)

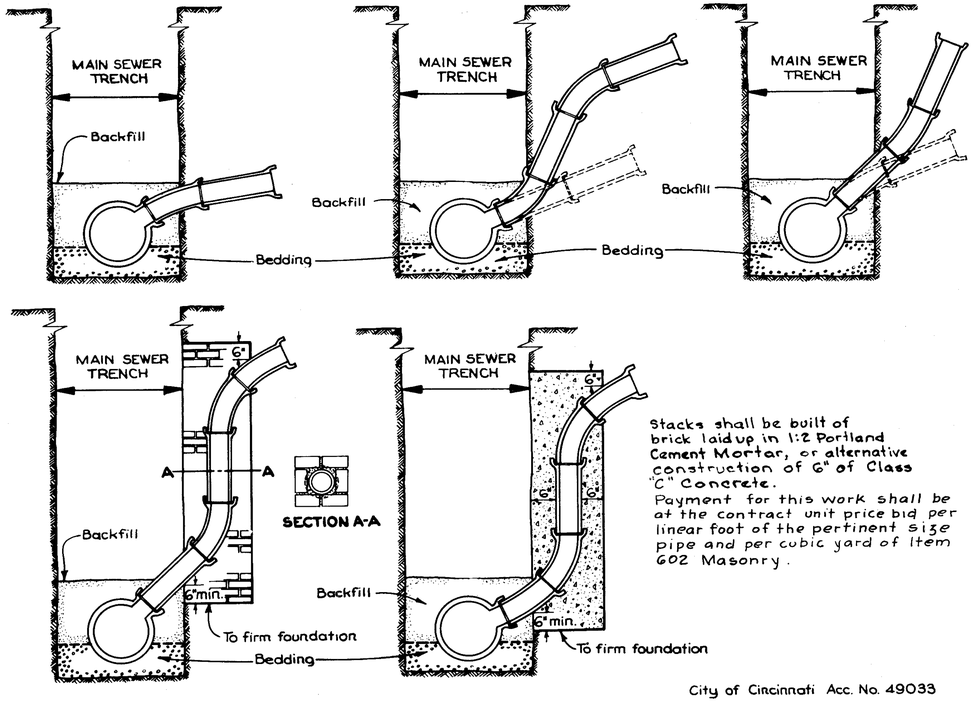


City of Cincinnati Acc. No. 49004

TYPICAL INVERTS

Note:
All Acc. No's shown are City of Cincinnati Acc. No's.

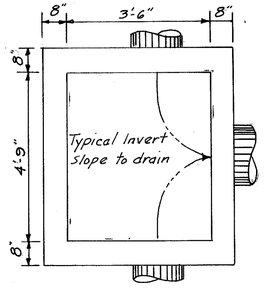
SEWER DETAILS



Stacks shall be built of brick laid up in 1:2 Portland Cement Mortar, or alternative construction of 6" of Class "C" Concrete.
Payment for this work shall be at the contract unit price bid per linear foot of the pertinent size pipe and per cubic yard of Item 602 Masonry.

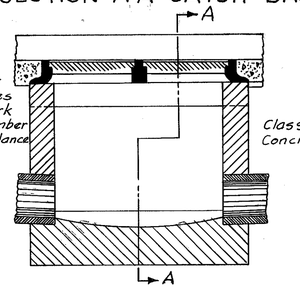
City of Cincinnati Acc. No. 49033

TYPICAL HOUSE DRAINS AND STACKS



PLAN C-C

Note:
Concrete slab may be precast with lift holes 12" from each end. Mark top of slab. Inlet chamber shall be built in accordance with Item 604



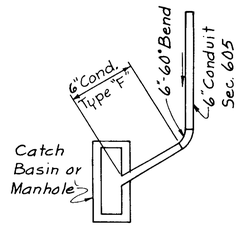
SECTION-B-B

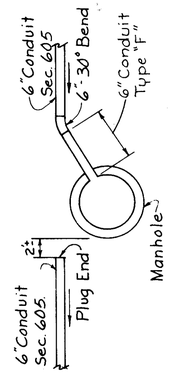
WALL HORIZONTAL REINFORCING STEEL	
DEPTH	BAR SPACING
4' to 8'	#5 @ 16"
8' to 12'	#5 @ 12"
12' to 16'	#5 @ 8"

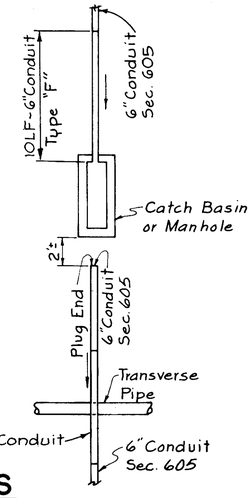
Notes:
All bars shall clear interior face of wall by 2". Bar lengths shall be 5'-10" for longer side and 4'-7" for the short side. Vertical reinforcing bars shall be #5 and placed 2'± O.C. Four of these shall be located at the corners of the Chambers.

SECTION A-A CATCH BASIN P MODIFIED

CATCH BASIN P MODIFIED







UNDERDRAIN DETAILS

FED. RD. CIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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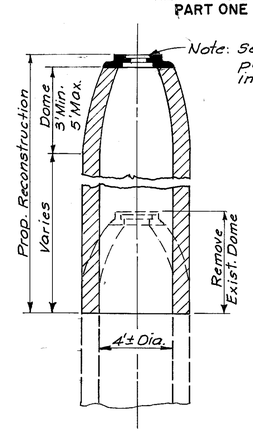
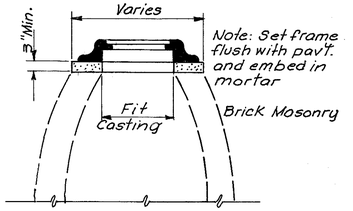
HAMILTON COUNTY
HAM-471-0.24
PART ONE



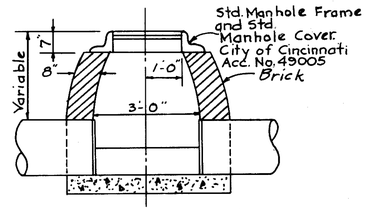
TYPICAL SECTION

MANHOLE RECONSTRUCTED TO GRADE



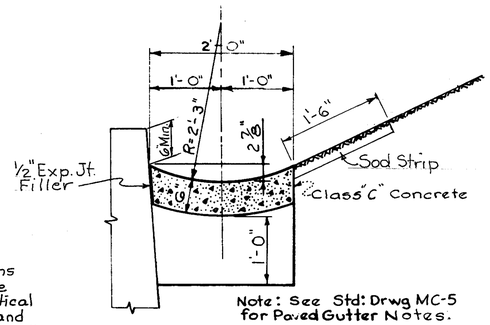
TYPICAL SECTION

MANHOLE ADJUSTED TO GRADE



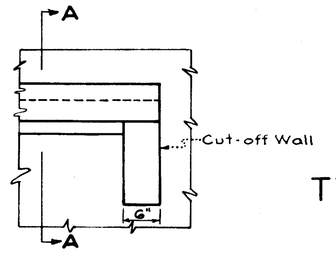
TYPE B MANHOLE

NOTE:
Channel and Bench may be made of vitrified brick or formed of Class 'C' Concrete
Where sewer does not change size or direction at manhole, channel pipe may be used.



Note: See Std: Drwg MC-5 for Paved Gutter Notes.

SECTION A-A



SIDE VIEW

TYPE 2 MODIFIED PAVED GUTTERS

Note:
All Acc. No's shown are City of Cincinnati Acc. No's.

SEWER DETAILS

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
	OHIO		

HAMILTON COUNTY
HAM-471-0.24
PART ONE

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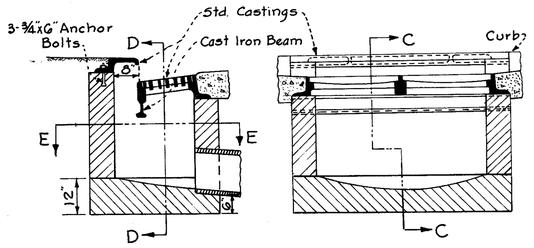
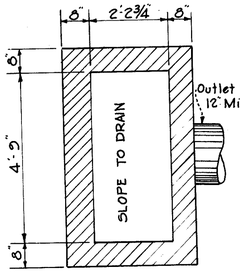


SECTION C-C

SECTION D-D



PLAN E-E

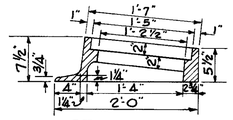
Inlet Chamber shall be built of concrete or brick masonry in accordance with Item 604

For Standard Castings See Acc. No. 49017.

For setting of Inlet Box and Casting See Acc. No. 49018

City of Cincinnati Acc. No. 49016

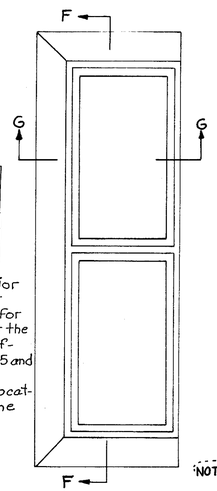
TYPE C CATCH BASIN



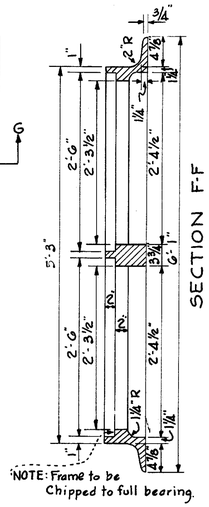
SECTION G-G

WALL HORIZONTAL REINFORCING STEEL	
DEPTH	BAR SPACING
4' to 8'	#5 @ 16"
8' to 12'	#5 @ 12"
12' to 16'	#5 @ 8"

NOTES:
All bars shall clear interior Face of wall by 2". Bar lengths shall be 5'-10" for longer side and 3'-5" for the short side. Vertical reinforcing bars shall be #5 and placed 2'± O.C.
Four of these shall be located at the corners of the Chambers.



FRAME PLAN



SECTION F-F

NOTE: Frame to be Chipped to full bearing.

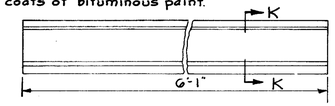
FOR GRATING DETAILS SEE TYPE A CATCH BASIN – SHEET NO. 58

GRATING DETAIL
2 GRATINGS REQUIRED

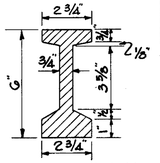
COMPUTED WEIGHTS	
Frame	680 lbs.
Gratings	296 lbs.
Curb Casting	305 lbs.
Cast Iron Beam	162 lbs.
Total	1443 lbs.

City of Cincinnati Acc. No. 49017

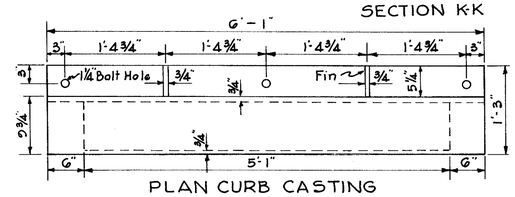
Note: All castings to receive 2 coats of bituminous paint.



GRAY CAST IRON BEAM

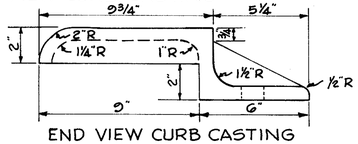


SECTION K-K



PLAN CURB CASTING

FRONT VIEW CURB CASTING

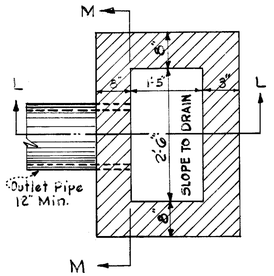


END VIEW CURB CASTING

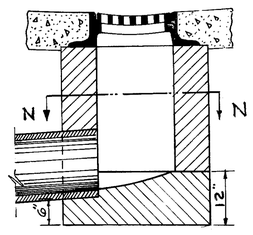
STANDARD CASTING FOR TYPE C CATCH BASIN

WALL HORIZONTAL REINFORCING STEEL	
DEPTH	BAR SPACING
4' to 8'	#5 @ 16"
8' to 12'	#5 @ 12"
12' to 16'	#5 @ 8"

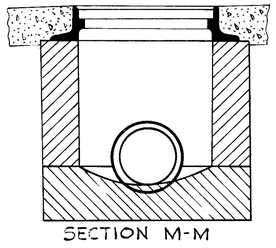
Notes:
All bars shall clear interior face of wall by 2". Bar lengths shall be 3'-7" for the longer side and 2'-6" for the short side. Verfical reinforcing bars shall be #5 and placed 2'± O.C. Four of these shall be located at the corners of the chambers



PLAN N-N



SECTION L-L



SECTION M-M

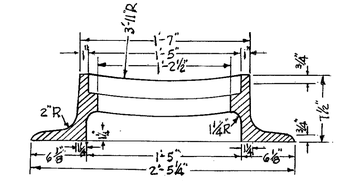
Inlet chamber shall be built of concrete or brick masonry in accordance with Item 604

For Sta. castings see Acc. No. 49020.

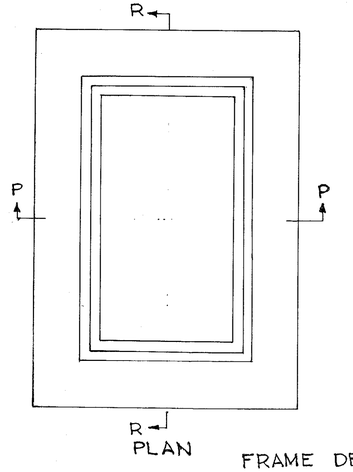
City of Cincinnati Acc. No. 49019

TYPE V CATCH BASIN

Note:
All castings to receive 2 coats of Bituminous Paint.

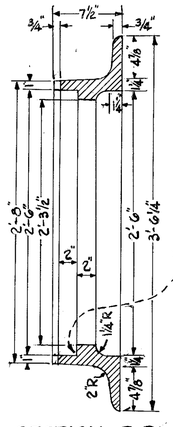


SECTION P-P

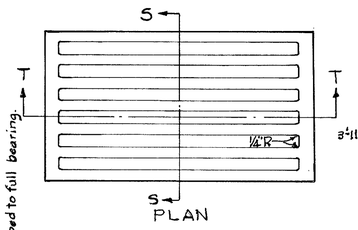


PLAN

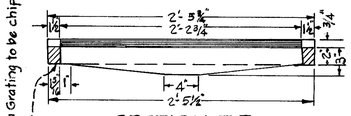
FRAME DETAIL



SECTION R-R



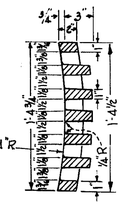
PLAN



SECTION T-T

GRATING DETAIL

Note: Frame and Grating to be chipped to full bearing.



SECTION S-S

COMPUTED WEIGHTS	
Frame	464 lbs.
Grating	148 lbs.
Total	612 lbs.

City of Cincinnati Acc. No. 49020

Note:
All Acc. No's shown are.
City of Cincinnati Acc. No's.

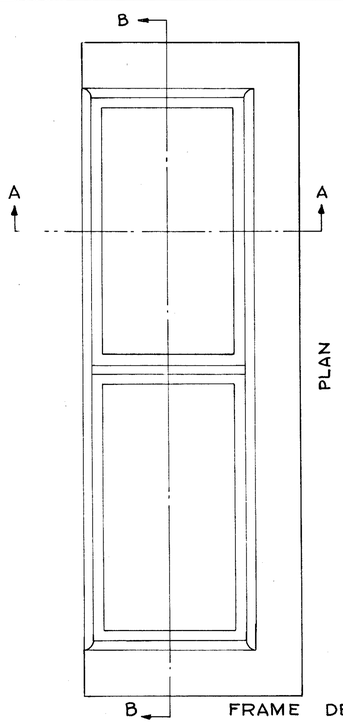
STANDARD CASTINGS FOR TYPE V CATCH BASIN

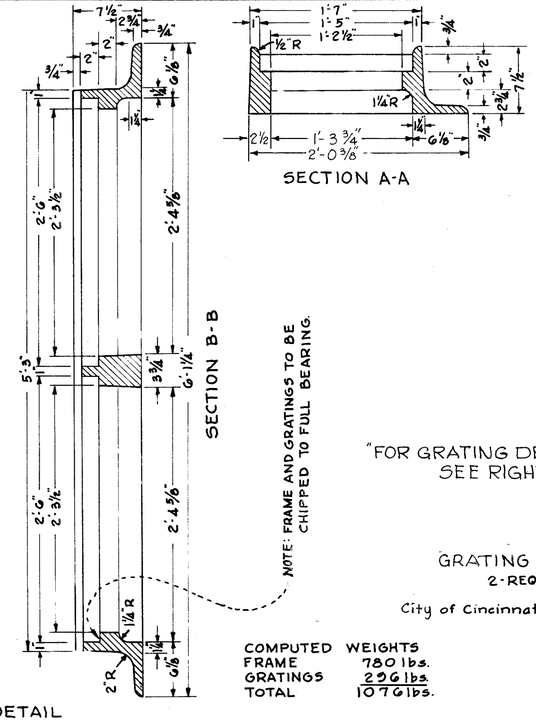
SEWER DETAILS

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

58
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE





NOTE: FRAME AND GRATINGS TO BE CHIPPED TO FULL BEARING.

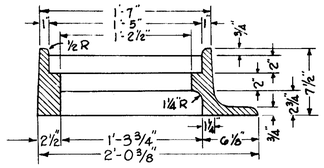
"FOR GRATING DETAILS" SEE RIGHT

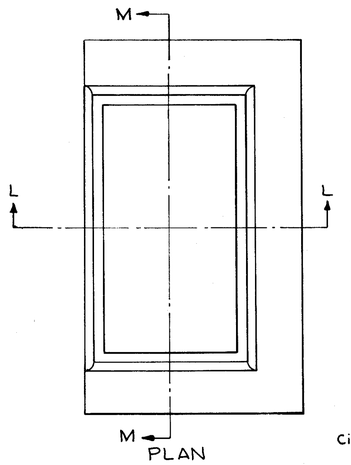
GRATING DETAIL
2-REQUIRED

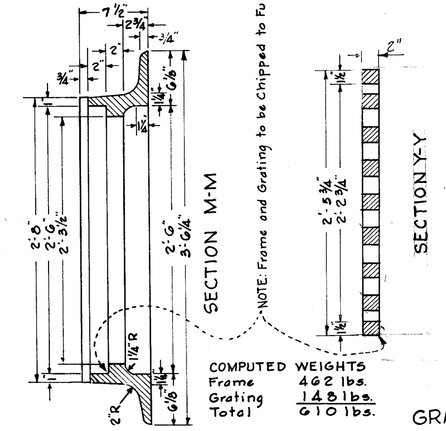
City of Cincinnati Acc. No. 49014

COMPUTED WEIGHTS	
FRAME	780 lbs.
GRATINGS	296 lbs.
TOTAL	1076 lbs.

Note:
All castings to receive 2 Coats of bituminous Paint.

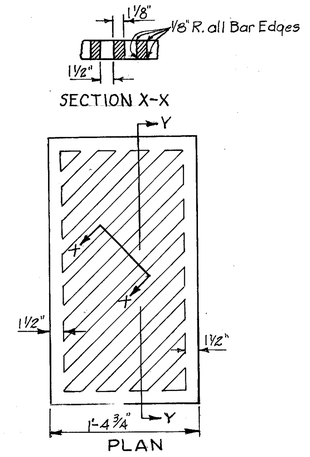






NOTE: Frame and Grating to be Chipped to Full Bearing

COMPUTED WEIGHTS	
Frame	462 lbs.
Grating	148 lbs.
Total	610 lbs.



GRATING DETAIL

City of Cincinnati Acc. No. 49012

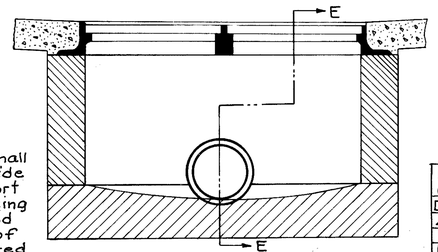
FRAME DETAIL

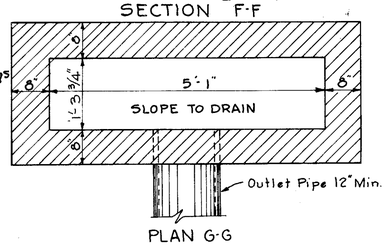
STANDARD CASTINGS FOR TYPE A-2 OR P CATCH BASIN

STANDARD CASTINGS FOR TYPE A CATCH BASIN

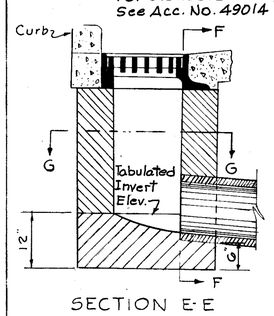
WALL HORIZONTAL REINFORCING STEEL	
DEPTH	BAR SPACING
4'to8'	#5 @ 16"
8'to12'	#5 @ 12"
12'to16'	#5@ 8"

Notes:
All bars shall clear interior face of wall by 2". Bar lengths shall be 6'-2" for longer side and 2'-4" for the short side. Vertical reinforcing bars shall be #5 and placed 2'± O.C. Four of these shall be located at the corners of the chambers.





For Standard Castings See Acc. No. 49014



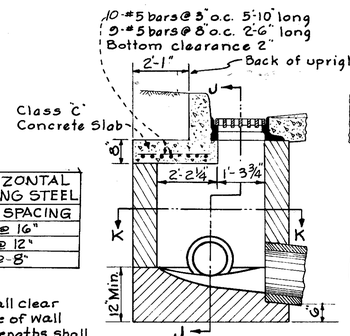
Inlet chamber shall be built of concrete or brick masonry in accordance with Item 604 For setting of Inlet Box and Castings See Acc. No. 49015.

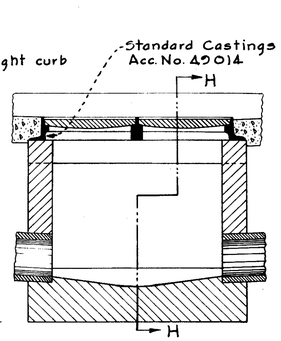
City of Cincinnati Acc. No. 49013

TYPE A-2 CATCH BASIN

WALL HORIZONTAL REINFORCING STEEL	
DEPTH	BAR SPACING
4'to8'	#5 @ 16"
8'to12'	#5 @ 12"
12'to16'	#5@ 8"

Notes:
All bars shall clear interior face of wall by 2". Bar lengths shall be 5'-10" for longer side and 4'-7" for the short side. Vertical reinforcing bars shall be #5 and placed 2'± O.C. Four of these shall be located at the corners of the chambers.

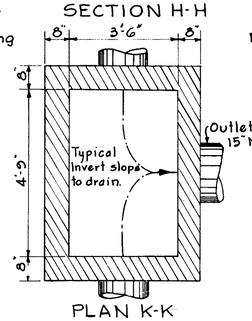




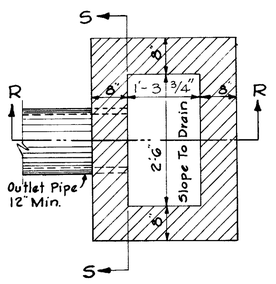
Note: Concrete slab may be precast with lift holes 12" from each end. Mark top of slab.
Inlet Chamber shall be built of concrete or brick masonry in accordance with Item 604

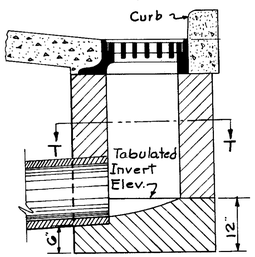
For Pavement Detail See Acc. No. 49015

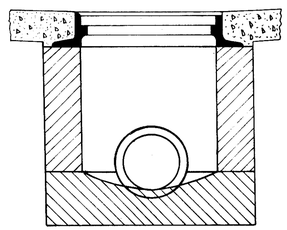
City of Cincinnati Acc. No. 49010



TYPE P CATCH BASIN





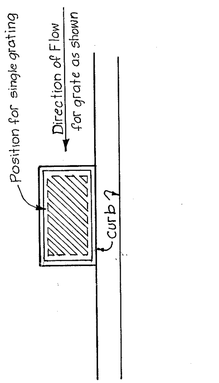


Inlet chamber shall be built of concrete or brick masonry in accordance with Item 604

For setting of Inlet Box and Castings See Acc. No. 49015.

For Std. castings see Acc. No. 49012

City of Cincinnati Acc. No. 49011



Note:
All Acc. No's shown are City of Cincinnati Acc. No's.

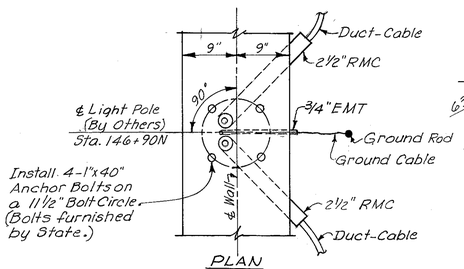
TYPE A CATCH BASIN

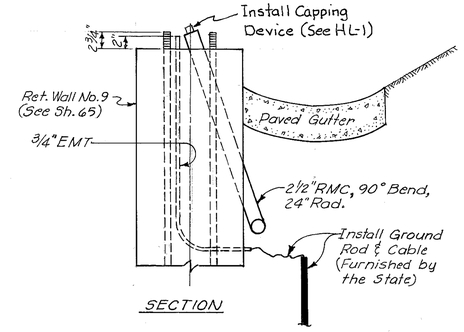
SEWER DETAILS

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

59
172

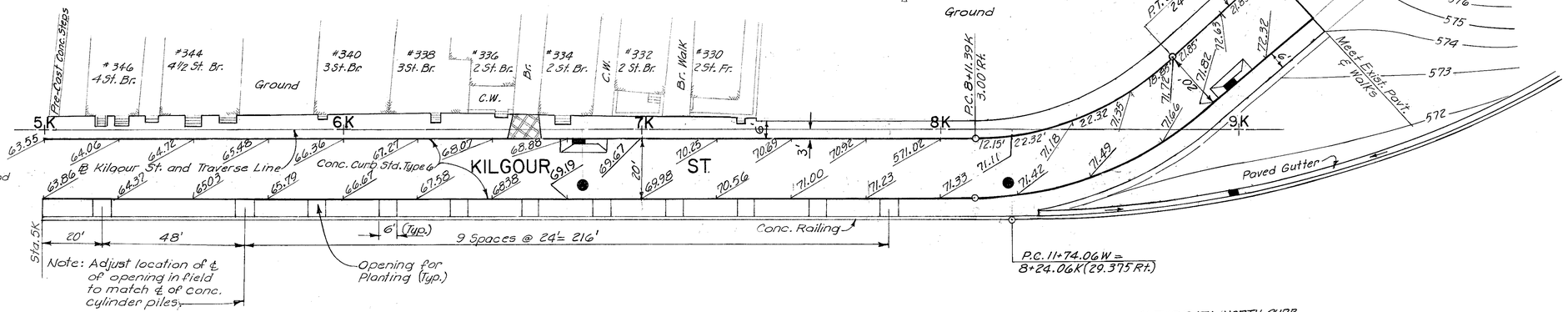
HAMILTON COUNTY
HAM-471-0.24
PART ONE





Note: Furnishing and installing 2½" RMC & ¾" EMT and installing anchor bolts and ground rod & Cable incidental to wall construction. Provide cap for duct-cable above wall. For additional details see Std. Drawing HL-1.

DETAIL A
See Sh. No. 17

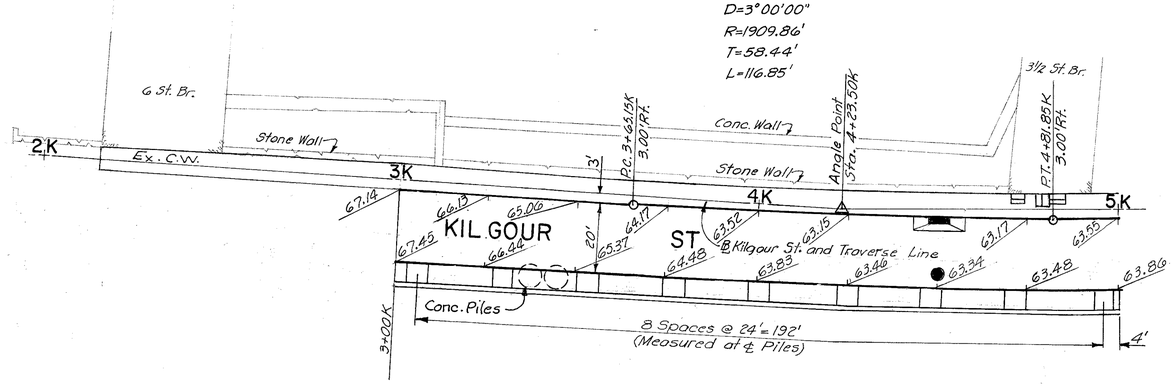


CURVE DATA NORTH CURB
KILGOUR & OREGON

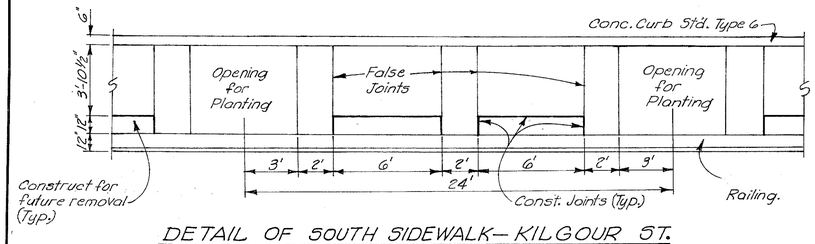
R = 100'
Δ = 43°20'14"
T = 39.73'
L = 75.64'

CURVE DATA N. CURB KILGOUR

Δ = 3°30'20"
D = 3°00'00"
R = 1909.86'
T = 58.44'
L = 116.85'



NOTES
Elevations shown are top of 1" Asphalt Concrete (Item 402) as shown in Typical Section Sh. No. 3



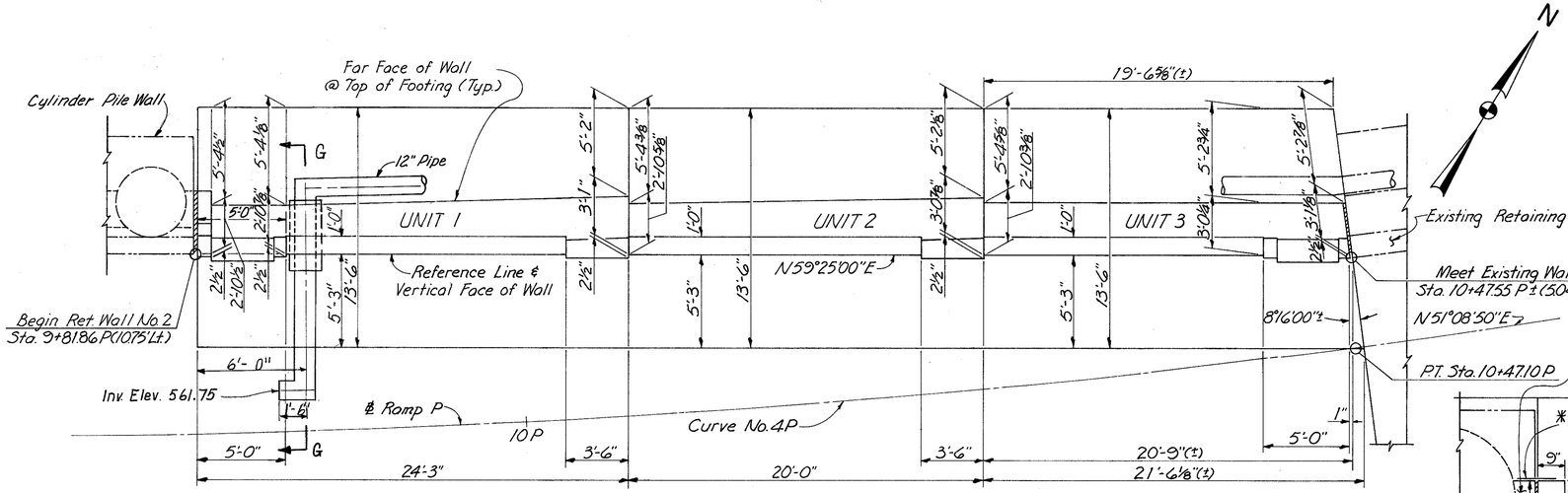
DETAIL OF SOUTH SIDEWALK — KILGOUR ST.

GRADE DETAILS
KILGOUR ST.

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

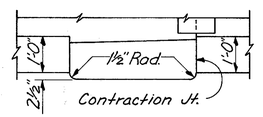
62
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE

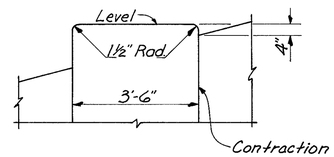


PLAN
(Key Not Shown)

NOTE: WORK RETAINING WALL NO. 2 CONSTRUCTION WITH OREGON STREET WALL CONSTRUCTION.

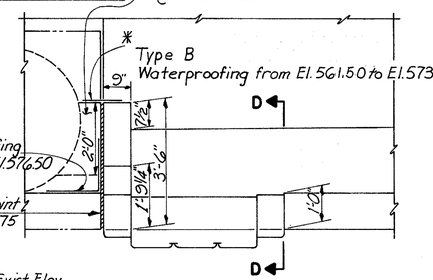


PLAN

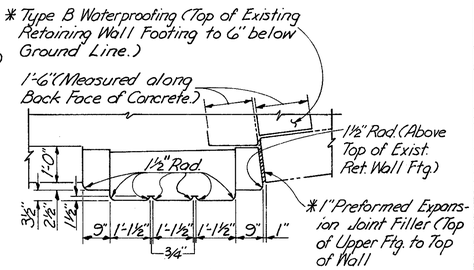


ELEVATION

DETAILS OF 3'-6" PILASTER

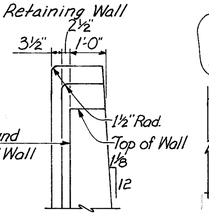


PLAN AT UNIT 1

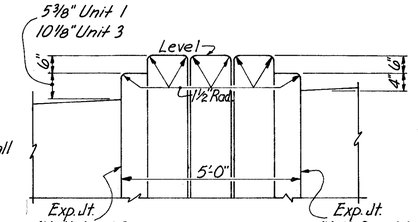


PLAN AT UNIT 3

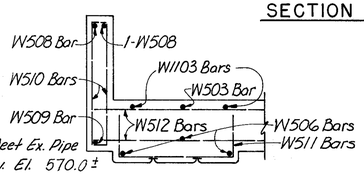
(For other dimensions see Plan at Unit 3)
* Quantities included with Retaining Wall No. 2 for payment.



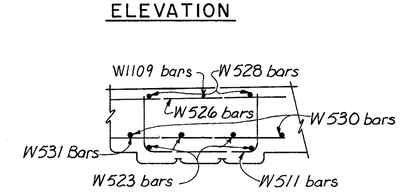
SECTION D-D



ELEVATION

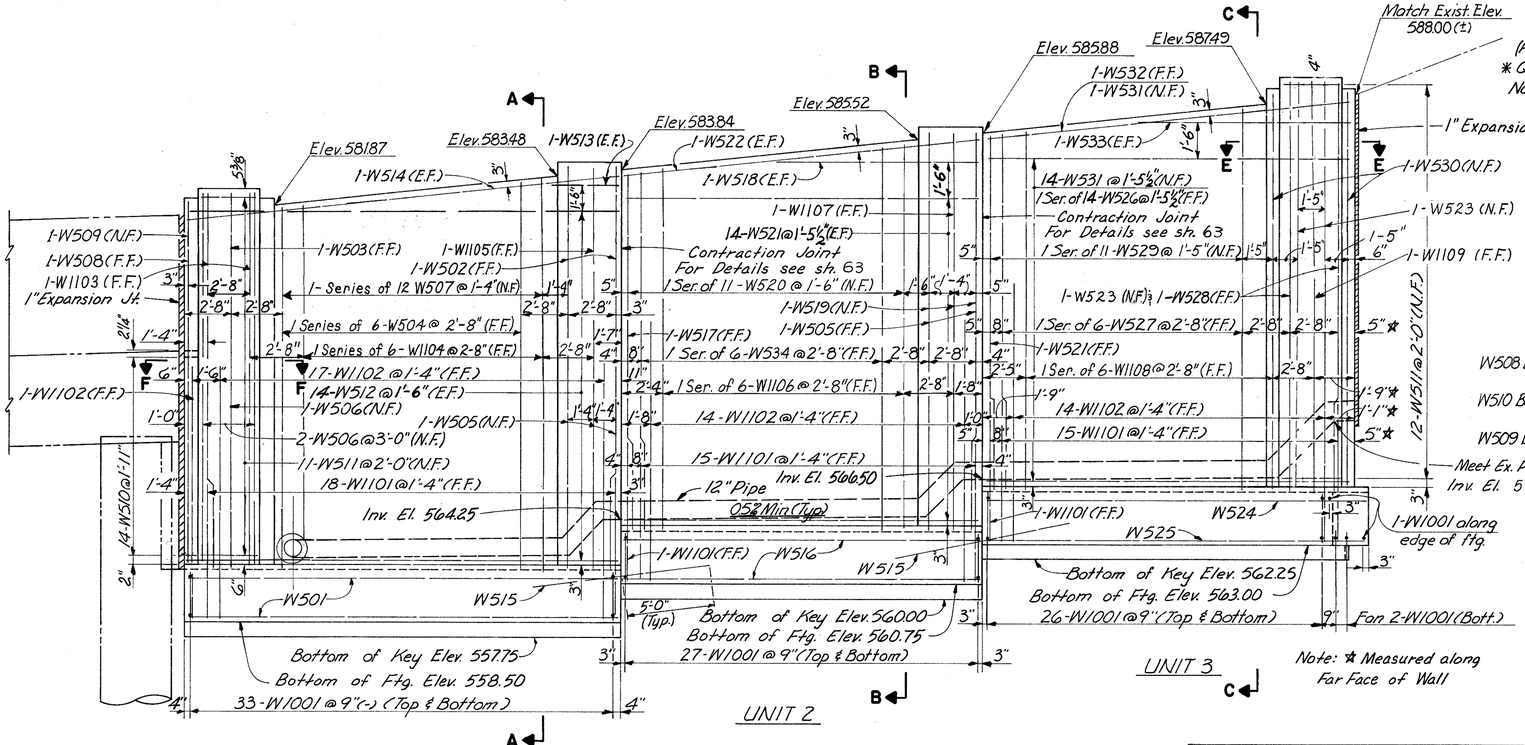


SECTION F-F



SECTION E E

DETAILS OF 5'-0" PILASTER



ELEVATION

Note: * Measured along Far Face of Wall

For Location of Retaining Wall No. 2 see sheets 19 & 63

Notes:
N.F. denotes Near Face
F.F. denotes Far Face
E.F. denotes Each Face
For General Notes No. 1 and No. 2 see sheet 69.
For Sections A-A, B-B and C-C see sheet 63.
For Drainage Detail see sheet 69.
For Section G-G see sheet 64.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

RETAINING WALL NO. 2
SHEET 1 OF 3

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
AYT	YK			JHo 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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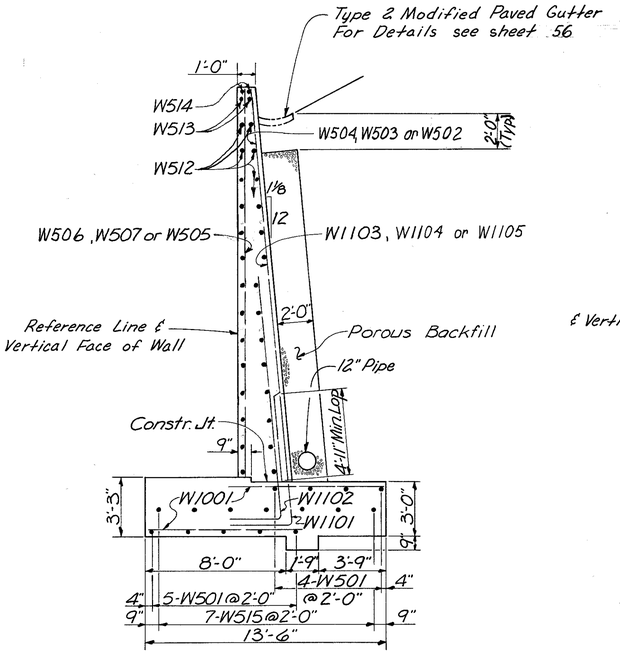
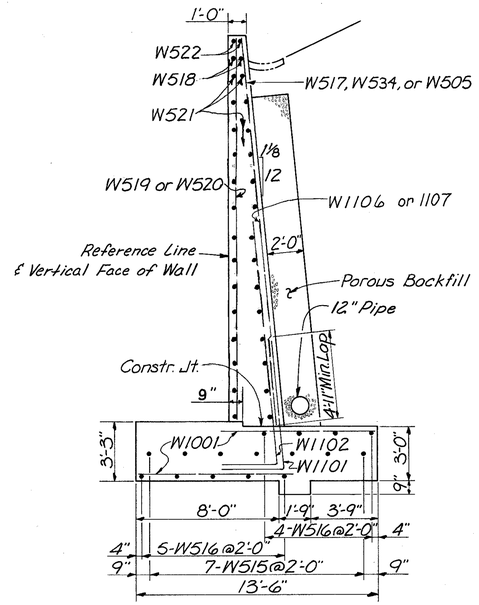
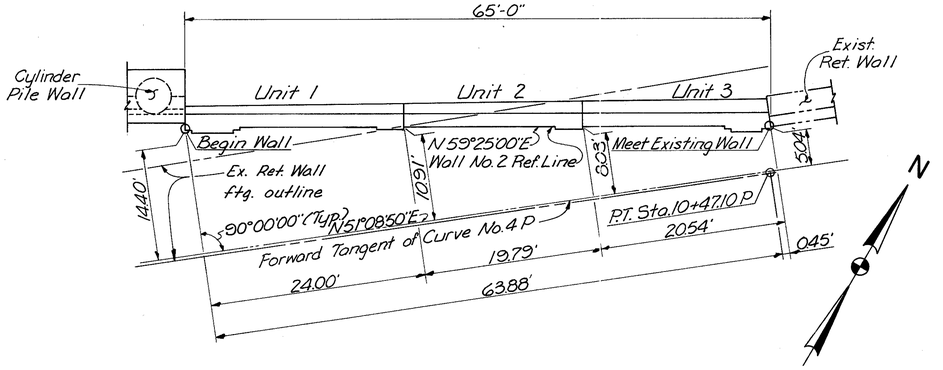
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



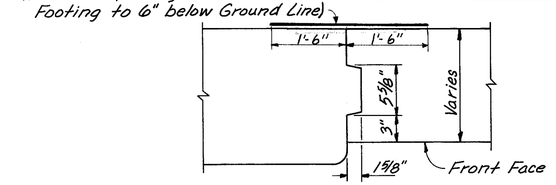
SECTION A - A



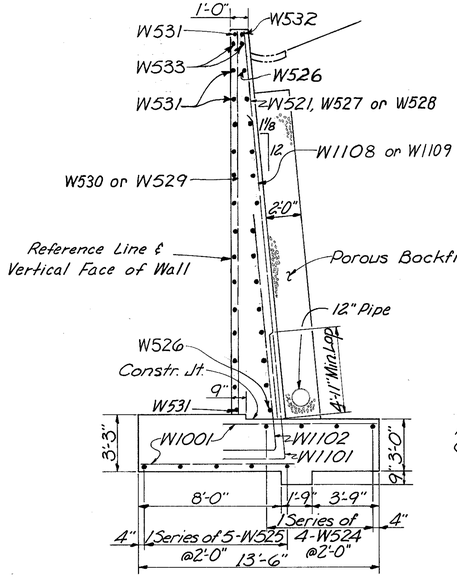
SECTION B - B



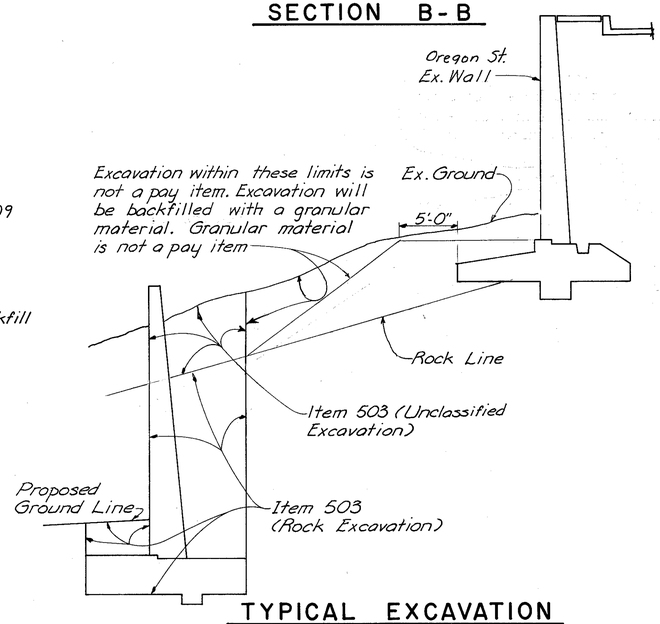
WALL LOCATION PLAN



CONTRACTION JOINT



SECTION C - C



TYPICAL EXCAVATION

No excavation or removal of existing Ramp P Retaining Wall until Oregon Street tiebacks are installed, stressed and locked-off. Excavation to be backfilled to existing ground before destressing Oregon Street tiebacks.

ESTIMATED QUANTITIES

Item	Total	Unit	Description
202	Lump	Lump Sum	Portions of structure removed
503	Lump	Lump Sum	Cofferdams, cribs and sheeting
503	66	Cu.Yd.	Unclassified excavation
503	280	Cu.Yd.	Rock excavation
509	13,674	Lb.	Reinforcing Steel, Cleaning, cutting and Installing
509	7197	Lb.	Reinforcing Steel
511	104	Cu.Yd.	Class C concrete, footings
511	106	Cu.Yd.	Class C concrete, wall above footings
512	10	Sq.Yd.	Type B waterproofing
516	74	Sq.Ft.	1" preformed expansion joint filler
518	89	Cu.Yd.	Porous backfill
518	63	Lin.Ft.	12" perforated corrugated steel pipe, including specials, 707.01
518	12	Lin. Ft.	12" non-perforated corrugated steel pipe, including specials, 707.01
518	4	Lin.Ft.	15" reinforced concrete pipe, 706.02, 2500 D-Load

PORTIONS OF STRUCTURE REMOVED shall include the removal of portions of the existing concrete retaining wall along Ramp P from Sta. 9+81.86 P to Sta. 10+47.55 P, as shown on plans. Removal shall be made in accordance with Item 202 of the Construction and Material Specifications, except as modified by these notes. At places where the removal of wall could result in a "cave-in", the Contractor shall take all the necessary precautions to prevent cave-ins by sheeting, bracing, or any other means that will permit the removal operation to be completed in a safe manner approved by the Engineer.

The City of Cincinnati, Division of Engineering, has the construction plans of the wall to be removed and prints will be available if requested by the Contractor.

If sheeting or bracing is used to prevent a "cave-in", it shall be included with Item 202, Portions of structure removed, for payment.

DESIGN ASSUMPTIONS

Maximum foundation pressure _____ 8,000 Lb./sq.ft.
Coefficient of friction "f" of masonry on subfoundation _____ 0.70

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

RETAINING WALL NO. 2

SHEET 2 OF 3

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
AYT	YK		WL	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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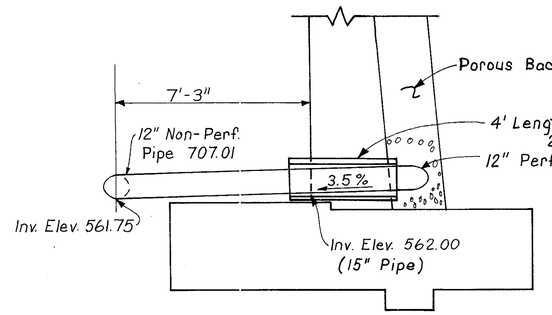
HAMILTON COUNTY
HAM. - 471 - 0.24
PART ONE

REINFORCING STEEL LIST

MARK	TYPE	LENGTH	DIMENSIONS a	b	c	d	TOTAL NO. OF BARS	NEW REINF. NUMBER	NEW REINF. WEIGHT	REINF. FURN. BY OTHERS NUMBER AND MARK	REINF. FURN. BY OTHERS WEIGHT
W1101	19	10'-11"	3'-6"	7'-7½"	7'-8"	8½"	50	50	2,900		
W1102	19	17'-7"	3'-6"	14'-3¼"	14'-4"	1'-4"	46	46	4,297		
W1103	Str.	21'-0"					2			2-W1105①*	223
W1104	Str.	20'-4" to 21'-9"					1 Series of 6			6-W1105①*	671
W1105	Str.	22'-6"					1			1-W1105①*	120
W1106	Str.	20'-2" to 21'-5"					1 Series of 6			6-W1105①*	663
W1107	Str.	22'-3"					1			1-W1105①*	118
W1108	Str.	19'-11" to 21'-4"					1 Series of 6			6-W1105①*	657
W1109	Str.	22'-8"					1			1-W1105①*	120
W1001	Str.	8'-6"					176			60-W1001①*18-W1005①* 48-W1006①*32-W1001②*	6,437
W501	Str.	23'-9"					9			9-W510①*	223
W502	Str.	22'-6"					2			2-W538②*	47
W503	Str.	21'-0"					1			1-W576①*	22
W504	Str.	20'-3" to 21'-7"					1 Series of 6			6-W513②*	131
W505	Str.	22'-3"					5			2-W581①*2-W514①* 1-W504①*	116
W506	Str.	20'-9"					3			2-W562①*1-W516①*	65
W507	Str.	20'-0" to 21'-6"					1 Series of 12			12-W513②*	260
W508	Str.	11'-11"					2			2-W503①*	25
W509	Str.	20'-3"					1			1-W530②*	21
W510	17	3'-8"	5"	3'-4½"			14			14-W510②*	54
W511	1	5'-3"	1'-2"	3'-2"			23			23-W512①*	126
W512	Str.	23'-11"					28			21-W510①*7-W507①*	698
W513	Str.	5'-4"					2			1-W558①*	11
W514	Str.	24'-0"					2			2-W520②*	50
W515	Str.	10'-0"					14			14-W502①	146
W516	Str.	19'-6"					9			9-W533②*	183
W517	Str.	19'-11"					1			1-W575①*	21
W518	Str.	8'-7"					2			1-W577①*	18
W519	Str.	22'-0"					3			2-R508②*1-R509②*	69
W520	Str.	19'-8" to 21'-3"					1 Series of 11			11-W512②*	235
W521	Str.	19'-8"					29			2-W572① 12-R507②* 12-R510②*3-R509②*	595
W522	Str.	19'-9"					2			2-R508②*	41
W523	Str.	22'-5"					4			4-R508②*	94
W524	Str.	19'-0" to 19'-11"					1 Series of 4			4-W512②*	81
W525	Str.	19'-9" to 20'-11"					1 Series of 5			5-W511②*	106
W526	Str.	19'-10" to 20'-2"					1 Series of 14			10-W511②*4-W529②*	292
W527	Str.	19'-10" to 21'-2"					1 Series of 6			6-W507②*	128
W528	Str.	22'-8"					2			2-W504①*	47
W529	Str.	19'-6" to 20'-11"					1 Series of 11			7-W507②*4-W513②*	232
W530	Str.	21'-11"					2			2-W508②*	46
W531	Str.	20'-4"					15			15-R507③*	318
W532	Str.	20'-2"					1			1-W549①*	21
W533	Str.	6'-10"					2			1-W525①*	14
W534	Str.	20'-0" to 21'-9"					1 Series of 6			6-W517②*	129

Total Weight of Reinforcing Steel, Cleaning, Cutting and Installing (Furnished by Others) = 13,674 Lbs.

Total Weight of Reinforcing Steel, (New) = 7,197 Lbs.



SECTION G - G

NOTE:
The reinforcing steel (furnished by others) is stored at the State of Ohio Dept. of Transportation rental storage area in Cincinnati, Ohio under the Brent Spence Bridge at Front and Rose streets. This steel shall be cleaned of rust, oil or dirt before using.

① Reinforcing Steel taken from previously called Retaining Wall 2.
② Reinforcing Steel taken from previously called Retaining Wall 3.
③ Reinforcing Steel taken from previously called Retaining Wall 7.
* Reinforcing Steel to be cut to proposed lengths.

For bar bending schedule see sh. 70. Refer to CMS Sections 106.03, 700, 709.01 through 709.05 and 709.08. Sufficient additional reinforcing steel shall be provided for sampling. Random samples shall be replaced in the structures by the additional steel, spliced in accordance with 509.08

The weight of Reinforcing Steel, Furnished by Others, is the actual weight of such reinforcing steel placed in the retaining wall.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

RETAINING WALL NO. 2

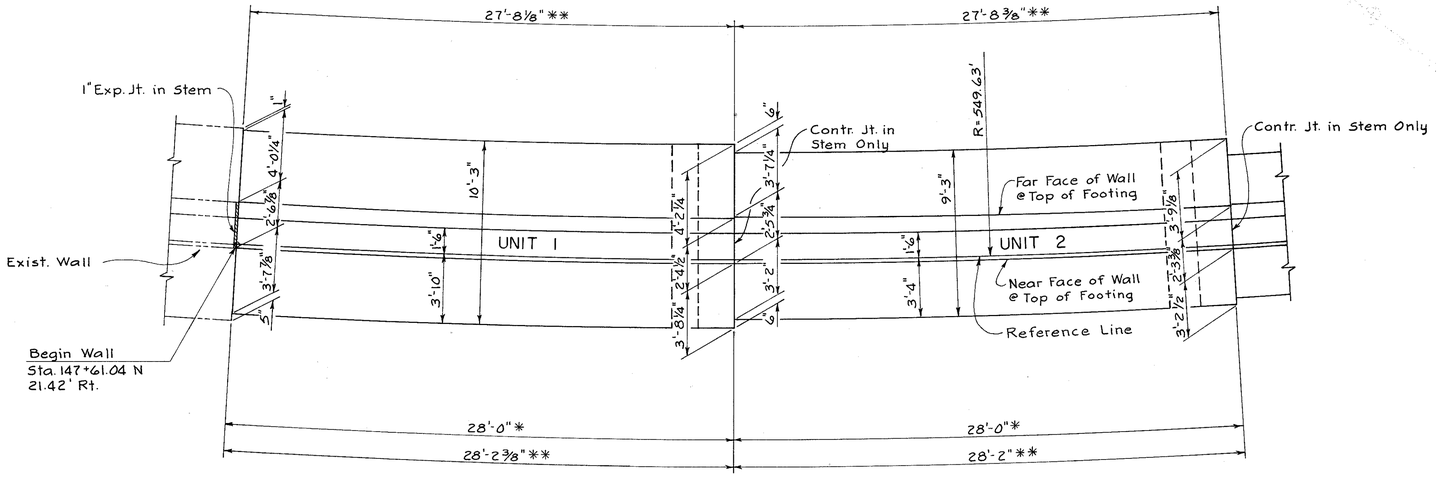
SHEET 3 OF 3

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MAMc			JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

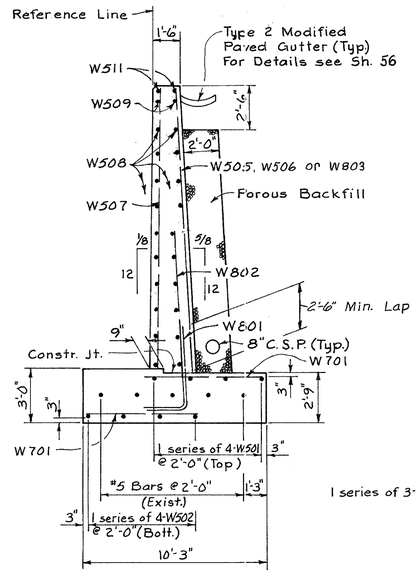
65/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

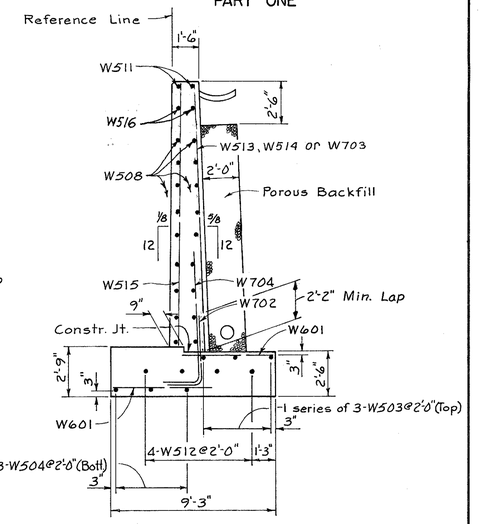


PLAN

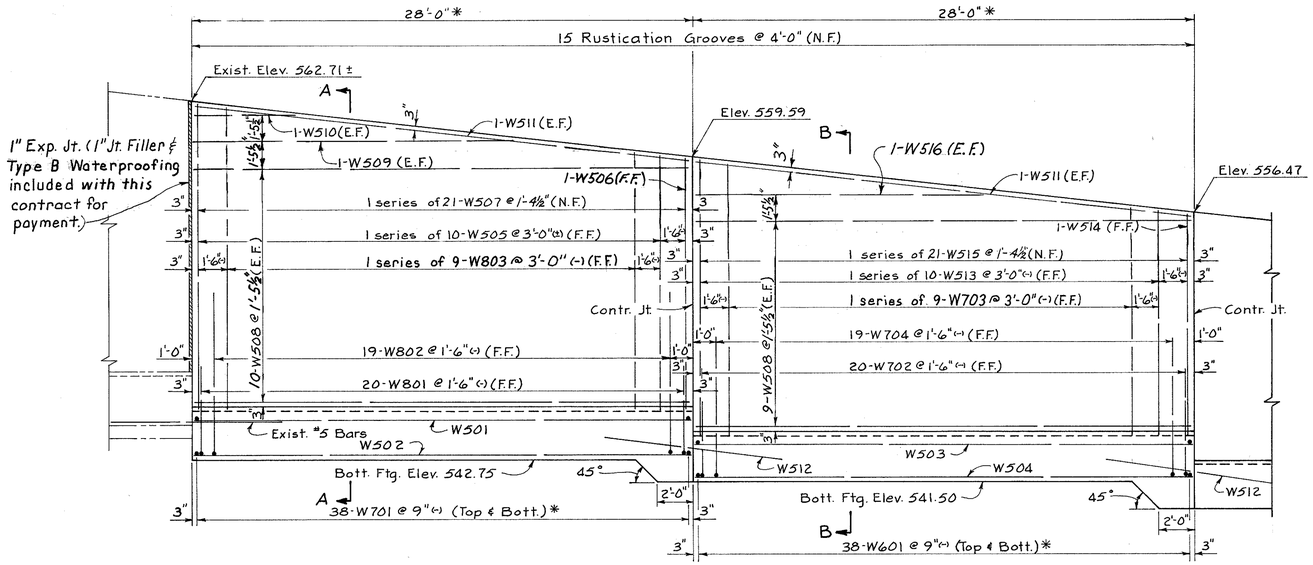
Prints of the design drawing of the existing wall are available for inspection by the Prospective Bidders at the Engineering Division, Room 314, City Hall, City of Cincinnati.
It shall be the responsibility of the Contractor to determine the accuracy of these plans and to obtain field measurements of the existing in order to insure a proper fit between the existing and proposed work.



SECTION A-A



SECTION B-B



UNIT 1 UNIT 2

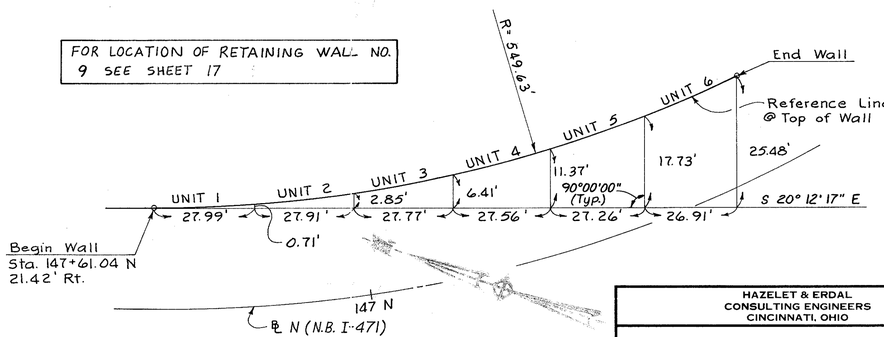
ELEVATION

DESIGN ASSUMPTIONS

Based on wall being founded on rock
Maximum foundation pressure = 8,000 lb/sq.ft.
Coeff. of friction "f" of masonry on subfoundation = 0.55

Notes:
Footings shall extend a minimum of 3" into bedrock or to the elevation shown whichever is lower. If the toe of the footing is placed against undisturbed rock or shale to a depth of 12" the key should be omitted. (Unit 6)
For Drainage Details see Sh. 69.
For General Notes 1 & 2 see Sh. 69.
For Details of Contraction Joint, Expansion Joint and Rustication Groove see Sh. 69.
N.F. Denotes Near Face
F.F. Denotes Far Face
E.F. Denotes Each Face
* Measured along Reference Line
** Measured along edge of footing
W512 Bars are centered under Exp. Jt. or Contr. Jt.

FOR LOCATION OF RETAINING WALL NO. 9 SEE SHEET 17



WALL LOCATION PLAN

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

RETAINING WALL NO. 9

SHEET 1 of 4

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	ALT	WK	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

66
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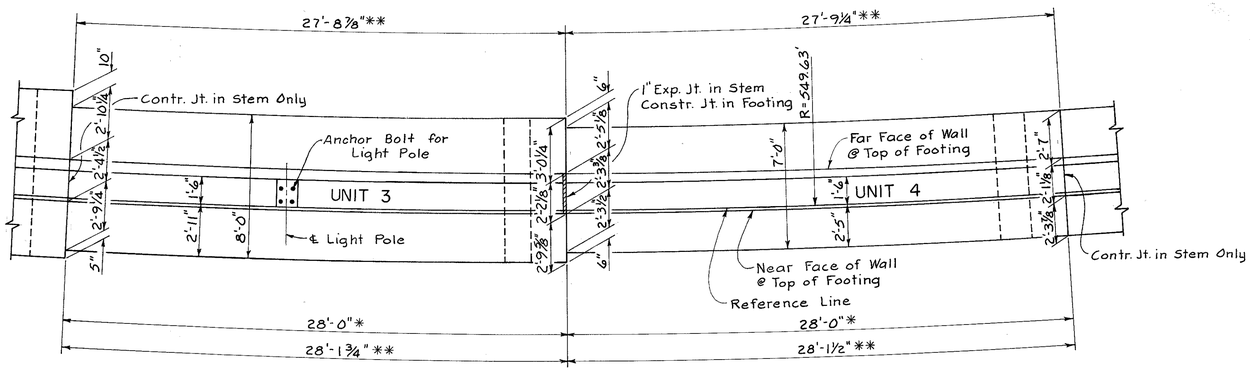
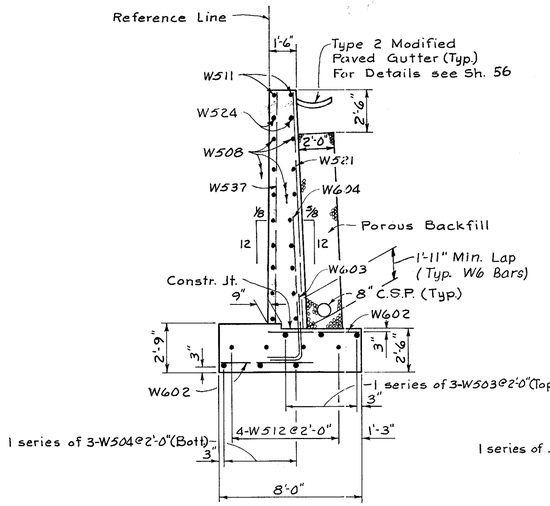
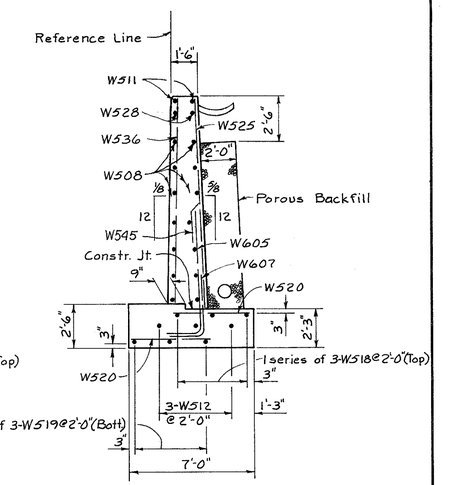
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



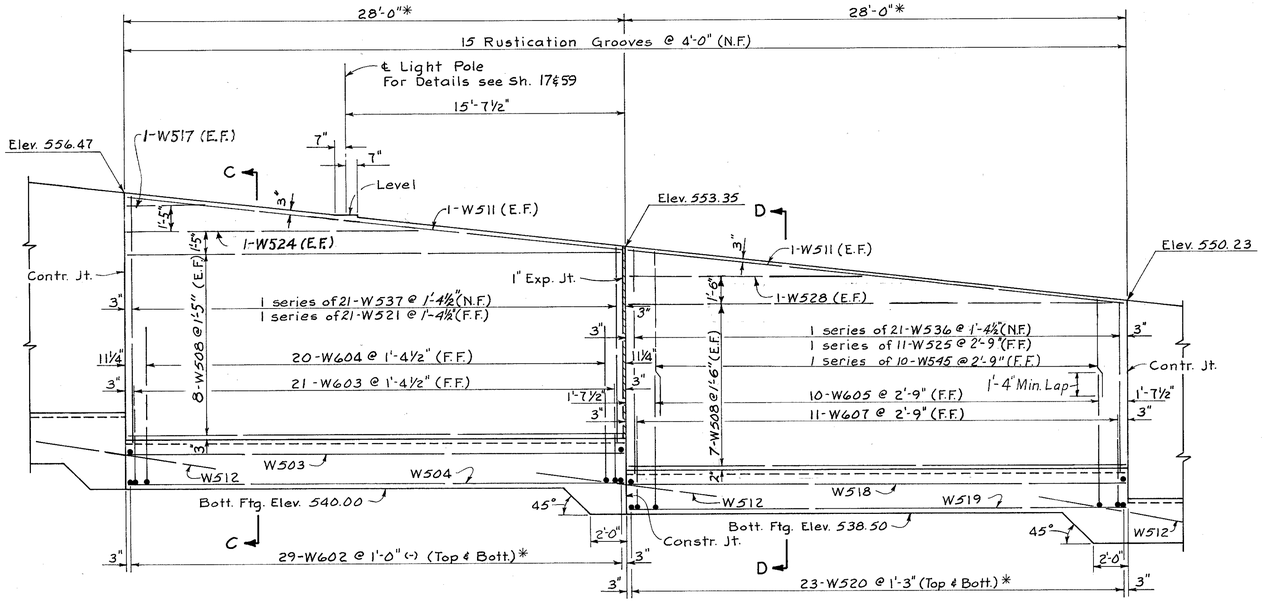
PLAN



SECTION C-C



SECTION D-D



UNIT 3 UNIT 4

ELEVATION

Notes:
For Notes see Sh. 65.

HAZELET & ERDAL
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CINCINNATI, OHIO

RETAINING WALL NO. 9

SHEET 2 of 4

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	ALT	JJR	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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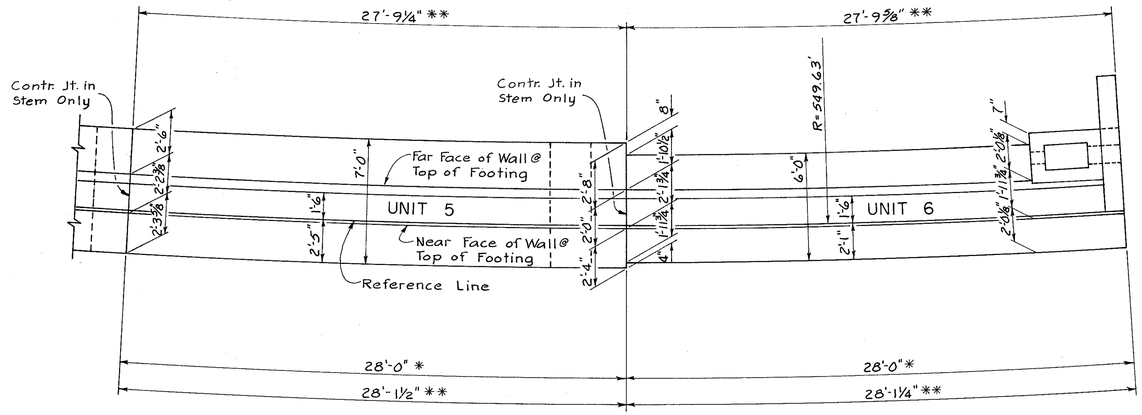
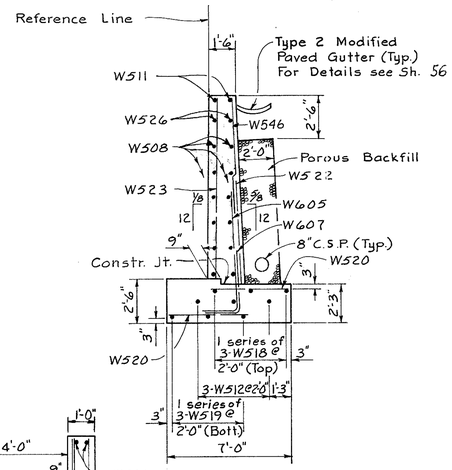
172

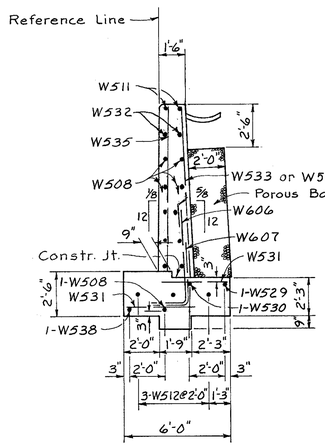
HAMILTON COUNTY
HAM-471-0.24
PART ONE



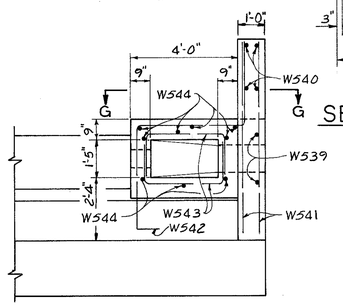
PLAN



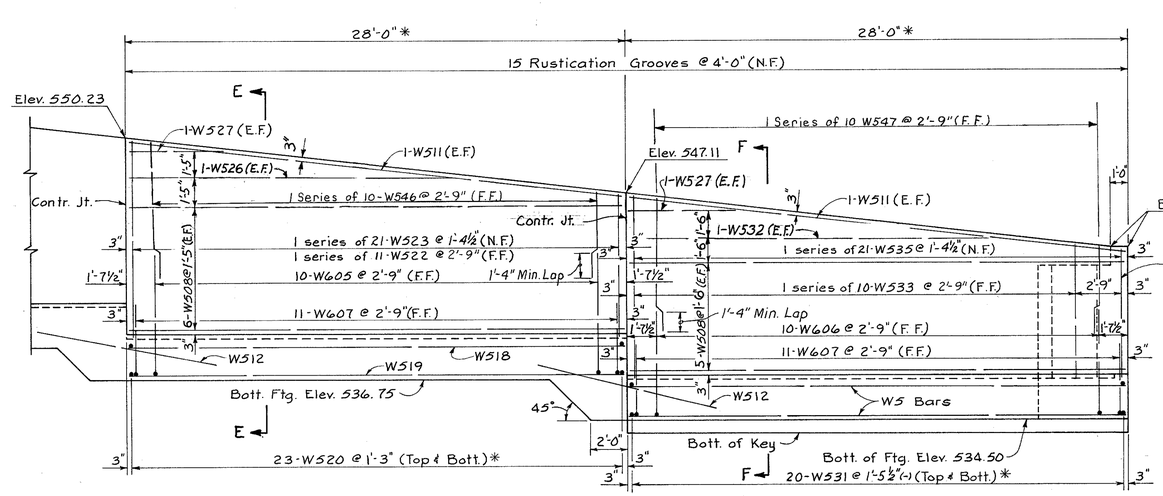
SECTION E-E



SECTION F-F

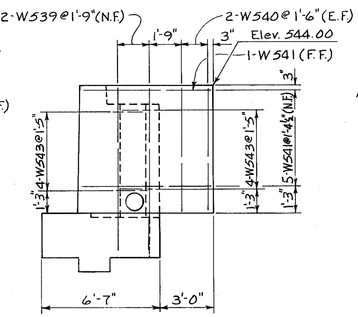


PLAN OF CATCH BASIN

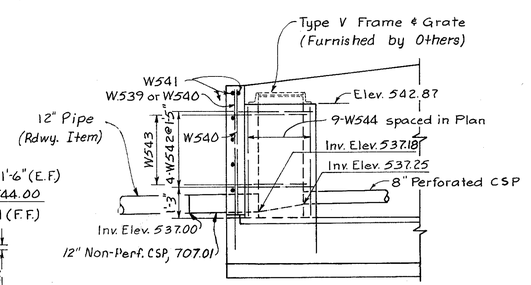


UNIT 5 UNIT 6

ELEVATION



END ELEVATION



VIEW G-G

Notes:
For Notes see Sh. 65.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

RETAINING WALL NO. 9

SHEET 3 of 4

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	ALT	JH	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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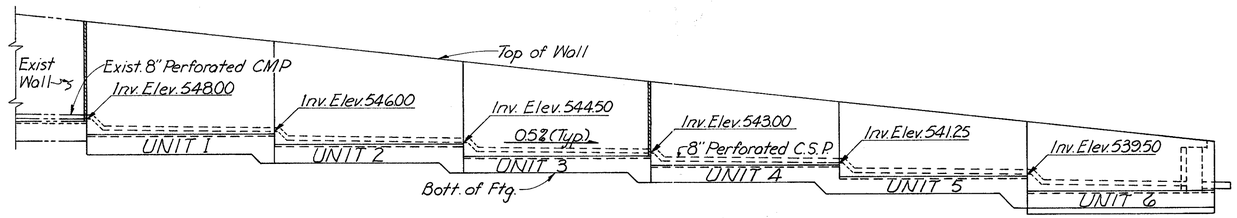
HAMILTON COUNTY
HAM-471-0.24
PART ONE

REINFORCING STEEL LIST

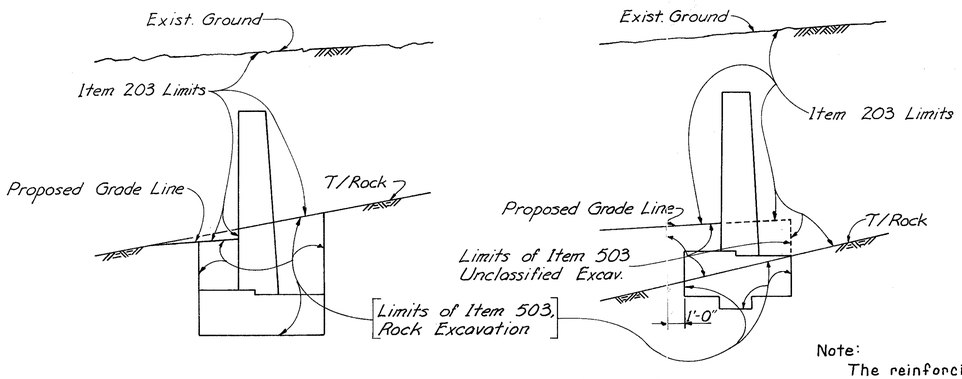
MARK	TYPE	LENGTH	DIMENSIONS a	b	c	d	TOTAL NO. OF BARS	NEW REINF. NUMBER	NEW REINF. WEIGHT	REINF. FURN. BY OTHERS NUMBER & MARK	REINF. FURN. BY OTHERS WEIGHT
W501	Str.	27'-2" to 27'-6"					1 Series of 4			4-W507*①	114
W502	Str.	27'-4" to 27'-8"					1 Series of 4			4-W510*①	115
W503	Str.	27'-3" to 27'-5"					2 Series of 3			6-W507*①	171
W504	Str.	27'-5" to 27'-8"					2 Series of 3			6-W510*①	172
W505	Str.	14'-1" to 16'-11"					1 Series of 10			5-W532*①	162
W506	Str.	13'-10"					1			1-W525 ①	14
W507	Str.	13'-7" to 16'-8"					1 Series of 21			11-W527*①	331
W508	Str.	27'-6"					91			63-W501①; 28-W507*①	2,610
W509	Str.	16'-0"					2			2-W514*①	33
W510	Str.	2'-11"					2			1-W558*①	6
W511	Str.	27'-8"					12			12-W510 ①	346
W512	Str.	10'-0"					17			17-W502 ①	177
W513	Str.	12'-5" to 15'-4"					1 Series of 10			5-W510*①	145
W514	Str.	12'-3"					1			1-W567*①	13
W515	Str.	12'-0" to 15'-1"					1 Series of 21			6-W515*①; 5-W510*①	297
W516	Str.	14'-7"					2			2-W560 ①	30
W517	Str.	3'-4"					2			1-W557*①	7
W518	Str.	27'-3" to 27'-6"					2 Series of 3			6-W507*①	171
W519	Str.	27'-5" to 27'-7"					2 Series of 3			6-W507*①	172
W520	Str.	4'-4"					92			56-W533①; 12-W525①	416
W521	Str.	10'-8" to 13'-8"					1 Series of 21			6-W514*①; 5-W519*①	266
W522	Str.	7'-11" to 11'-0"					1 Series of 11			6-W572*①	109
W523	Str.	7'-8" to 10'-9"					1 Series of 21			6-W572*①; 5-W578*①	202
W524	Str.	16'-1"					2			2-W565*①	34
W525	Str.	9'-3" to 12'-4"					1 Series of 11			6-W521*①	124
W526	Str.	17'-0"					2			2-W565*①	35
W527	Str.	4'-3"					4			2-W531*①	18
W528	Str.	12'-1"					2			2-W560*①	25
W529	Str.	27'-4"					1			1-W516 ①	29
W530	Str.	27'-5"					1			1-W504 ①	29
W531	Str.	3'-9"					40			38-W534①; 1-W546*①	156
W532	Str.	17'-5"					2			1-W523*①	36
W533	Str.	7'-4" to 10'-1"					1 Series of 10			5-W523*①	91
W534	Str.	6'-9"					1			1-W535 ①	7
W535	Str.	6'-9" to 9'-10"					1 Series of 21			6-W522*①; 6-W565*①	182
W536	Str.	9'-0" to 12'-1"					1 Series of 21			6-W520*①; 5-W507*①	231
W537	Str.	10'-5" to 13'-5"					1 Series of 21			8-W505*①; 3-W507*①	261
W538	Str.	27'-7"					1			1-W507 ①	29
W539	Str.	9'-0"					2			1-W576*①	19
W540	Str.	6'-6"					4			2-W503*①	27
W541	Str.	7'-0"					6			2-W580*①	44
W542	9	11'-5"	3'-1"	4'-1"	4'-0"	7½"	4	4	48		
W543	1	6'-3"	1'-9"	3'-0"			8	2	13	6-W539 ①	39
W544	Str.	7'-10"					9			9-W531*①	74
W545	Str.	6'-1" to 8'-10"					1 series of 10			5-W537*①	78
W546	Str.	4'-8" to 7'-5"					1 series of 10			10-W551*①	63
W547	Str.	4'-8" to 7'-7"					1 series of 10			10-W536*①	64
W601	Str.	5'-6"					76			42-WG05①; 17-WG02*①	628
W602	Str.	4'-10"					58			40-WG15①; 9-WG02*①	421
W603	19	5'-11"	1'-11"	4'-2"	4'-2"	3"	21			15-WG16①; 6-WG01②	187
W604	19	10'-6"	1'-11"	8'-9"	8'-9"	6"	20	6	95	14-WG17①	221
W605	19	8'-6"	1'-11"	6'-9"	6'-9"	4"	20	2	26	18-WG09①	230
W606	19	7'-6"	1'-11"	5'-9"	5'-9"	4"	10			10-WG11①	113
W607	19	5'-8"	1'-11"	3'-11"	3'-11"	3"	33			20-WG08①; 13-WG01②	281
W701	Str.	6'-1"					76			22-W701①; 54-W705①	945
W702	19	6'-6"	2'-2"	4'-6"	4'-6"	3"	20			20-W702①	266
W703	Str.	12'-7" to 15'-2"					1 series of 9			9-W702*②	255
W704	19	9'-6"	2'-2"	7'-6"	7'-6"	5"	19			19-W703①	369
W801	19	7'-4"	2'-6"	5'-0"	5'-0"	3"	20			15-W802①; 5-W804②	392
W802	19	11'-5"	2'-6"	9'-1"	9'-1"	6"	19			14-W803①; 5-W805②	579
W803	Str.	14'-3" to 16'-9"					1 series of 9			6-W818*②; 3-W819*②	372

Total Weight of Reinforcing Steel, Cleaning, Cutting and Installing (Furnished by Others) = 13,033 Lbs

Total Weight of Reinforcing Steel, (Furnish and Install) = 182 Lbs.



DRAINAGE DETAIL



LIMITS OF EXCAVATION (Typ.)

ESTIMATED QUANTITIES

ITEM	TOTAL	UNIT	DESCRIPTION
503	31	Cu.Yd.	Unclassified excavation
503	447	Cu.Yd.	Rock excavation
509	13,033	Lb.	Reinforcing Steel, Cleaning, Cutting and Installing
509	182	Lb.	Reinforcing Steel
511	134	Cu.Yd.	Class "C" concrete, footings
511	142	Cu.Yd.	Class "C" concrete, wall above footings
512	20	Sq.Yd.	Type B Waterproofing
516	50	Sq.Ft.	1" Preformed expansion joint filler
518	115	Cu.Yd.	Porous backfill
518	168	Lin.Ft.	8" Perforated, corrugated steel pipe, including specials, 707.01
518	4	Lin.Ft.	12" Non-Perforated, corrugated steel pipe, including specials, 707.01
604	1	Each	Install grating and frame casting for type V catch basin

Note:
The reinforcing steel and the type V Frame and Grate (furnished by others) is stored at the State of Ohio Dept. of Transportation rental storage area in Cincinnati, Ohio under the Brent Spence Bridge at Front and Rose streets. This steel shall be cleaned of rust, oil or dirt before using.

① Reinforcing Steel taken from previously called Retaining Wall 2.

② Reinforcing Steel taken from previously called Retaining Wall 3.

* Reinforcing Steel to be cut to proposed lengths.

For bar bending schedule see sh. 70.

Refer to CMS Sections 106.03, 700, 709.01 through 709.05 and 709.08. Sufficient additional reinforcing steel shall be provided for sampling. Random samples shall be replaced in the structures by the additional steel, spliced in accordance with 509.08.

The weight of Reinforcing Steel Furnished by Others is the actual weight of such reinforcing steel placed in the retaining wall.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

RETAINING WALL NO. 9

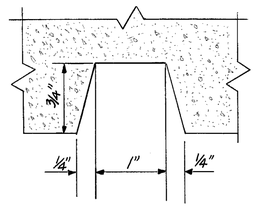
SHEET 4 of 4

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	ALT	MRT	JHO	JHO 2-27-79	

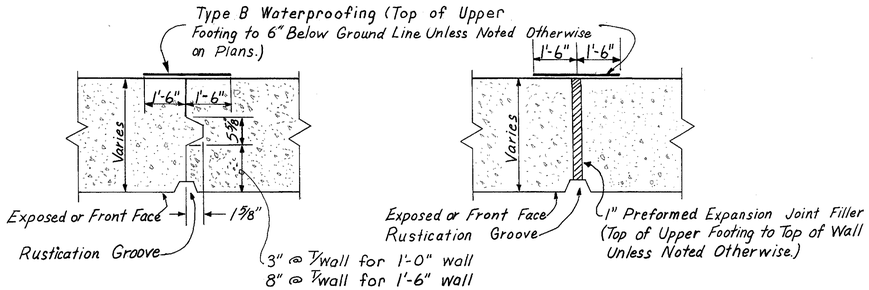
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

69
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



RUSTICATION GROOVE

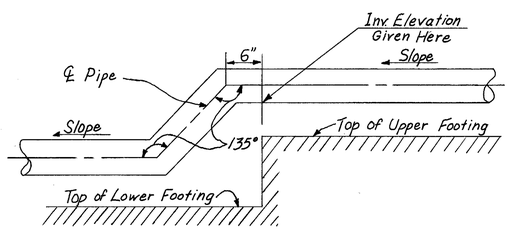


CONTRACTION JOINT

EXPANSION JOINT

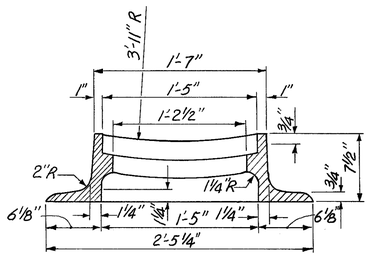
GENERAL NOTES

Note 1	Design Unit Stresses	Concrete Class C Unit Stress 1333 psi Reinforcing Steel A S T M A615, A616 or A617 unit stress 20,000 psi.
Note 2	Reinforcing Bars	Provide 3" clearance to reinforcing Steel in footings, and 2" clearance in wall (min.).
Note 3	Footing Keys	Keys for footings on soil shall be placed in a carefully made trench against undisturbed earth.

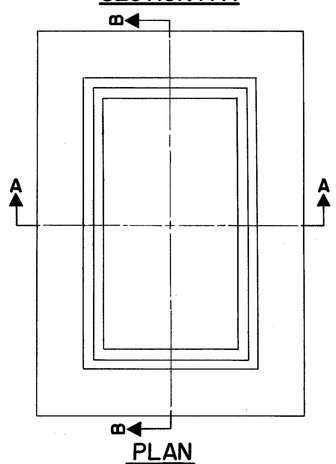


DRAINAGE DETAIL

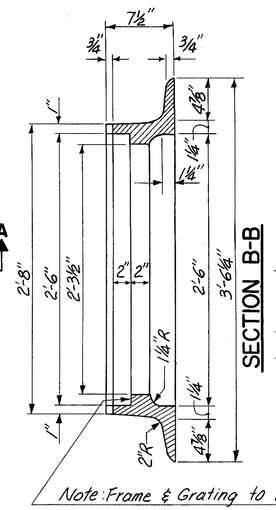
(Note: For size & slope of Pipe see wall plans.)

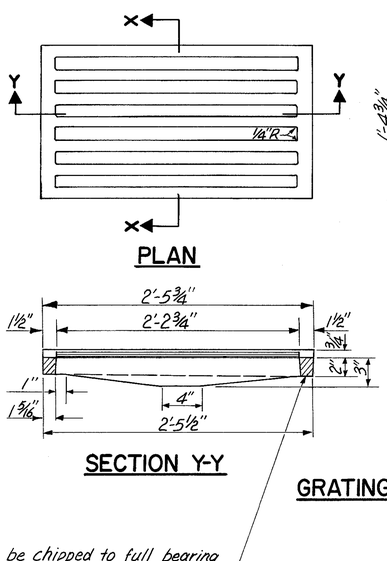


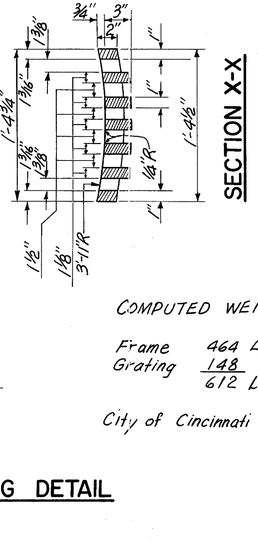
SECTION A-A



PLAN







GRATING DETAIL

Note: All castings to receive 2 coats of Bituminous Paint.

Note: Frame & Grating to be chipped to full bearing

FRAME DETAIL

COMPUTED WEIGHTS

Frame 464 Lbs.
Grating 148
612 Lbs.

City of Cincinnati Acc. No. 49020

STANDARD CASTINGS FOR TYPE V CATCH BASIN

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

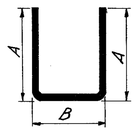
MISCELLANEOUS DETAILS FOR RETAINING WALLS

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK			JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

70
172

HAMILTON COUNTY
HAM-471-024
PART ONE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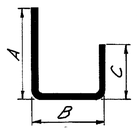
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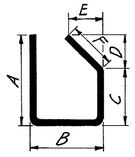
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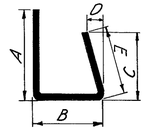
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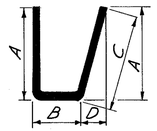
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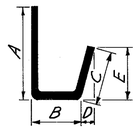
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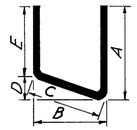
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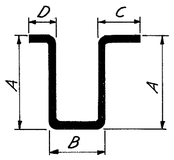
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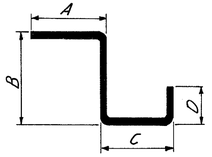
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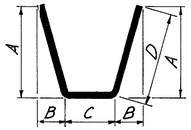
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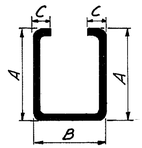
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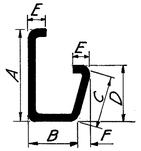
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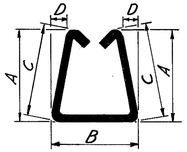
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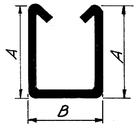
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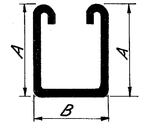
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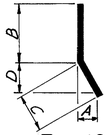
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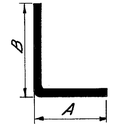
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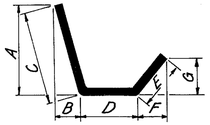
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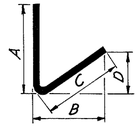
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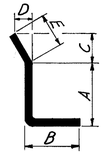
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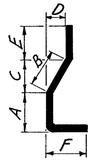
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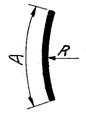
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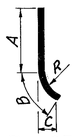
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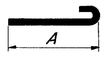
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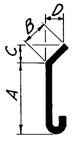
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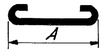
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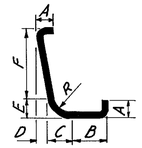
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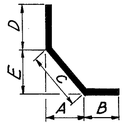
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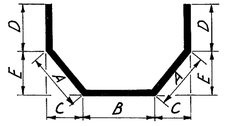
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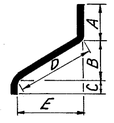
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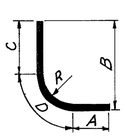
Bars shall be carefully shaped to the pertinent dimensions shown in the table of Standard Bends, Section 509.05 of the State of Ohio Construction and Material Specifications.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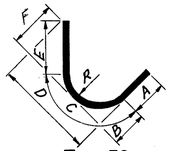
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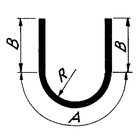
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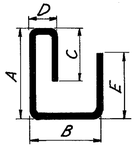
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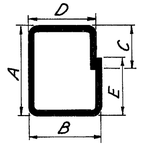
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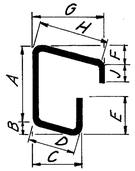
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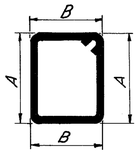
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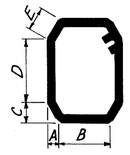
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Spiral Bar. For pitch see Reinforcing Steel List
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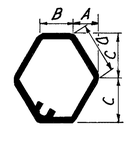
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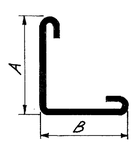
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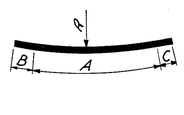
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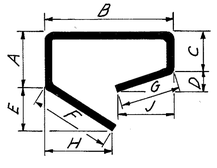
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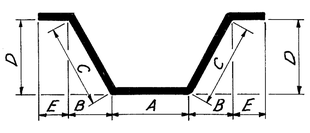
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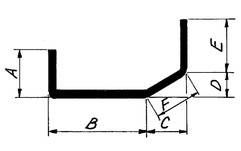
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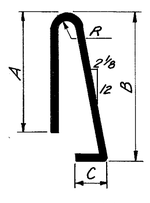
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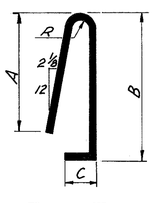
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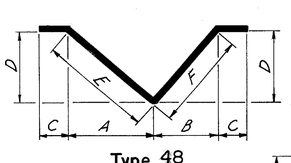
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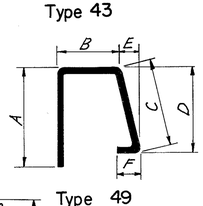
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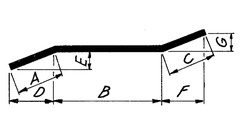
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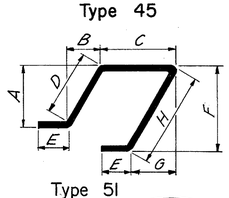
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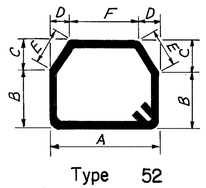
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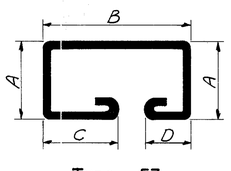
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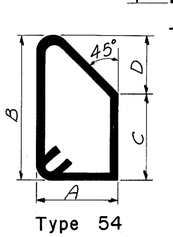
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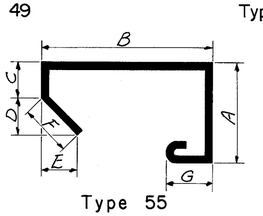
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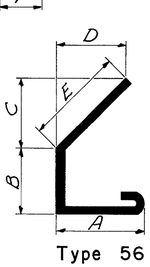
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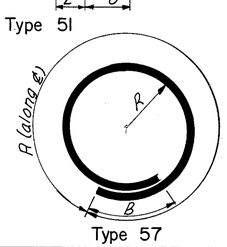

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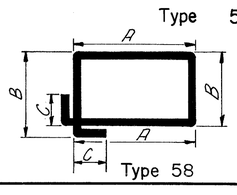
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CINCINNATI, OHIO

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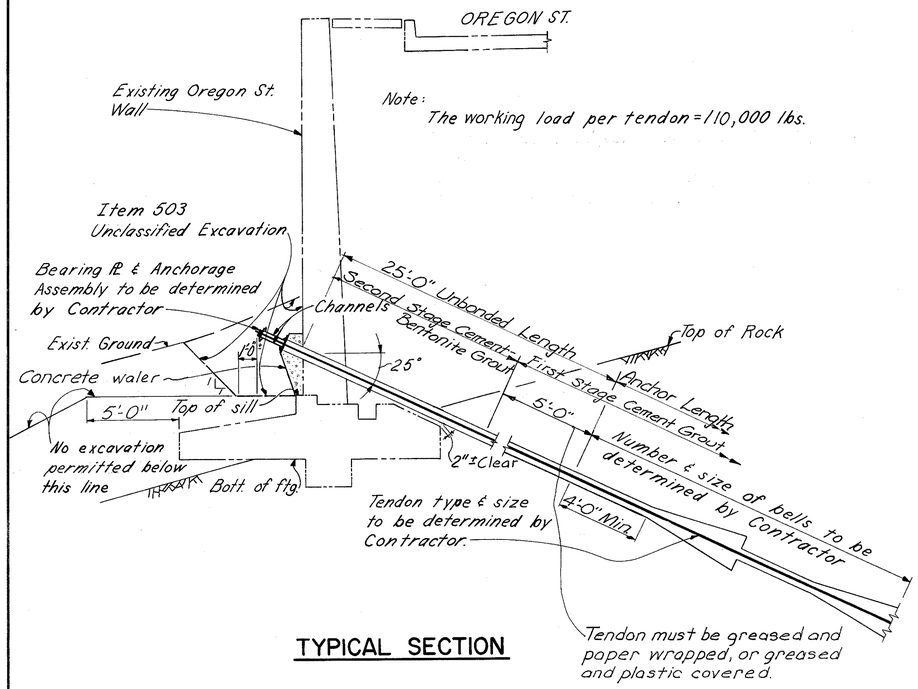
BAR BENDING SCHEDULE

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	AYT			JHO 2-27-79	

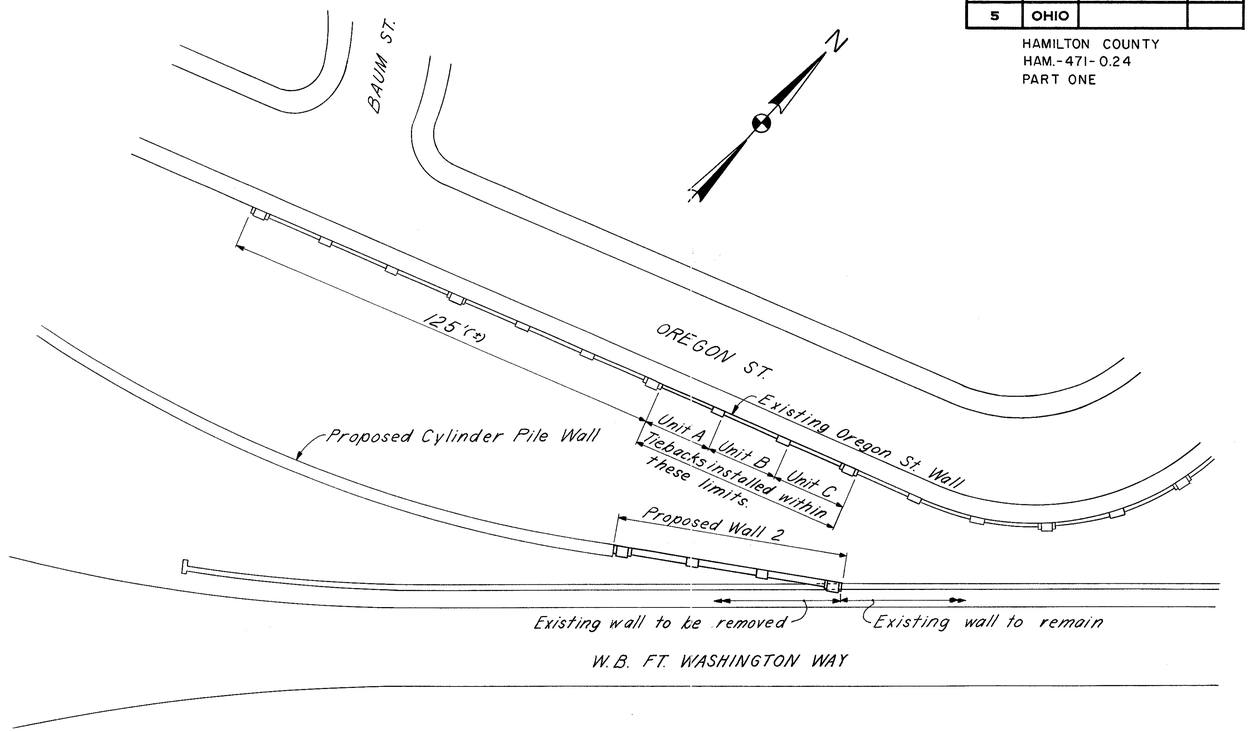
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

71
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE



TYPICAL SECTION



WALL LOCATION PLAN

ESTIMATED QUANTITIES			
ITEM	TOTAL	UNIT	DESCRIPTION
503	58	Cubic Yard	Unclassified Excavation
509	506	Pound	Reinforcing Steel
511	8	Cubic Yard	Class "C" Concrete
513	5,100	Pound	Structural Steel
Special	9	Each	Anchor Bore Hole Drilled
Special	9	Each	Post-Tensioning Rock Anchor System
Special	9	Each	Grout for Anchor Drill Hole
Special	Lump	Lump Sum	Final Disposition of Tiebacks and Accessories, Channels, Bearing Plates and Anchor Bolts

Construction:
All the tendons in a wall unit must be installed and proportionally stressed as a unit. If one of the tendons in a wall unit fails during the stressing operation the remainder of the tendons shall not be stressed any further, until a new anchor has been grouted and is ready for stressing. Precaution must be exercised by the Contractor so that during any stressing operation performed on the existing wall the top of wall does not move more than ½" uphill and that no cracking or damage is done to existing wall.

Notes:
Prints of the existing Oregon St. Wall design drawings are available for inspection by prospective bidders at the Engineering Divison, Room 314, City Hall in Cincinnati.
It shall be the responsibility of the Contractor to determine the accuracy of these plans and to obtain field measurements of the existing structure in order to insure a proper fit between the existing and proposed work.

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CINCINNATI, OHIO

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TEMPORARY TIEBACK DETAILS

EXIST. OREGON ST. WALL

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	TMC	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

72/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

NOTES

JOB DESCRIPTION

THE WORK SHALL INCLUDE THE FURNISHING OF ALL LABOR AND EQUIPMENT; AND PREPARING SHOP DRAWINGS, FABRICATING, FURNISHING AND ERECTING ALL THE MATERIALS NEEDED TO CONSTRUCT THE TEMPORARY TIEBACK SYSTEM ACCORDING TO THE PLANS AND SPECIFICATIONS. WHERE THE TERM TIEBACK IS USED IN THIS SPECIFICATION IT SHALL MEAN ROCK ANCHOR.

THE CONSTRUCTION OF THIS SYSTEM SHALL PRECEDE THE DEMOLITION OF THE EXISTING WALL ALONG WEST BOUND FORT WASHINGTON WAY IN ORDER TO PREVENT ANY MOVEMENT OF THE THREE UNITS OF THE EXISTING OREGON STREET WALL SHOWN IN THESE PLANS. THESE THREE UNITS ARE DIRECTLY UPHILL FROM THE WALL THAT IS TO BE DEMOLISHED AND REPLACED BY WALL 2.

THE CONTRACTOR SHALL EXCAVATE ALONG THE WALL SO THAT THE REINFORCED CONCRETE WALER CHANNELS, TIEBACKS AND OTHER ACCESSORIES CAN BE INSTALLED. HOLES FOR THE TIEBACKS SHALL BE DRILLED THROUGH THE WALL AND THE SOIL AND INTO THE ROCK. CONCRETE ANCHORS SHALL BE INSTALLED ALONG THE WALL IN ORDER TO HOLD THE REINFORCED CONCRETE WALER IN ITS PROPER LOCATION. CHANNELS SHALL THEN BE FASTENED TO THE CONCRETE WALER WITH ANCHOR BOLTS, AND THE TIEBACKS SHALL BE INSERTED INTO THEIR RESPECTIVE HOLES. THE TIEBACKS SHALL BE PRESTRESSED AS PRESCRIBED AND LOCKED OFF. AFTER THE DEMOLITION OF THE SECTION OF THE EXISTING WALL ALONG WEST BOUND FORT WASHINGTON WAY AS SPECIFIED IN THE PLANS FOR WALL 2, AND THE CONSTRUCTION AND BACKFILLING OF WALL NO. 2; THE TIEBACKS SHALL BE RELEASED AND THE PORTION OF THE TIEBACK SYSTEM ABOVE THE BEARING SURFACE OF THE CONCRETE WALER SHALL BE REMOVED.

THE BORING INFORMATION PROVIDED IN THE PLANS FOR THE ENTIRE 471-0.24 PART ONE PROJECT IS FOR THE CONTRACTOR'S INTERPRETATION OF THE SUBSURFACE STRATA IN ORDER TO PERFORM HIS WORK. ANY INTERPRETATIONS OR ASSUMPTIONS SHOWN IN THESE PLANS SHALL NOT BE CONSTRUED AS REFERENCE INFORMATION TO BE USED BY THE CONTRACTOR FOR THE CONSTRUCTION OF THE OREGON STREET WALL TIEBACK SYSTEM.

APPLICABLE SPECIFICATIONS. THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1977, AND THE OHIO "SUPPLEMENT" TO THESE SPECIFICATIONS.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS.

(1) A36-75 - STRUCTURAL STEEL

(2) A416-74 - UNCOATED SEVEN-WIRE STRESS-RELIEVED STRAND FOR PRESTRESSED CONCRETE

(3) A421-77 - UNCOATED STRESS-RELIEVED WIRE FOR PRESTRESSED CONCRETE

(4) A615-76a - DEFORMED AND PLAIN BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT

(5) A616-76 - RAIL-STEEL DEFORMED AND PLAIN BARS FOR CONCRETE REINFORCEMENT

(6) A617-76 - AXLE-STEEL DEFORMED AND PLAIN BARS FOR CONCRETE REINFORCEMENT

(7) A722-75 - UNCOATED HIGH-STRENGTH STEEL BAR FOR PRESTRESSING CONCRETE

(8) C31-69 - MAKING AND CURING CONCRETE TEST SPECIMENS IN THE FIELD

(9) C39-72 - COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

(10) C192-76 - MAKING AND CURING CONCRETE TEST SPECIMENS IN THE LABORATORY

(11) C232-71 - BLEEDING OF CONCRETE

U.S. CORPS OF ENGINEERS:

(1) METHOD CRD-C79-77 - TEST FOR FLOW OF GROUT MIXTURES (FLOW-CONE METHOD)

(2) METHOD CRD-C81-74 - TEST OF EXPANSION OF GROUT MIXTURES

DESIGN DATA: CONCRETE CLASS C - UNIT STRESS 1333 psi

GROUT - FIRST STAGE CEMENT GROUT - MINIMUM COMPRESSIVE STRENGTH 4000 psi.
SECOND STAGE CEMENT-BENTONITE GROUT - MINIMUM COMPRESSIVE STRENGTH 50-80 psi.

STRUCTURAL STEEL (INCLUDES ALL NUTS, BOLTS AND ACCESSORIES) - ASTM A36 - UNIT STRESS 20,000 psi.

REINFORCING STEEL - ASTM A615, A616 OR A617, GRADE 40 UNIT STRESS 20,000 psi.

UNCLASSIFIED EXCAVATION

DESCRIPTION. THIS ITEM SHALL CONSIST OF EXCAVATING ALL MATERIALS, OF WHATEVER NATURE ENCOUNTERED, NECESSARY TO CONSTRUCT THE TIEBACK SYSTEM. THE EXCAVATION FOR THE WALER SHALL BE CONFINED TO THE AREA SHOWN ON THE PLANS. INCLUDED IN THIS ITEM IS DEWATERING. WORK UNDER THIS ITEM SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF 503 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN. LIMITED EXCAVATION TO SET DRILLING AND OTHER EQUIPMENT IN THE VICINITY OF THE TIEBACK SYSTEM, OR THE EXCAVATION REQUIRED FOR THE TIEBACK SYSTEM ITSELF; SHALL NOT BE MADE UNTIL THE CONTRACTOR IS READY TO BEGIN CONSTRUCTION OF THE SYSTEM AND PROCEED WITHOUT UNNECESSARY DELAYS UNTIL THE WORK IS COMPLETED.

DEWATERING. WHEN WATER IS ENCOUNTERED DURING EXCAVATION OR CONSTRUCTION OF THE TIEBACK SYSTEM, THE CONTRACTOR SHALL PROVIDE ALL PUMPING NECESSARY TO COMPLETE THE REQUIRED CONSTRUCTION.

DISPOSAL OF EXCAVATED MATERIAL. THE REMOVAL AND SATISFACTORY OFF-SITE DISPOSAL OF ALL EXCAVATED MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ON-SITE TEMPORARY STOCKPILING OF EXCAVATED MATERIAL WILL BE ALLOWED. HOWEVER, ON-SITE TEMPORARY STOCKPILING WILL BE AT A LOCATION SHOWN ON THE PLANS, AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AVOIDANCE AND CLEAN-UP OF STREET SPILLAGE TO THE SATISFACTION OF LOCAL AUTHORITIES. DISPOSAL SHALL BE IN ACCORDANCE WITH 203.05 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

METHOD OF MEASUREMENT. THE CUBIC YARDS OF UNCLASSIFIED EXCAVATION SHALL BE MEASURED AS A SOLID BOUNDED BY THE PAY LIMITS SHOWN ON THE PLANS.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
503	CUBIC YARD	UNCLASSIFIED EXCAVATION

ANCHOR BORE HOLE DRILLED

DESCRIPTION. THIS ITEM SHALL CONSIST OF PREPARING WORKING AREAS FOR THE DRILL RIG; DRILLING ALIGNED BORE HOLES, OF SIZE DETERMINED BY CONTRACTOR WITH UNDER-REAM BELLS OF NUMBER AND SIZE ALSO DETERMINED BY CONTRACTOR, THROUGH THE EXISTING OREGON STREET RETAINING WALL, THE FILL AND OVERBURDEN, AND INTO THE CLAYSTONE (CLAY SHALE) BEDROCK TO THE ANCHOR LENGTHS DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER; FURNISHING AND INSTALLING STEEL CASING THROUGH THE FILL AND OVERBURDEN; AND FURNISHING ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE THE CONSTRUCTION OF THE ANCHOR BORE HOLES FOR THE PURPOSE OF INSTALLING THE TENDONS OF THE CAPACITIES SHOWN ON THE PLANS.

GENERAL. BORED HOLES, FOR TENDON INSTALLATION OF THE DESIGN LOAD SPECIFIED, SHALL BE DRILLED AT THE LOCATIONS AND IN THE DIRECTION SHOWN ON THE PLANS AND TO THE DEPTHS DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. DRILLED HOLES SHALL BE OF THE SIZE REQUIRED TO SUIT THE TENDON SYSTEM CHOSEN BY THE CONTRACTOR.

THE ANCHORAGE LENGTHS AND THE BELL SIZE, NUMBER AND SPACING SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER; BASED ON THE LOADS, THE CONDITIONS ENCOUNTERED AND THE EQUIPMENT AVAILABLE. DRAWINGS CONCERNING THE DETAILS OF THE UNDER-REAM BELLS AND THE SUITABLE EQUIPMENT FOR UNDER-REAMING OF THE ROCK FROM THE ANCHOR HOLE TO FORM UNDER-REAMED BELLS AS SPECIFIED SHALL BE SUBMITTED TO THE ENGINEER 30 DAYS PRIOR TO COMMENCING WORK, AND NO SUCH WORK SHALL BE COMMENCED UNTIL DRAWINGS HAVE BEEN APPROVED BY THE ENGINEER.

ALL DRILLING IN THE ANCHORAGE ZONE SHALL BE ACCOMPLISHED BY CORE DRILLING, ROTARY DRILLING, OR DOWN THE HOLE PRECUSSIVE DRILLING IN SUCH A MANNER AS TO MINIMIZE DAMAGE TO THE SURROUNDING ROCK.

DRILLING EQUIPMENT. THE DRILLING EQUIPMENT SHALL BE SUITABLE FOR THE STRATA ENCOUNTERED AND DRILL HOLE SIZE REQUIRED.

THE EQUIPMENT AND TECHNIQUES EMPLOYED SHALL BE CONSISTENT WITH OBTAINING A CLEAN, UNDISTURBED HOLE AND SHALL BE SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER AS THE WORK PROGRESSES.

CASING BORE HOLES. PERMANENT STEEL DRILL CASING, OF THE TYPE ACCEPTED BY THE ENGINEER, SHALL BE INSATLLED IN ALL BORE HOLES EXTENDING FROM THE BACK FACE OF THE EXISTING WALL THROUGH THE FILL AND WEATHERED ROCK.

BACKFILLING ABANDONED ANCHOR DRILL HOLES. ANY PARTIALLY OR COMPLETELY DRILLED HOLES, WHICH ARE ABANDONED FOR ANY REASON, SHALL BE BACKFILLED WITH GROUT TO THE EXISTING RETAINING WALL USING THE PROCEDURE, MATERIALS AND EQUIPMENT REQUIRED BY SPECIFICATIONS. THE ENGINEER MAY PERMIT MODIFICATION OF THE GROUT MIX USED IN FILLING AN ABANDONED HOLE. THE STEEL CASING SHALL BE REMOVED AS THE HOLE IS BACKFILLED OR IMMEDIATELY AFTER BACKFILLING WITH GROUT IS COMPLETED AND BEFORE THE GROUT SETS. NO PAYMENT WILL BE MADE FOR BACKFILLING WITH GROUT THE HOLES THAT ARE ABANDONED AND ALL COSTS IN CONNECTION THEREWITH SHALL BE AT NO EXPENSE TO THE STATE.

THE ANCHOR HOLES AND BELLS SHALL BE FLUSHED WITH AIR OR WATER TO CLEAN THEM THOROUGHLY OF ALL DRILL CUTTINGS, GREASE OR OTHER DEBRIS AND DIRT USING METHODS APPROVED BY THE ENGINEER.

AFTER THE DRILLING OF THE ANCHOR HOLE AND BELLS, THE TENDON SHALL BE INSTALLED WITHIN 24 HOURS AFTER COMPLETING THE FINAL CLEANING OUT OF THE ANCHOR HOLE; HOWEVER, JUST PRIOR TO INSERTION OF THE ANCHOR TENDON ASSEMBLY, THE ANCHOR HOLE SHALL BE CHECKED TO VERIFY THAT IT IS CLEAR TO THE FULL DEPTH REQUIRED. IF CAVED MATERIAL OR DEBRIS IS DETECTED IN THE HOLE, SUCH DEBRIS OR MATERIAL SHALL BE REMOVED BY INSERTING THE DRILL TOOL TO THE BOTTOM OF THE HOLE AND FLUSHING WITH AIR AND/OR WATER. IF THESE PROCEDURES ARE NOT EFFECTIVE, THE HOLES SHALL BE REDRILLED IN ORDER TO REMOVE THE FOREIGN MATERIALS.

METHOD OF MEASUREMENT. COMPLETED AND ACCEPTED ANCHOR BORE HOLES, OF THE CAPACITY SPECIFIED, AND AS DETERMINED BY PROOF TESTING, SHALL BE MEASURED AS A UNIT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	ANCHOR BORE HOLE DRILLED

NOTES CONTINUED ON SHEET 73

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

EXIST. OREGON ST. WALL

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-27-79	

NOTES (CONTINUED FROM SHEET 72)

POST-TENSIONING ROCK ANCHOR SYSTEM

DESCRIPTION. THIS WORK SHALL CONSIST OF FURNISHING, FABRICATING, INSTALLING, AND STRESSING THE POST-TENSIONING SYSTEM OF THE LOAD CAPACITY SPECIFIED INCLUDING TENDON AND HEAD ANCHORAGE ASSEMBLIES, AND ALL OTHER ANCHORAGE ACCESSORIES.

THE ENTIRE ANCHORAGE ASSEMBLY, INCLUDING ALL COMPONENTS AND ACCESSORIES, SHALL BE A STANDARD PRODUCT OF A RECOGNIZED REPUTABLE MANUFACTURER OF POST-TENSIONED ANCHORS OF THE TYPE THE CONTRACTOR PROPOSES TO USE UNDER THIS CONTRACT. DURING FABRICATION AND INSTALLATION OF THE ANCHORAGE TENDON ASSEMBLIES, THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT EACH ASSEMBLY IS SATISFACTORILY FABRICATED, FREE FROM CORROSION, DAMAGE OR OTHER DEFECTS, AND PROPERLY INSTALLED.

MATERIAL. PRESTRESSING STEEL USED IN ROCK ANCHOR TENDONS, AS APPLICABLE, SHALL CONFORM TO THE FOLLOWING:

(1) SEVEN-WIRE STRAND. SEVEN-WIRE STRAND FOR ANCHORAGE TENDONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A416-74, "UNCOATED SEVEN-WIRE STRESS-RELIEVED STRAND FOR PRESTRESSED CONCRETE" AND SHALL HAVE A MINIMUM ULTIMATE STRENGTH OF 250,000 psi.

(2) HIGH TENSILE WIRE. HIGH TENSILE STRENGTH SINGLE WIRE, TYPE BA, FOR MULTIWIRE TYPE STEEL ANCHOR TENDONS SHALL CONSIST OF WIRES CONFORMING TO THE REQUIREMENTS OF ASTM A421-76, "UNCOATED STRESS-RELIEVED WIRE FOR PRESTRESSED CONCRETE". THE WIRES SHALL HAVE A NOMINAL DIAMETER OF 1/4-INCH OR LARGER AND A MINIMUM TENSILE STRENGTH OF 240,000 psi. OIL TEMPERED WIRES SHALL NOT BE USED.

(3) HIGH-STRENGTH STEEL BARS. HIGH-STRENGTH STEEL BARS USED IN SOLID DEFORMED THREAD-BARS FOR ANCHORAGE TENDONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A722-75, "UNCOATED HIGH-STRENGTH STEEL BAR FOR PRESTRESSING CONCRETE". BARS SHALL HAVE A SINGLE MINIMUM ULTIMATE TENSILE STRENGTH LEVEL OF 150,000 psi.

STRUCTURAL STEEL BEARING PLATES. BEARING PLATES SHALL BE FABRICATED FROM STRUCTURAL STEEL CONFORMING TO ASTM A36 SILICON KILLED FINE-GRAIN PRACTICE. ALSO DEPENDING ON THE SYSTEM CHOSEN, THE BEARING PLATES SHALL BE PROVIDED WITH ALL APPROPRIATE APPURTENANCES FOR THE ATTACHMENT OF TENSIONING AND ALL OTHER EQUIPMENT CONSISTENT WITH THE SYSTEM THE CONTRACTOR PROPOSES TO USE.

NO KINKS, BENDS, NICKS, BROKEN WIRES, OR OTHER DEFECTS, INCLUDING SCALE OR LOOSE RUST WILL BE PERMITTED IN THE WIRES, STRANDS OR BARS USED FOR THE ANCHORAGE TENDONS. SLIGHT RUSTING, PROVIDED IT IS NOT SUFFICIENT TO CAUSE VISIBLE PITS, SHALL NOT BE CAUSE FOR REJECTION.

WIRE TENDON ANCHOR ASSEMBLIES SHALL BE DESIGNED SO THAT NO INDENTATION WILL BE MADE ON THE PRESTRESSING STEEL. TENDON WIRES OR STRANDS SHALL BE FURNISHED IN SINGLE FULL LENGTHS WITH NO SPLICING OR COUPLING WITHIN THE TENDON LENGTH PERMITTED. SOLID DEFORMED THREAD-BARS SHALL BE SUPPLIED IN STRAIGHT LENGTHS AND BE SPLICED BY THREADED COUPLERS WHICH DEVELOP THE MINIMUM GUARANTEED ULTIMATE TENSILE STRENGTH OF THE BARS. A MAXIMUM OF TWO SEPARATE BARS MAY BE USED, THAT IS ONLY ONE COUPLER PER ANCHOR IS PERMITTED.

ANCHORAGES. POST-TENSIONING ANCHORAGE COMPONENTS SHALL DEVELOP THE MINIMUM GUARANTEED BREAKING STRENGTH OF THE PRESTRESSING STEEL AND SHALL BE FABRICATED TO PRECISE DIMENSIONS AND TO CLOSE MANUFACTURING TOLERANCES APPROPRIATE TO THE WORK. THE SIZE OF BEARING PLATES SHALL BE DESIGNED TO DEVELOP THE MINIMUM GUARANTEED BREAKING STRENGTH OF THE PRESTRESSING STEEL.

ALL TENDONS SHALL BE PROPORTIONED SO THAT THE STEEL IS NOT STRESSED HIGHER AT WORKING LOAD THAN 60 PERCENT OF ULTIMATE. WORKING LOAD BEING 110 KIPS.

SHOP DRAWINGS. SHOP DRAWINGS SHOWING COMPLETE DETAILS OF THE ROCK ANCHOR FABRICATION, DETAILS OF ANCHORAGE COMPONENTS, SEQUENCE OF ASSEMBLY AND INSTALLATION, AND STRESSING PROCEDURE SHALL BE SUBMITTED FOR APPROVAL AT LEAST 30 DAYS PRIOR TO USE. SHOP DRAWINGS SHALL BE FURNISHED IN ACCORDANCE WITH 501.05 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. ONCE APPROVED, NO CHANGES OR DEVIATIONS FROM SHOP DRAWINGS WILL BE PERMITTED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

THE ENGINEER WILL REVIEW AND APPROVE THE CONTRACTOR'S DRAWINGS WITH RESPECT TO ARRANGEMENT AND CONFORMANCE TO THE SPECIFICATIONS AND RELATED DESIGN DRAWINGS. HOWEVER, THE APPROVAL DOES NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITY FOR THE COMPLETENESS AND ACCURACY OF ALL DIMENSIONS AND DETAILS NOR ADEQUACY OF HIS DESIGN.

FABRICATION SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DRAWINGS HAVE BEEN RECEIVED FROM THE DIRECTOR.

FABRICATION. ANCHORAGE TENDON ASSEMBLIES SHALL BE CAPABLE OF ADJUSTMENT TO THE "AS DRILLED ANCHOR BORE HOLE LENGTH" IN THE EVENT FIELD CONDITIONS GENERATE UNSCHEDULED INCREASES OR DECREASES IN THIS LENGTH. THE SUPPLIER SHALL SPECIFY THE METHODS AND PROCEDURE FOR TENDON CUTTING AND CUTTING TOLERANCE.

WELDING. THE GROUNDING OF WELDING MACHINES, OR THE GROUNDING OF ELECTRICAL CIRCUITS WILL NOT BE PERMITTED ON OR ADJACENT TO ANY ANCHORAGE ASSEMBLY, OR MATERIALS TO BE USED IN ANCHORAGE ASSEMBLIES, OR ANY METAL IN CONTACT WITH AN ANCHORAGE ASSEMBLY UNLESS SPECIFICALLY APPROVED BY THE ENGINEER.

WELDING PROCEDURES AND WELDER'S QUALIFICATIONS SHALL CONFORM TO 513 (171) OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

THE BONDED LENGTH OF THE ANCHORAGE TENDONS SHALL BE CLEANED, COMPLETELY DECREASED AND WIRE-BRUSHED TO ASSURE EFFECTIVE BONDING BETWEEN THE GROUT AND THE TENDON.

INSPECTION AND TESTING. CERTIFIED MILL TEST REPORTS AND OTHER VERIFICATION DOCUMENTS SHOWING THE RESULTS OF CHEMICAL ANALYSIS AND PHYSICAL TESTS REQUIRED BY THE ASTM SPECIFICATIONS ON THE MATERIAL TO BE USED IN THE POST-TENSIONING SYSTEM SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL NOT LATER THAN 20 DAYS PRIOR TO FABRICATION OR COMMENCEMENT OF INSTALLATION WORK, WHICHEVER IS APPLICABLE. ALL TESTS SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE ASTM SPECIFICATIONS.

INSTALLATION. THE ANCHOR ASSEMBLY, TENDON MATERIAL AND ACCESSORIES SHALL BE HANDLED AND PROTECTED PRIOR TO INSTALLATION IN SUCH A MANNER AS TO AVOID CORROSION OR PHYSICAL DAMAGE TO THE PRESTRESSING STEEL OR ANCHORAGE ASSEMBLIES.

STORAGE OF STEEL TENDONS AND ACCESSORIES SHALL BE IN WEATHERPROOF BUILDINGS, HEATED IF NECESSARY TO PREVENT CONDENSATION AND CORROSION. IMMEDIATELY PRIOR TO PLACING EACH ANCHORAGE ASSEMBLY IN AN ANCHOR HOLE, THE ASSEMBLY SHALL BE INSPECTED BY THE CONTRACTOR AND ENGINEER FOR ANY DAMAGED, NICKED OR SCARRED TENDON MATERIAL OR OTHER INJURIOUS DETERIORATION. ANY CORRODED OR DAMAGED TENDON OR OTHER PART OF AN ANCHOR ASSEMBLY WHICH IN THE OPINION OF THE CONTRACTOR OR ENGINEER IS UNSUITABLE FOR USE IN THIS PROJECT, SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.

ALL THE EQUIPMENT USED FOR FABRICATING, ASSEMBLING, HANDLING AND PLACING THE ROCK ANCHORS SHALL BE SUCH THAT IT DOES NOT DAMAGE OR DETERIORATE THE PRESTRESSING STEEL OR THE ANCHORAGES. ROCK ANCHORS, FREE OF DIRT, LOOSE RUST, GREASE OR ANY OTHER DELETERIOUS SUBSTANCES SHALL BE FABRICATED AND INSTALLED USING PERSONNEL TRAINED AND QUALIFIED IN THIS TYPE OF WORK.

THE ANCHORAGE TENDON AND HEAD ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THESE SPECIFICATIONS, PLANS, AND CONTRACTOR'S APPROVED DESIGN DRAWINGS.

THE ANCHORAGE ASSEMBLY SHALL BE CENTERED IN THE HOLE BY SUITABLE SPACERS AND SECURELY FASTENED IN PLACE TO PREVENT MOVEMENT DURING THE GROUTING. THE ANCHOR HOLES SHALL BE PROTECTED FROM ENTRY OF DIRT OR OTHER FOREIGN MATTER UNTIL THE HOLES HAVE BEEN COMPLETELY GROUTED.

TENDONS OR HEAD ASSEMBLIES THAT FAIL UPON APPLICATION OF LOADS, EQUAL TO OR LESS THAN THEIR YIELD VALUE, DUE TO FAULTY MATERIAL, FABRICATION OR INSTALLATION; OR ANY CORRODED OR DAMAGED BEARING PLATE WHICH IN THE OPINION OF THE ENGINEER IS UNSUITABLE FOR USE IN THE PROJECT; SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.

EACH ANCHOR DRILL HOLE SHALL BE GIVEN A FINAL CLEANING BEFORE INSTALLING THE ANCHOR TENDON ASSEMBLY.

BEFORE INSTALLING THE ANCHORAGE TENDON ASSEMBLY, EACH DRILL HOLE SHALL BE FLUSHED WITH AIR AND/OR WATER TO CLEAN IT THOROUGHLY OF ALL DRILL CUTTINGS, GREASE OR ANY OTHER DEBRIS AND DIRT, USING METHODS APPROVED BY THE ENGINEER. WITHIN 24 HOURS AFTER COMPLETING THE FINAL CLEANING OUT OF THE ANCHOR HOLE, JUST PRIOR TO INSERTION OF THE ANCHORAGE ASSEMBLY, THE HOLE SHALL BE CHECKED TO VERIFY THAT IS IS CLEAR TO THE FULL DEPTH. IF CAVED MATERIAL OR DEBRIS IS DETECTED IN THE HOLE, SUCH DEBRIS OR MATERIAL SHALL BE REMOVED BY INSERTING THE DRILL TOOL TO THE BOTTOM OF THE HOLE AND FLUSHING WITH AIR AND/OR WATER. IF THESE PROCEDURES ARE NOT EFFECTIVE, THE HOLE SHALL BE REDRILLED TO REMOVE THE MATERIALS AT THE CONTRACTOR'S EXPENSE.

GROUTING. ROCK ANCHOR SHALL BE GROUTED AS SHOWN ON THE PLANS IN ORDER TO BOND IT TO THE FOUNDATION STRATA. GROUTING SHALL BE COMPLETED WITHIN 6 HOURS AFTER ANCHOR HAS BEEN PLACED IN THE HOLE.

ALL GROUT PIPING SHALL BE CLEAN AND FREE OF DELETERIOUS MATERIALS THAT WOULD INTERFERE WITH GROUTING PROCEDURE. PIPING SHALL BE THOROUGHLY FLUSHED AND BLOWN OUT PRIOR TO GROUTING. THE GROUT SHALL BE INJECTED INTO THE HOLE STARTING AT THE LOW END. GROUTING AND VENTING METHODS OF APPROVED TYPE SHALL BE USED TO ASSURE COMPLETE ENCASEMENT OF THE PRESTRESSING STEEL BY THE GROUT IN THE ANCHORAGE ZONE.

TENDON TENSIONING. HYDRAULIC JACKS SHALL BE CAPABLE OF STRESSING EQUALLY AND SIMULTANEOUSLY ALL STRESSED ELEMENTS OF THE ROCK ANCHOR. EACH JACK SHALL BE EQUIPPED WITH A PRESSURE GAGE FOR DETERMINING THE JACKING STRESS. THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM SHALL BE CAPABLE OF MEASURING THE TENDON LOAD TO AN ACCURACY OF PLUS OR MINUS THREE PERCENT OF THE TENDON DESIGN LOAD. SIXTY DAYS PRIOR TO BEGINNING TENSIONING, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER CERTIFIED CALIBRATION DATA FOR THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM, AND INCLUDING AT LEAST ONE SPARE PRESSURE GAGE. AFTER THE PRIMARY GROUT HAS ATTAINED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,000 psi AND IN NO EVENT PRIOR TO A SETTING TIME OF SEVEN DAYS, THE CONTRACTOR SHALL TENSION THE ANCHOR. THE TENSIONING PROCESS SHALL BE SO CONDUCTED THAT THE APPLIED LOAD AND THE ELONGATION OF THE ANCHOR MAY BE MEASURED AT ANY TIME. ELONGATION MEASUREMENTS SHALL BE ACCURATE TO 1/100-INCH AND JACK SYSTEM READINGS TO PLUS OR MINUS THREE PERCENT OF THE JACKING LOAD. DURING THE TENSIONING OF EACH ANCHOR, A RECORD SHALL BE KEPT OF GAGE PRESSURE AND OF ANCHOR ELONGATION AT 20 PERCENT, 40 PERCENT, 60 PERCENT, 80 PERCENT, 100 PERCENT, 115 PERCENT AND 130 PERCENT OF THE WORKING LOADS. DURING ANY LOADING CYCLE THE APPLIED LOADS, AS MEASURED BY THE ELONGATIONS AND THE PRESSURE GAGE READINGS, SHALL BE WITHIN PLUS OR MINUS FIVE PERCENT OF AGREEMENT UP TO THE MAXIMUM LOAD APPLIED IN THE PREVIOUS LOADING CYCLE, AND IF NOT, STRESSING OPERATIONS MAY BE SUSPENDED BY THE ENGINEER UNTIL CAUSE FOR THE DIFFERENCE IS FOUND AND CORRECTED. THE MAXIMUM JACKING STRESS SHALL NEVER EXCEED 80 PERCENT OF THE GUARANTEED ULTIMATE STRENGTH OF THE STEEL. ALL STRESSING ELEMENTS OF THE ROCK ANCHOR SHALL BE STRESSED SIMULTANEOUSLY. SAFETY PRECAUTIONS SHALL BE TAKEN TO PREVENT WORKERS FROM STANDING BEHIND THE JACKS WHEN ROCK ANCHORS ARE STRESSED. THE STRESSING ANCHORAGE SHALL BE CAPABLE OF LIFT-OFF IN ORDER TO CHECK THE TENDON LOAD. THE PRESTRESSING SYSTEM SHALL THEREFORE BE CAPABLE OF STRESS ADJUSTMENT. ALL TENSIONING SHALL BE DONE IN THE PRESENCE OF THE ENGINEER.

NOTES CONTINUED ON SHEET 74

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

EXIST. OREGON ST. WALL

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-27-79	5-13-80

NOTES (CONTINUED FROM SHEET 73)

TESTS. AFTER THE GAGE PRESSURE AND ANCHOR ELONGATION AT 20 PERCENT, 40 PERCENT, 60 PERCENT, 80 PERCENT, 100 PERCENT, 115 PERCENT AND 130 PERCENT OF THE WORKING LOAD HAVE BEEN RECORDED, THE ANCHOR LOAD SHALL BE SLOWLY REDUCED TO 100 PERCENT OF THE WORKING LOAD AND SECURED, AND THE INITIAL LIFT-OFF READING SHALL BE RECORDED. THE LOAD SHALL BE RELEASED FROM THE JACK AND, AFTER A MINIMUM TIME OF ONE HOUR, THE JACK SHALL BE RELOADED AND A SECOND LIFT-OFF READING RECORDED. IF THE LOAD LOSS IS WITHIN 3 PERCENT OF THE INITIAL LIFT-OFF READING, THE ANCHOR SHALL BE DEEMED ACCEPTABLE. IF THE LOAD LOSS IS GREATER THAN 3 PERCENT OF THE INITIAL LIFT-OFF READING, THE LOAD SHALL BE RAISED TO THE INITIAL LOAD, SECURED, AND A THIRD LIFT-OFF READING SHALL BE RECORDED. AFTER A MINIMUM OF 2 HOURS THE ANCHOR SHALL BE RETESTED AND IF THE LOAD LOSS IS GREATER THAN 3 PERCENT OF THE THIRD LIFT-OFF READING, THE ANCHOR WILL BE DEEMED AS HAVING FAILED. IF THE ROCK ANCHOR CANNOT BE SUCCESSFULLY TESTED TO THE REQUIRED LOADS, IT MAY STILL BE INCORPORATED INTO THE ANCHOR SCHEME, AT A PROPORTION OF THE WORKING LOAD AS DIRECTED BY THE ENGINEER. IN SUCH CASES, A SUPPLEMENTAL ANCHOR OR ANCHORS SHALL BE INSTALLED TO CARRY THE REMAINING PORTION OF THE LOAD AS APPROVED BY THE ENGINEER. THE LOCATION OF THE HOLE FOR THE REPLACEMENT ANCHOR WILL BE SELECTED BY THE ENGINEER. THE CONTRACTOR SHALL PROVIDE, AT HIS EXPENSE, ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO PROVIDE THE NEW ANCHOR HOLE AND SHALL INSTALL THEREIN A NEW ANCHOR ASSEMBLY. NO DRILLING SHALL BE PERFORMED FOR A REPLACEMENT ANCHOR UNTIL THE GROUTING HAS BEEN COMPLETED FOR ALL PRESTRESSED ROCK ANCHORS. ALL ANCHORS SHALL AGAIN BE TESTED 14 DAYS AFTER THE ABOVE TESTS HAVE BEEN COMPLETED. THE FINAL "LOCK-OFF" LOAD SHALL BE 110 KIPS OR A LESSER VALUE AS DIRECTED BY THE ENGINEER AND ADJUSTMENTS SHALL BE MADE AS NECESSARY.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE THE NUMBER OF TENDONS SUCCESSFULLY TESTED AND LOCKED-OFF AT THEIR PRESCRIBED LOAD.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL WORK HEREINBEFORE DESCRIBED.

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	POST-TENSIONING ROCK ANCHOR SYSTEM

GROUT FOR ANCHOR DRILL HOLES

DESCRIPTION. THIS ITEM SHALL CONSIST OF SUPPLYING AND PUMPING FIRST STAGE CEMENT GROUT AND SECOND STAGE CEMENT-BENTONITE GROUT INTO THE ANCHOR DRILL HOLES AT THE OREGON STREET WALL TIEBACK SYSTEM THROUGH A GROUT PIPE SYSTEM EXTENDING TO THE BOTTOM OF THE HOLE, FILLING THE LENGTH OF THE ANCHOR DRILL HOLE WITH GROUT AFTER INSTALLATION OF AN ANCHORAGE TENDON ASSEMBLY.

GENERAL. GROUTING SHALL BE IN GENERAL ACCORDANCE WITH "RECOMMENDED PRACTICE FOR GROUTING OF POST-TENSIONED PRESTRESSED CONCRETE" PUBLISHED BY THE PRESTRESSED CONCRETE INSTITUTE, VOL. 17, NO. 6, NOVEMBER - DECEMBER, 1972, EXCEPT AS REVISED AND AUGMENTED BY THIS SPECIFICATION.

MATERIALS. MATERIALS SHOWN SHALL CONFORM TO THE FOLLOWING:

(1) PORTLAND CEMENT SHALL BE AS SPECIFIED IN 701.04 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. THE CEMENT SHALL BE FRESH AND SHALL CONTAIN NO LUMPS OR OTHER INDICATION OF HYDRATION OR WAREHOUSE SET. FRESH CEMENT SHALL BE DELIVERED TO THE SITE, STORED UNDERCOVER FOR NO LONGER THAN 1 MONTH ON THE SITE AND MUST BE KEPT BELOW 100 DEGREES F. CEMENT SHALL BE USED IN ORDER OF DELIVERY.

(2) BENTONITE SHALL BE THE HIGH SWELLING WYOMING TYPE SODIUM BASE BENTONITE CONSISTING MAINLY OF THE CLAY MINERAL, MONTMORILLONITE.

(3) WATER SHALL BE CLEAN AND POTABLE.

(4) ADDITIVES ARE CONSIDERED GENERALLY UNDESIRABLE AND THEIR USE WILL BE PERMITTED ONLY IF PROPERLY JUSTIFIED. IF THE CONTRACTOR DESIRES TO USE AN ADDITIVE OF ANY TYPE IN THE GROUT, DETAILS OF THE PROPOSED ADDITIVE AND THE JUSTIFICATION FOR ITS USE SHALL BE SUBMITTED TO THE ENGINEER, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK, FOR APPROVAL IN WRITING.

FIRST STAGE CEMENT GROUT. GROUT SHALL CONSIST OF A MIXTURE OF PORTLAND CEMENT AND WATER. PROPORTIONS OF GROUTING MATERIALS SHALL BE BASED ON RESULTS OF TESTS ON FREST AND HARDENED GROUT PRIOR TO BEGINNING THE WORK. THE WATER CONTENT SHALL BE THE MINIMUM NECESSARY FOR PROPER PLACEMENT BUT IN NO CASE SHALL THE WATER-CEMENT RATIO (BY WEIGHT) EXCEED 0.45.

THE GROUT SHALL BE PROPORTIONED TO OBTAIN THE FOLLOWING PROPERTIES:

(a) COMPRESSIVE STRENGTH. THE MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS SHALL BE 4000 psi. GROUT SAMPLES SHALL BE PREPARED, CURED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C31, C39 AND C192.

(b) CONSISTENCY. THE CONSISTENCY OF THE GROUT SHALL BE DETERMINED IN ACCORDANCE WITH U.S. CORPS OF ENGINEERS METHOD CRD-C79-77. WHEN TESTED BY THIS METHOD THE EFFLUX TIME OF THE GROUT SAMPLE IMMEDIATELY AFTER MIXING SHALL BE NOT LESS THAN 11 SECONDS.

(c) EXPANSION. THE GROUT MIX SHALL HAVE AN EXPANSION OF 3 PLUS OR MINUS 2 PERCENT WHEN TESTED BY U.S. CORPS OF ENGINEERS, METHOD CRD-C81-74, METHOD OF TEST OF EXPANSION OF GROUT MIXTURES.

(d) BLEEDING. BLEEDING OF THE GROUT MIX SHALL BE LESS THAN 2 PERCENT OF THE GROUT VOLUME THREE HOURS AFTER MIXING. THE TOTAL BLEED WATER SHALL NOT EXCEED 4% OF THE GROUT VOLUME. IN ADDITION, ALL SEPARATED WATER SHALL BE ABSORBED 24 HOURS AFTER MIXING. BLEEDING SHALL BE MEASURED BY A SUITABLE TEST SUCH AS ASTM C232 METHOD A, WITH PROCEDURES MODIFIED TO OBTAIN THIS DATA.

TEST DATA FOR AT LEAST THREE LABORATORY SAMPLES OF THE GROUT PROPOSED FOR USE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AT LEAST 30 DAYS PRIOR TO USE IN GROUTING ANCHORS. ALL TESTS SHALL BE PERFORMED BY THE STATE.

THE BRAND OF CEMENT WHICH IS USED FOR THE APPROVED LABORATORY SAMPLES SHALL BE USED FOR ALL ON SITE GROUTING UNLESS A CHANGE IS APPROVED IN WRITING BY THE ENGINEER.

SECOND STAGE CEMENT-BENTONITE GROUT. GROUT SHALL CONSIST OF A MIXTURE OF ONE PART CEMENT TO FOUR PARTS BENTONITE WITH A WATER SOLID (CEMENT PLUS BENTONITE) RATIO OF BETWEEN 1 AND 2.

THIS GROUT MIX SHALL BE CONSIDERED A STARTING POINT AND THE ACTUAL MIX SHALL BE PROPORTIONED, VARYING THE CEMENT-BENTONITE RATIO, AND WATER-SOLID RATIO, TO OBTAIN THE FOLLOWING PROPERTIES:

(a) COMPRESSIVE STRENGTH. COMPRESSIVE STRENGTH AT 7 DAYS SHALL BE BETWEEN 50 AND 80 psi. GROUT SAMPLES SHALL BE PREPARED, CURED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C31, C39 AND C192.

TEST DATA FOR AT LEAST THREE LABORATORY SAMPLES OF THE FINAL GROUT MIX PROPOSED FOR USE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AT LEAST 30 DAYS PRIOR TO USE IN GROUTING ANCHORS. ALL TESTS SHALL BE PERFORMED BY THE STATE.

THE BRANDS OF CEMENT AND OF BENTONITE WHICH ARE USED FOR THE APPROVED LABORATORY SAMPLES SHALL BE USED FOR ALL ON SITE GROUTING UNLESS A CHANGE IS APPROVED IN WRITING BY THE ENGINEER.

EQUIPMENT AND MIXING. ONLY APPROVED MIXING AND PUMPING EQUIPMENT SHALL BE USED IN THE PREPARATION AND HANDLING OF GROUT. ALL OIL OR OTHER RUST INHIBITORS SHALL BE REMOVED FROM THE MIXING EQUIPMENT, STIRRING MECHANISMS AND OTHER PORTIONS OF THE EQUIPMENT IN CONTACT WITH THE GROUT BEFORE USE. ALL EQUIPMENT SHALL BE MAINTAINED IN FIRST CLASS OPERATING CONDITION AT ALL TIMES AND SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING ITEMS:

A. A POWER OPERATED GROUT MIXER SPECIFICALLY DESIGNED FOR CONTINUOUS MECHANICAL MIXING OF A UNIFORM GROUT WHICH IS FREE OF LUMPS AND UNDISPERSED SOLIDS, TOGETHER WITH A MECHANICALLY AGITATED SUMP, IF NECESSARY, TO MAINTAIN AN UNINTERRUPTED, CONTINUOUSLY AGITATED, GROUT SUPPLY. THE MIXER SHALL HAVE A SUITABLE WATER MEASURING DEVICE CONSISTING OF A WATER METER OR A CALIBRATED WATER BATCHING TANK.

B. A POSITIVE DISPLACEMENT TYPE GROUT PUMP CAPABLE OF OPERATING AT DISCHARGE PRESSURES REQUIRED BY SITE CONDITIONS. A PRESSURE GAGE HAVING A FULL SCALE READING OF NO GREATER THAN 300 psi SHALL BE PLACED AT SOME POINT IN THE GROUT LINE BETWEEN THE PUMP OUTLET AND THE GROUT PIPE IN THE ANCHOR DRILL HOLE.

C. VALVES, PRESSURE GAGES, PIPE, PRESSURE HOSE, SUPPLY LINES, COUPLINGS, SCALES AND SMALL TOOLS AS MAY BE NECESSARY TO PROVIDE A CONTINUOUS SUPPLY OF GROUT AND SUITABLE PRESSURE CONTROL. THE PIPE AND HOSES SHALL BE OF SUFFICIENT SIZE TO CARRY THE PUMPED GROUT AT PRESSURES BELOW 250 psig.

D. STANDBY WATER FLUSHING EQUIPMENT READY FOR USE, IF REQUIRED BY THE ENGINEER. THE STANDBY WATER FLUSHING EQUIPMENT SHALL UTILIZE A DIFFERENT POWER SOURCE THAN THE GROUTING EQUIPMENT, SHALL HAVE SUFFICIENT CAPACITY TO FLUSH OUT ANY PARTIALLY GROUTED HOLES, IF NECESSARY, DUE TO BLOCKAGE OR BREAKDOWN OF GROUTING EQUIPMENT AND SHALL BE CAPABLE OF DEVELOPING AT LEAST 200 psi AS INDICATED ON A 4 INCH MINIMUM DIAMETER PRESSURE GAGE PERMANENTLY AFFIXED TO THE EQUIPMENT.

E. THE GROUTING EQUIPMENT SHALL BE CAPABLE OF PUMPING THE GROUT IN A MANNER WHICH WILL MAINTAIN THE GROUT IN A UNIFORM AND PROPERLY MIXED STATE WITHOUT INTRODUCTION OF OIL, AIR OR OTHER FOREIGN SUBSTANCES INTO THE GROUT. NO LOSS OF WATER FROM THE GROUT DUE TO POOR SEALS, CONNECTIONS OR OTHER CAUSES WILL BE PERMITTED. THE GROUTING EQUIPMENT SHALL CONTAIN A SCREEN WITH 0.125-INCH MAXIMUM CLEAR OPENING TO SIEVE THE GROUT BEFORE IT ENTERS THE GROUT PUMP. THIS SCREEN SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND CLEANING.

F. THE CEMENT AND THE BENTONITE SHALL BE MEASURED BY WEIGHT. WATER SHOULD BE ADDED TO THE MIXING DRUM BEFORE THE CEMENT OR BENTONITE ARE ADDED.

NOTES CONTINUED ON SHEET 75

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

EXIST. OREGON ST. WALL

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

HAMILTON COUNTY
HAM - 471 - 0.24
PART ONE

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NOTES (CONTINUED FROM SHEET 74)

GROUT INJECTION. AFTER INSTALLATION OF THE ANCHORAGE TENDON ASSEMBLY SYSTEM IN AN ANCHOR DRILL HOLE, GROUT SHALL BE INJECTED INTO THE DRILL HOLE STARTING AT THE LOWER END OF THE HOLE. IMMEDIATELY PRIOR TO GROUTING THE GROUT PIPE NETWORK SHALL BE CHECKED WITH WATER OR COMPRESSED AIR TO ENSURE THAT IT IS CLEAR. IF THE HOLE REMAINS OPEN MORE THAN 24 HOURS BEFORE GROUTING THE ANCHORAGE LENGTH, THE CONTRACTOR MAY, AT THE ENGINEER'S REQUEST, BE REQUIRED TO RE-CLEAN THE HOLE. GROUT INJECTION SHALL BE CONTINUED UNTIL THE DRILL HOLE IS FILLED WITH GROUT TO THE TOP OF THE FIRST STAGE CEMENT GROUT LIMITS. ALL NECESSARY PRE-CAUTIONS SHALL BE TAKEN TO ENSURE THAT THE BELLED SECTIONS ARE COMPLETELY FILLED WITH GROUT. THE LOWER END OF THE GROUT PIPE SHALL BE BURIED IN THE GROUT AT ALL TIMES TO PREVENT ENTRAPMENT OF AIR OR WATER. THE LEVEL OF THE GROUT AT THE TOP OF THE TENDON ANCHORAGE LENGTH SHALL BE DETERMINED TO AN ACCURACY OF PLUS OR MINUS 6 INCHES BY A SUITABLE METHOD.

ALTERNATIVELY THE DRILL HOLE MAY BE FILLED WITH CEMENT GROUT UP TO THE FACE OF WALL. AFTER A SUITABLE TIME INTERVAL, THE EXCESS CEMENT GROUT SHALL BE REMOVED DOWN TO THE TOP OF THE ANCHORAGE LENGTH BY WATER JETTING USING A LANCE WITH REVERSE DIRECTION JETS. THE APPLICABILITY OF THIS METHOD MAY BE DEPENDENT ON THE TYPE OF TENDON EMPLOYED.

PRECAUTIONS SHALL BE TAKEN TO PREVENT THE TEMPERATURE OF THE FIRST STAGE CEMENT GROUT FROM RISING ABOVE 80°F. OR DROPPING BELOW 40°F. DURING MIXING OR PLACEMENT. DURING COLD WEATHER A HEATED SHELTER SHALL BE PROVIDED OVER THE ANCHORAGE HEAD AND ADJACENT GROUT MIXING EQUIPMENT, IF NECESSARY, TO MAINTAIN THE GROUT TEMPERATURE ABOVE 40°F.

CHECK MEASUREMENTS OF WATER-CEMENT RATIO OF THE MIXED GROUT AT THE TIME OF INJECTION SHALL BE MADE BY THE STATE BY MEASURING THE SPECIFIC GRAVITY USING A BAROID MUD BALANCE OR SIMILAR APPROVED METHOD.

GROUT WHICH DOES NOT MEET THE CONSISTENCY REQUIREMENT OF THIS SPECIFICATION AND GROUT WHICH IS NOT USED WITHIN 45 MINUTES OF THE TIME MIXING WAS INITIATED SHALL BE WASTED.

DETAILS OF THE PROPOSED GROUTING PROCEDURE, INCLUDING THE GROUT PIPE LAYOUT SHALL BE SUBMITTED AT LEAST 30 DAYS PRIOR TO COMMENCING WORK.

TEST SPECIMENS. THE CONTRACTOR SHALL MAKE AND CURE A MINIMUM OF 4 TEST CYLINDERS FOR THE FIRST STAGE CEMENT GROUT AND 2 TEST CYLINDERS FOR THE SECOND STAGE CEMENT-BENTONITE GROUT IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C31 FOR EACH ANCHOR GROUTED. THESE CYLINDERS WILL BE TESTED BY THE STATE AND TEST RESULTS FURNISHED TO THE CONTRACTOR.

CURING AND LOADING. STRESSING OF TENDONS SHALL NOT BE STARTED UNTIL THE FIRST STAGE CEMENT GROUT HAS ATTAINED A MINIMUM AGE OF 7 DAYS AND A MINIMUM COMPRESSIVE STRENGTH OF 4000 psi AS DETERMINED BY CYLINDER TESTS.

CEMENT-BENTONITE GROUT SHALL BE INJECTED INTO THE DRILL HOLE STARTING AT THE END OF THE FIRST STAGE GROUT. GROUT INJECTION SHALL BE CONTINUED UNTIL THE DRILL HOLE IS COMPLETELY FILLED WITH GROUT TO THE LIMITS SHOWN ON THE PLANS.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE MEASURED BY THE UNIT FOR EACH ANCHOR DRILL HOLE FILLED WITH GROUT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	GROUT FOR ANCHOR DRILL HOLE

FINAL DISPOSITION OF TIEBACK SYSTEM

DESCRIPTION. THIS ITEM SHALL CONSIST OF MAKING A FINAL DISPOSITION OF ALL TIEBACKS AND INCIDENTALS UPON THE COMPLETION OF CONSTRUCTING AND BACKFILLING WALL 2.

GENERAL. AFTER WALL 2 HAS BEEN CONSTRUCTED AND BACKFILLED TO ORIGINAL GROUND OR HIGHER IN FRONT OF THE OREGON STREET WALL AND TO A MINIMUM DENSITY EQUIVALENT TO THE SURROUNDING MATERIAL THE LOAD ON THE TIEBACKS SHALL BE RELEASED SLOWLY IN INCREMENTS OF 25 PERCENT OF THE FINAL LOAD ON THE TIEBACKS AND MAINTAINED FOR 5-MINUTE INTERVAL. THIS PROCEDURE SHALL BE USED UNTIL THE TOTAL LOAD HAS BEEN RELEASED. THE CHANNELS AND BEARING PLATES SHALL THEN BE REMOVED, THE ANCHOR BOLTS AND ROCK ANCHORS SHALL BE BURNED OFF FLUSH WITH THE CONCRETE WALER SURFACE, AND ANY VOIDS IN THE CONCRETE SHALL BE FILLED WITH GROUT. AT NO TIME SHOULD GROUT BE INTRODUCED INTO THE DRAINAGE MATERIAL DIRECTLY BEHIND THE WALL. THE EXCAVATION FOR THE WALER SHALL BE BACKFILLED TO AT LEAST THE SAME GRADES AND ELEVATIONS AS BEFORE THE WALER CONSTRUCTION AND TO THE SAME DENSITY AS THE SURROUNDING MATERIAL.

METHOD OF MEASUREMENT. ALL WORK PERFORMED UNDER THIS ITEM SHALL BE MEASURED AS A UNIT.

BASIS OF PAYMENT. PAYMENT FOR ALL WORK UNDER THIS ITEM WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	FINAL DISPOSITION OF TIEBACKS AND ACCESSORIES, CHANNELS, BEARING PLATES AND ANCHOR BOLTS

DAMAGE TO EXISTING WALL

ANY STRUCTURAL DAMAGE TO THE EXISTING WALL THAT IS CAUSED BY ANY PART OF THE CONTRACTOR'S OPERATION, AS DETERMINED BY THE ENGINEER, SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER AND AT NO EXPENSE TO THE STATE.

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/

NOTES

EXISTING OREGON ST. WALL

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM.-471-0.24
PART ONE

125'(±) to west end of Exist. Wall

60'-0"

19'-3" | 20'-0" | 20'-9"

15'-9" | 3'-6" | 16'-6" | 3'-6" | 15'-9" | 5'-0"

UNIT A

Railing Not Shown

Exist. Wall

A ◀ 10-¾"ϕ Bolts with concrete anchor at 2'-0" = 18'-0" (Top & Bott.) ▶ B

7½" | 15'-3" | 6" | 16'-0" | 3"

8-B406 See Sections A-A & B-B for Spa.

16-B401 @ 1'-0"

1'-0" 4-B402 @ 10" 3

Point A (See Section A-A) Point B (See Section B-B)

1⅛"

1-B407 See Section A-A

Top of Ground

D

A ◀ Top of Sill | Top of Ftg. ▶ B

3'-1½" | 6'-6" | 6'-6" | 3'-1½"

Bott. of Ftg.

Bott. of Key

UNIT B

Railing Not Shown

Top of exist. wall

Exist. Wall

A ◀ 10-¾"ϕ Bolts with concrete anchor at 2'-1" = 18'-9" (Top & Bott.) ▶ B

7½" | 16'-0" | 3"

8-B408 See Sections A-A, B-B for Spa.

17-B403 @ 1'-0"

6" 4-B404 @ 1'-0" 3

Point A (See Section A-A) Point B (See Section B-B)

Rock Anchor (Typ.)

1⅛"

1-B409 See Section A-A

A ◀ Top of Sill | Top of Ftg. ▶ B

3'-0" | 7'-0" | 7'-0" | 3'-0"

Bott. of Ftg.

Bott. of Key

UNIT C

Railing Not Shown

1-¾"ϕ Bolt with concrete anchor (Top & Bott.)

1-¾"ϕ Bolt with concrete anchor (Bott.)

Exist. Wall

B ◀ C ◀ B

6" | 16'-9" | 7-B410 See Sections A-A, B-B & C-C for Spa. | 4½"

8-¾"ϕ Bolts with concrete anchor at 2'-3" = 15'-9" (Top & Bott.)

16-B401 @ 1'-0"

A ◀ 2'-0" | 2'-0" | 6"

1'-0" | 1'-0" 3-B405 @ 1'-0" | 1'-0" | 4½"

Point A (See Section A-A) Point C (See Section C-C)

2¾"

1-B407 See Sect. A-A

1-B402

1-B409 See Sect. B-B

D

Top of Ground

Top of Sill | Top of Ftg.

A ◀ B ◀ C ◀ B

3'-7½" | 7'-0" | 7'-0" | 3'-1½"

Bott. of Ftg.

Notes:

Reinforcing steel shall be placed so as not to interfere with the ¾"ϕ x 8" & ¾"ϕ x 11" anchor bolts. At the interface between the new and existing concrete, the existing concrete surface shall be clean, free of foreign matter and roughened to a full amplitude of approximately ¼".

For Sect. A-A, B-B and C-C, see following sh. 77

CONCRETE WALER

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

Rock Anchor (Typ.)

Back face of wall at top of ftg.

Rear Edge of ftg.

B401 | B402 | B403 | B404 | B401 | B405

B407 | B409 | B407 | B409

¾"ϕ Bolts with concrete anchor (Typ.)

90°(Typ.) | 90°(Typ.)

7½" | 2¼" | 2½"

B406 | B408 | Front face of wall | B410 | B402

Front Edge of ftg.

SECTION D-D

N

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TIEBACK DETAILS

EXIST. OREGON ST. WALL

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	TMC	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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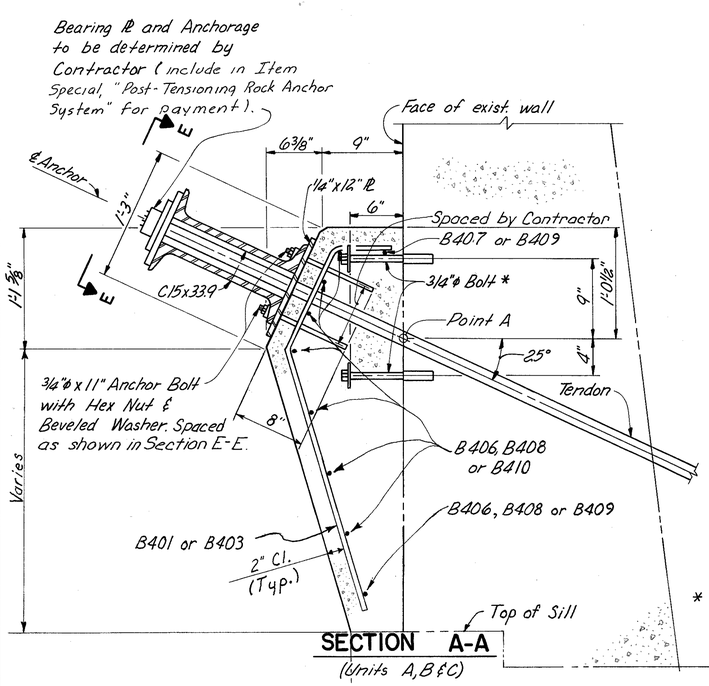
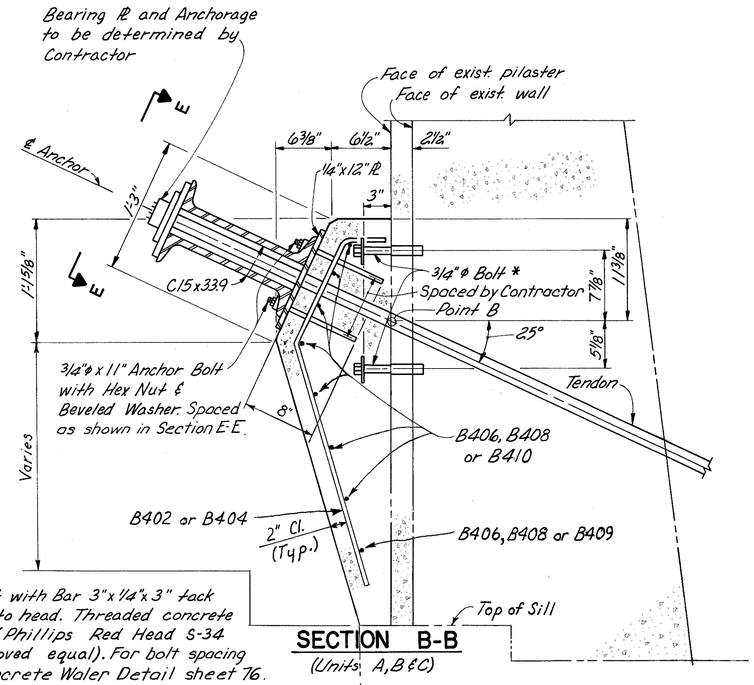
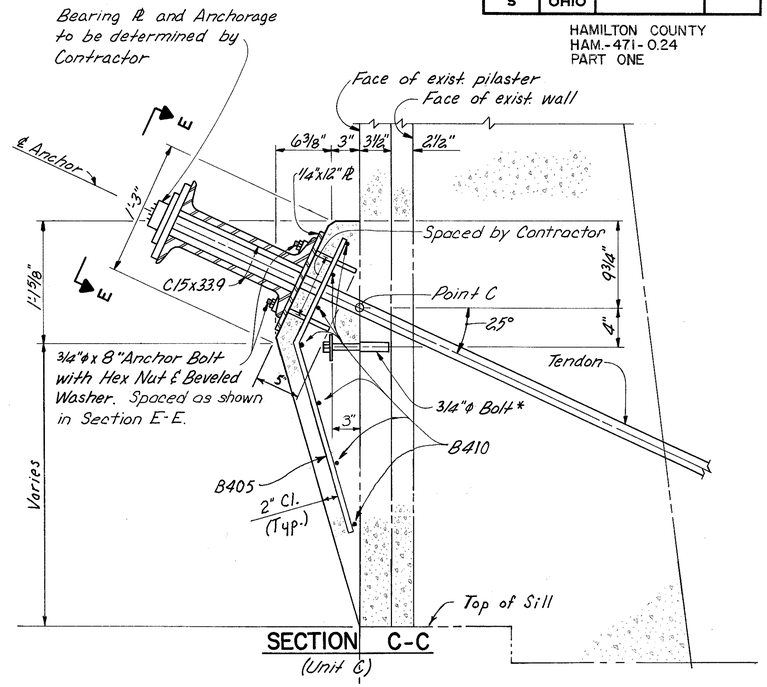
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



SECTION A-A
(Units A, B & C)

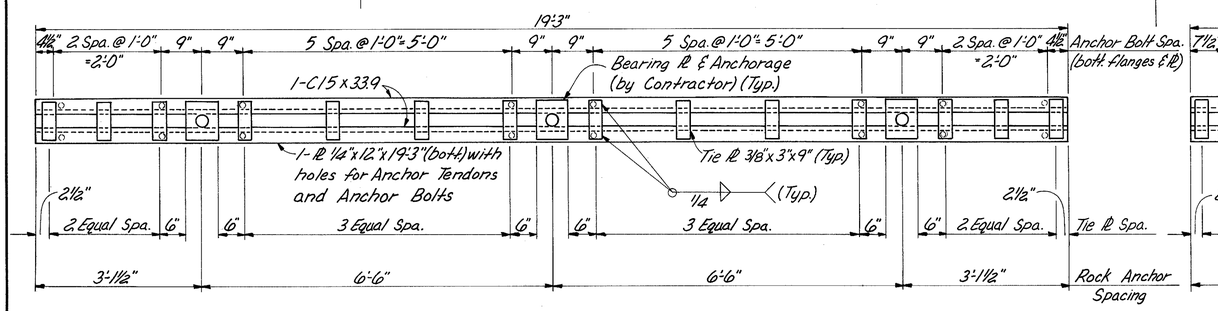


SECTION B-B
(Units A, B & C)

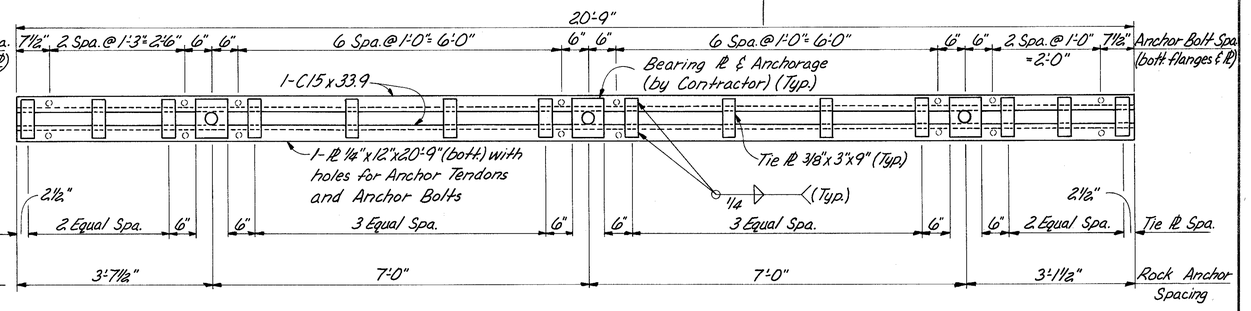


SECTION C-C
(Unit C)

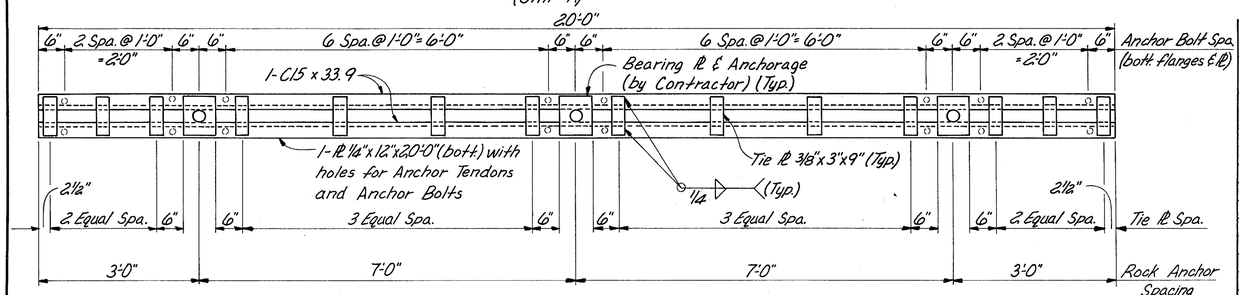
* 3/4"ϕ Bolt with Bar 3"x1/4"x3" tack welded to head. Threaded concrete anchor (Phillips Red Head S-34 or approved equal). For bolt spacing see Concrete Waler Detail sheet 76.



SECTION E-E
(Unit A)



SECTION E-E
(Unit C)



SECTION E-E
(Unit B)

REINFORCING STEEL LIST

MARK	TYPE	LENGTH	NUMBER OF BARS	WEIGHT	DIMENSIONS A	B	C	D	E	F	G
B401	18	4'- 1"	32	87	1'- 8"	1'- 10½"	2'- 6"	1'- 1"	6"	2½"	5½"
B402	18	3'- 11"	6	16	1'- 8"	1'- 10½"	2'- 6"	1'- 1"	4"	1½"	3½"
B403	18	3'- 11"	17	44	1'- 7"	1'- 8½"	2'- 4"	1'- 1"	6"	2½"	5½"
B404	18	3'- 9"	4	10	1'- 7"	1'- 8½"	2'- 4"	1'- 1"	4"	1½"	3½"
B405	16	2'- 11"	3	6	1'- 2½"	1'- 1"	1'- 10"	1'- 4½"			
B406	Str.	18'- 10"	8	101							
B407	Str.	15'- 4"	2	20							
B408	Str.	19'- 8"	8	105							
B409	Str.	16'- 2"	2	22							
B410	Str.	20'- 5"	7	95							

Total Reinforcing Steel Weight = 506 lbs.

Note: Refer to CMS Sections 106.03, 700, 709.01 through 709.05 and 709.08. Sufficient additional reinforcing steel shall be provided for sampling. Random samples shall be replaced in the structures by the additional steel, spliced in accordance with 509.08.

For Bar Bending Schedule see sheet 70.

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TIEBACK DETAILS

EXIST. OREGON ST. WALL

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	MRT	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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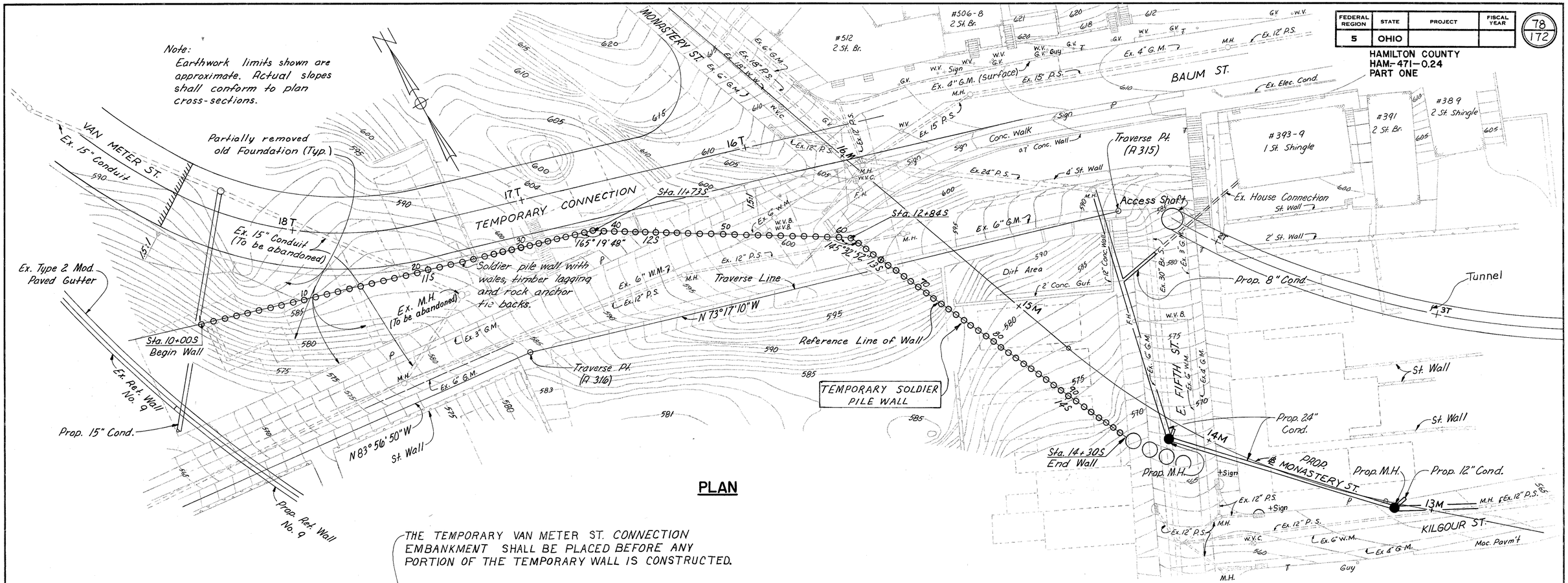
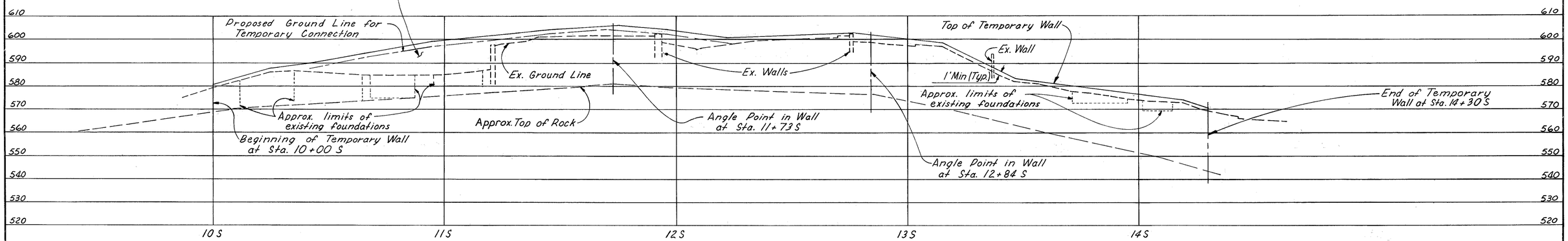
PART ONE

Note:
Earthwork limits shown are approximate. Actual slopes shall conform to plan cross-sections.



PLAN

THE TEMPORARY VAN METER ST. CONNECTION EMBANKMENT SHALL BE PLACED BEFORE ANY PORTION OF THE TEMPORARY WALL IS CONSTRUCTED.



ELEVATION

(Along Wall Reference Line)

Notes:
For Bench Marks see sheet no. 16
For Alignment & Witness Plan see sheet no. 15

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SITE PLAN

TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	ALT / MRT		JJR	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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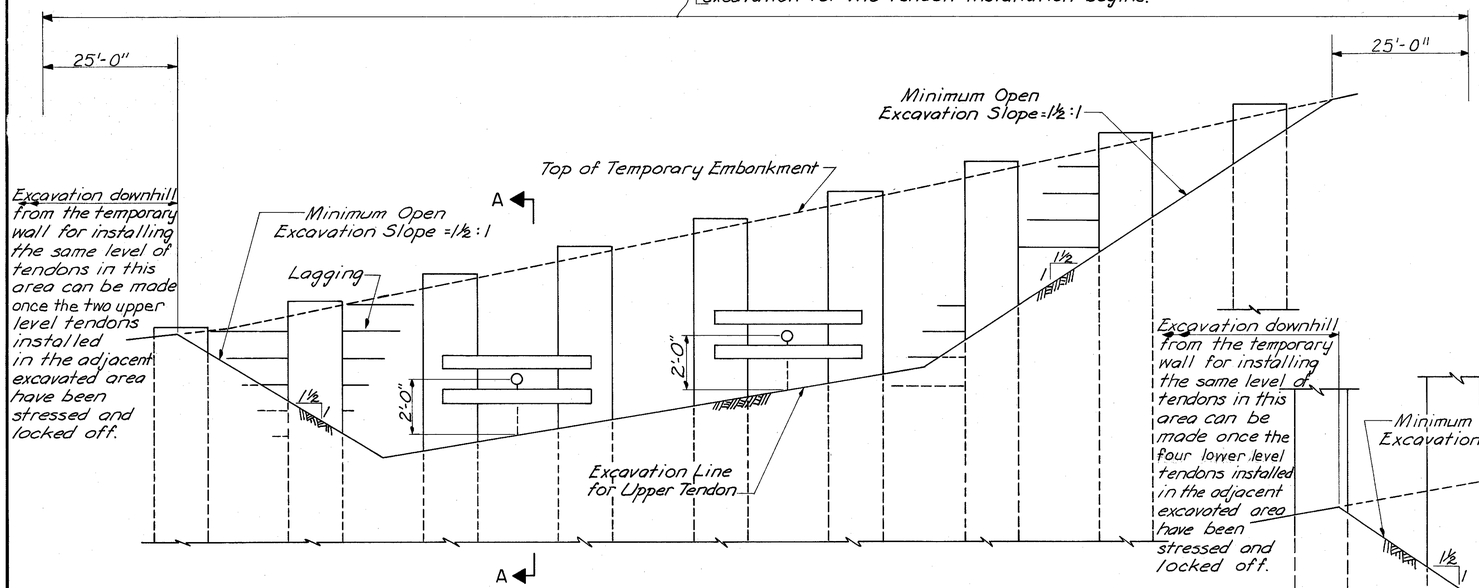
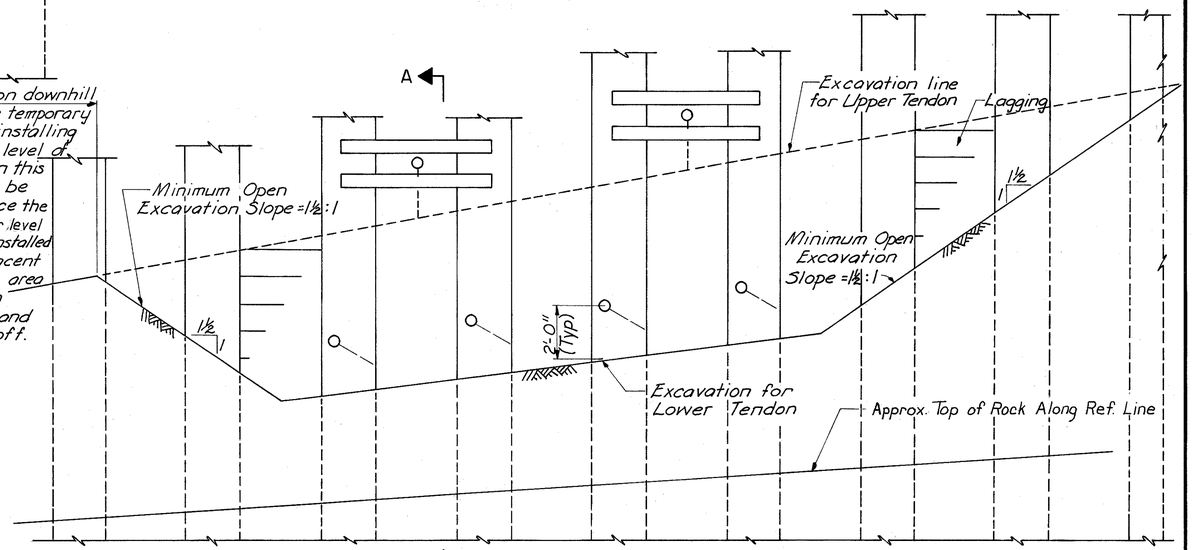
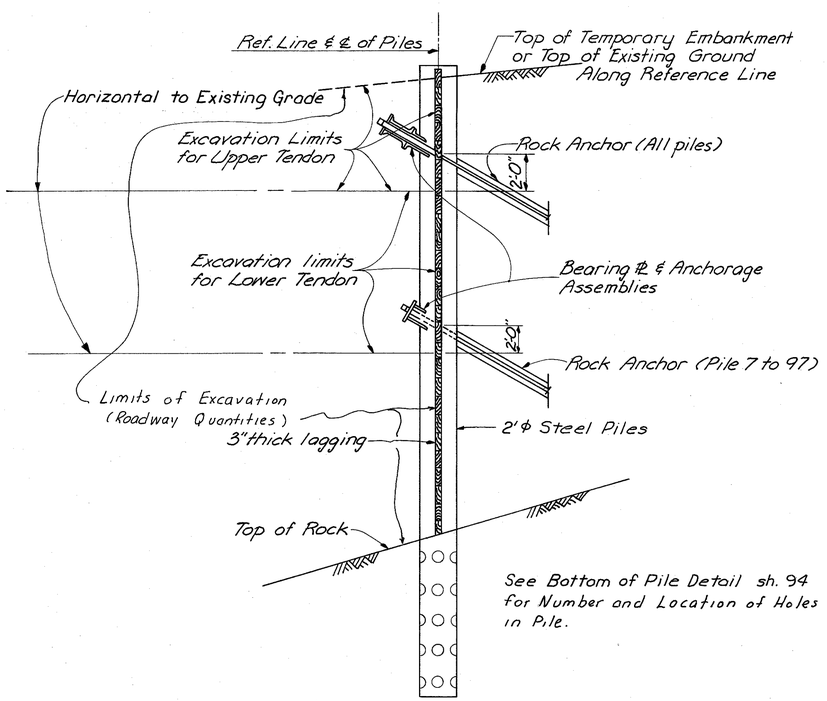
All piles within these limits shall have been concreted into rock, backfilled with the cement-sand mix specified in the General Notes, and filled with concrete before the excavation for the tendon installation begins.



PROFILE SHOWING EXCAVATION FOR INSTALLATION OF UPPER TENDON



PROFILE SHOWING EXCAVATION FOR INSTALLATION OF LOWER TENDON



SECTION A-A

ESTIMATED QUANTITIES

ITEM	TOTAL	UNIT	DESCRIPTION
503	2,043	Lin. Ft.	Soil Excavation, Pipe Piles
503	891	Lin. Ft.	Rock Excavation, Pipe Piles
511	419	Cu. Yd.	Class C Concrete, Steel Pipe Piles
513	42,000	Lb.	Structural Steel, A36 & A53
513	303,000	Lb.	Structural Steel, A252 Grade 2
513	278,000	Lb.	Structural Steel, A252 Grade 3
Special	5,011	Sq. Ft.	Lagging
Special	311	Cu. Yd.	Cement-Sand Mix for Steel Pipe Piles
Special	143	Each	Anchor Bore Hole Drilled
Special	143	Each	Post-tensioning Rock Anchor System
Special	143	Each	Grout for Anchor Drill hole
Special	Lump	Lump Sum	Wall Monitoring
Special	Lump	Lump Sum	Final Disposition of Rock Anchors and Accessories, Channels, Bearing Plates and Lagging

Stage 1 Construction Piles 1 thru 44
Stage 2 Construction Piles 45 thru 60
Stage 3 Construction Piles 61 thru 97

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CONSTRUCTION DRAWING

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		RFD	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM-471-0.24
PART ONE

NOTES

JOB DESCRIPTION

THE WORK SHALL INCLUDE THE FURNISHING OF ALL LABOR AND EQUIPMENT, AND PREPARING SHOP DRAWINGS, FABRICATING, FURNISHING AND ERECTING ALL THE MATERIALS NEEDED TO CONSTRUCT THE WALL ACCORDING TO THE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL INSTALL PIPE PILES IN VERTICAL BORED HOLES AND ENCASE THEM IN CONCRETE TO 1'-0" ABOVE THE TOP OF ROCK. THE REMAINDER OF THE PILE AND THE BORED HOLE ABOVE THE TOP OF CONCRETE SHALL BE BACK-FILLED WITH (1) CEMENT-SAND MIX BETWEEN THE DRILLED HOLE AND PIPE AND (2) CONCRETE INSIDE THE PIPE. AS THE EXCAVATION PROCEEDS FOR THE BUTTRESS FILL THE LAGGING AND ROCK ANCHORS SHALL BE INSTALLED. WHILE THE BUTTRESS FILL IS IN THE FINAL STAGES OF COMPLETION, LAGGING SHALL BE REMOVED, THE ROCK ANCHORS RELEASED, AND THE TOP OF WALL SHALL BE CUT OFF TWO FEET BELOW THE TOP OF EXISTING GROUND.

APPLICABLE SPECIFICATIONS. THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1977, AND THE OHIO "SUPPLEMENT" TO THESE SPECIFICATIONS.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS

AMERICAN SOCIETY FOR TESTING MATERIALS:

(1) A36-75 - STRUCTURAL STEEL

(2) A53-77a - PIPE, STEEL, BLACK AND HOT-DIPPED, ZINC-COATED WELDED AND SEAMLESS

(3) A252-77a - WELDED AND SEAMLESS STEEL PIPE PILES

(4) A416-74 - UNCOATED SEVEN-WIRE STRESS-RELIEVED STRAND FOR PRESTRESSED CONCRETE

(5) A421-77 - UNCOATED STRESS-RELIEVED WIRE FOR PRESTRESSED CONCRETE

(6) A722-75 - UNCOATED HIGH-STRENGTH STEEL BAR FOR PRESTRESSING CONCRETE

(7) C31-69 - MAKING AND CURING CONCRETE TEST SPECIMENS IN THE FIELD

(8) C39-72 - COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

(9) C192-76 - MAKING AND CURING CONCRETE TEST SPECIMENS IN THE LABORATORY

(10) C232-71 - BLEEDING OF CONCRETE

U.S. CORPS OF ENGINEERS:

(1) METHOD CRD-C79-77 - TEST FOR FLOW OF GROUT MIXTURES (FLOW CONE METHOD)

(2) METHOD CRD-C81-74 - TEST OF EXPANSION OF GROUT MIXTURES

DESIGN DATA: STRUCTURAL STEEL

(1) PIPE PILES

(A) ASTM A252 GRADE "2" - UNIT STRESS 19,250 psi.
(B) ASTM A252 GRADE "3" - UNIT STRESS 24,750 psi.

(2) BRACKETS, CHANNELS AND ACCESSORIES

(A) ASTM A36 - UNIT STRESS 20,000 psi.

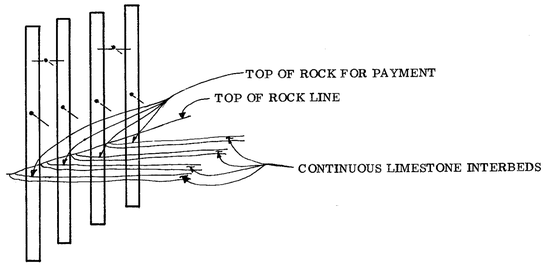
GROUT

(1) TENDON

(A) FIRST STAGE CEMENT GROUT - f'c = 4,000 psi.
(B) SECOND STAGE CEMENT BENTONITE GROUT - f'c = 50-80 psi.

CONCRETE CLASS C - UNIT STRESS 1,333 psi.

DEFINITION OF TOP OF ROCK FOR PAYMENT: TOP OF ROCK FOR PAYMENT SHALL BE THE POINT AT WHICH THE FIRST CONTINUOUS LIMESTONE INTERBED IS ENCOUNTERED FOR EACH PILE.



LIMESTONE FLOAT ROCK AND SHALE OR CLAYSTONE (CLAY SHALE) ABOVE THE FIRST CONTINUOUS LIMESTONE INTERBED WILL BE PAID FOR AT SOIL EXCAVATION RATES. TOP OF ROCK FOR PILE EMBEDMENT REQUIREMENTS WILL BE DETERMINED BY THE ENGINEER IN THE FIELD AND MAY OR MAY NOT COINCIDE WITH "TOP OF ROCK FOR PAYMENT".

CONSTRUCTION PROCEDURE

THE TEMPORARY WALL SHALL BE CONSTRUCTED IN THE THREE STAGES SHOWN ON SHEET NO. 79 IN ORDER THAT EITHER BAUM STREET OR THE TEMPORARY VAN METER STREET CONNECTION SHALL BE OPEN AT ALL TIMES DURING THE ENTIRE HAM-471-0.24 PART ONE PROJECT. THE SEQUENCE OF NUMBERS DESIGNATING THE THREE STAGES ON THE AFOREMENTIONED SHEET SHALL NOT BE CONSTRUED AS THE ONLY ORDER OF CONSTRUCTION.

A NUMBER OF THE PILES MAY BE CONSTRUCTED CONCURRENTLY; HOWEVER, EXCAVATION ON ANY PILE CANNOT BEGIN WITHIN TWO PILE DIAMETERS OF (1) ANY OTHER PILE UNDER CONSTRUCTION OR (2) AN ALREADY CONSTRUCTED PILE UNTIL THE CONCRETE INSIDE THE PILE HAS BEEN ALLOWED TO CURE FOR SEVEN DAYS.

PILES IN STAGES 1 AND 3 CAN BE CONSTRUCTED SIMULTANEOUSLY.

THE EXCAVATION NEEDED FOR INSTALLING THE TENDONS SHALL BE MADE AS SHOWN ON "PROFILE SHOWING EXCAVATION FOR INSTALLATION OF UPPER TENDONS" AND "PROFILE SHOWING EXCAVATION FOR INSTALLATION OF LOWER TENDONS", SHEET NO. 79.

ALL THE TENDONS IN THE UPPER ROW FOR STAGE 1 AND/OR STAGE 2 AND/OR STAGE 3 OF THE WALL CONSTRUCTION SHALL BE SUCCESSFULLY TESTED AND LOCKED OFF AT THEIR PRESCRIBED LOAD BEFORE THE EXCAVATION TO REACH THE LOWER ROW OF TENDONS IS UNDERTAKEN. SIMILARLY ALL THE TENDONS IN THE LOWER ROW FOR STAGE 1 AND/OR STAGE 2 AND/OR STAGE 3 SHALL BE SUCCESSFULLY TESTED AND LOCKED OFF AT THEIR PRESCRIBED LOAD BEFORE THE EXCAVATION FOR THE CONSTRUCTION OF THE BUTTRESS FILL TO REACH THE ROCK IS UNDERTAKEN.

TENDONS IN STAGES 1 AND 3 CAN BE INSTALLED SIMULTANEOUSLY.

NOT MORE THAN TWO SEPARATE EXCAVATIONS IN STAGE 1 CONSTRUCTION, ONE SEPARATE EXCAVATION IN STAGE 2 CONSTRUCTION AND TWO SEPARATE EXCAVATIONS IN STAGE 3 CONSTRUCTION SHALL BE OPENED UP IN FRONT OF THE WALL WITHOUT PRIOR APPROVAL OF THE ENGINEER.

EXCAVATION IN FRONT OF THE WALL, DRILLING AND TENDON INSTALLATION CAN PROCEED SEQUENTIALLY ALONG THE WALL BEGINNING FROM ANY OF THE FIVE EXCAVATIONS PREVIOUSLY MENTIONED. EACH EXCAVATION SHALL HAVE A BASE THAT HAS A WIDTH OF ONLY FOUR PILE SPACINGS AS SHOWN ON THE "PROFILE SHOWING EXCAVATION FOR INSTALLATION OF UPPER TENDON" AND "PROFILE SHOWING EXCAVATION FOR INSTALLATION OF LOWER TENDON" ON SHEET NO. 79. AFTER ALL FOUR OF THE PILES IN A PARTICULAR EXCAVATION HAVE THEIR TENDONS STRESSED AND LOCKED-OFF, FURTHER EXCAVATION IN FRONT OF THE WALL CAN PROCEED ALONG THE LENGTH OF THE WALL IN EITHER DIRECTION. EACH NEW EXCAVATION MUST BE IMMEDIATELY ADJACENT TO AT LEAST FOUR PILES THAT ALREADY HAVE THEIR TENDONS STRESSED AND LOCKED-OFF, HAVE A BASE OF ONLY FOUR UNSUPPORTED PILE SPACINGS, HAVE AN ADVANCING SLOPE NO FLATTER THAN 1 1/2(H):1(V) AND BE NOT CLOSER THAN 90 FEET TO ANOTHER EXCAVATION WITH UNSUPPORTED PILES. AN UNSUPPORTED PILE IS A PILE THAT IS NOT SUPPORTED WITH A TENSIONED ANCHOR AT THE LEVEL WHERE TENSIONING IS TAKING PLACE. WHEN PROBLEMS WITH INSTALLING AND TENSIONING TENDONS OCCUR FOR A PILE IN A GROUP OF FOUR, THE UPPERMOST POINT OF THE 1 1/2(H):1(V) ADVANCING SLOPE OF AN APPROACHING EXCAVATION SHALL GET NO CLOSER TO THE AFOREMENTIONED UNSUPPORTED PILES THAN TWO PILE SPACINGS. WHEN TWO EXCAVATIONS HAVING PILES WITH PROPERLY INSTALLED AND STRESSED TENDONS APPROACH ONE ANOTHER CLOSER THAN 90 FEET, CONCURRENT ADVANCEMENT WILL NOT BE PERMITTED.

NOTES CONTINUED ON SHEET 81

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CINCINNATI, OHIO

NOTES

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHo 2-27-79	

NOTES (CONTINUED FROM SHEET 80)

FIELD AND LABORATORY INVESTIGATIONS

A REPORT OF FIELD AND LABORATORY INVESTIGATIONS FOR THIS PROJECT IS CONTAINED IN APPENDIX I TO THE SUMMARY GEOTECHNICAL REPORT. THIS APPENDIX IS PROVIDED FOR INFORMATION ONLY AND IS NOT A PART OF THE PLANS. NO WARRANTY IS MADE FOR THE ACCURACY OF BORINGS, TEST PITS, LABORATORY INVESTIGATIONS, ROCK ELEVATIONS, GROUND WATER, OR INTERPRETATIONS OF SUBSURFACE CONDITIONS, EVEN THOUGH THIS INFORMATION IS THE RESULT OF FIELD INVESTIGATIONS FOR THE EVALUATION OF SLOPE STABILIZATION MEASURES ON MT. ADAMS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, IF HE DEEMS IT NECESSARY, TO CONDUCT HIS OWN SUBSURFACE DRILLING PROGRAM TO VERIFY SOIL AND ROCK CONDITIONS.

LAGGING

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING, CUTTING, FITTING AND PLACING THE TIMBER LAGGING BETWEEN THE STEEL PIPE PILES; AND FURNISHING AND ERECTING THE ATTACHMENTS FOR CONNECTING THE LAGGING TO THE STEEL PIPE PILES.

GENERAL. THE CONTRACTOR SHALL, 30 DAYS PRIOR TO COMMENCING WORK ON THE TEMPORARY SOLDIER PILE WALL, SUBMIT FOR APPROVAL HIS METHOD OF ATTACHING THE LAGGING TO THE STEEL PIPE PILES. THE TYPE AND METHOD OF INSTALLATION OF LAGGING SHALL BE SUCH AS TO PREVENT LOSS OF GROUND BETWEEN PIPE PILES AND WITHSTAND STRESSES INDUCED BY TENSIONING OF ROCK ANCHOR SYSTEM.

MATERIAL. WOOD LAGGING SHALL BE 3-INCHES THICK AND IN ACCORDANCE WITH 711.26 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

ALTERNATE. THE CONTRACTOR HAS THE OPTION OF USING SHOTCRETE (SEE SHOTCRETE SPECIFICATIONS, SHEET NO. 122) IN LIEU OF WOOD FOR THE LAGGING. IF HE ELECTS TO USE SHOTCRETE, HE SHALL, 30 DAYS PRIOR TO COMMENCING WORK ON THE TEMPORARY SOLDIER PILE WALL, SUBMIT FOR APPROVAL BY THE ENGINEER, DESIGN CALCULATIONS AND WORKING DRAWINGS SHOWING DETAILS AND METHOD OF APPLICATION.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE THE NUMBER OF SQUARE FEET MEASURED IN THE PLANE OF THE FACE OF THE LAGGING, AND WITHIN LIMITS SHOWN ON PLANS, COMPLETE IN PLACE AND ACCEPTED.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	SQUARE FOOT	LAGGING

DRILLED PIPE PILES EXCAVATION AND TEMPORARY SHAFT SUPPORT

DESCRIPTION. THIS ITEM SHALL CONSIST OF EXCAVATING A SHAFT TO THE LIMITS SHOWN ON SHEET NO. 89 THROUGH THE FILL AND OVERBURDEN AND INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS; FURNISHING AND INSTALLING A TEMPORARY CASING THROUGH THE SOILS AND WEATHERED SHALE, IF NECESSARY IN ORDER TO PREVENT CAVING; REMOVING THE SPOIL, DISPOSING OF EXCAVATED MATERIAL; AND FURNISHING ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO COMPLETE THE EXCAVATION FOR THE PIPE PILES IN ACCORDANCE WITH 503 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

GENERAL. THE DRILLED SHAFT FOR THE PIPE PILES SHALL BE LOCATED AS SHOWN ON THE PLANS. THE TOLERANCES FOR DRILLING THE SHAFT SHALL BE SUCH THAT: (1) NO SHAFT SHALL BE OFF CENTER FROM ITS DESIGN LOCATION MORE THAN 2 INCHES AT THE TOP OF THE EXISTING GROUND, (2) NO SHAFT SHALL BE MORE THAN 1 1/2 INCHES OUT OF PLUMB FOR THE FIRST 10 FEET OF ITS LENGTH AND 1/2 INCH FOR EACH 10 FEET OF ADDITIONAL LENGTH, (3) THE ALIGNMENT OF THE SHAFT SHALL NOT CAUSE THE ALIGNMENT OF THE PILES TO BE SUCH THAT THE WALES SHALL NOT HAVE GOOD BEARING ON THEIR BEARING PLATES THAT ARE CONNECTED TO THE PILES, AND (4) THE ALIGNMENT OF THE SHAFT SHALL NOT CAUSE THE ALIGNMENT OF THE TENDONS TO BE OUTSIDE THEIR PRESCRIBED TOLERANCES. IF THE SHAFT AXIS VARIES MORE THAN THAT PREVIOUSLY SPECIFIED, THE DESIGN SHALL BE MODIFIED AT NO ADDITIONAL COST TO THE STATE.

EXCAVATION. EXCAVATION FOR THE PIPE PILES SHALL BE PERFORMED BY ROTARY DRILLING METHODS USING ANY PRACTICAL METHODS AND MACHINERY APPROVED BY THE ENGINEER. THE ORDER OF CONSTRUCTION OF THE PIPE PILES SHALL BE AS OUTLINED IN THE CONSTRUCTION PROCEDURE ON SHEET NO. 80. EACH SHAFT SHALL BE EXCAVATED TO THE MINIMUM ROCK EMBEDMENT OF THE PILES SHOWN ON SHEET NO. 87.

DISPOSAL OF EXCAVATED MATERIAL. EXCAVATED MATERIAL SHALL BE DISPOSED OF AS DESCRIBED IN THE NOTE FOR "ACCESS SHAFT EXCAVATION AND SUPPORT, SHEET NO. 103.

PROTECTIVE CASING. IF WATER IS ENCOUNTERED DURING THE INSTALLATION OF THE PIPE PILES, OR IF THE NATURE OF THE EXCAVATION IS SUCH THAT THERE IS DANGER OF FOREIGN SUBSTANCES, EARTH OR OTHER DEBRIS CONTAMINATING OR FALLING INTO THE CONCRETE OR CEMENTED SAND MIX DURING THE PLACING OPERATIONS, THEN THE CONTRACTOR SHALL USE TEMPORARY STEEL SHELLS FOR THE PLACING OF THE FILLER AROUND THE 2' DIA. STEEL PIPE PILE. THESE STEEL SHELLS SHALL BE WITHDRAWN AS THE FILLER IS PLACED SO THAT THE CONCRETE OR CEMENT SAND MIX COMPLETELY FILLS THE EXCAVATED SPACE TO THE TOP OF THE PILE.

MATERIAL FOR PROTECTIVE CASING. IF USED, METAL SHELLS SHALL BE WATER-TIGHT AND SHALL BE OF SUFFICIENT STRENGTH TO WITHSTAND THE EARTH AND WATER PRESSURE DURING THE INSTALLATION PROCEDURE.

WATER IN THE EXCAVATION. ANY WATER ENCOUNTERED DURING THE INSTALLATION OF THE PIPE PILES SHALL BE PUMPED OR REMOVED BEFORE PLACEMENT OF THE CONCRETE OR THE CEMENT-SAND MIX WILL BE PERMITTED. IN CASES WHERE WATER CANNOT BE HELD LONG ENOUGH FOR THE FILLER TO BE PLACED IN THE NORMAL MANNER, THE CONTRACTOR AND THE ENGINEER WILL HAVE TO AGREE ON AN ACCEPTABLE METHOD OF CONSTRUCTION.

OBSERVATION. THE CONTRACTOR SHALL HAVE AVAILABLE AT ALL TIMES A MIRROR AND A LIGHT SUITABLE FOR ILLUMINATING THE INTERIOR OF THE SHAFT FOR ITS FULL LENGTH. ALL HOLES WILL BE OBSERVED BY THE ENGINEER (1) AT THE TIME OF DRILLING TO APPROVE THE MINIMUM EMBEDMENT DEPTH INTO ROCK; AND (2) PRIOR TO PLACEMENT OF CONCRETE AND CEMENT-SAND, TO MAKE SURE THE HOLE IS IN PROPER CONDITION FOR CONCRETING. ADEQUATE TIME SHALL BE PROVIDED TO PERMIT OBSERVATION OF THE HOLE AND ALL DIMENSIONS TO BE MEASURED BY THE ENGINEER. SUFFICIENT SUPPORT EQUIPMENT AND PERSONNEL SHALL BE SUPPLIED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER TO PERMIT PROPER OBSERVATION OF ALL DRILLED EXCAVATIONS.

UPON THE ENGINEER'S ACCEPTANCE, THE STEEL PIPE PILES SHALL THEN BE INSTALLED AND THE CONCRETE AND CEMENT-SAND PLACED.

PLACEMENT OF STEEL. ADEQUATE PROVISIONS SHALL BE MADE TO ENSURE THAT THE STEEL WILL REMAIN IN PLACE AND CENTERED THROUGHOUT PLACEMENT OF THE CONCRETE AND CEMENT-SAND MIX, SINCE THE ALIGNMENT OF THE ROCK ANCHORS COULD BE AFFECTED AND THIS COULD POSSIBLY CAUSE THE ROCK ANCHORS TO BE OUTSIDE THEIR PRESCRIBED TOLERANCES. THREE 1/2-INCH THICK CURVED STEEL SPACERS (TO FIT TIGHT AGAINST EARTH OR CASING) THAT ARE TO BE EQUISPACED AT 120 DEGREES ABOUT THE CIRCUMFERENCE, SHALL BE TACK WELDED TO THE PIPE AT 5-FOOT INTERVALS TO CENTER THE PIPE IN THE DRILL HOLE AND FACILITATE FILLING OF THE ANNULAR SPACE.

METHOD OF MEASUREMENT. THE DEPTH OF THE COMPLETED SHAFT, EXCAVATED AND PROPERLY SUPPORTED, IF REQUIRED, SHALL BE MEASURED IN LINEAR FEET ALONG THE AXIS OF THE PIPE PILE WITHIN THE LIMITS SHOWN ON SHEET NO. 89.

SEPARATE MEASUREMENT WILL BE MADE FOR THAT PORTION OF THE SHAFT EXCAVATED THROUGH SOIL AND FOR THAT PORTION OF THE SHAFT EXCAVATED THROUGH ROCK. THE DIVIDING LINE FOR MAKING THESE MEASUREMENTS SHALL BE THE FIRST OCCURENCE OR A CONTINUOUS LIMESTONE LAYER AND SHALL BE DETERMINED BY THE ENGINEER. FOR THE DEFINITION OF THE TOP OF ROCK FOR PAYMENT SEE SHEET NO. 80.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
503	LINEAR FOOT	SOIL EXCAVATION FOR PIPE PILES
503	LINEAR FOOT	ROCK EXCAVATION FOR PIPE PILES

CLASS C CONCRETE STEEL PIPE PILES

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING PORTLAND CEMENT CONCRETE IN ACCORDANCE WITH 511 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN. THE CONCRETE SHALL BE PLACED IN AND AROUND THE CYLINDER PILES AS SHOWN ON THE PLANS.

GENERAL. FOR THE PURPOSE OF IDENTIFICATION IN THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, CONCRETE FOR THE PILES SHALL BE CONSIDERED STRUCTURAL CONCRETE (EXCLUDING SUPERSTRUCTURE CONCRETE). CONCRETE WITH A SLUMP OF 6 INCHES SHALL BE USED.

CONSTRUCTION. PROMPTLY AFTER THE ENGINEER HAS COMPLETED HIS OBSERVATION AND THE STEEL PIPE PILES HAVE BEEN INSTALLED, CONCRETE SHALL BE PLACED IN A MANNER THAT WILL NOT CAUSE SEGREGATION OF THE PARTICLES OR PERMIT INFILTRATION OF WATER OR ANY OTHER OCCURRENCE WHICH WOULD TEND TO DECREASE THE STRENGTH OF THE CONCRETE OR THE CAPACITY OF THE FINISHED PILE. THE ENGINEER SHALL BE PRESENT THROUGHOUT THE CONCRETE PLACING OPERATION FOR EACH AND EVERY PILE.

CONCRETE SHALL BE PLACED BY PUMPING THE CONCRETE BOTH INSIDE AND OUTSIDE OF PIPE THROUGH A TREMIE PIPE EXTENDING TO THE BOTTOM OF THE HOLE, FILLING THE BORED HOLE FROM THE BOTTOM TO 1-FOOT ABOVE THE TOP OF ROCK.

NOTES CONTINUED ON SHEET 82

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

82
172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

NOTES (CONTINUED FROM SHEET 81)

IN PLACING THE CEMENT-SAND MIX AND THE REMAINDER OF THE CONCRETE, THE CONTRACTOR HAS TWO OPTIONS: (1) ALLOW THE PREVIOUSLY PLACED CONCRETE TO ATTAIN A MINIMUM AGE OF 2 DAYS BEFORE PLACING THE CEMENT-SAND MIX. AFTER THE CEMENT-SAND HAS BEEN PLACED AROUND THE OUTSIDE OF THE PIPE PILE AS THE CASING WAS PULLED, PLACE THE CONCRETE INSIDE THE PIPE PILE OR (2) CONTINUALLY PLACE THE CONCRETE INSIDE THE PIPE, WHILE SIMULTANEOUSLY PULLING THE CASING AND PLACING THE CEMENT-SAND MIX OUTSIDE THE PILE, MAINTAINING THE SAME ELEVATION BOTH INSIDE AND OUTSIDE THE PIPE. THE CONCETE INSIDE THE PIPE SHALL BE FILLED TO WITHIN 2 FEET OF THE TOP OF THE GROUND LINE.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE THE NUMBER OF CUBIC YARDS AS DETERMINED BY CALCULATIONS FROM PLAN AND PROFILE DIMENSIONS, IN PLACE, COMPLETED AND ACCEPTED.

DEDUCTIONS WILL BE MADE FOR THE ENCASED PIPE PILE.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
511	CUBIC YARD	CLASS C CONCRETE, STEEL PIPE PILE

CEMENT-SAND MIX FOR STEEL PIPE PILES

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING ALL LABOR, EQUIPMENT AND MATERIALS NEEDED TO FILL THE VOID BETWEEN THE SHAFT WALL AND THE PIPE PILE FROM THE TOP OF THE CONCRETE TO THE TOP OF THE GROUND LINE WITH A CEMENT-SAND MIX. THE WORK SHALL BE PERFORMED IN ACCORDANCE WITH 511 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

GENERAL. AFTER THE PIPE HAS BEEN CONCRETED TO 1-FOOT ABOVE THE TOP OF ROCK, THE CONTRACTOR HAS TWO OPTIONS OF HIS PROCEDURE OF FILLING THE REMAINDER OF THE HOLE AS STATED IN THE NOTE, "CLASS C CONCRETE STEEL PIPE PILES".

THE CASING, IF USED, SHALL BE PULLED WITHOUT DAMAGING THE PIPE PILE OR MOVING THE PILE FROM ITS ORIGINAL POSITION; AND THE CEMENT-SAND MIX SHALL BE DROPPED BETWEEN THE SHAFT WALL AND THE PIPE PILE WITHOUT THE USE OF A TREMIE, AND COMPACTED WITH A ROD, ALL WITHIN THE SAME DAY.

THE CEMENT-SAND MIX SHALL BE SO PROPORTIONED SUCH THAT ONCE THE EARTH ADJACENT TO THE TO THE CEMENT-SAND MIX HAS BEEN EXCAVATED, THE MIX WILL REMAIN VERTICALLY IN PLACE. 30 DAYS BEFORE THE CONTRACTOR USES THE CEMENT-SAND MIX ON THE TEMPORARY WALL, HE SHALL HOLD A DEMONSTRATION PROVING THE PROPORTIONS HE PROPOSES TO USE WILL ENABLE HIS MIX TO REMAIN VERTICALLY IN PLACE WHEN THE EARTH ADJACENT TO IT IS REMOVED.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE THE NUMBER OF CUBIC YARDS AS DETERMINED BY CALCULATIONS FROM PLAN AND PROFILE DIMENSIONS, IN PLACE, COMPLETED AND ACCEPTED.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	CUBIC YARD	CEMENT-SAND MIX FOR STEEL PIPE PILES

ANCHOR BORE HOLE DRILLED

DESCRIPTION. THIS ITEM SHALL CONSIST OF PREPARING WORKING AREAS FOR THE DRILL RIG; DRILLING ALIGNED BORE HOLES, OF SIZE DETERMINED BY CONTRACTOR WITH UNDER-REAM BELLS OF NUMBER AND SIZE ALSO DETERMINED BY CONTRACTOR, FROM THE GROUND SURFACE THROUGH THE FILL AND OVERBURDEN, AND INTO THE CLAYSTONE (CLAY SHALE) BEDROCK TO THE PRESCRIBED ANCHOR LENGTHS DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER; FURNISHING AND INSTALLING STEEL CASING THROUGH THE FILL AND OVERBURDEN; AND FURNISHING ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE THE CONSTRUCTION OF THE ANCHOR BORE HOLES FOR THE PURPOSE OF INSTALLING THE TENDONS OF THE CAPACITIES SHOWN ON THE PLANS.

GENERAL. BORED HOLES, FOR TENDON INSTALLATION OF THE DESIGN LOADS SPECIFIED, SHALL BE DRILLED AT THE LOCATIONS AND IN THE DIRECTION SHOWN ON THE PLANS AND TO THE DEPTHS DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. DRILLED HOLES SHALL BE OF THE SIZE REQUIRED TO SUIT THE SYSTEM CHOSEN BY THE CONTRACTOR.

THE ANCHORAGE LENGTHS AND THE BELL SIZE, NUMBER AND SPACING SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER; BASED ON THE LOADS, THE CONDITIONS ENCOUNTERED AND THE EQUIPMENT AVAILABLE. DRAWINGS CONCERNING THE DETAILS OF THE UNDER-REAM BELLS AND THE SUITABLE EQUIPMENT FOR UNDER-REAMING THE ROCK FROM THE ANCHOR HOLE TO FORM UNDER-REAMED BELLS AS SPECIFIED SHALL BE SUBMITTED TO THE ENGINEER 30 DAYS PRIOR TO COMMENCING WORK, AND NO SUCH WORK SHALL BE COMMENCED UNTIL DRAWINGS HAVE BEEN APPROVED BY THE ENGINEER.

ALL DRILLING IN THE ANCHORAGE ZONE SHALL BE ACCOMPLISHED BY CORE DRILLING, ROTARY DRILLING OR DOWN THE HOLE PRECUSSIVE DRILLING IN SUCH A MANNER AS TO MINIMIZE DAMAGE TO THE SURROUNDING ROCK.

DRILLING EQUIPMENT. DRILLING EQUIPMENT SHALL BE AS DESCRIBED IN THE NOTE, "POST-TENSIONING SYSTEM TO TUNNEL", SHEET NO. 109.

CASING BORE HOLES. PERMANENT STEEL DRILL CASING, OF THE TYPE ACCEPTED BY THE ENGINEER, SHALL BE INSTALLED IN ALL THE BORE HOLES EXTENDING FROM THE PIPE PILE THROUGH THE FILL AND WEATHERED ROCK.

BACKFILLING ABANDONED ANCHOR DRILL HOLES. BACKFILLING ABANDONED ANCHOR DRILL HOLES SHALL BE AS DESCRIBED IN THE NOTE, "POST-TENSIONING SYSTEM TO TUNNEL", SHEET NO. 109.

TESTING OF ANCHOR HOLES. AFTER THE DRILLING OF THE ANCHOR HOLE IS COMPLETED AND BEFORE THE CONSTRUCTION OF THE BELLS, THE ANCHOR HOLE SHALL BE CLEANED OUT TO THE SATISFACTION OF THE ENGINEER, AND AN ALIGNMENT SURVEY SHALL BE MADE OF THOSE ANCHOR HOLES SHOWN IN TABLE A, SHEET NO. 87. THESE SURVEYS WILL BE MADE BY THE ENGINEER AND THIS ITEM SHALL INCLUDE FURNISHING ASSISTANCE TO THE ENGINEER WHEN REQUIRED TO MAKE THE SURVEYS.

INSTRUMENTS AND EQUIPMENT REQUIRED FOR ALIGNMENT SURVEY SHALL BE FURNISHED BY THE CONTRACTOR UNDER THIS ITEM AND SHALL BE AT THE PROJECT SITE AND AVAILABLE FOR USE BY THE ENGINEER BEFORE THE DRILLING CONTRACTOR BEGINS DRILLING THE FIRST TEST HOLE THAT IS TO BE SURVEYED.

THE INSTRUMENT AND EQUIPMENT REQUIRED FOR ALIGNMENT SURVEYS OF THE COMPLETED DRILL HOLES SHALL CONSIST OF A DOWN-THE-HOLE PORTABLE BOREHOLE DEFLECTOMETER AS MADE BY TERRAMETRICS, GOLDEN, COLORADO, OR APPROVED EQUAL. THE DEFLECTOMETER SHALL CONSIST OF TWO 5-FOOT GAGE LENGTH TUBES JOINED BY AN ARTICULATED CENTRAL JOINT AND FITTED WITH WHEEL ASSEMBLIES AT THE JOINT AND AT EACH END. THE ANGLE BETWEEN THE TWO LEGS OF THE DEFLECTOMETER SHALL BE MEASURED BY A STRAIN-GAGED STEEL BEAM CLAMPED TO EACH LEG AND FORMING A SINGLE AXIS SENSOR APPROPRIATELY SET RELATIVE TO THE GUIDE WHEELS. THE DEFLECTOMETER AND CABLE SHALL BE COMPLETELY WATERPROOF AND CAPABLE OF CONTINUOUSLY OPERATING PROPERLY IN MUDDY WATER. THE WHEEL ASSEMBLIES SHALL BE DESIGNED TO PROPERLY LOCATE THE INSTRUMENT IN ALUMINUM INCLINOMETER CASING AS MADE BY SLOPE INDICATOR COMPANY, SEATTLE, WASHINGTON, OR APPROVED EQUAL. THE DEFLECTOMETER SHALL BE SUPPLIED WITH 200 FEET OF CONTROL CABLE CONNECTING IT TO A PORTABLE BATTERY POWERED READOUT BOX SUCH AS THE TERRAMETRICS MODEL P350A OR APPROVED EQUAL.

THE EQUIPMENT SHALL INCORPORATE SUITABLE CALIBRATION CHECKING DEVICES. THESE SHALL INCLUDE A DEVICE WHICH ENABLES ONE LEG OF THE DEFLECTOMETER TO BE FIXED WHILE THE SECOND LEG IS MOVED BY KNOWN AMOUNTS, MEASURED INDEPENDENTLY. A CALIBRATION CHART SHALL BE PROVIDED BY THE MANUFACTURER.

THE DEFLECTOMETER SHALL OPERATE WITHIN ALUMINUM INCLINOMETER CASING WHICH IS TEMPORARILY INSERTED, IN TURN, IN EACH DRILL HOLE. THE CASING SHALL BE SUPPLIED IN 10-FOOT LENGTHS, WITH A MINIMUM OF 200 FEET OF CASING TO BE ON THE SITE AND SHALL BE JOINED BY TELESCOPIC ALUMINUM COUPLINGS PERMANENTLY FIXED TO ONE END OF EACH CASING AND TEMPORARILY AFFIXED TO THE SECOND TUBE. EACH INCLINOMETER CASING SECTION SHALL BE PROVIDED WITH GUIDE SPRINGS TO LOCATE IT CENTRALLY WITHIN THE DRILL HOLE. THE GUIDE SPRINGS SHALL BE STIFF ENOUGH THAT THE INCLINOMETER CASING IS NOT LOCALLY DEFLECTED BY THE WEIGHT OF THE DEFLECTOMETER. THE INSTRUMENTS AND 200 FEET OF CASING CAN BE USED WITH THE TEMPORARY WALL CONSTRUCTION AND CYLINDER PILE WALL CONSTRUCTION, IF BOTH WALLS ARE NOT CONSTRUCTED SIMULTANEOUSLY.

THE DEFLECTOMETER SHALL PREFERABLY BE ABLE TO ROLL DOWN THE INCLINED INCLINOMETER CASING UNDER GRAVITY. IF THIS IS NOT POSSIBLE, IT SHALL BE CAPABLE OF BEING RODDED DOWN THE CASING FROM THE GROUND SURFACE.

THE CONTRACTOR SHALL SUBMIT FOR APPROVAL THE MAKE, MODEL AND SPECIFICATION, INCLUDING PRECISION, FOR THE MEASURING EQUIPMENT WHICH HE PLANS TO SUPPLY FOR USE BY THE ENGINEER UNDER THIS ITEM. THIS EQUIPMENT IS SUBJECT TO FINAL APPROVAL BY THE ENGINEER.

THE CONTRACTOR SHALL MAINTAIN AT LEAST ONE-FOOT SPACING BETWEEN ANY TWO GROUTED ANCHORS AT ALL POINTS ALONG BOTH THE FREE LENGTH AND THE ANCHORAGE LENGTH.

IF THE DEFLECTOMETER SURVEY INDICATES THAT THE NEW DRILL HOLE IS UNACCEPTABLY CLOSE TO ITS NEIGHBORING ANCHOR IN THE ANCHORAGE ZONE THE DRILL HOLE SHALL, IF POSSIBLE, BE EXTENDED TO AVOID THE ANCHORAGE LENGTH (INCLUDING THE UNDER-REAMS) BEING TOO CLOSE. OTHERWISE, IT SHALL BE NECESSARY FOR THE CONTRACTOR TO GROUT AT LEAST PART OF THE HOLE AND REDRILL.

AFTER IT HAS BEEN DETERMINED THAT THE ALIGNMENT OF THE ANCHOR HOLE IS SATISFACTORY, THE LENGTH OF THE HOLE SHALL BE DETERMINED.

AFTER COMPLETION OF DETERMINATION OF LENGTH, THE UNDER-REAMED BELLS SHALL BE CONSTRUCTED.

THE ANCHOR HOLES AND BELLS SHALL THEN BE FLUSHED WITH AIR OR WATER TO CLEAN THEM THOROUGHLY OF ALL DRILL CUTTINGS, GREASE OR OTHER DEBRIS AND DIRT USING METHODS APPROVED BY THE ENGINEER.

AFTER THE DRILLING OF THE ANCHOR HOLE, THE SURVEYS AND TESTS DESCRIBED ABOVE SHALL BE PERFORMED WITHOUT INTERRUPTION AND AS EXPEDITIUOSLY AS PRACTICABLE, AND THE TENDON SHALL BE INSTALLED WITHIN 24 HOURS AFTER COMPLETING THE FINAL CLEANING OUT OF THE ANCHOR HOLE; HOWEVER, JUST PRIOR TO INSERTION OF THE ANCHOR TENDON ASSEMBLY, THE ANCHOR HOLE SHALL BE CHECKED TO VERIFY THAT IT IS CLEAR TO THE FULL DEPTH REQUIRED. IF CAVED MATERIAL OR DEBRIS IS DETECTED IN THE HOLE, SUCH DEBRIS OR MATERIAL SHALL BE REMOVED BY INSERTING THE DRILL TOOL TO THE BOTTOM OF THE HOLE AND FLUSHING WITH AIR AND/OR WATER. IF THESE PROCEDURES ARE NOT EFFECTIVE, THE HOLES SHALL BE REDRILLED IN ORDER TO REMOVE THE FOREIGN MATERIALS.

METHOD OF MEASUREMENT. COMPLETED AND ACCEPTED ANCHOR BORE HOLES, OF THE CAPACITY SPECIFIED, SHALL BE MEASURED AS A UNIT.

NOTES CONTINUED ON SHEET 83

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-27-79	

NOTES (CONTINUED FROM SHEET 82)

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	ANCHOR BORE HOLE DRILLED

POST-TENSIONING ROCK ANCHOR SYSTEM

DESCRIPTION. THIS WORK SHALL CONSIST OF FURNISHING, FABRICATING, INSTALLING, STRESSING AND RETENSIONING, IF REQUIRED BY THE ENGINEER, THROUGHOUT THE CONSTRUCTION OF THE BUTTRESS FILL THE POST-TENSIONING SYSTEM OF THE LOAD CAPACITY SPECIFIED INCLUDING TENDON AND HEAD ANCHORAGE ASSEMBLIES, AND ALL OTHER ANCHORAGE ACCESSORIES.

THE ENTIRE ANCHORAGE ASSEMBLY, INCLUDING ALL COMPONENTS AND ACCESSORIES, SHALL BE A STANDARD PRODUCT OF A RECOGNIZED REPUTABLE MANUFACTURER OF POST-TENSIONED ANCHORS OF THE TYPE THE CONTRACTOR PROPOSES TO USE UNDER THIS CONTRACT. DURING FABRICATION AND INSTALLATION OF THE ANCHORAGE TENDON ASSEMBLIES, THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT EACH ASSEMBLY IS SATISFACTORILY FABRICATED, FREE FROM CORROSION, DAMAGE OR OTHER DEFECTS, AND PROPERLY INSTALLED.

MATERIAL. PRESTRESSING STEEL USED IN ROCK ANCHOR TENDONS, AS APPLICABLE, SHALL CONFORM TO THE FOLLOWING:

(1) SEVEN-WIRE STRAND. SEVEN-WIRE STRAND FOR ANCHORAGE TENDONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A416-74, "UNCOATED SEVEN-WIRE STRESS-RELIEVED STRAND FOR PRE-STRESSED CONCRETE" AND SHALL HAVE A MINIMUM BREAKING STRENGTH OF 41.3 KIPS PER STRAND.

(2) HIGH TENSILE WIRE. HIGH TENSILE STRENGTH SINGLE WIRE, TYPE BA, FOR MULTIWIRE TYPE STEEL ANCHOR TENDONS SHALL CONSIST OF WIRES CONFORMING TO THE REQUIREMENTS OF ASTM A421-77, "UNCOATED STRESS-RELIEVED WIRE FOR PRESTRESSED CONCRETE". THE WIRES SHALL HAVE A NOMINAL DIAMETER OF 1/4-INCH OR LARGER AND A MINIMUM TENSILE STRENGTH OF 240,000 psi. OIL TEMPERED WIRES SHALL NOT BE USED.

(3) HIGH-STRENGTH STEEL BARS. HIGH-STRENGTH STEEL BARS USED IN SOLID DEFORMED THREAD-BARS FOR ANCHORAGE TENDONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A722.75, "UNCOATED HIGH-STRENGTH STEEL BAR FOR PRESTRESSING CONCRETE". BARS SHALL HAVE A SINGLE MINIMUM ULTIMATE TENSILE STRENGTH LEVEL OF 150,000 psi.

STRUCTURAL STEEL BEARING PLATES. BEARING PLATES SHALL BE FABRICATED FROM STRUCTURAL STEEL CONFORMING TO ASTM A36 SILICON KILLED FINE-GRAIN PRACTICE. ALSO DEPENDING ON THE SYSTEM CHOSEN, THE BEARING PLATES SHALL BE PROVIDED WITH ALL APPROPRIATE APPURTENANCES FOR THE ATTACHMENT OF TENSIONING AND ALL OTHER EQUIPMENT CONSISTENT WITH THE SYSTEM THE CONTRACTOR PROPOSES TO USE.

NO KINKS, BENDS, NICKS, BROKEN WIRES, OR OTHER DEFECTS, INCLUDING SCALE OR LOOSE RUST WILL BE PERMITTED IN THE WIRES, STRANDS OR BARS USED FOR THE ANCHORAGE TENDONS. SLIGHT RUSTING, PROVIDED IT IS NOT SUFFICIENT TO CAUSE VISIBLE PITS, SHALL NOT BE CAUSE FOR REJECTION.

WIRE TENDON ANCHORAGE ASSEMBLIES SHALL BE DESIGNED SO THAT NO INDENTATION WILL BE MADE ON THE PRESTRESSING STEEL. TENDON WIRES OR STRANDS SHALL BE FURNISHED IN SINGLE FULL LENGTHS WITH NO SPLICING OR COUPLING WITHIN THE TENDON LENGTH PERMITTED. SOLID DEFORMED THREAD-BARS SHALL BE SUPPLIED IN STRAIGHT LENGTHS AND BE SPLICED BY THREADED COUPLERS WHICH DEVELOP THE MINIMUM GUARANTEED ULTIMATE TENSILE STRENGTH OF THE BARS. A MAXIMUM OF TWO SEPARATE BARS MAY BE USED, THAT IS, ONLY ONE COUPLER PER ANCHOR IS PERMITTED.

ANCHORAGES. POST-TENSIONING ANCHORAGE COMPONENTS SHALL DEVELOP THE MINIMUM GUARANTEED BREAKING STRENGTH OF THE PRESTRESSING STEEL AND SHALL BE FABRICATED TO PRECISE DIMENSIONS AND TO CLOSE MANUFACTURING TOLERANCES APPROPRIATE TO THE WORK. THE SIZE OF BEARING PLATES SHALL BE DESIGNED TO DEVELOP THE MINIMUM GUARANTEED BREAKING STRENGTH OF THE PRESTRESSING STEEL.

ALL TENDONS SHALL BE PROPORTIONED SO THAT THE STEEL IS NOT STRESSED HIGHER AT WORKING LOAD THAN 60 PERCENT OF ULTIMATE. WORKING LOADS BEING THOSE LOADS LISTED AS "ANCHOR LOAD" IN TABLE B SHOWN ON SHEET NO. 87.

SHOP DRAWINGS. SHOP DRAWINGS SHOWING COMPLETE DETAILS OF THE ROCK ANCHOR FABRICATION, DETAILS OF ANCHORAGE COMPONENTS, SEQUENCE OF ASSEMBLY AND INSTALLATION, AND STRESSING PROCEDURE SHALL BE SUBMITTED FOR APPROVAL AT LEAST 30 DAYS PRIOR TO USE. SHOP DRAWINGS SHALL BE FURNISHED IN ACCORDANCE WITH 501.05 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS ONCE APPROVED, NO CHANGES OR DEVIATIONS FROM SHOP DRAWINGS WILL BE PERMITTED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

THE ENGINEER WILL REVIEW THE CONTRACTOR'S DRAWINGS WITH RESPECT TO ARRANGEMENT AND CONFORMANCE TO THE SPECIFICATIONS AND RELATED DESIGN DRAWINGS. HOWEVER, THE APPROVAL DOES NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITY FOR THE COMPLETENESS AND ACCURACY OF ALL DIMENSIONS AND DETAILS NOR ADEQUACY OF HIS DESIGN.

FABRICATION SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DRAWINGS HAVE BEEN RECEIVED FROM THE ENGINEER.

FABRICATION. ANCHORAGE TENDON ASSEMBLIES SHALL BE CAPABLE OF ADJUSTMENT TO THE "AS DRILLED ANCHOR BORE HOLE LENGTH" IN THE EVENT FIELD CONDITIONS GENERATE UNSCHEDULED INCREASES OR DECREASES IN THIS LENGTH. THE SUPPLIER SHALL SPECIFY THE METHODS AND PROCEDURE FOR TENDON CUTTING AND CUTTING TOLERANCE.

WELDING. THE GROUNDING OF WELDING MACHINES, OR THE GROUNDING OF ELECTRICAL CIRCUITS WILL NOT BE PERMITTED ON OR ADJACENT TO ANY ANCHORAGE ASSEMBLY, OR MATERIALS TO BE USED IN ANCHORAGE ASSEMBLIES, OR ANY METAL IN CONTACT WITH AN ANCHORAGE ASSEMBLY UNLESS SPECIFICALLY APPROVED BY THE ENGINEER.

WELDING PROCEDURES AND WELDER'S QUALIFICATIONS SHALL CONFORM TO 513.17 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

THE BONDED LENGTH OF THE ANCHORAGE TENDONS SHALL BE CLEANED, COMPLETELY DEGREASED AND WIRE-BRUSHED TO ASSURE EFFECTIVE BONDING BETWEEN THE GROUT AND THE TENDON.

INSPECTION AND TESTING. CERTIFIED MILL TEST REPORTS AND OTHER VERIFICATION DOCUMENTS SHOWING THE RESULTS OF CHEMICAL ANALYSIS AND PHYSICAL TESTS REQUIRED BY THE ASTM SPECIFICATIONS ON THE MATERIAL TO BE USED IN THE POST-TENSIONING SYSTEM SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL NOT LATER THAN 20 DAYS PRIOR TO FABRICATION OR COMMENCEMENT OF INSTALLATION WORK, WHICHEVER IS APPLICABLE. ALL TESTS SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE ASTM SPECIFICATIONS.

INSTALLATION. THE ANCHOR ASSEMBLY, TENDON MATERIAL AND ACCESSORIES SHALL BE HANDLED AND PROTECTED PRIOR TO INSTALLATION IN SUCH A MANNER AS TO AVOID CORROSION OR PHYSICAL DAMAGE TO THE PRESTRESSING STEEL OR ANCHORAGE ASSEMBLIES.

STORAGE OF STEEL TENDONS AND ACCESSORIES SHALL BE IN WEATHERPROOF BUILDINGS, HEATED IF NECESSARY TO PREVENT CONDENSATION AND CORROSION. IMMEDIATELY PRIOR TO PLACING EACH ANCHORAGE ASSEMBLY IN AN ANCHOR HOLE, THE ASSEMBLY SHALL BE INSPECTED BY THE CONTRACTOR AND THE ENGINEER FOR ANY DAMAGED, NICKED OR SCARRED TENDON MATERIAL OR OTHER INJURIOUS DETERIORATION. ANY CORRODED OR DAMAGED TENDON OR OTHER PART OF AN ANCHOR ASSEMBLY WHICH IN THE OPINION OF THE CONTRACTOR OR ENGINEER IS UNSUITABLE FOR USE IN THIS PROJECT, SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.

ALL THE EQUIPMENT USED FOR FABRICATING, ASSEMBLING, HANDLING AND PLACING THE ROCK ANCHORS SHALL BE SUCH THAT IT DOES NOT DAMAGE OR DETERIORATE THE PRESTRESSING STEEL OR THE ANCHORAGES. ROCK ANCHORS, FREE OF DIRT, LOOSE RUST, GREASE OR ANY OTHER DELETERIOUS SUBSTANCES SHALL BE FABRICATED AND INSTALLED BY THE MANUFACTURER OR APPROVED REPRESENTATIVE USING PERSONNEL TRAINED AND QUALIFIED IN THIS TYPE OF WORK.

THE ANCHORAGE TENDON AND HEAD ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THESE SPECIFICATIONS, PLANS, AND CONTRACTOR'S APPROVED DESIGN DRAWINGS.

THE ANCHORAGE ASSEMBLY SHALL BE CENTERED IN THE HOLE BY SUITABLE SPACERS AND SECURELY FASTENED IN PLACE TO PREVENT MOVEMENT DURING THE GROUTING. THE ANCHOR HOLES SHALL BE PROTECTED FROM ENTRY OF DIRT OR OTHER FOREIGN MATTER UNTIL THE HOLES HAVE BEEN COMPLETELY GROUTED.

TENDONS OR HEAD ASSEMBLIES THAT FAIL UPON APPLICATION OF LOADS, EQUAL TO OR LESS THAN THEIR YIELD VALUE, DUE TO FAULTY MATERIAL, FABRICATION OR INSTALLATION; OR ANY CORRODED OR DAMAGED BEARING PLATE WHICH IN THE OPINION OF THE ENGINEER IS UNSUITABLE FOR USE IN THE PROJECT; SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.

EACH ANCHOR DRILL HOLE SHALL BE GIVEN A FINAL CLEANING BEFORE INSTALLING THE ANCHOR TENDON ASSEMBLY.

BEFORE INSTALLING THE ANCHORAGE TENDON ASSEMBLY, EACH DRILL HOLE SHALL BE FLUSHED WITH AIR AND/OR WATER TO CLEAN IT THOROUGHLY OF ALL DRILL CUTTINGS, GREASE OR ANY OTHER DEBRIS AND DIRT, USING METHODS APPROVED BY THE ENGINEER. WITHIN 24 HOURS AFTER COMPLETING THE FINAL CLEANING OUT OF THE ANCHOR HOLE, AND JUST PRIOR TO INSERTION OF THE ANCHORAGE ASSEMBLY, THE CONTRACTOR SHALL BE REQUIRED TO DEMONSTRATE TO THE SATISFACTION OF THE ENGINEER THAT THE HOLE IS CLEAN, PROPERLY FORMED AND OF THE REQUIRED DIMENSIONS. IF CAVED MATERIAL OR DEBRIS IS DETECTED IN THE HOLE, SUCH DEBRIS OR MATERIAL SHALL BE REMOVED BY INSERTING THE DRILL TOOL TO THE BOTTOM OF THE HOLE AND FLUSHING WITH AIR AND/OR WATER. IF THESE PROCEDURES ARE NOT EFFECTIVE, THE HOLE SHALL BE REDRILLED TO REMOVE THE MATERIALS AT THE CONTRACTOR'S EXPENSE.

PRIMARY GROUTING. ROCK ANCHOR SHALL BE PRIMARY GROUTED (FIRST STAGE GROUTING) IN ORDER TO BOND IT TO THE FOUNDATION STRATA. PRIMARY GROUTING SHALL BE COMPLETED WITHIN 6 HOURS AFTER ANCHOR HAS BEEN PLACED IN THE HOLE.

ALL GROUT PIPING SHALL BE CLEAN AND FREE OF DELETERIOUS MATERIALS THAT WOULD INTERFERE WITH GROUTING PROCEDURE. PIPING SHALL BE THOROUGHLY FLUSHED AND BLOWN OUT PRIOR TO GROUTING. THE GROUT SHALL BE INJECTED INTO THE HOLE STARTING AT THE LOW END. GROUTING AND VENTING METHODS OF APPROVED TYPE SHALL BE USED TO ASSURE COMPLETE ENCASEMENT OF THE PRESTRESSING STEEL BY THE GROUT IN THE ANCHORAGE ZONE.

NOTES CONTINUED ON SHEET 84

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-27-79	

NOTES (CONTINUED FROM SHEET 83)

TENDON TENSIONING. HYDRAULIC JACKS SHALL BE CAPABLE OF STRESSING EQUALLY AND SIMULTANEOUSLY ALL STRESSED ELEMENTS OF THE ROCK ANCHOR. EACH JACK SHALL BE EQUIPPED WITH A PRESSURE GAGE FOR DETERMINING THE JACKING STRESS. THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM SHALL BE CAPABLE OF MEASURING THE TENDON LOAD TO AN ACCURACY OF PLUS OR MINUS 3 PERCENT OF THE TENDON DESIGN LOAD. SIXTY DAYS PRIOR TO BEGINNING TENSIONING, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER CERTIFIED CALIBRATION DATA FOR THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM, AND INCLUDING AT LEAST ONE SPARE PRESSURE GAGE. AFTER THE PRIMARY GROUT HAS ATTAINED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,000 psi AND IN NO EVENT PRIOR TO A SETTING TIME OF 7 DAYS, THE CONTRACTOR SHALL TENSION THE ANCHOR. THE TENSIONING PROCESS SHALL BE SO CONDUCTED THAT THE APPLIED LOAD AND THE ELONGATION OF THE ANCHOR MAY BE MEASURED AT ANY TIME. ELONGATION MEASUREMENTS SHALL BE ACCURATE TO 1/100-INCH AND JACK SYSTEM READINGS TO PLUS OR MINUS THREE PERCENT OF THE JACKING LOAD. DURING ANY LOADING CYCLE THE APPLIED LOADS, AS MEASURED BY THE ELONGATIONS AND THE PRESSURE GAGE READINGS, SHALL BE WITHIN PLUS OR MINUS 5 PERCENT OF AGREEMENT, UP TO THE MAXIMUM LOAD APPLIED IN THE PREVIOUS LOADING CYCLE, AND IF NOT, STRESSING OPERATIONS MAY BE SUSPENDED BY THE ENGINEER UNTIL CAUSE FOR THE DIFFERENCE IS FOUND AND CORRECTED. THE MAXIMUM JACKING STRESS SHALL NEVER EXCEED 80 PERCENT OF THE GUARANTEED ULTIMATE STRENGTH OF THE STEEL. ALL STRESSING ELEMENTS OF THE ROCK ANCHOR SHALL BE STRESSED SIMULTANEOUSLY. SAFETY PRECAUTIONS SHALL BE TAKEN TO PREVENT WORKERS FROM STANDING BEHIND THE JACKS WHEN ROCK ANCHORS ARE STRESSED. THE STRESSING ANCHORAGES SHALL BE CAPABLE OF LIFT-OFF IN ORDER TO CHECK THE TENDON LOAD. THE PRESTRESSING SYSTEM SHALL, THEREFORE, BE CAPABLE OF STRESS ADJUSTMENT. ALL TENSIONING SHALL BE DONE IN THE PRESENCE OF THE ENGINEER.

TEST PROCEDURE. PERFORMANCE TESTS SHALL BE SUCCESSFULLY PERFORMED ON EIGHT REPRESENTATIVE ROCK ANCHORS AS APPROVED BY THE ENGINEER. FOUR OF THESE ANCHORS SHALL BE INCLUDED IN THE INITIAL ANCHORS INSTALLED. THE OTHER FOUR ANCHORS SHALL BE TESTED AS THE JOB PROGRESSES. THE ANCHORS TESTED SHALL INCLUDE BOTH UPPER AND LOWER ANCHORS AND BE REPRESENTATIVE OF THE VARIOUS ANCHOR LOADS AND ANCHOR SIZE.

THE EIGHT PERFORMANCE TEST ANCHORS WILL REQUIRE ADDITIONAL STEEL IN ORDER THAT THE MAXIMUM LOAD TESTED IS BELOW 80 PERCENT OF THE GUARANTEED ULTIMATE STRENGTH OF THE STEEL. THEREFORE, THE CONTRACTOR SHALL HAVE ANCHORS FOR FOUR PERFORMANCE TESTS AVAILABLE AT ALL TIMES, THAT MAY BE PLACED AT ANY LOCATION ALONG THE WALL CHOSEN BY THE ENGINEER, AND BE ABLE TO WITHSTAND THE LOAD REQUIRED FOR THE PERFORMANCE TEST. THE ENGINEER WILL SELECT A PARTICULAR LOCATION FOR A PERFORMANCE TEST AFTER AN ANCHOR HOLE IS DRILLED AND BELLED BUT PRIOR TO THE INSERTION OF THE TENDON. THE CAPACITIES OF THE ANCHORS USED FOR THE FOUR PERFORMANCE TEST LOCATIONS THAT THE CONTRACTOR CHOOSES SHALL BE DETERMINED BY THE CONTRACTOR; THEREFORE, HE CAN DIRECTLY OBTAIN THE NEEDED CAPACITY ANCHORS.

THE PERFORMANCE TESTS SHALL BE ACCOMPLISHED IN LOADING CYCLES CONSISTING OF LOADS APPLIED INCREMENTALLY AS NOTED IN THE ACCOMPANYING TABLE. AT THE END OF EACH APPLIED INCREMENT OF LOAD, THE MOVEMENT AT THE END OF THE TENDON SHALL BE MEASURED TO A PRECISION OF 0.001-INCH. THE LOAD SHALL BE MAINTAINED UNTIL THE RATE OF MOVEMENT IS LESS THAN 0.01-INCH DURING A FIVE MINUTE INTERVAL. WHEN THE MAXIMUM LOAD OF 150 PERCENT OF THE ANCHOR LOAD HAS BEEN ATTAINED AND AFTER THE RATE OF MOVEMENT OF THE TENDON END IS LESS THAN 0.01-INCH DURING A FIVE MINUTE PERIOD, THE MAXIMUM LOAD SHALL BE MAINTAINED AND THE DEFORMATION MONITORED FOR A MINIMUM PERIOD OF TWO HOURS. AS NOTED IN THE ACCOMPANYING TABLE, AT THE END OF THE FINAL CYCLE THE LOAD IS LOCKED OFF AT 70 PERCENT OF THE ANCHOR LOAD.

PERFORMANCE TESTING ON 8 SELECTED ROCK ANCHORS

CYCLE	PERCENTAGE OF ANCHOR LOAD										
1	5	25	5								
2	5	25	50	25	5						
3	5	25	50	75	50	25	5				
4	5	25	50	75	100	75	50	25	5		
5	5	25	50	75	100	125	100	75	50	25	5
6	5	25	50	75	100	125	150	125	100	70 *	

PROOF TESTS SHALL BE PERFORMED ON ALL ROCK ANCHORS NOT PERFORMANCE TESTED.

THE PROOF TESTS SHALL BE ACCOMPLISHED IN A LOADING CYCLE CONSISTING OF LOADS APPLIED INCREMENTALLY AS NOTED IN THE ACCOMPANYING TABLE. AT THE END OF EACH APPLIED INCREMENT OF LOAD, THE MOVEMENT AT THE END OF THE TENDON SHALL BE MEASURED TO A PRECISION OF 0.001-INCH. THE LOAD SHALL BE MAINTAINED UNTIL THE RATE OF MOVEMENT IS LESS THAN 0.01-INCH DURING A FIVE MINUTE INTERVAL. AT THE END OF THE LOAD CYCLE THE LOAD IS LOCKED-OFF AT 70 PERCENT OF THE ANCHOR LOAD.

PROOF TESTING ON REMAINING ROCK ANCHORS

CYCLE	PERCENTAGE OR ANCHOR LOAD										
1	5	25	50	75	100	130	100	75	50	25	5
2	5	25	50	75	100	130	100	70*			

*LOCK-OFF LOAD

DURING THE TESTING OF ROCK ANCHORS, TEMPORARY MEMBERS MAY BE ADDED WHERE REQUIRED TO DISTRIBUTE THE LOAD AND NOT OVERSTRESS THE PILES.

THE RESULTS OF THESE TESTS MAY BE USED BY THE ENGINEER AS GUIDELINES FOR ADJUSTING THE STRESSING OR RESTRESSING OF ANY OF THE ROCK ANCHORS.

IF A ROCK ANCHOR CANNOT BE SUCCESSFULLY TESTED TO THE REQUIRED LOADS, IT MAY STILL BE INCORPORATED INTO THE ANCHOR SCHEME BY USING ONE-HALF OF THE MAXIMUM LOAD ATTAINED WITH A RATE OF MOVEMENT LESS THAN 0.01-INCH IN A FIVE MINUTE PERIOD, IF APPROVED BY THE ENGINEER. IN SUCH CASES, A SUPPLEMENTAL ANCHOR OR ANCHORS SHALL BE INSTALLED TO CARRY THE REMAINING PORTION OF THE LOAD AS APPROVED BY THE ENGINEER. THE SUPPLEMENTAL ROCK ANCHORS SHALL BE INSTALLED AT THE CONTRACTOR'S EXPENSE WHICH SHALL INCLUDE ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY FOR THE INSTALLATION.

ROCK ANCHOR RETENSIONING. IF AT ANYTIME DURING THE CONSTRUCTION OF THE PROJECT THE TOP ANCHOR POINT OF ANY PILE MOVES MORE THAN 1-INCH DOWNHILL FROM ITS ORIGINAL POSITION (AS DETERMINED BEFORE ANY EXCAVATION IN FRONT OF THE WALL), THE CONTRACTOR MAY BE REQUIRED TO RETEST AND/OR RETENSION THE ANCHORS AS DIRECTED BY THE ENGINEER. THE RETENSIONING OF ANCHORS SHALL BE DONE IN A MANNER SIMILAR TO THE PROCEDURE DESCRIBED ABOVE EXCEPT THE INCREMENT LOADS WILL BE ABOUT TEN PERCENT OF THE ANCHOR LOAD AND CYCLING OF THE LOADS MAY NOT BE REQUIRED. THE RETENSIONING SHALL CONTINUE UNTIL THE TOP OF THE PILE OR PILES IS BROUGHT INTO A POSITION SATISFACTORY TO THE ENGINEER OR UNTIL THE LOAD ON THE ANCHOR REACHES THE SPECIFIED ANCHOR LOAD. IN THE EVENT THAT THIS PROCEDURE DOES NOT BRING THE TOP OF THE PILE OR PILES INTO A SATISFACTORY POSITION, AN ADDITIONAL ANCHOR OR ANCHORS MAY BE REQUIRED BY THE ENGINEER TO BE INSTALLED ACCORDING TO THE PREVIOUSLY MENTIONED PROCEDURE. THESE ADDITIONAL ROCK ANCHORS SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR ITEM SPECIAL "ANCHOR BOREHOLE DRILLED" AND ITEM SPECIAL "POST-TENSIONING ROCK ANCHOR SYSTEM".

SECONDARY GROUTING. WITHIN 48 HOURS OF COMPLETION OF THE TESTS AND LOCKING THE TENDONS OFF AT THEIR PRESCRIBED LOADS, THE SECONDARY GROUTING (SECOND-STAGE GROUTING) TO FILL THE ANNULAR SPACE ALONG THE STRESSING LENGTH BETWEEN THE ROCK AND THE UPHILL SIDE OF THE WALL, SHALL BE STARTED. THE PRESTRESSING SYSTEM USED SHALL PERMIT THE VENTING OF AIR FROM WITHIN THE STRESSING LENGTH DURING SECONDARY GROUTING TO ASSURE THAT THE POINTS OF STRESS TRANSFER ARE ADEQUATELY PROTECTED AGAINST CORROSION.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE THE NUMBER OF TENDONS SUCCESSFULLY TESTED AND LOCKED-OFF AT THEIR PRESCRIBED LOAD.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL WORK AND MATERIALS HEREINBEFORE DESCRIBED.

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	POST-TENSIONING ROCK ANCHOR SYSTEM

GROUT FOR ANCHOR DRILL HOLES

DESCRIPTION. THIS ITEM SHALL CONSIST OF SUPPLYING AND PUMPING FIRST STAGE CEMENT GROUT AND SECOND STAGE CEMENT-BENTONITE GROUT INTO THE ANCHOR DRILL HOLES AT THE TEMPORARY WALL THROUGH A GROUT PIPE SYSTEM EXTENDING TO THE BOTTOM OF THE HOLE, FILLING THE LENGTH OF THE ANCHOR DRILL HOLE WITH GROUT AFTER INSTALLATION OF AN ANCHORAGE TENDON ASSEMBLY.

GENERAL, MATERIALS, FIRST STAGE CEMENT GROUT, SECOND STAGE CEMENT-BENTONITE GROUT, EQUIPMENT AND MIXING, FIRST STAGE GROUT INJECTION, TEST SPECIMENS, CURING AND LOADING AND SECOND STAGE GROUT INJECTION. THESE SECTIONS SHALL BE AS DESCRIBED IN THE NOTE, "GROUT FOR ROCK ANCHOR DRILL HOLES", SHEET NO. 104.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE MEASURED BY THE UNIT FOR EACH ANCHOR DRILL HOLE FILLED WITH GROUT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	GROUT FOR ANCHOR DRILL HOLE

TEMPORARY WALL MONITORING

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING, INSTALLING AND PROVIDING ALL PERSONNEL AND EQUIPMENT NEEDED TO INSTALL THE INCLINOMETERS, PIEZOMETERS, ROCK ANCHOR LOAD CELLS AND BENCHMARKS. SURVEYING OF VERTICAL AND LATERAL MOVEMENT OF POINTS ON THE WALL AND ON STRUCTURES WITHIN 100 FEET OF THE WALL WILL BE DONE BY THE ENGINEER USING EQUIPMENT SUPPLIED AND MAINTAINED BY THE CONTRACTOR.

DIVISION OF RESPONSIBILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROCUREMENT, STORAGE, INSTALLATION AND MAINTENANCE OF ALL INSTRUMENTS (AND SURVEY EQUIPMENT) AND FOR MAINTAINING OR SUPPLYING ACCESS TO ALL INSTRUMENTS (AND SURVEY POINTS). IN THE PERFORMANCE OF HIS WORK, THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, TOOLS, MACHINERY AND OTHER EQUIPMENT, MEANS OF ACCESS, AND ALL INCIDENTALS NECESSARY AND PROPER FOR THE EXPEDITIOUS COMPLETION OF THE REQUIRED WORK.

THE ENGINEER SHALL BE RESPONSIBLE FOR THE FINAL APPROVAL OF INSTRUMENTS PROPOSED BY THE CONTRACTOR, ASSISTANCE WITH AND ACCEPTANCE OF INSTALLATIONS, AND SHALL PERFORM MONITORING AND DATA INTERPRETATION. THE INSTRUMENTATION AND SURVEY PROGRAM IS NOT INTENDED TO SUPERSEDE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE AND MAINTAIN THE SAFETY AND STABILITY OF THE WALL AND THE HILLSIDE. TO ASSIST THE CONTRACTOR IN FULFILLING HIS RESPONSIBILITY ALL INSTRUMENTATION AND SURVEY DATA WILL BE AVAILABLE FOR HIS USE ON A TIMELY BASIS.

CONTRACTOR ASSISTANCE AND COOPERATION. THE CONTRACTOR SHALL: INSTALL INSTRUMENTS AND ASSIST AND COOPERATE WITH THE ENGINEER IN MONITORING INSTRUMENTATION; PROVIDE ACCESS, SAFE WORK AREAS, LIGHT, AIR, AND POWER AND SERVICES SUCH AS WELDING AND GROUTING THAT IS NECESSARY FOR INSTALLATION AND MAINTENANCE OF INSTRUMENTATION AND FOR MONITORING TO BE PERFORMED BY THE ENGINEER; SCHEDULE WORK TO ALLOW THE ENGINEER TO MONITOR THE INSTRUMENTS IN ACCORDANCE WITH THE ENGINEER'S MONITORING SCHEDULE; NOTIFY ENGINEER OF CONTRACTOR'S OPERATIONS SUFFICIENTLY IN ADVANCE SO THAT THE ENGINEER MAY, AT HIS DISCRETION, OBSERVE INSTRUMENTATION INSTALLATION AND CONSTRUCTION OPERATIONS AND MONITOR PERTINENT INSTRUMENTS.

APPROVAL OF INSTRUMENTS. THE CONTRACTOR SHALL SUBMIT FOR THE ENGINEER'S APPROVAL DETAILS OF ALL INSTRUMENTS HE PROPOSES TO INSTALL OR SUPPLY AND DETAILS OF THEIR METHOD OF INSTALLATION. THE CONTRACTOR IS REQUIRED TO SUBMIT HIS REQUEST FOR APPROVAL SUFFICIENTLY EARLY TO BE CERTAIN THAT THE ITEM CAN BE PURCHASED, INSTALLED, AND FUNCTIONING AT THE PROPER TIME. AT LEAST THIRTY DAYS SHALL BE ALLOWED FOR REVIEW BY THE ENGINEER.

NOTES CONTINUED ON SHEET 85

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-28-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

85/172

HAMILTON COUNTY
HAM 471-0.24
PART ONE

NOTES (CONTINUED FROM SHEET 84)

INSTRUMENT PROCUREMENT. CONTRACTOR SHALL PROCURE AND MAKE AVAILABLE TO THE ENGINEER ALL INSTRUMENTS AT LEAST THIRTY DAYS IN ADVANCE OF THEIR REQUIRED USE IN THE MONITORING PROGRAM TO ENABLE THE ENGINEER TO CHECK THEIR PROPER FUNCTIONING, CALIBRATION AND STABILITY.

STORAGE PROVISIONS. CONTRACTOR SHALL PROVIDE SUITABLE ON-SITE STORAGE FACILITIES FOR THE INSTRUMENTS. FACILITIES SHALL BE CLEAN, DRY, WELL-LIGHTED, HEATED, ACCESSIBLE AND LOCKED. THEY SHALL CONTAIN ADEQUATE BENCH SPACE FOR USE BY THE ENGINEER IN CHECKING OUT EQUIPMENT AND FOR CALIBRATION WHICH SHALL HAVE AT LEAST THREE 110 VAC CONVENIENCE OUTLETS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF THE INSTRUMENTS.

INSTALLATION. INSTRUMENTS SHALL BE INSTALLED IN A TIMELY MANNER BY THE CONTRACTOR UNDER THE SURVEILLANCE OF THE ENGINEER. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY ACCESS, MATERIALS, EQUIPMENT AND LABOR FOR PROPER INSTALLATION. THE CONTRACTOR SHALL MAKE A PROPER INSTALLATION WHICH MAY REQUIRE THE ASSISTANCE OF A QUALIFIED REPRESENTATIVE OF THE INSTRUMENT MANUFACTURER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ARRANGING FOR SUCH SERVICES AS AND WHEN REQUIRED BY THE ENGINEER.

ACCESS. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL TERMINAL BOXES, REFERENCE POINTS AND OTHER INSTRUMENTATION MONITORING LOCATIONS AND SHALL COOPERATE WITH THE ENGINEER TO MAINTAIN FREE OF OBSTRUCTIONS ALL LINES OF SIGHT FOR SURVEY ALIGNMENTS.

REFERENCE IDENTIFICATION. ALL INSTRUMENT LEADS, TERMINAL BOXES AND SURVEY MARKERS SHALL BE CLEARLY AND PERMANENTLY IDENTIFIED AND MARKED BY THE CONTRACTOR.

MONITORING. THE ENGINEER WILL TAKE READINGS ON INSTALLED INSTRUMENTS ON A FREQUENCY COMMENSURATE WITH THE CURRENT JOB NEEDS. IT IS ANTICIPATED THAT READINGS WILL BE REQUIRED IN ACTIVE AREAS ON A DAILY BASIS AND THAT INACTIVE AREAS WILL BE MONITORED WEEKLY.

INCLINOMETERS. THIS SHALL CONSIST OF FURNISHING AND INSTALLING TWO INCLINOMETER CASINGS. THE INCLINOMETERS SHALL BE PLACED WITHIN 10 TO 20 FEET UPHILL OF THE PROPOSED WALL LOCATION AT STATIONS 13 + 25S AND 14 + 00S, BEFORE THE CONSTRUCTION OF THE TEMPORARY WALL BEGINS, AND NOT IN THE ALIGNMENT OF ANY ROCK ANCHORS. THE INCLINOMETER CASING SHALL BE OBTAINED FROM AN ESTABLISHED MANUFACTURER OR AGENT OF QUALITY GEOTECHNICAL INSTRUMENTS. THEY SHALL BE 3.34-INCH OUTSIDE DIAMETER ABS PLASTIC, FLUSH COUPLED, TREMIE GROUTED OR USING ONE WAY VALVE, W/BENTONITE-CEMENT MIX. THE INCLINOMETERS SHALL EXTEND TO ELEVATIONS 540 FEET ADJACENT TO STATION 13 + 25S AND 520 FEET ADJACENT TO STATION 14 + 00S. COMPLETE UNITS MEETING THESE SPECIFICATIONS ARE AVAILABLE FROM SLOPE INDICATOR CO., 3668 ALBION PLACE NORTH, SEATTLE, WASHINGTON 98103.

PIEZOMETERS. THIS SHALL CONSIST OF FURNISHING AND INSTALLING TWELVE PIEZOMETERS, AT SIX LOCATIONS ALONG THE WALL. THE PIEZOMETERS SHALL BE PLACED WITHIN 5 FEET UPHILL OF THE PROPOSED WALL LOCATION AT STATIONS 10 + 20S, 11 + 00S, 11 + 80S, 12 + 60S, 13 + 40S AND 14 + 20S, BEFORE THE CONSTRUCTION OF THE TEMPORARY WALL BEGINS, AND NOT IN THE ALIGNMENT OF ANY ROCK ANCHORS. THE TIPS OF THE PIEZOMETERS SHALL BE INSTALLED SUCH THAT WATER LEVELS ARE MEASURED BOTH NEAR THE BASE OF THE SILT AND IN THE UPPER 3 TO 5 FEET OF ROCK. TWO PIEZOMETERS MAY BE INSTALLED IN ONE DRILLHOLE. EACH PIEZOMETER SHALL BE AN OPEN RIGID PVC STANDPIPE WITH A COARSE POROUS FILTER AT THE TIP CAPABLE OF BEING READ WITH AN ELECTRIC WATER LEVEL INDICATOR. EACH FILTER TIP SHALL BE SURROUNDED BY A SAND POCKET AND SHALL INCORPORATE A BENTONITE SEAL IMMEDIATELY ABOVE THE SAND POCKET. THE REMAINING PORTION OF THE DRILLHOLE SHALL BE FILLED WITH CEMENT-BENTONITE GROUT. (SEE DETAIL ON SHEET NO. 94)

THE CONTRACTOR, AT THE REQUEST OF THE ENGINEER, SHALL BE REQUIRED TO RELIEVE HYDROSTATIC PRESSURES ON THE WALL, SHOULD THEY DEVELOP.

LOAD CELLS. THIS SHALL CONSIST OF FURNISHING AND INSTALLING LOAD CELLS SUCH THAT THE LOADS ON THE SINGLE ROCK ANCHORS FOR PILES 5 AND 6; AND THE LOADS ON THE UPPER AND LOWER ROWS OF ROCK ANCHORS FOR PILES 7, 8, 21, 22, 39, 40, 55, 56, 67, 68, 79, 80, 95 AND 96; CAN BE MONITORED TO ASSESS CHANGES IN LOAD ON THE WALL IN RELATION TO EXCAVATION LEVELS IN FRONT OF THE WALL, INCLINOMETER MOVEMENTS BEHIND THE WALL, AND POSSIBLE VARIATIONS IN GROUND WATER CONDITIONS.

THE LOAD CELLS SHALL CONSIST OF A HOLLOW CENTER CELL WHICH SEATS COAXIALLY WITH THE ROCK ANCHOR TENDONS. EACH CELL SHALL BE INSTRUMENTED WITH A MINIMUM OF FOUR FULL BRIDGE RESISTANCE GAGES OR FOUR VIBRATING WIRE STRAIN GAGES TO AVERAGE OUT ECCENTRIC LOADS ON THE CELL. WORKING CAPACITY OF THE CELL SHALL BE AT LEAST EQUAL TO THE YIELD LOAD OF THE ROCK ANCHORS. ULTIMATE LOAD CELL CAPACITY SHALL BE EQUAL TO 1.5 TIMES THE WORKING LOAD OF THE CELL OR AS OTHERWISE RECOMMENDED BY THE MANUFACTURER. THE COMBINED CELL AND READOUT UNIT SHALL BE SENSITIVE TO AT LEAST PLUS OR MINUS 0.25 PERCENT OF THE FULL LOADING CAPACITY. CELLS SHALL BE FULLY TEMPERATURE COMPENSATED OVER A RANGE OF 0 TO 150 DEGREES F. THE CELL, LEADS AND READOUT BOX SHALL BE DESIGNED FOR CONSTRUCTION USE, SUCH THAT THEY ARE WATER AND DUST PROOF, AND CORROSION AND SHOCK RESISTANT. LEADS SHALL CONSIST OF HEAVY DUTY SHIELDED AND JACKETED OUTDOOR VARIETY CABLES OF SUFFICIENT LENGTH TO MONITOR ALL CELLS FROM THE TOP OF THE WALL. THE CABLES SHALL BE ATTACHED TO THE PILES THRU CONDUIT EXTENDING TO THE TOP OF THE WALL WITH WATERPROOF PROTECTIVE AND LOCKABLE MOUNTINGS AT THE TOP OF THE WALL. CELLS SHALL BE PROVIDED WITH SUITABLE BEVELED OR HEMISPHERICAL WASHERS AND A MOLYBDENUM DISULFIDE LUBRICANT TO REDUCE ECCENTRIC LOADING DUE TO MISALIGNMENT WITH THE ROCK ANCHOR TENDON OR FRICTION BETWEEN THE CELL AND WASHERS. THE CELLS SHALL BE PROVIDED WITH CALIBRATION GRAPHS RELATING STRAIN TO LOAD FOR BOTH LOADING AND UNLOADING CURVES.

SURVEYING. DURING EXCAVATION AND CONSTRUCTION OF THE BUTTRESS, THE TOP OF THE TEMPORARY WALL AND THE FOUNDATIONS OF ADJACENT BUILDINGS WILL BE PERIODICALLY SURVEYED BY THE ENGINEER AT SELECTED LOCATIONS FOR VERTICAL AND HORIZONTAL MOVEMENTS. SURVEY POINTS SHALL BE LOCATED ON EVERY OTHER PILE ALONG THE TEMPORARY WALL. ALSO, SURVEY POINTS SHALL BE ESTABLISHED ON BUILDINGS LOCATED WITHIN 100 FEET OF THE BUTTRESS EXCAVATION, AT SELECTED POINTS UPHILL FROM WALL, AND ON INCLINOMETER CASINGS UPHILL FROM THE TEMPORARY WALL. ON THE BUILDINGS MENTIONED, AT LEAST THREE SURVEY POINTS SHALL BE ESTABLISHED ALONG EACH OUTSIDE WALL. THE VERTICAL SURVEYS SHALL BE MADE TO A SENSITIVITY OF PLUS OF MINUS 0.01 FEET AND SHALL BE PERFORMED RELATIVE TO STABLE BENCHMARKS LOCATED OUTSIDE THE SLIDE MASS BOUNDARIES, ISOLATED FROM SEASONAL SURFACE MOVEMENTS, ANCHORED A MINIMUM OF 10 FEET INTO ROCK. A SUITABLE BENCHMARK INSTALLATION IS SHOWN ON SHEET NO. 129. BENCHMARKS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AT LOCATIONS APPROVED BY THE ENGINEER.

HORIZONTAL MOVEMENTS SHALL BE MONITORED USING THE ELECTRONIC DISTANCE MEASURING (EDM) EQUIPMENT EMPLOYED TO MONITOR MOVEMENTS OF THE TIED-BACK CYLINDER PILE WALL SHEET NO. 117. ~~PLASTIC TRUCK REFLECTORS SHALL BE USED AS HORIZONTAL SURVEY POINTS ON THE TEMPORARY SOLDIER~~ PILE WALL AND ON THE BUILDINGS (SEE SHEET NO. 129C). THE EDM INSTRUMENT SHALL BE STATIONED AT CONTROL POINT NO. 1 AS SHOWN ON SHEET NO. 129A. ©

FOR THE PURPOSE OF MEASURING MOVEMENTS ON TEMPORARY SLOPES, VERTICAL SURVEY POINTS ON 20-FOOT SPACINGS ALONG THE EAST AND SOUTH BOUNDARIES OF THE BUTTRESS EXCAVATION SHALL BE ESTABLISHED.

METHOD OF MEASUREMENT. WORK PERFORMED UNDER THIS ITEM SHALL BE MEASURED AS A UNIT.

BASIS OF PAYMENT. WALL MONITORING WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE, WHICH PRICE SHALL INCLUDE THE COST OF ALL WORK AND MATERIALS HEREINBEFORE DESCRIBED.

PAYMENT WILL BE MADE UNDER:

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	TEMPORARY WALL MONITORING

HORIZONTAL SURVEY POINTS ON THE TEMPORARY SOLDIER PILE WALL SHALL BE SET AS CENTER-PUNCH MARKS ON THE TOPS OF THE STEEL PILES, IDENTIFIED WITH A BRIGHT COLORED PAINT. SIMILAR SURVEY POINTS SHALL BE SET ON THE STEEL PIPES PROTECTING THE INCLINOMETER CASINGS. SURVEY POINTS ON THE BUILDINGS WILL BE ESTABLISHED BY THE ENGINEER. ©

FINAL DISPOSITION OF ROCK ANCHOR SYSTEM

DESCRIPTION. THIS ITEM SHALL CONSIST OF MAKING A FINAL DISPOSITION OF ALL ROCK ANCHORS AND INCIDENTALS WHEN THE BUTTRESS FILL COMES WITHIN TWO FEET OF EACH TENDON. ALSO THE CONTRACTOR SHALL REMOVE ALL WOOD LAGGING FROM THE JOB SITE AS THE BUTTRESS FILL IS PLACED.

GENERAL. WHEN THE BUTTRESS FILL HAS BEEN CONSTRUCTED TO WITHIN 2 FEET OF A ROCK ANCHOR THE LOAD ON THE ANCHORS SHALL BE RELEASED "SLOWLY" WITH THE USE OF A JACK UNTIL THE TOTAL LOAD HAS BEEN TRANSFERRED TO THE FILL. THE FILL MUST BE HORIZONTAL IN FRONT OF WALL FOR A MINIMUM OF 50 FEET OR TO THE INTERSECTION WITH THE FINAL GRADE. AT NO TIME SHALL A STRESSED TENDON BE CUT IN ORDER TO RELIEVE ITS LOAD. THE CHANNELS, BEARING PLATES, AND ANCHOR ACCESSORIES SHALL THEN BE REMOVED FROM THE JOB SITE AS WELL AS THAT PORTION OF THE UNLOADED ROCK ANCHOR THAT CAN BE CUT OFF AND REMOVED FROM THE JOBSITE. WOOD LAGGING SHALL NOT BE REMOVED MORE THAN TWO FEET ABOVE THE LEVEL OF THE BUTTRESS FILL AT ANY TIME.

METHOD OF MEASUREMENT. ALL WORK PERFORMED UNDER THIS ITEM SHALL BE MEASURED AS A UNIT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	FINAL DISPOSITION OF ROCK ANCHORS AND ACCESSORIES, CHANNELS, BEARING PLATES AND WOOD LAGGING.

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NOTES

TEMPORARY SOLDIER PILE WALL

STA. 10+00 S TO STA. 14+30 S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		RFD	JHO 2-28-79	9-19-80 ©

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FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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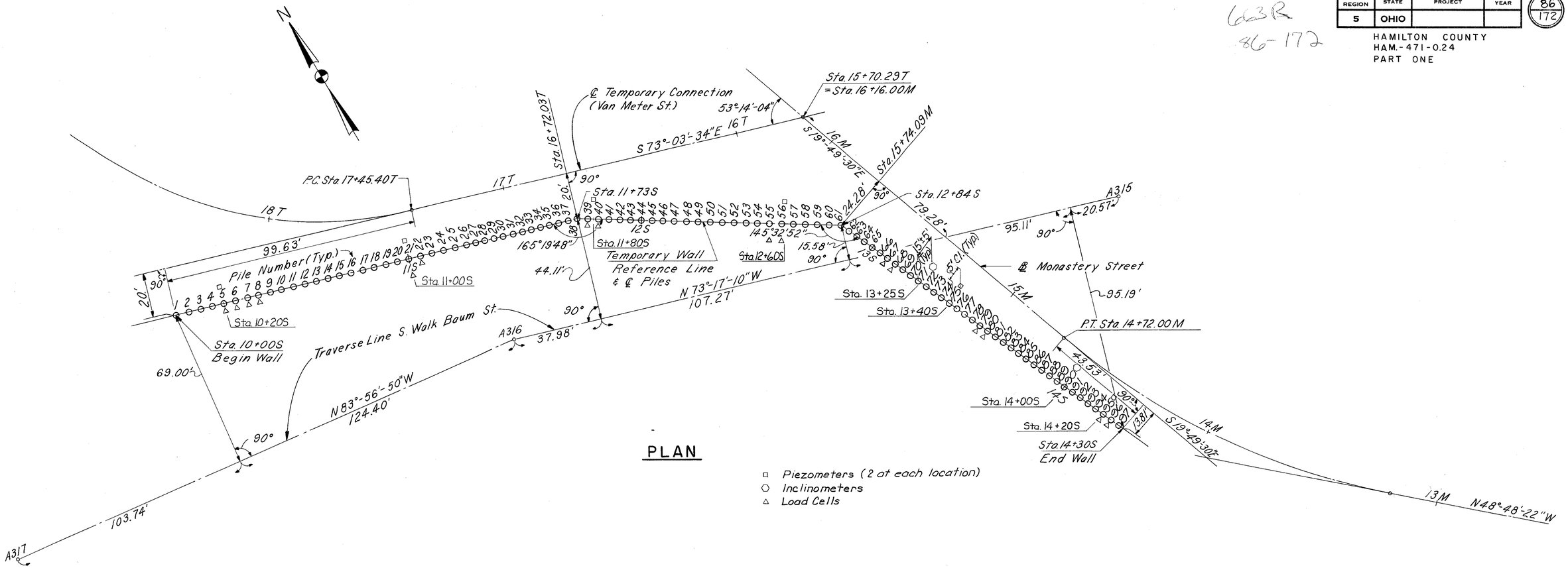
HAMILTON COUNTY
HAM.-471-0.24
PART ONE

663R
86-172



PLAN

- ▫ Piezometers (2 at each location)
- ⬡ Inclinometers
- △ Load Cells

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STAKE OUT PLAN

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	YK/RFD	TMC	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM.-471-0.24
PART ONE

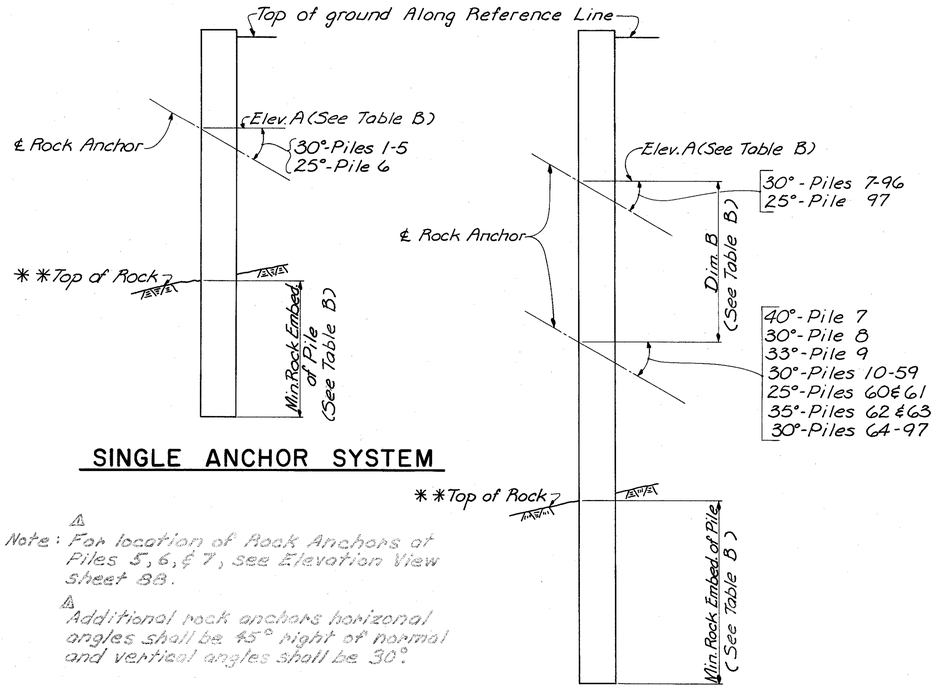
TABLE B

PILE NO.	ELEV. A	DIM. B	MIN. ROCK EMBED. OF PILE	ANCHOR LOAD (Kips) UPPER	ANCHOR LOAD (Kips) LOWER	MIN. UNBONDED LENGTH IN ROCK
1	575.2	——	8'	191	——	20'
2	576.2	——	↑	191	——	↑
3	577.2	——	↑	191	——	↑
4	578.2	——	↑	191	——	↑
5	579.0	——	↑	191	172	↑
6	580.0	——	↑	182	172	↑
7	582.9	5'-9"	↑	116	141	↑
8	582.9	5'-6"	↑	↑	134	↑
9	583.2	5'-9"	↑	116	↑	↑
10	583.2	5'-3"	↑	↑	↑	↑
11	585.5	6'-6"	↑	116	↑	↑
12	585.5	6'-3"	↑	↑	↑	↑
13	587.0	6'-9"	↑	116	↑	↑
14	587.0	6'-6"	↑	↑	134	↑
15	588.5	7'-3"	↑	116	136	↑
16	588.5	7'-0"	↓	↑	↑	↑
17	590.0	7'-9"	8'	116	↑	↑
18	590.0	7'-3"	9'	↑	↑	↑
19	591.5	8'-0"	↑	116	↑	↑
20	591.5	7'-9"	↑	↑	↑	↑
21	592.8	8'-6"	↑	116	↑	↑
22	592.8	8'-3"	↑	↑	↑	↑
23	593.5	8'-6"	↑	116	↑	↑
24	593.5	8'-3"	↓	↑	↑	↑
25	594.5	8'-6"	9'	110	136	↑
26	594.5	8'-6"	10'	↑	140	↑
27	595.2	8'-7"	↑	93	125	↑
28	595.2	8'-5"	↑	↑	↑	↑
29	596.0	8'-8"	↑	93	↑	↑
30	596.0	8'-6"	↑	↑	↑	↑
31	596.5	8'-9"	↑	93	↑	↑
32	596.5	8'-7"	↑	↑	↑	↑
33	597.2	8'-9"	↑	93	↑	↑
34	597.2	8'-8"	↑	↑	↑	↑
35	597.8	8'-9"	↑	93	↑	↑
36	597.8	8'-8"	↑	↑	↑	↑
37	598.2	8'-9"	↑	96	125	↑
38	598.2	8'-1"	↓	↑	133	↑
39	597.8	7'-9"	10'	104	141	↑
40	597.8	8'-6"	9'	↑	↑	↑
41	597.0	8'-0"	↑	104	↑	↑
42	597.0	8'-6"	↑	↑	141	↑
43	596.0	7'-9"	↑	104	137	↑
44	596.0	8'-0"	↑	↑	137	↑
45	595.2	7'-9"	↓	107	137	↑
46	595.2	7'-9"	9'	↑	144	↑
47	594.2	7'-3"	8'	116	152	↑
48	594.2	7'-6"	↑	↑	152	↑
49	593.5	7'-3"	↑	116	152	↑
50	593.5	7'-3"	8'	↑	131	↑
51	594.0	7'-6"	9'	116	↑	↑
52	594.0	7'-9"	↑	↑	↑	↑
53	594.5	8'-0"	↑	98	131	↑
54	594.5	8'-0"	9'	127	127	20'

TABLE B

PILE NO.	ELEV. A	DIM. B	MIN. ROCK EMBED. OF PILE	ANCHOR LOAD (Kips) UPPER	ANCHOR LOAD (Kips) LOWER	MIN. UNBONDED LENGTH IN ROCK
55	594.8	8'-3"	9'	98	127	20'
56	594.8	8'-6"	9'	↑	127	↑
57	594.8	8'-6"	10'	87	127	↑
58	594.8	8'-6"	10'	↑	123	↑
59	594.2	8'-3"	10'	87	123	↑
* 60	594.2	8'-6"	9'	↑	117	↑
* 61	593.2	8'-2"	↑	122	132	↑
* 62	593.2	8'-3"	↑	↑	122	↑
* 63	592.2	8'-5"	9'	116	↑	↑
64	592.2	8'-8"	10'	↑	↑	↑
65	591.5	8'-10"	10'	116	↑	↑
66	591.5	9'-1"	10'	↑	↑	20'
67	591.0	9'-5"	11'	134	122	21'
68	591.0	9'-7"	↑	↑	140	21'
69	589.7	9'-9"	↑	152	↑	22
70	589.7	9'-7"	11'	↑	↑	22
71	586.6	9'-2"	10'	152	↑	23
72	586.6	8'-10"	↑	↑	↓	23
73	583.2	8'-8"	↑	203	140	24
74	583.2	8'-0"	10'	↑	174	24
75	579.2	7'-5"	8'	203	↑	25
76	579.2	7'-4"	↑	↑	↑	25
77	577.5	7'-4"	↑	203	↑	26
78	577.5	7'-5"	↑	↑	↑	26
79	575.8	7'-6"	8'	203	↓	27
80	575.8	7'-6"	9'	↑	174	28
81	574.0	7'-6"	↑	240	203	28
82	574.0	7'-7"	↑	↑	↑	29
83	572.8	7'-8"	↑	240	↑	29
84	572.8	7'-9"	↑	↑	↑	30
85	571.5	8'-0"	↑	240	↑	30
86	571.5	8'-1"	↑	↑	↓	31
87	570.2	8'-2"	↑	240	203	↑
88	570.2	8'-3"	↑	↑	231	↑
89	569.2	8'-5"	9'	240	↑	↑
90	569.2	8'-8"	10'	↑	↑	↑
91	568.3	8'-9"	↑	245	231	31
92	568.3	9'-0"	↑	↑	236	32
93	567.3	9'-3"	10'	247	236	↑
94	567.3	9'-7"	11'	↑	236	↑
95	565.8	9'-8"	↑	249	256	↑
96	565.8	9'-6"	↑	↑	256	↑
97	563.7	9'-4"	11'	125	256	32

*Special care shall be exercised to drill bottom tendon shaft accurately to the vertical and horizontal angle shown in order to avoid possible conflict in the vicinity of crossings with other tendons.



SINGLE ANCHOR SYSTEM

DOUBLE ANCHOR SYSTEM

Note: For location of Rock Anchors at Piles 5, 6, & 7, see Elevation View Sheet 88.

Additional rock anchors horizonal angles shall be 45° right of normal and vertical angles shall be 30°.

Note: Elevation A must be maintained for all piles. If the holes are excavated too deep or the pipes are fabricated too short or too long, then the pipes will have to be lengthened or bottom of holes lowered in order to provide minimum rock embedment for piles. Cost of lengthening pipes or lowering of holes for these reasons will not be included in 513, "Structural Steel"; 503, "Rock Excavation"; or 511, "Class C Concrete, Steel Pipe Piles;" but will be incidental to other items of project.

** For design purpose – may not coincide with Top of Rock for payment.

TABLE A

ANCHOR HOLES FOR ALIGNMENT SURVEY	
PILE NO.	
6	Lower
7	↑
8	↑
60	↑
61	↑
62	↓
63	Lower
7-8	Upper
9-10	Upper
97	Upper

Revised 5-5-81

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CROSS SECTIONS

TEMPORARY SOLDIER PILE WALL STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	YK		H.L.L.	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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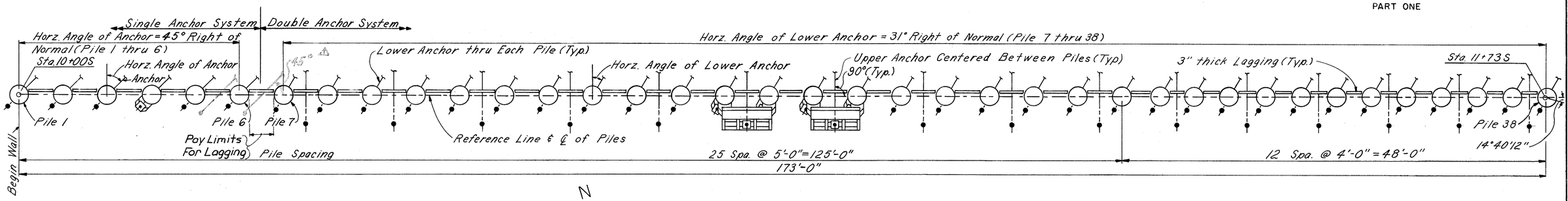
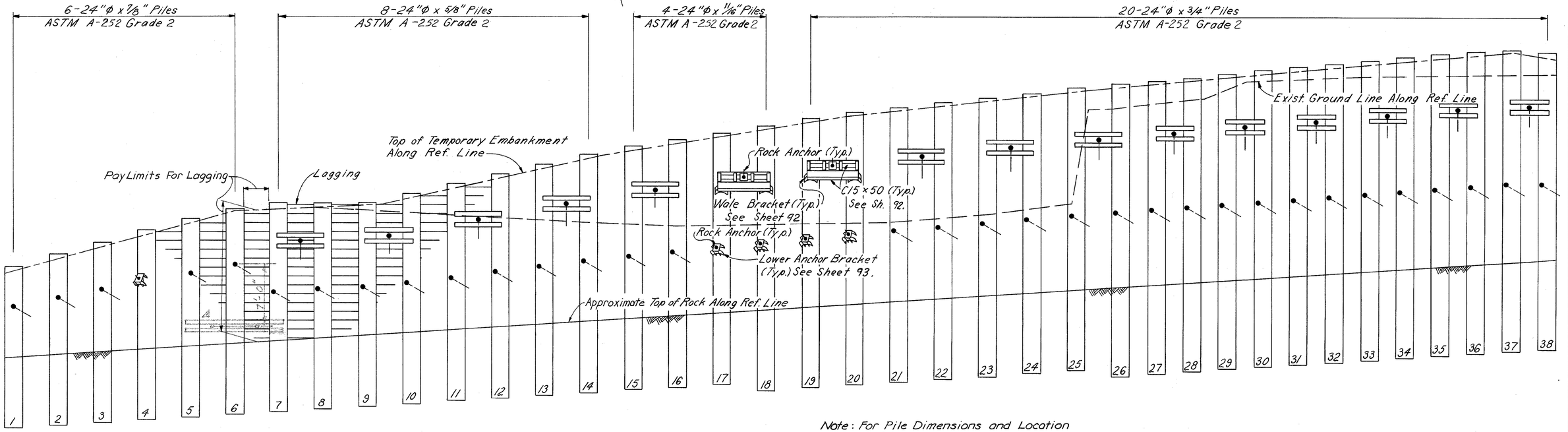
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PLAN



ELEVATION
(Along Ref. Line)

Note: For Pile Dimensions and Location of Anchors See Sheets 86 & 87.

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PLAN & ELEVATION
TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	TMC	VDG	JHo 2-27-79	

Δ Revised 5-5-81

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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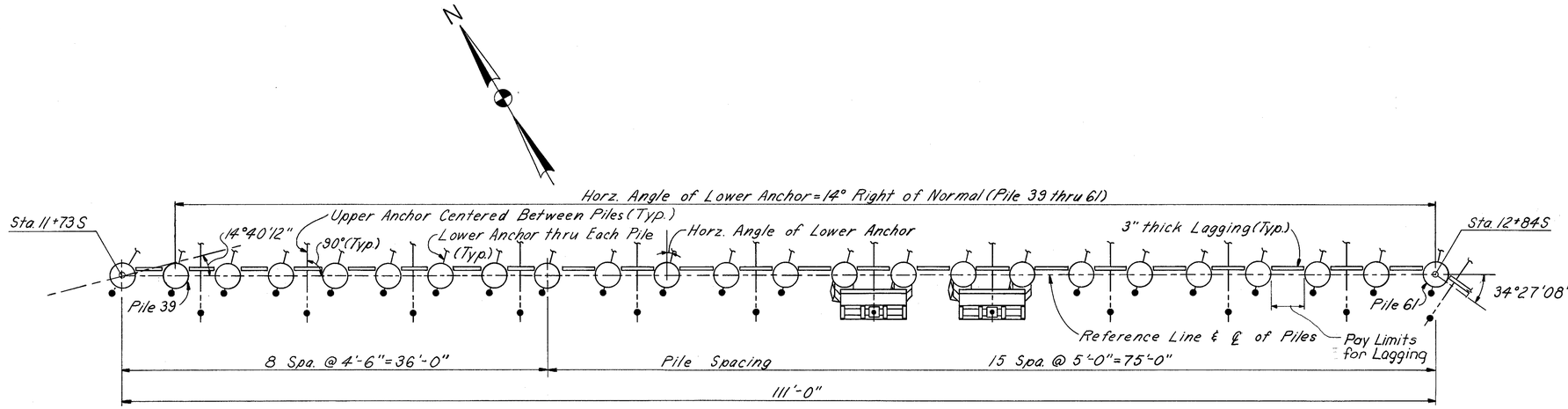
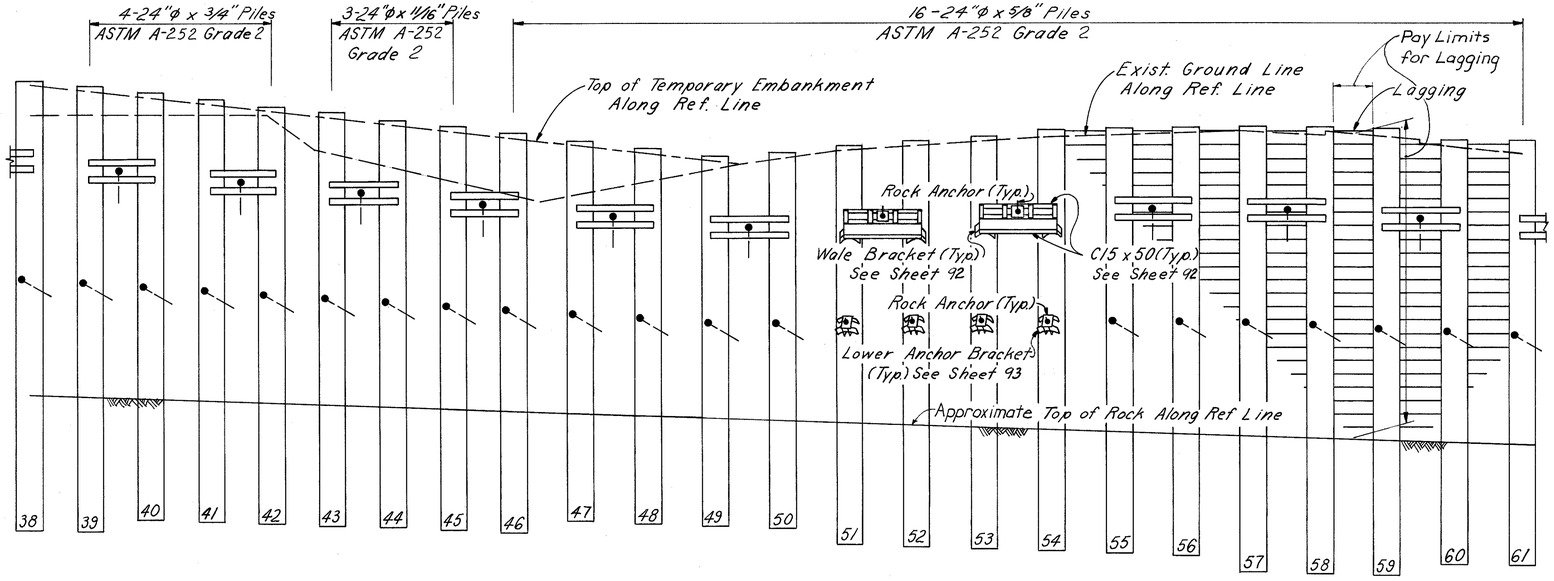
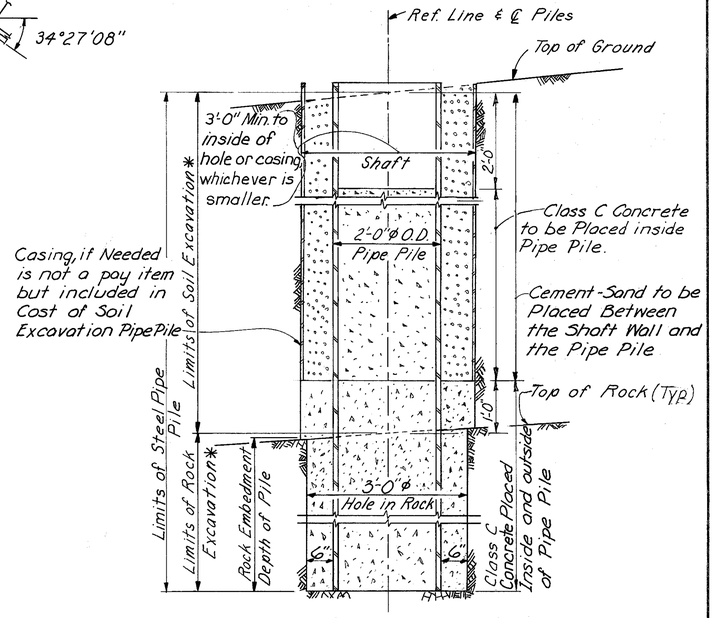
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PLAN



ELEVATION
(Along Ref. Line)



PILE INSTALLATION AND EXCAVATION LIMITS

* See defintion of "Top of Rock" for payment purposes, sh 80 - may not coincide with "Top of Rock" for design rock embedment requirements.

Note:
For Pile Dimensions and Location of Anchors See Sheets 86 & 87.

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PLAN & ELEVATION
TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	TMC	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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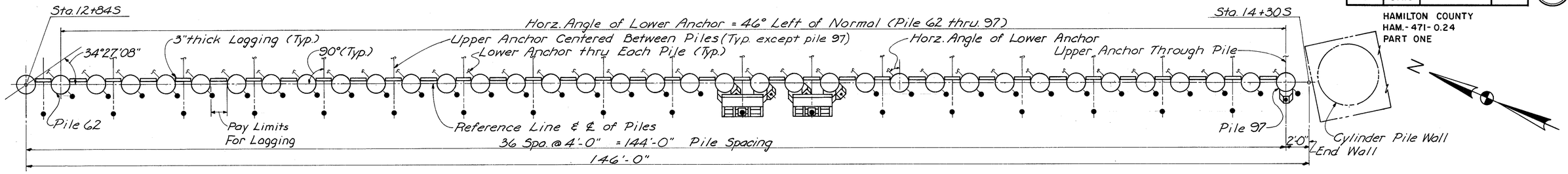
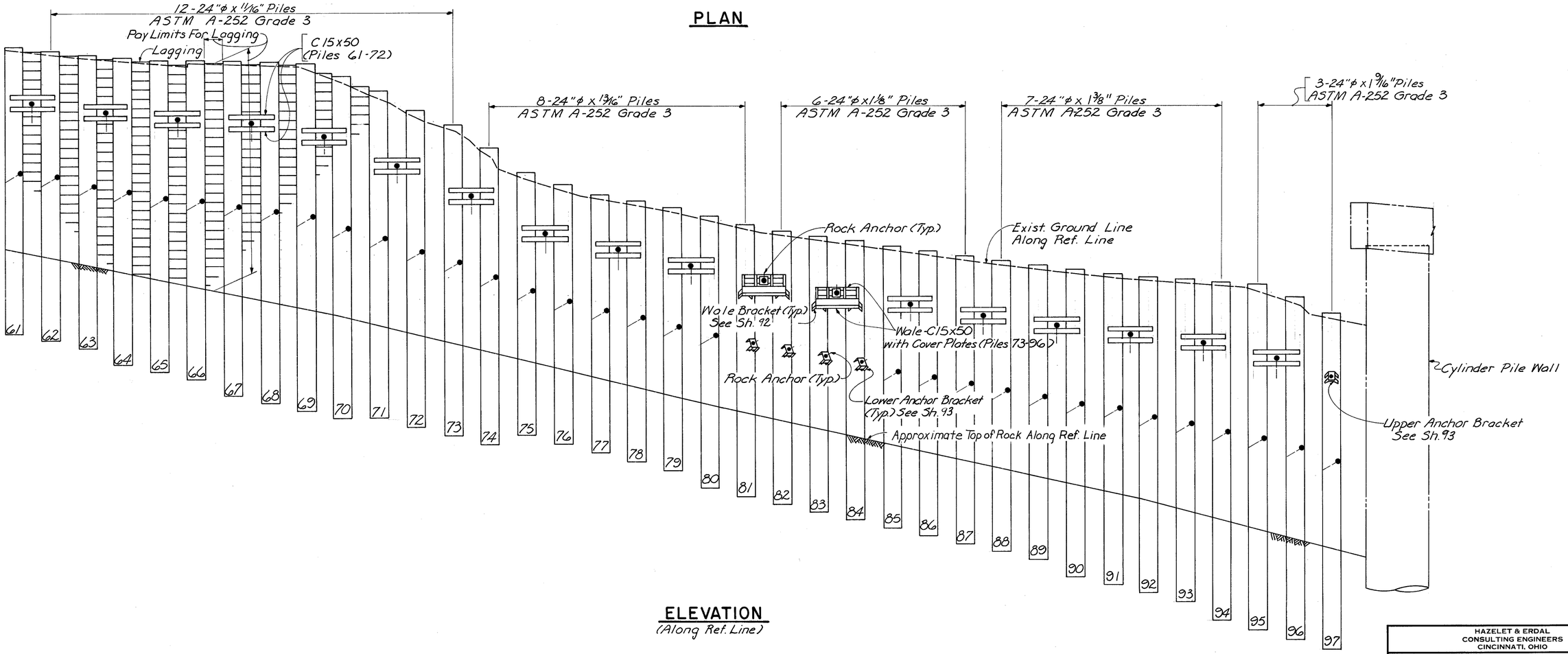
HAMILTON COUNTY
HAM.- 471- 0.24
PART ONE



PLAN



ELEVATION
(Along Ref. Line)

Note:
For Pile Dimensions and Location of Anchors See Sheets 86 & 87.

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PLAN & ELEVATION
TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	YK	MRT	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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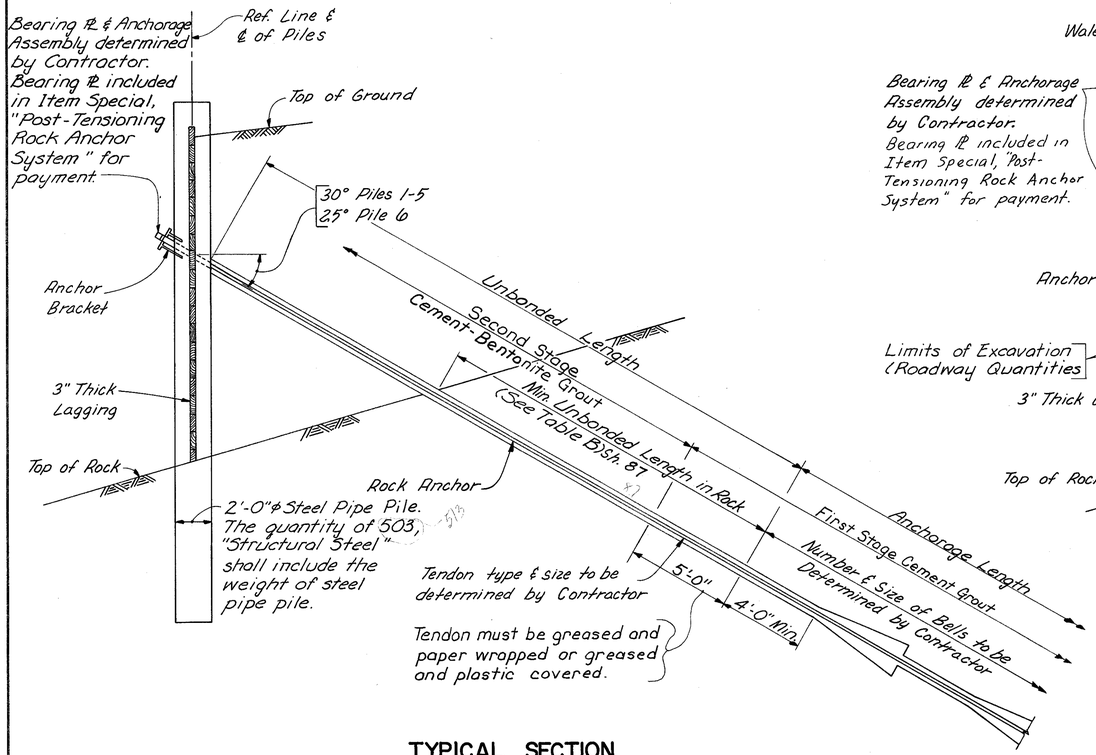
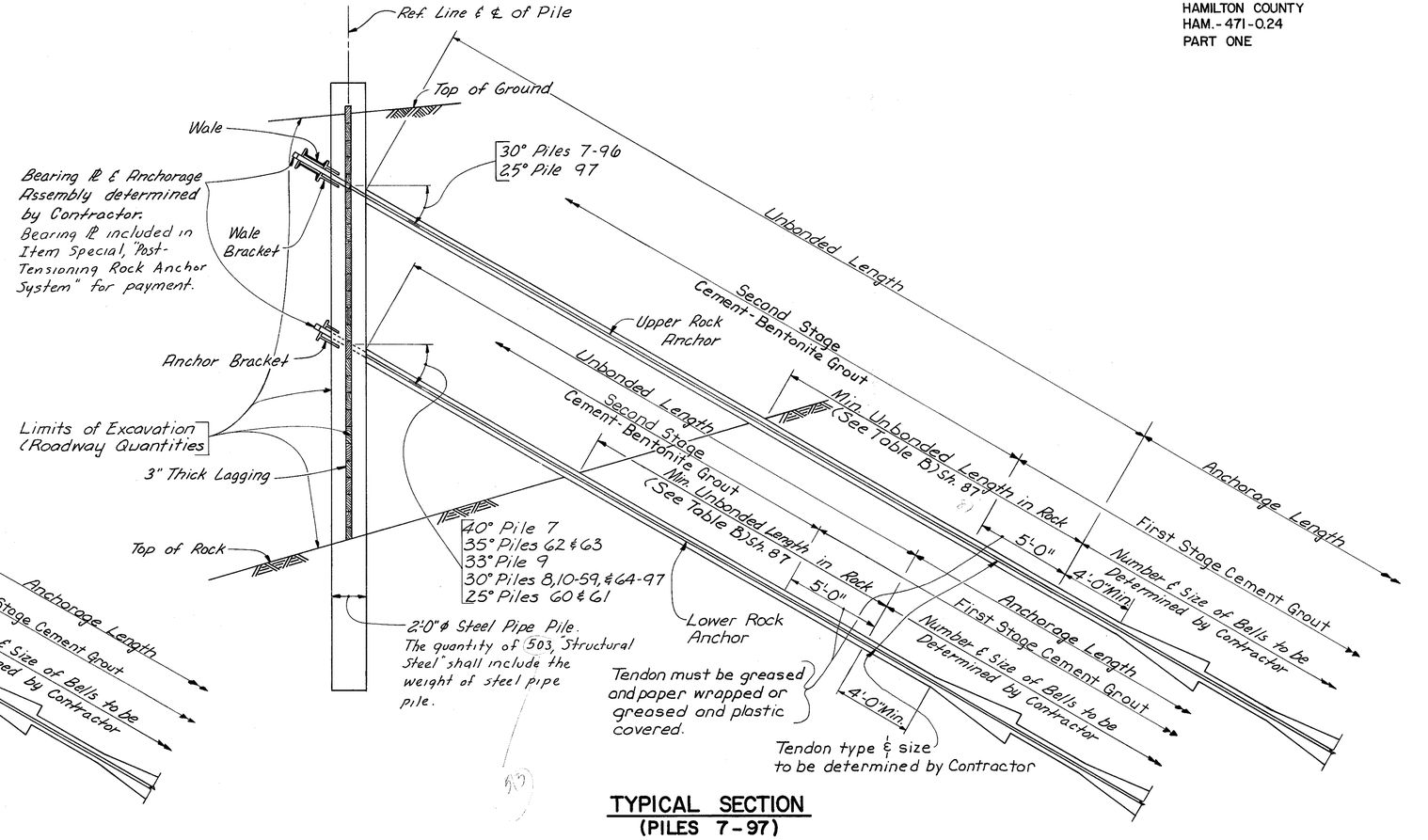
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



TYPICAL SECTION
(PILES 1-6)



TYPICAL SECTION
(PILES 7-97)

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WALL DETAILS

TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	MRT	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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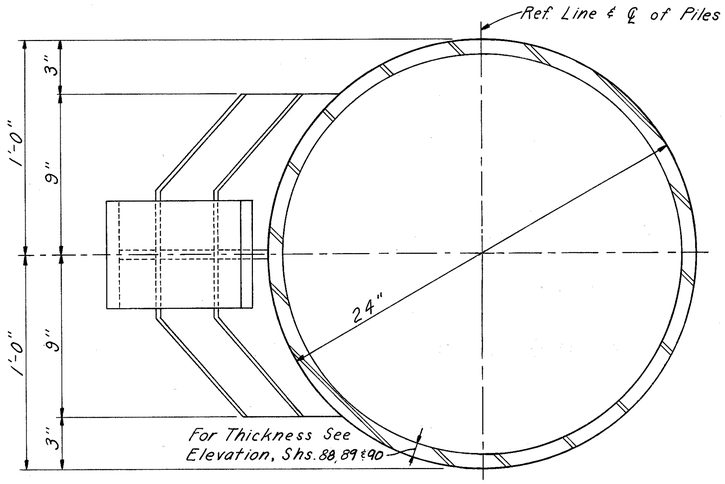
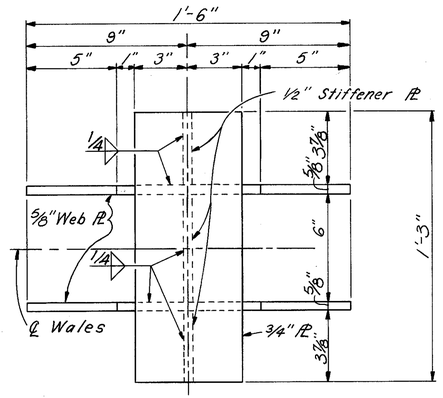
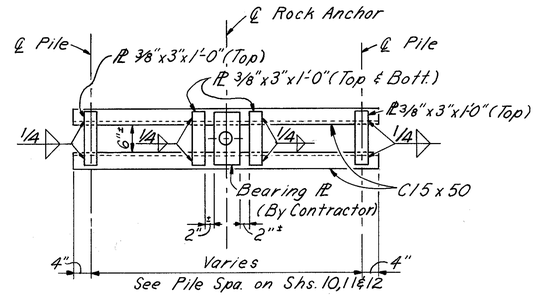
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



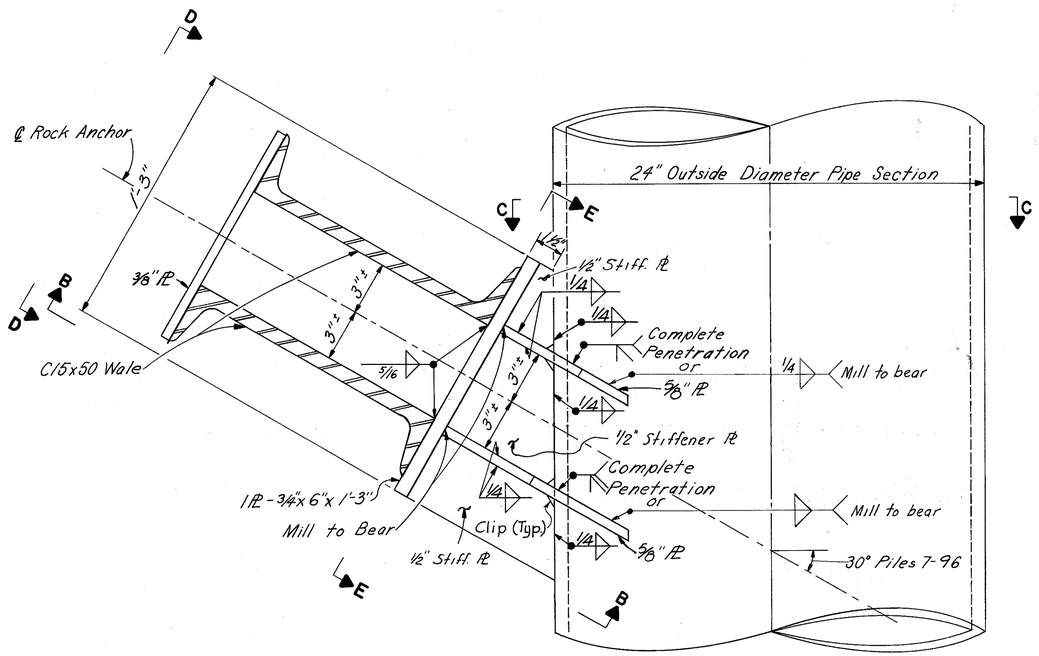
SECTION C-C
(Wales Not Shown)



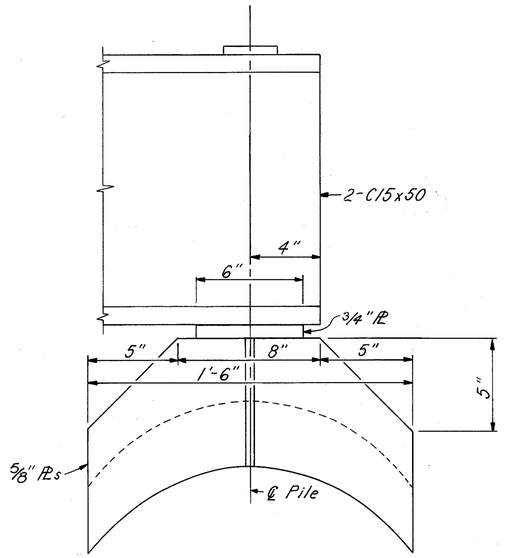
SECTION E-E



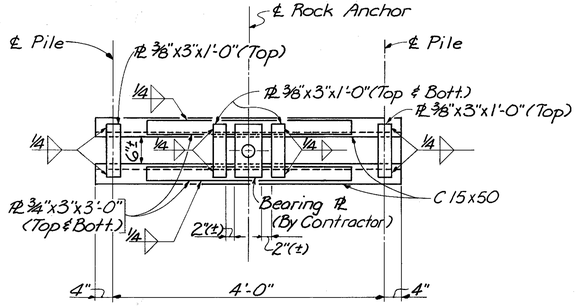
SECTION D-D
(Piles 7-72)



WALE BRACKET



SECTION B-B



SECTION D-D
(Piles 73-96)

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

WALL DETAILS

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISI
RFD	RFD	TMC	VDG	JHO 2-27-79	

Superseded by sheet 92A, 5-5-81

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

92A
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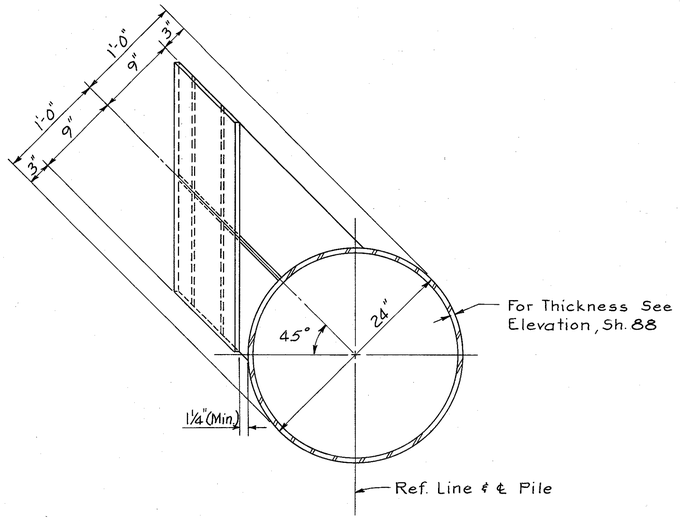
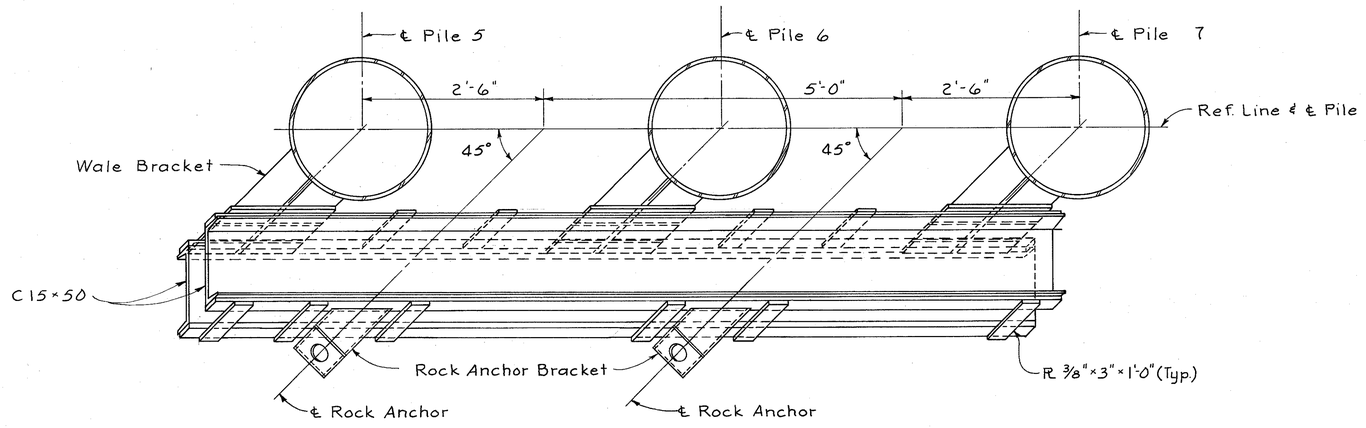
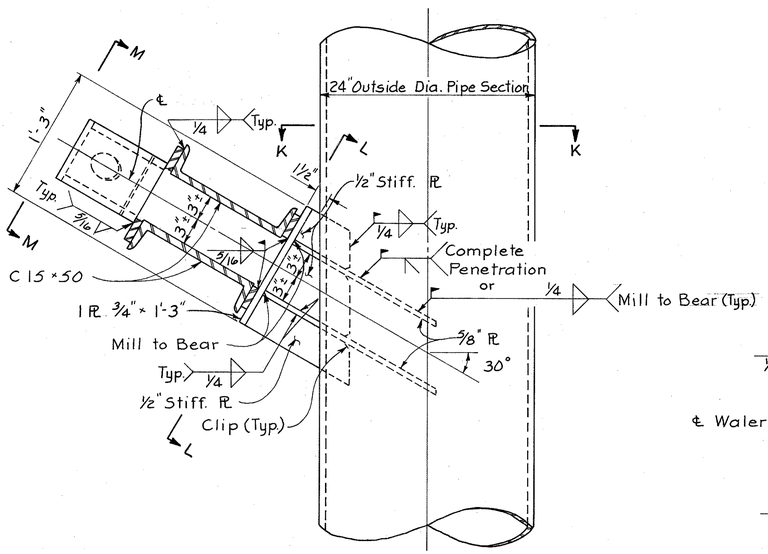
HAMILTON COUNTY
HAM-471-0.24
PART ONE



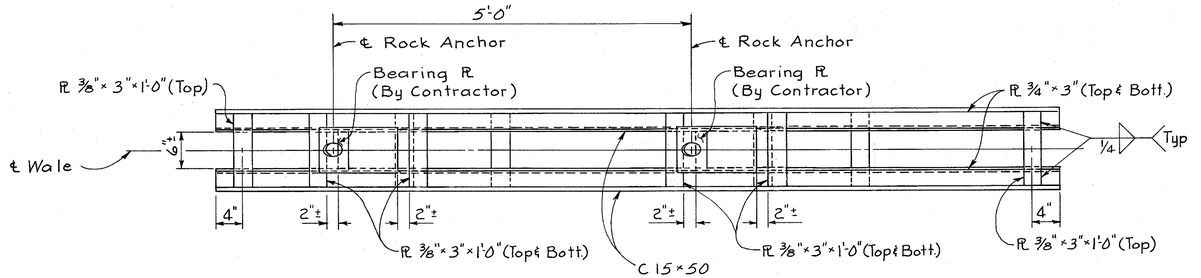
SECTION K-K



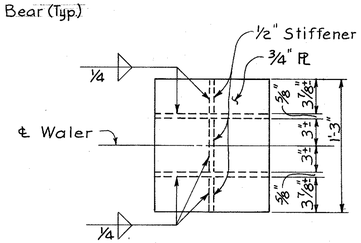
PLAN



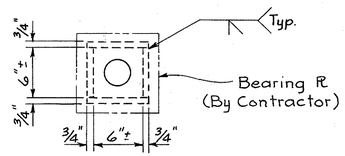
WALE BRACKET



SECTION M-M



SECTION L-L



ROCK ANCHOR BRACKET

Supersedes sheet 92, 5-5-81

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

WALL DETAILS

TEMPORARY SOLDIER PILE WALL
STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
VDG	ALT		WL		

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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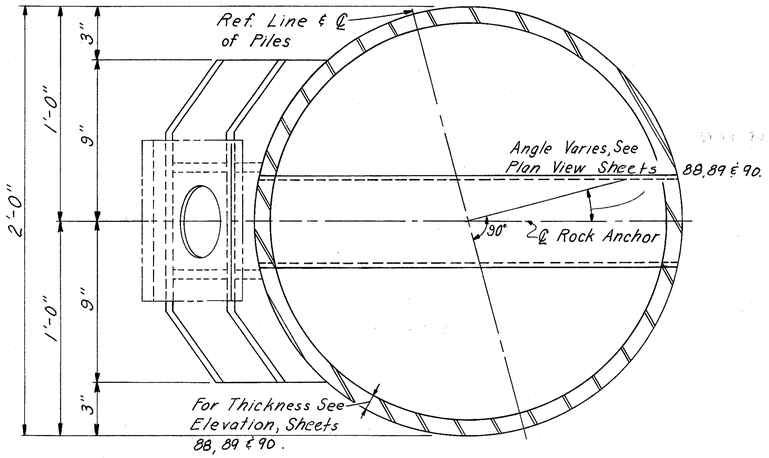
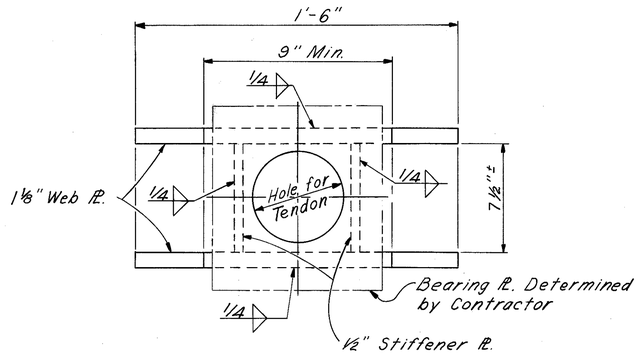
172

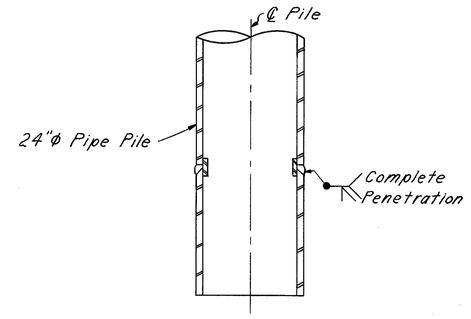
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



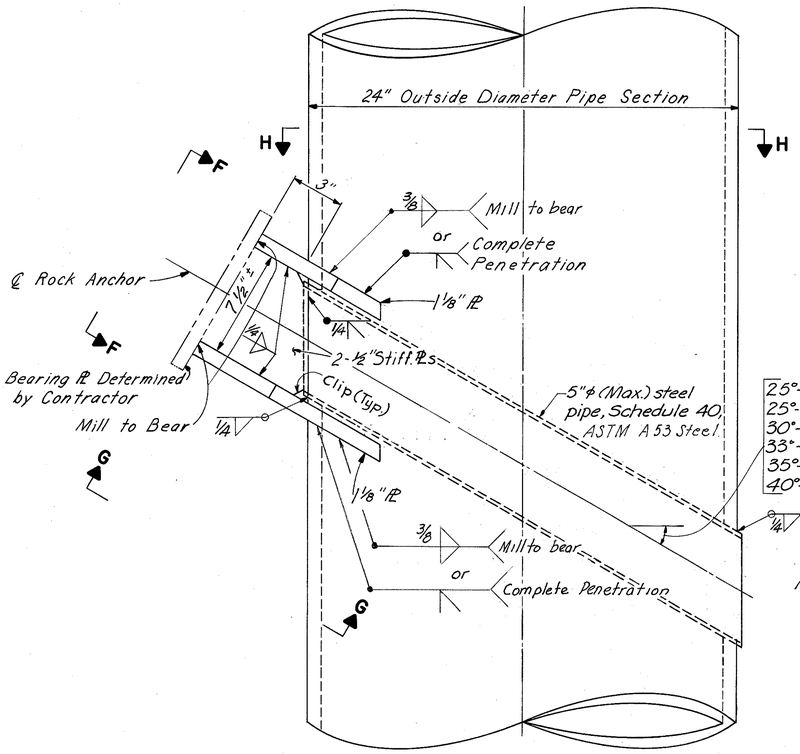
SECTION H-H



SECTION F-F

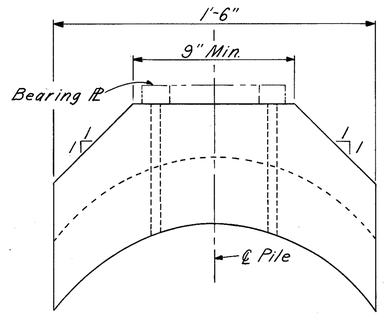


PILE FIELD SPLICE



ANCHOR BRACKET

Note:
5" Steel pipe shall be included in Item 513, "Structural Steel". A deduction for 5" steel pipe shall be made in Item 511, "Class C concrete, Steel Pipe Piles". The Anchor Bracket Detail is for the tendons of Piles 1-6 and the lower tendons of Piles 7-97 except as noted.



SECTION G-G

Note: See Permanent Bench Mark Detail Sh. 129 Cylinder Pile Wall Drawings

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

WALL DETAILS

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	TMC	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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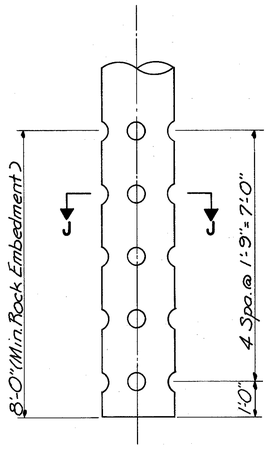
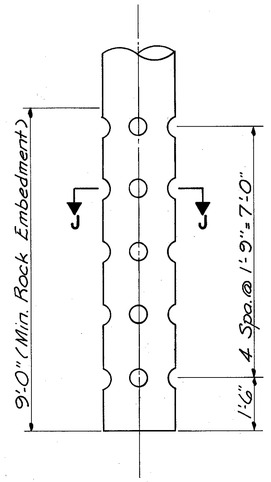
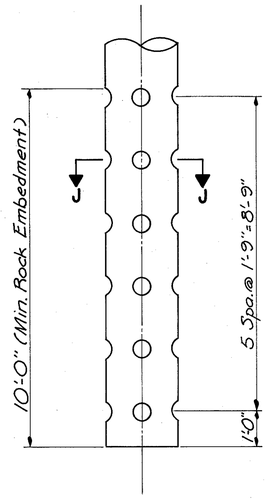
HAMILTON COUNTY
HAM.-471-024
PART ONE



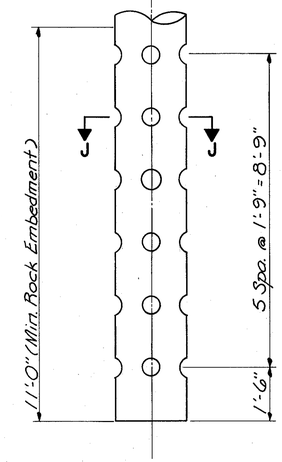
PILES 1-17, 47-50, & 75-79



PILES 18-25, 40-46 51-56, 60-63 & 80-89

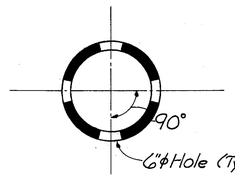


PILES 26-39, 57-59 64-66, 71-74 & 90-93

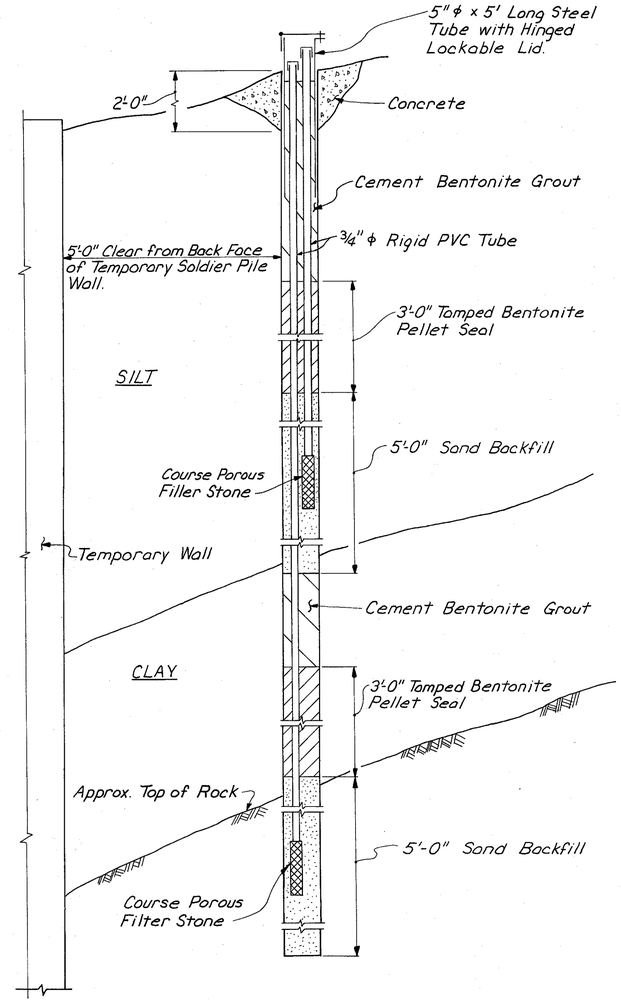


PILES 67-70 & 94-97

BOTTOM OF PILE DETAIL



SECTION J-J



OPEN-STANDPIPE PIEZOMETER INSTALLATION

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

WALL DETAILS

TEMPORARY SOLDIER PILE WALL

STA. 10+00S TO STA. 14+30S

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
RFD	RFD	YK	VDG	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

95/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

Access Shaft Building. For Details See Sheet 160.

Access Shaft

Ex. House Connection

Ex 6" GM

Sta. 1+80.00 T = Sta. 0+87.46 K (123.37' Lt.)

Future 14' Conc. Drive

E. FIFTH ST.

Future 6' Conc. Walk

Ex. 30" Br. S-C.B.

Future

Ex 6" WM

Prop. 24" Conduit

P.T. Sta. 4+11.00 T

Curve No. 1T

St. Wall

℄ 9' Inside ϕ Tunnel For Profile see Sh. 97.

P.T. Sta. 4+11.00 T = Sta. 2+44.64 K (55.625 Lt.)

Conc. Wall

6 St. Br.

85'-0"

Angle Pt. Sta. 5+88.17 T

S 66° 43' 00" E

S 70° 13' 20" E

#348 3½ St. Br.

#346 4 St. Br.

#344 4½ St. Br.

Conc. Wall

Prop. Wall (By Others)

PC. Sta. 3+36.44 W = Sta. -0+01.73 K (25.67' Lt.)

Prop. 8" Water Main

Prop. 24" Conduit

Ex. 12" PS

Ex. 6" WM

Prop. 12" Conduit

Base Line Kilgour Street

KILGOUR ST.

Sta. 4+23.50 K

Base Line W

Curve No. 1W

Curve No. 2W

Prop. 24" Conduit

P.T. Sta. 8+31.86 W = Sta. 4+81.85 K (29.375' Rt.)

P.C. Sta. 7+13.39 W = Sta. 3+65.15 K (29.375' Rt.)

Ex 4" GM

Guy

Ex 6" GM

CYLINDER PILE WALL

Temp. Steps see sheet 42. (Include with 614)

P.T. Sta. 5+44.05 W = Sta. 1+95.81 K (29.375' Rt.)

MONASTERY ST.

BRIDGE NO. HAM-471-M Monastery Street Off Kilgour Street (By Others)

FINN ST.

Ex. 3" GM

PLAN

Type 1 Railing

Proposed Ground Line in Front of Wall

Approx. Top of Rock

7'ϕ Cylinder Piles with tie backs to tunnel

Prop. 24" Conduit

For Details See Sheet No. 24

Match Line

4 W 5 W 6 W 7 W 8 W 9 W

PROFILE
ALONG ℄ W

CURVE DATA

Curve No. 1T	Curve No. 1W	Curve No. 2W
Δ = 34°39'00"	Δ = 31°08'30"	Δ = 3°30'20"
R = 381.97'	R = 381.97'	R = 1936.23'
T = 119.15'	T = 106.44'	T = 59.25'
L = 231.00'	L = 207.61'	L = 118.47'
D = 15°00'00"	D = 15°00'00"	D = 2°57'32.89"

Note:
For Bench Marks see sheet 16
For Alignment and Witness Plan see sheet 15
For Sections A-A, B-B and C-C see Sheet 98
For Sections G-G and H-H see Sheet 99

Work Sheets 95 thru 99 together

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

SITE PLAN
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	WRT/YK		JH2	JHO 2-23-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

96/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

BAUM ST.

Ventilation Shaft Building For Details see sheet 162.

Exist. 2"Exposed GM

Ventilation Shaft to Tunnel Sta.11+18.00T

Sta.11+52.00 T=Sta.9+78.17K(113.50Lt.)

End of Tunnel

Sign

Ex. 6" W.M.

Ex.4"GM

OREGON ST.

Exist Wall to be removed to below ground

Retaining Wall 2

Meet Existing Wall Sta. 15+17.39 W =Sta 10+47.35 P (5.04' Lt.)

W.B.F.T. WASHINGTON WAY

Sta. P.T. 15+12.39 W =Sta. 9+81.86 P (10.75' Lt.)

Ex.12"PS

Prop.12"Cond.

Ex.24"PS

N79°25'00"E

Ex.27"PS

Ex.Asphalt Curb

Ex.4"Exposed GM

Conc. Wall

Type 2 Modified Poved Gutter

CYLINDER PILE WALL

Curve No. 3W

Curve No. 2T

Prop.14 Cond.

Ex.Guard Rail

Ex.12"C.M.Pipe

Sta. P.C. 11+74.06 W =Sta. 8+24.06 K (129.75' Rt)

T.P.

Type 1 Railing

Type 2 Railing

Ex.H.P.14x117 Soldier Piles @6' Ctrs. (3" Wood Lagging)

℄ 9' Inside ϕ Tunnel For Profile see Sh.97.

S70°13'20"E

Base Line Kilgour Street

KILGOUR ST.

Base Line W S70°13'20"E

Prop.12" Outlet Sewer from Tunnel For Profile see Sh.26

Sta. 9+38.98T =Sta.7+76.02K (556.25Lt.)

Prop.12" Conduit

Ex.12"PS

Ex.8"WM

Ex. 6" W.M.

Ex. Soldier Pile Wall Bracing H.P.14x117(Buried)

Ex. sheet Pile Reaction

MATCH LINE

RAMP L

RAMP P

Bridge NO. HAM.-471- Ramp L over Monastery St. & Ramp P (By Others)

"340 3 St. Br.

"338 3 St. Br.

"336 2 St. Br.

"334 2 St. Br.

"332 2 St. Br.

"330 4 St. Br.

"319 2 St. Fr.

"317 2 St. Br.

85'-0"

CURVE DATA

Curve No. 2T	Curve No. 3W
Δ = 31° 57' 108"	Δ = 50° 21' 40"
R = 381.97'	R = 384.92'
T = 109.36'	T = 180.97'
L = 213.02'	L = 338.33'
D = 15° 00' 00"	D = 14° 53' 06.25"

PLAN

Match Line

Prop. Ground Line in Front of Wall

Approx. Top of Rock

Prop.14"Conduit For Details See Sheet No. 26.

4'ϕ Cylinder Piles with rock anchors

5'ϕ Cylinder Piles with tie backs to tunnel

6'ϕ Cylinder Piles with tie backs to tunnel

7'ϕ Cylinder Piles with tie backs to tunnel

Prop. Outlet Sewer from Tunnel

RETAINING WALL NO 2

580 570 560 550 540 530 520 510 500 490

10 W 11 W 12 W 13 W 14 W 15 W

Work Sheets 95 thru 99 together

PROFILE
Along ℄ W

Note:
For Section D-D see sheet 98.
For SectionsE-E, F-F and J-J see sheet 99

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

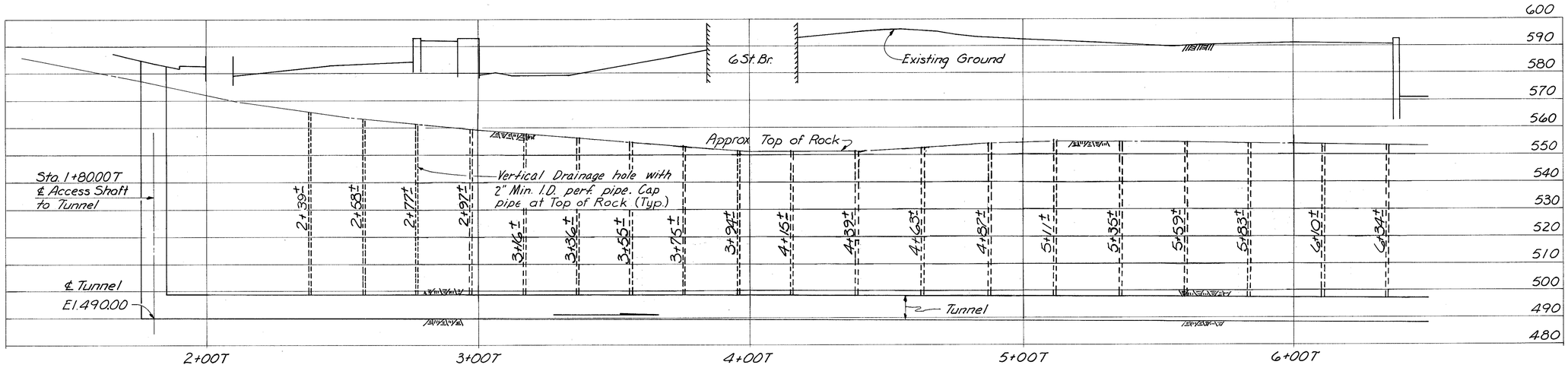
SITE PLAN
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MRT/YK		WL	JHO 2-23-79	

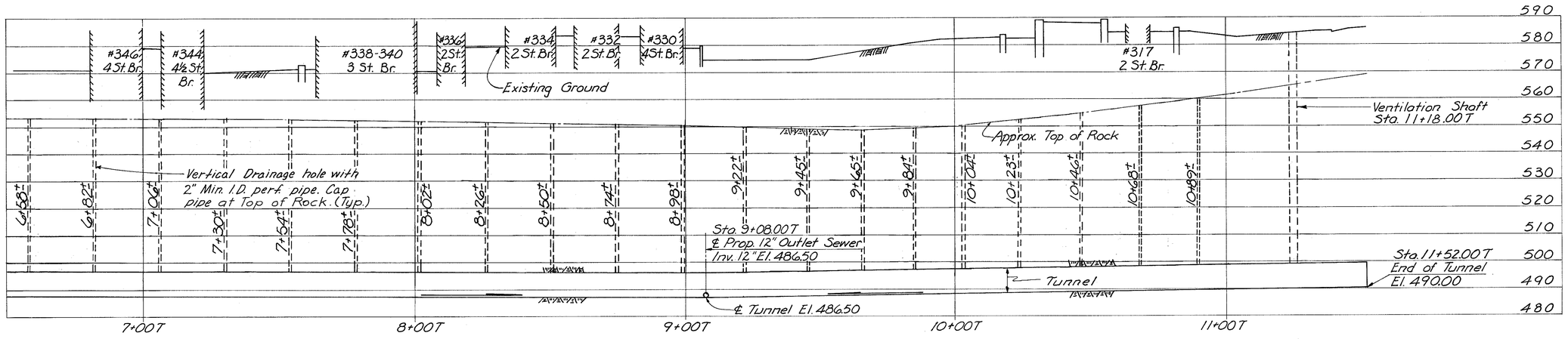
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

97/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



PROFILE
Along ℄T



PROFILE
Along ℄T

Notes: For Tunnel Plan, Layout, and Curve Data see SITE PLAN-CYLINDER PILE WALL sheets 95 and 96
For Bench Marks see sheet 16

Work Sheets 95 thru 99 Together

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

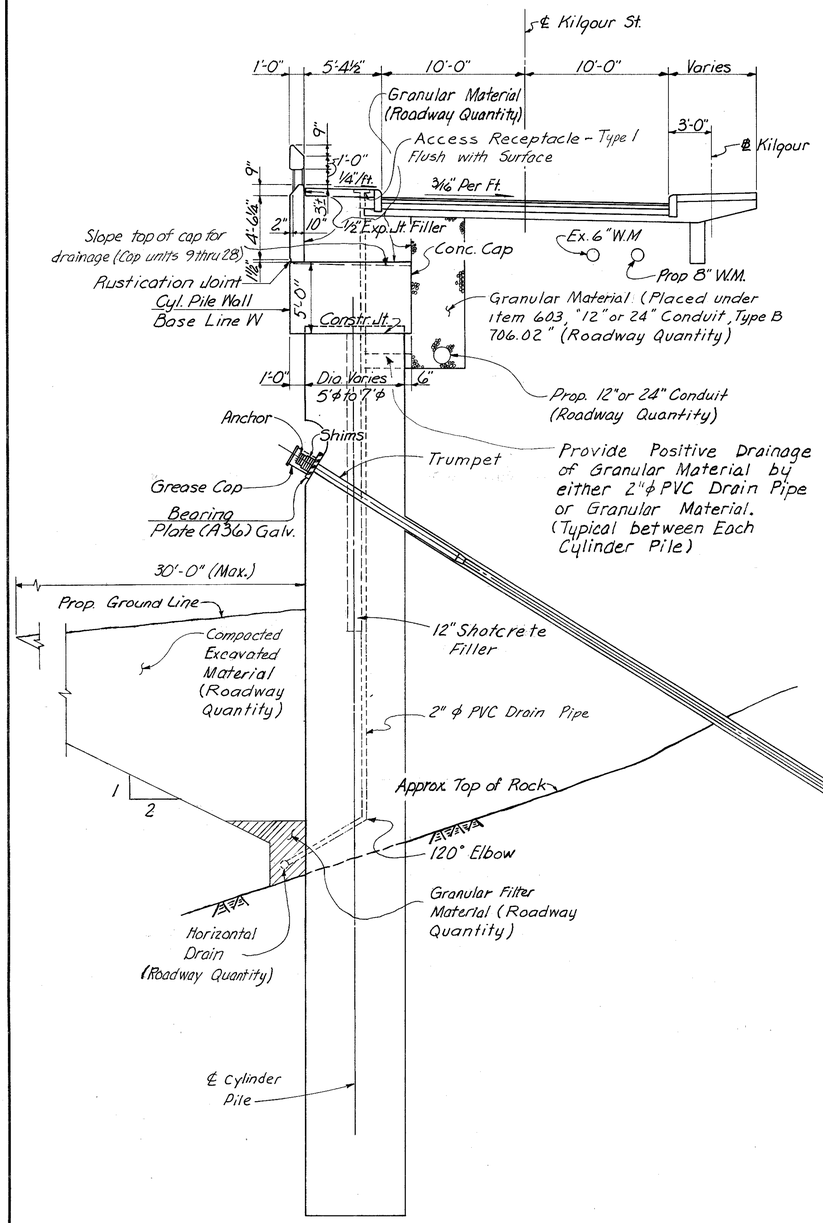
SITE PLAN
LONGITUDINAL SECTION ALONG TUNNEL
STA. 1+80T TO STA. 11+52T

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK			JHO 2-23-79	

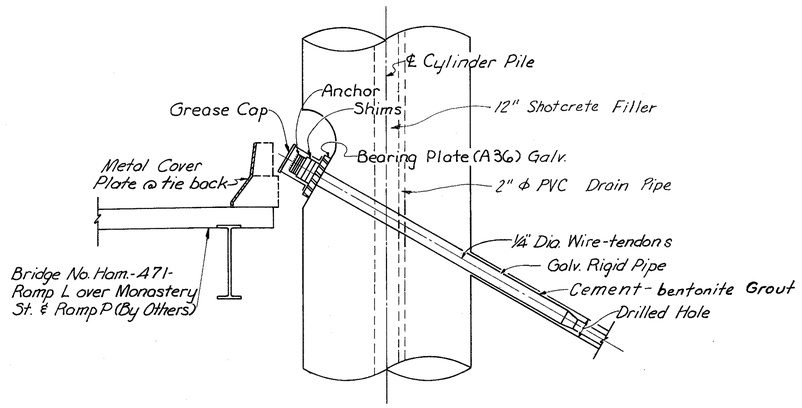
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

98/172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE



SECTION A-A



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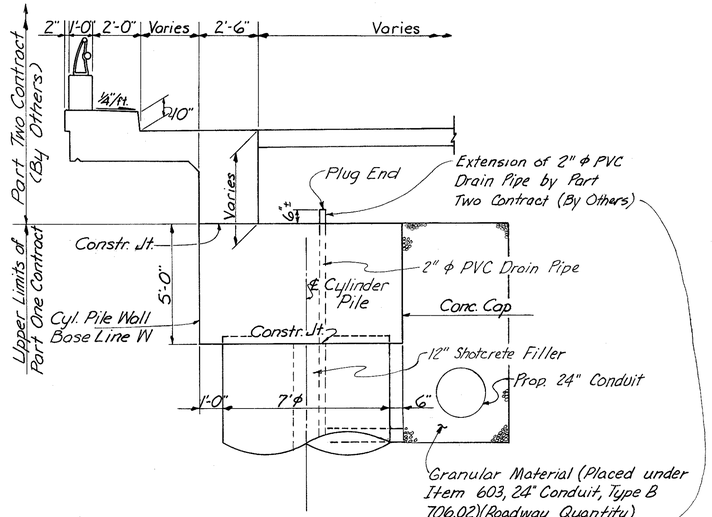
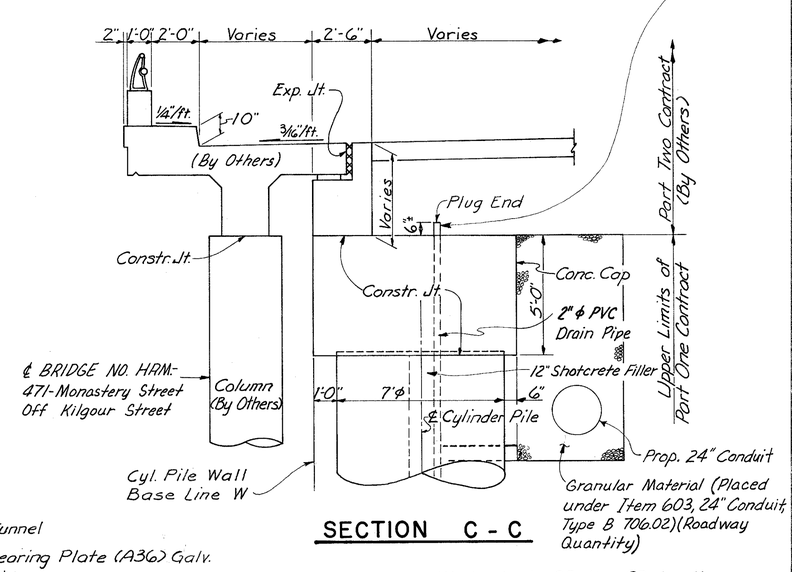


SECTION B-B



SECTION C - C

Work sheets 95 thru 99 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

SITE PLAN DETAILS

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		JHO	JHO 2-23-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

99
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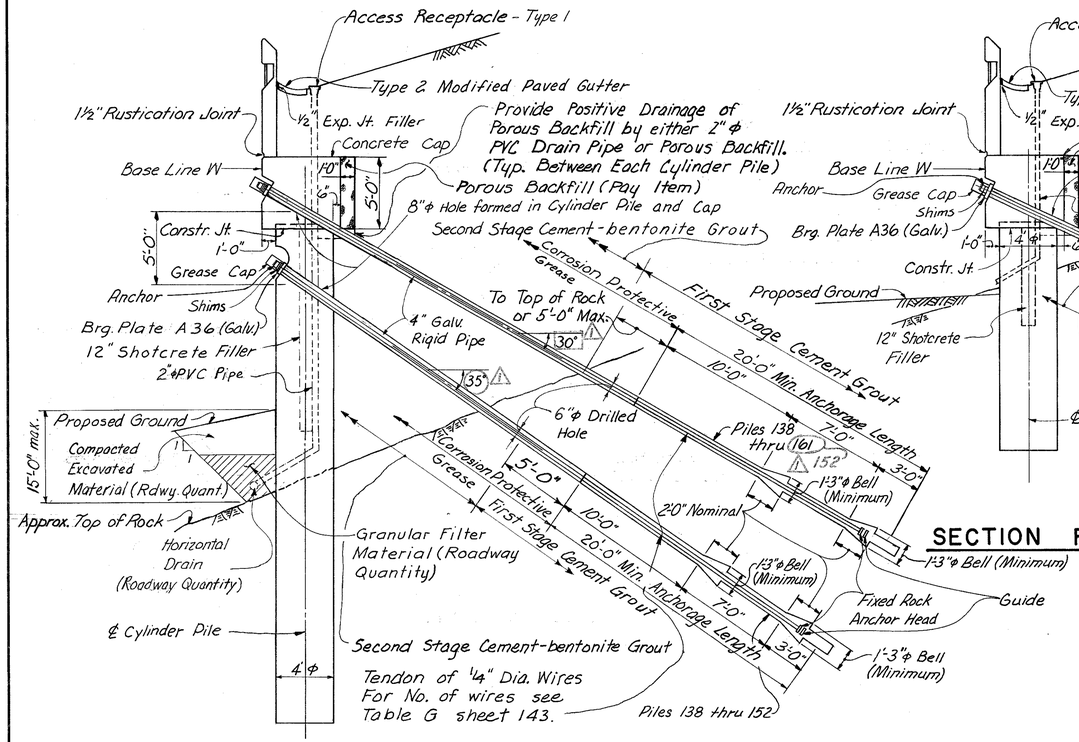
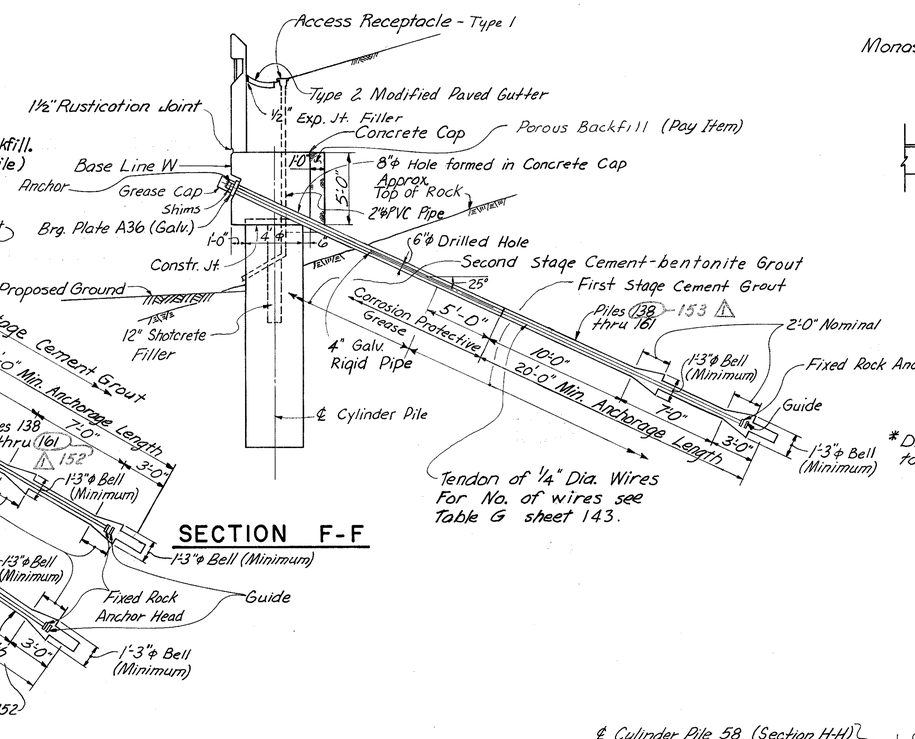
HAMILTON COUNTY
HAM.-471-0.24
PART ONE

△ 30° 30° Piles 138-147 & 149-152
32° Pile 148

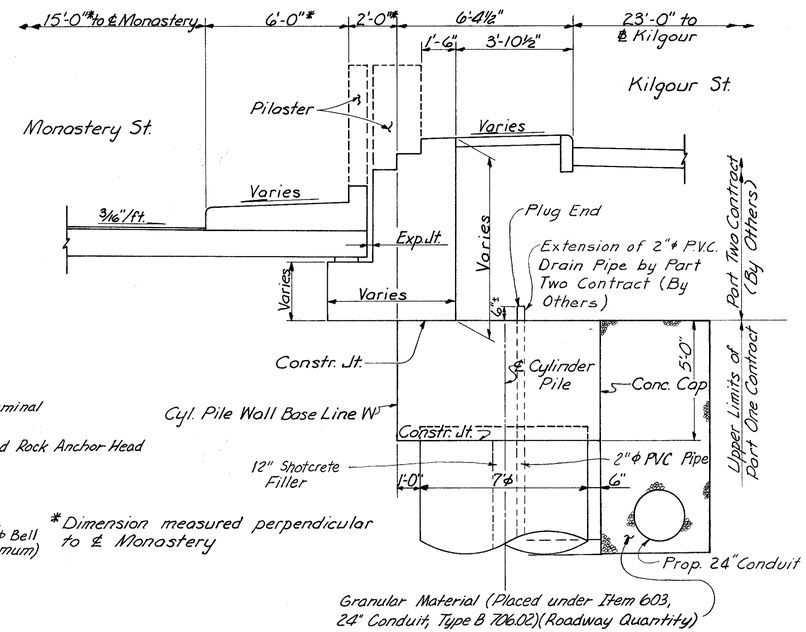
△ 35° 35° Piles 138-147 & 149-152
30° Pile 148



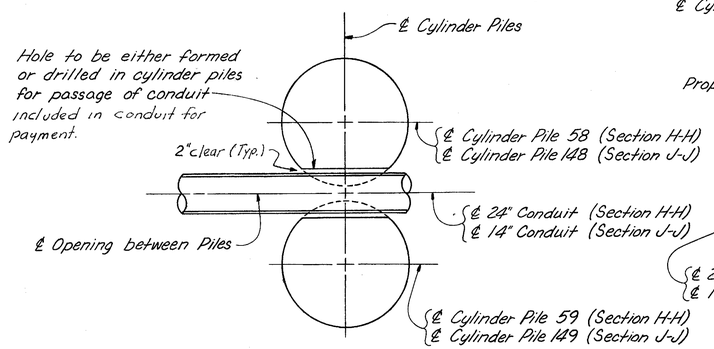
SECTION E-E



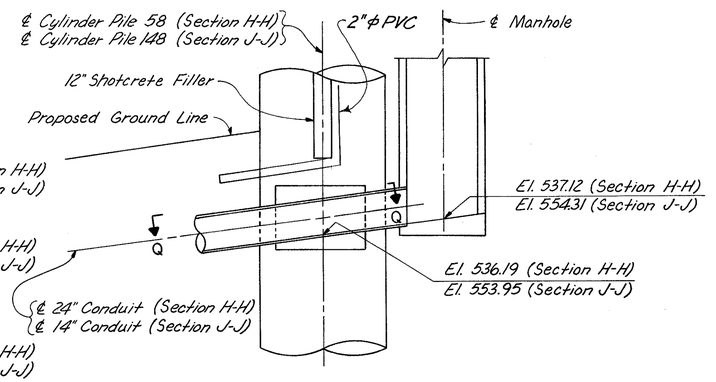
SECTION F-F



SECTION G-G



SECTION Q-Q



SECTION H-H
Section J-J Similar

Revised 11-10-80 △

Work sheets 95 thru 99 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

SITE PLAN DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVIS
	YK		WL	JHO 2-23-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM.-471-0.24
PART ONE

ESTIMATED QUANTITIES

ITEM	TOTAL	UNIT	DESCRIPTION
202	Lump	Lump sum	Removal of existing Soldier Pile Wall
503	Lump	Lump sum	Cofferdams, Cribs and Sheeting
503	2,990	Cubic yard	Unclassified Excavation
503	228	Linear foot	Soil Excavation, 4 foot Diameter Cylinder Piles
503	424	Linear foot	Soil Excavation, 5 foot Diameter Cylinder Piles
503	349	Linear foot	Soil Excavation, 6 foot Diameter Cylinder Piles
503	4,140	Linear foot	Soil Excavation, 7 foot Diameter Cylinder Piles
503	369	Linear foot	Rock Excavation, 4 foot Diameter Cylinder Piles
503	310	Linear foot	Rock Excavation, 5 foot Diameter Cylinder Piles
503	211	Linear foot	Rock Excavation, 6 foot Diameter Cylinder Piles
503	2,866	Linear foot	Rock Excavation, 7 foot Diameter Cylinder Piles
509	459,360	Pound	Reinforcing Steel, Grade 60
509	60	Each	Mechanical Connector Splice for 14S Reinforcing Steel Bars
511	603	Linear foot	Class "C" Concrete, 4 foot Diameter Cylinder Pile
511	736	Linear foot	Class "C" Concrete, 5 foot Diameter Cylinder Pile
511	560	Linear foot	Class "C" Concrete, 6 foot Diameter Cylinder Pile
511	7,039	Linear foot	Class "C" Concrete, 7 foot Diameter Cylinder Pile
511	305	Cubic yard	Class "C" Concrete, Anchorage Blocks
511	1,683	Cubic yard	Class "C" Concrete, Cap
511	40	Cubic yard	Class "C" Concrete, Tunnel Floor
513	5,000,000	Pound	Structural Steel
513	11	Each	Steel Pipe Beam Splice
513	18	Each	Steel Plate Beam Splice
517	630	Linear foot	Type 1 Railing
517	282	Linear foot	Type 2 Railing
518	40	Each	Access Receptacle - Type 1
518	2	Each	Access Receptacle - Type 2
518	10	Each	Access Receptacle - Type 3
518	14	Each	Access Receptacle - Type 4
518	2	Each	Access Receptacle - Type 5
518	3	Each	Access Receptacle - Type 6
518	198	Each	Tunnel Weep Holes
518	341	Linear foot	Tunnel Drainage Pipe
518	2,293	Linear foot	Vertical Drainage Holes
518	6,420	Linear foot	2-Inch Perforated Polyvinylchloride Pipe
518	65	Cubic yard	Porous Backfill
Special	Lump	Lump sum	Access Shaft Excavation and Support
Special	18	Linear foot	Ventilation Shaft Excavation and Support, in Soil
Special	68	Linear foot	Ventilation Shaft Excavation and Support, in Rock
Special	968	Linear foot	Tunnel Excavation and Initial Support, in Rock
Special	3,296	Linear foot	Structural Shotcrete Filler
Special	968	Linear foot	Final Tunnel Lining
Special	137	Each	Post-Tensioning System to Tunnel
Special	39	Each	Post-Tensioning Rock Anchor System
Special	39	Each	Grout for Rock Anchor Drill Holes
Special	137	Each	Grout for Anchor Drill Holes to Tunnel
Special	190	Hour	Assistance Time for Tests in Cylinder Piles at Regular Paying Rate
Special	90	Hour	Assistance Time for Tests in Cylinder Piles at Overtime Paying Rate
Special	90	Hour	Assistance Time for Tests in Tunnel at Regular Paying Rate
Special	50	Hour	Assistance Time for Tests in Tunnel at Overtime Paying Rate
Special	Lump	Lump sum	Mechanical Equipment
Special	Lump	Lump sum	Electrical Equipment
Special	Lump	Lump sum	Access Shaft Building
Special	Lump	Lump sum	Ventilation Shaft Building
Special	28	Each	Restressing of Tendon (For Cylinder Piles 1 thru 137)
Special	8	Each	Restressing of Tendon (For Cylinder Piles 138 thru 161)
Special	Lump	Lump Sum	Observation and Monitoring

GENERAL NOTES

REFERENCE

SHALL BE MADE TO SUPPLEMENTAL SPECIFICATION 836 DATED 3-12-75

DESIGN SPECIFICATIONS

THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1977, AND THE OHIO "SUPPLEMENT" TO THESE SPECIFICATIONS.

DESIGN DATA

CONCRETE CLASS C
- UNIT STRESS 1600 psi (CYLINDER PILES)
- UNIT STRESS 1333 psi (ANCHORAGE BLOCKS AND CAP)
- UNIT STRESS 1200 psi (RAILING AND TUNNEL FLOOR)

STRUCTURAL STEEL - ASTM A36 - UNIT STRESS 20,000 psi

STEEL PIPE - ASTM A252, GRADE 2 Fy = 35,000 psi

REINFORCING STEEL
- ASTM A615, A616 OR A617, GRADE 60
  UNIT STRESS 24,000 psi (CYLINDER PILES, ANCHORAGE BLOCKS AND CAP)
- ASTM A615, A616 OR A617, GRADE 40
  UNIT STRESS 20,000 psi (RAILING, ACCESS SHAFT LINING, TUNNEL LINING, ACCESS SHAFT BUILDING AND VENTILATION SHAFT BUILDING)

PRESTRESSING WIRES - ASTM A421, TYPE BA MINIMUM TENSILE STRENGTH = 240,000 psi

REINFORCING STEEL

REINFORCING STEEL USED IN THE CONSTRUCTION OF THE 4' DIAMETER CYLINDER PILES, REINFORCED CONCRETE ANCHORAGE BLOCKS AND REINFORCED CONCRETE CAP SHALL BE GRADE 60 STEEL.

WELDING

WELDING SHALL CONFORM TO THE REQUIREMENTS OF THE AASHTO STANDARD SPECIFICATIONS FOR THE WELDING OF STRUCTURAL STEEL HIGHWAY BRIDGES, 1977, AND SUBSEQUENT AASHTO INTERIM SPECIFICATIONS, BRIDGES.

APPROVALS

"WHEREVER IN THESE NOTES IT IS REQUIRED THAT THE CONTRACTOR SUBMIT FOR APPROVAL OF THE ENGINEER NARRATIVE DESCRIPTIVE MATERIAL, CATALOG CUTS OR DRAWINGS, FIVE COPIES OF SUCH MATERIAL SHALL ACCOMPANY HIS SUBMITTAL. WHERE IT IS REQUIRED THAT DESIGN COMPUTATIONS COVERING HIS PROPOSED CONSTRUCTION BE SUBMITTED FOR APPROVAL OF THE ENGINEER, TWO COPIES OF THOSE COMPUTATIONS SHALL ACCOMPANY HIS SUBMITTAL. SUCH SUBMITTALS SHALL BE MADE AT LEAST 30 DAYS PRIOR TO STARTING CONSTRUCTION ON THE PHASE OF THE WORK COVERED BY THE SUBMITTAL, AND THE CONSTRUCTION WORK SHALL NOT BE STARTED ON THAT PHASE OF THE WORK UNTIL THE CONTRACTOR RECEIVES THE ENGINEER'S APPROVAL. ALL DRAWINGS AND DESIGN COMPUTATIONS SUBMITTED BY THE CONTRACTOR FOR APPROVAL SHALL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER AND SHALL BEAR HIS SIGNATURE AND REGISTRATION NUMBER, OR HIS PROFESSIONAL ENGINEERING SEAL."

CONSTRUCTION AND MATERIAL SPECIFICATIONS

ALL WORK INCLUDED IN THIS CONTRACT SHALL BE IN ACCORDANCE WITH THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED IN THESE NOTES. EACH ITEM OF WORK SHALL INCLUDE THE FURNISHING OF ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE THE ITEMS SO SPECIFIED.

ENGINEER

WHEREVER IN THESE NOTES "ENGINEER" IS MENTIONED IT SHALL MEAN THAT IN ADDITION TO THOSE PERSONS LISTED IN THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, IT SHALL ALSO MEAN ENGINEER'S REPRESENTATIVE, GEOTECHNICAL ENGINEER AND ENGINEERING GEOLOGIST.

DEFINITION OF TOP OF ROCK FOR PAYMENT

FOR DEFINITION OF TOP OF ROCK FOR PAYMENT, SEE SHEET NO. 80.

NOTES CONTINUED ON SHEET 101

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

ESTIMATED QUANTITIES & GENERAL NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		JJH	JJH 2-23-79	9-4-79

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

101
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE

NOTES (CONTINUED FROM SHEET 100)

TUNNEL EXCAVATION AND INITIAL SUPPORT, IN ROCK

DESCRIPTION. THIS ITEM SHALL CONSIST OF EXCAVATING THE TUNNEL THROUGH THE CLAYSTONE (CLAY SHALE) BEDROCK, WITH OCCASIONAL LIMESTONE STRINGERS; FURNISHING AND INSTALLING INITIAL SUPPORT FOR THE EXCAVATION; REMOVING THE SPOIL; HAND EXCAVATING FOR INSTALLATION OF ANCHOR BLOCK; DEWATERING; DISPOSING OF EXCAVATED MATERIAL; AND FURNISHING ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO COMPLETE THE CONSTRUCTION OF THE TUNNEL IN ACCORDANCE WITH THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN. FINAL TUNNEL SUPPORT SHALL BE AS SPECIFIED IN THE NOTE "FINAL TUNNEL LINING".

GENERAL. THE TUNNEL SHALL BE CONSTRUCTED ALONG THE ALIGNMENT AND TO THE LENGTH SHOWN ON THE PLANS. THE TUNNEL SHALL BE CIRCULAR OR IT MAY BE ANY OTHER SHAPE APPROVED BY THE ENGINEER, AND SHALL HAVE A MINIMUM FINISHED SIZE AS SHOWN ON THE PLANS.

THREE PLATE BEARING TESTS WILL BE PERFORMED BY THE ENGINEER, AND IN ADDITION, IT MAY BE FOUND NECESSARY THAT THE ENGINEER PERFORM DIRECT SHEAR TEST AT A MAXIMUM OF THREE LOCATIONS. THE TESTS SHALL BE PERFORMED EITHER WITHIN THE INITIAL 100 FEET OF THE TUNNEL EXCAVATION, OR IN AN ADIT EXCAVATED ON THE ALIGNMENT OF THE TUNNEL CENTERLINE AND LOCATED ON THE SIDE OF THE ACCESS SHAFT EXCAVATION OPPOSITE FROM THE TUNNEL. THE ADIT SHALL BE NOT LESS THAN 20 FEET LONG, 5 FEET WIDE, AND 7 FEET CLEAR HEIGHT. THE COST OF CONSTRUCTING THE ADIT SHALL BE AT THE CONTRACTOR'S EXPENSE, AND THE CONTRACTOR SHALL HAVE THE OPTION OF WHETHER TO CONSTRUCT THE ADIT AND TO HAVE THE TESTS PERFORMED THEREIN, OR WHETHER TO HAVE THE TESTS PERFORMED IN THE TUNNEL EXCAVATION, IN WHICH CASE IT WOULD NOT BE NECESSARY TO CONSTRUCT THE ADIT.

THE NEED FOR PERFORMING DIRECT SHEAR TESTS IN THE TUNNEL OR ADIT DEPENDS ON WHETHER OR NOT THE DIRECT SHEAR TESTS PERFORMED IN THE INITIAL CYLINDER PILES INDICATE THAT THE EFFECTIVE ANGLE OF INTERNAL FRICTION OF THE ROCK MASS IS GREATER THAN 15 DEGREES; IF IT IS NOT, THEN THE MAXIMUM OF THREE DIRECT SHEAR TESTS WILL BE PERFORMED IN THE TUNNEL OR ADIT.

TUNNEL EXCAVATION. THE TUNNEL MAY BE EXCAVATED BY ANY METHOD, SUBJECT TO THE APPROVAL OF THE ENGINEER, WITH THE EXCEPTION OF BLASTING WHICH IS PROHIBITED FOR THIS CONTRACT.

THE CONTRACTOR SHALL, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK, SUBMIT FOR APPROVAL BY THE ENGINEER, FIVE COPIES OF SHOP AND WORKING DRAWINGS, INCLUDING ALL DETAILS, PERTINENT DESCRIPTIONS, DATA AND TWO COPIES OF CALCULATIONS REGARDING HIS PROPOSED CONSTRUCTION EQUIPMENT, FACILITIES, METHODS OF CONSTRUCTION, HOISTING PLANT, INITIAL SUPPORTS, GROUND WATER CONTROL, AND TUNNEL VENTILATION AND LIGHTING. THE CONTRACTOR'S DRAWINGS SHALL SHOW DETAILS OF INITIAL SUPPORT SYSTEMS, INCLUDING LOCATION AND TIMING OF INSTALLATION IN RELATION TO THE EXCAVATION PLAN AND SEQUENCE, AND DESIGN ASSUMPTIONS AND CALCULATIONS. THE CONTRACTOR'S DRAWINGS SHALL SHOW DETAILS OF THE RELATIONSHIP OF THE FINAL LINING TO THE INITIAL SUPPORT AND TO THE EXCAVATION PLAN, TIMING AND SEQUENCE OF EXCAVATION AND SUPPORT. EXCAVATION FOR THE TUNNEL SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DETAIL PLANS FOR THE TUNNEL INITIAL SUPPORT HAS BEEN RECEIVED FROM THE ENGINEER. COMPUTATIONS SHALL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER AND SHALL BEAR HIS SIGNATURE AND REGISTRATION NUMBER, OR PROFESSIONAL ENGINEERING SEAL.

IF THE USE OF A TUNNEL BORING MACHINE IS PROPOSED, THE CONTRACTOR SHALL, AT LEAST 30 DAYS PRIOR TO ITS USE, SUBMIT FIVE SETS OF DETAILED SHOP DRAWINGS OF THE MACHINE FOR APPROVAL BY THE ENGINEER. TUNNEL BORING MACHINE SHALL: (1) MINIMIZE EXCAVATION OUTSIDE THE APPROVED TUNNEL DIMENSION, (2) BE PROVIDED WITH A DUST CONTROL SYSTEM, INCLUDING A SPRAY SYSTEM AND DUST SHROUD, WITH THE INTAKE END OF THE SUCTION LINE AS CLOSE TO THE MACHINE AS POSSIBLE WITHOUT INTERFERING WITH OTHER OPERATIONS, AND (3) PERMIT THE INSTALLATION OF INITIAL SUPPORTS NOT MORE THAN FIVE FEET FROM THE FACE OF THE TUNNEL OR, IF A MACHINE SHIELD IS USED, NOT MORE THAN FIVE FEET BEHIND THE SHIELD.

THE CONTRACTOR SHALL ENDEAVOR TO AVOID LOOSENING MATERIAL BEYOND THE APPROVED EXCAVATION DIMENSIONS. ANY LOOSE MATERIAL REMAINING ON THE EXCAVATED SURFACES SHALL BE REMOVED IMMEDIATELY. THE REMOVAL OF LOOSE MATERIALS SHALL BE DONE BY METHODS THAT WILL NOT DAMAGE THE REMAINING ROCK IN THE TUNNEL.

ANY DAMAGE TO, OR DISPLACEMENT OF TUNNEL SUPPORTS, OR DAMAGE TO ANY OTHER PARTS OF THE WORK CAUSED BY ANY OF THE CONTRACTOR'S OPERATIONS, SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE IN AN APPROVED AND TIMELY MANNER.

THE CONTRACTOR SHALL ASSUME ALL COSTS RESULTING FROM EXCAVATION AND REMOVAL OF ROCK OUTSIDE OF THE APPROVED TUNNEL DIMENSIONS. ANY REMEDIAL OR PREVENTIVE SUPPORT MEASURES, WHICH MAY BE NECESSITATED BY OVER-EXCAVATION, SHALL BE PERFORMED BY THE CONTRACTOR AT HIS OWN EXPENSE.

TUNNELING AND RELATED CONSTRUCTION SHALL BE PERFORMED IN A MANNER THAT WILL MINIMIZE THE MOVEMENT OF THE ROCK IN FRONT OF AND SURROUNDING THE TUNNEL, AND MINIMIZE SUBSIDENCE OF THE GROUND SURFACE, STRUCTURES, AND UTILITIES ABOVE AND IN THE VICINITY OF THE TUNNEL. THE CONTRACTOR SHALL SUPPORT THE ROCK CONTINUOUSLY IN A MANNER WHICH WILL PREVENT LOSS OF ROCK AND KEEP THE SURFACES OF THE TUNNEL, PASSAGES AND BOTTOMS OF SHAFTS STABLE.

ALL TUNNELING OPERATIONS SHALL BE CONDUCTED BY METHODS AND WITH EQUIPMENT WHICH WILL POSITIVELY CONTROL DUST, FUMES, VAPORS, GASES, FIBRES, FOGS, MISTS, OR OTHER ATMOSPHERIC IMPURITIES.

CLEAN WORKING CONDITIONS SHALL BE MAINTAINED AT ALL TIMES INSIDE THE TUNNEL. ALL MUCK, SLUSH, GROUT SPILLS, UNUSABLE TIMBER, AND OTHER MATERIAL NOT REQUIRED FOR TUNNELING SHALL BE PROMPTLY REMOVED.

DURING THE EXCAVATION OF THE TUNNEL, THE CONTRACTOR SHALL PROVIDE ACCESS, ASSISTANCE, AND OTHER SERVICES AS REQUIRED BY THE ENGINEER FOR THE PLATE BEARING AND/OR DIRECT SHEAR TESTS PERFORMED IN THE TUNNEL BY THE ENGINEER. PAYMENT FOR THESE SERVICES WILL BE INCLUDED UNDER ITEM SPECIAL "CONTRACTOR ASSISTANCE TIME FOR TESTS".

TEMPORARY DRAINAGE. TEMPORARY DRAINAGE FACILITIES OF ADEQUATE SIZE, WITH STANDBY PUMPS FOR EMERGENCY USE, TO COLLECT AND DISPOSE OF WATER WHICH ENTERS THE UNDERGROUND EXCAVATIONS SHALL BE INSTALLED AND MAINTAINED DURING THE CONSTRUCTION PERIOD.

DISPOSAL OF EXCAVATED MATERIAL. EXCAVATED MATERIAL SHALL BE DISPOSED OF AS DESCRIBED IN THE NOTE FOR "ACCESS SHAFT EXCAVATION AND SUPPORT".

INITIAL TUNNEL SUPPORT. THE CHOICE OF THE INITIAL SUPPORT SYSTEM SHALL BE LEFT TO THE CONTRACTOR, SUBJECT TO APPROVAL BY THE ENGINEER. THE TUNNEL INITIAL SUPPORT SYSTEM SHALL BE DESIGNED, FURNISHED AND INSTALLED BY THE CONTRACTOR FOR STABILITY AND SAFETY DURING CONSTRUCTION PRIOR TO AND DURING THE CONSTRUCTION OF THE FINAL TUNNEL LINING. THE TUNNEL INITIAL SUPPORT SYSTEM SHALL BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER.

THE CONTRACTOR IS ALERTED TO THE FACT THAT THE STRESSING OF THE TENDONS WILL CAUSE ELASTIC DEFORMATIONS OF THE TUNNEL, CAUSING SOME REDISTRIBUTION OF STRESSES IN THE ROCK SURROUNDING THE TUNNEL AND THE INITIAL SUPPORT SYSTEM AND POSSIBLY SOME LOOSENING OF ROCK IN THE CROWN OF THE TUNNEL.

INITIAL SUPPORTS MAY BE STEEL RIB TUNNEL SUPPORT SYSTEM (SEE STEEL RIB TUNNEL AND SHAFT INITIAL SUPPORT SYSTEM SPECIFICATION, SHEET NO. 118), ROCK REINFORCEMENT WITH ROCK SURFACE REINFORCEMENT (SEE ROCK REINFORCEMENT SPECIFICATION, SHEET NO. 121), CONCRETE TUNNEL LINING (SEE CONCRETE LINING SPECIFICATION, SHEET NO. 120), SHOTCRETE (SEE SHOTCRETE SPECIFICATION, SHEET NO. 122), OR PRECAST CONCRETE (SEE PRECAST CONCRETE SPECIFICATION, SHEET NO. 120).

METHOD OF MEASUREMENT. THE COMPLETED TUNNEL, PROPERLY EXCAVATED AND INITIALLY SUPPORTED, SHALL BE MEASURED BY LENGTH IN LINEAR FEET.

LENGTH FOR PAYMENT SHALL BE MEASURED WITHIN THE LIMITS SHOWN ON THE "PROFILE OF TUNNEL" DRAWING AND ALONG THE CENTERLINE OF THE TUNNEL.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL WORK HEREINBEFORE DESCRIBED:

PAYMENT WILL BE MADE UNDER:

ITEM	UNIT	DESCRIPTION
SPECIAL	LINEAR FOOT	TUNNEL EXCAVATION AND INITIAL SUPPORT, IN ROCK

CLASS C CONCRETE, ANCHORAGE BLOCKS

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING PORTLAND CEMENT CONCRETE IN ACCORDANCE WITH 511 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN. THE CONCRETE SHALL BE PLACED IN REASONABLY CLOSE CONFORMITY WITH THE LINES, GRADES AND DIMENSIONS OF THE CONCRETE ANCHORAGE BLOCKS SHOWN ON THE PLANS.

GENERAL. FOR THE PURPOSE OF IDENTIFICATION IN THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, CONCRETE FOR THE ANCHORAGE BLOCKS SHALL BE CONSIDERED STRUCTURAL CONCRETE (EXCLUDING SUPERSTRUCTURE CONCRETE).

CONCRETE USED IN THE ANCHORAGE BLOCKS MAY BE HIGH-EARLY-STRENGTH CONCRETE.

THE DIMENSIONS OF THE ANCHORAGE BLOCKS SHOWN ON SHEET NO. 150 HAVE BEEN CALCULATED BASED ON AN ASSUMED ALLOWABLE ROCK BEARING PRESSURE OF 25 TONS PER SQUARE FOOT. IF INFORMATION OBTAINED FROM THE INITIAL PLATE BEARING TESTS TO BE PERFORMED BY THE ENGINEER WITHIN THE TUNNEL OR THE SIDE ADIT INDICATES THAT THE ALLOWABLE BEARING PRESSURE OF THE ROCK MASS IS SUBSTANTIALLY GREATER THAN 25 TONS PER SQUARE FOOT, THE ANCHORAGE BLOCKS WILL BE REDESIGNED BY THE ENGINEER.

APPROVAL FROM THE ENGINEER MUST BE OBTAINED BEFORE ANY REINFORCING STEEL FOR THE ANCHORAGE BLOCKS IS FABRICATED OR ORDERED OR ANY CONSTRUCTION OF THE CAST-IN-PLACE OR PRECAST ANCHORAGE BLOCKS HAS BEEN STARTED.

NOTES CONTINUED ON SHEET 102

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 101)

ALL LOOSE OR SLAKED ROCK SHALL BE REMOVED FROM THE TUNNEL WALLS. SCALING OF THE LOOSE ROCK AND CLEANING OF THE ROCK SURFACE WITH HIGH PRESSURE AIR AND/OR WATER PRIOR TO CONCRETING THE BLOCKS SHOULD PROVIDE AN ADEQUATELY CLEAN AND FRESH ROCK SURFACE FOR CONCRETING.

CONSTRUCTION. FORMWORK FOR CAST-IN-PLACE ANCHOR BLOCKS SHALL BE ADEQUATELY SUPPORTED DURING CONCRETING OPERATIONS IN ORDER THAT THERE BE NO MOVEMENT THEREOF. IF TENDON BEARING PLATES ARE NOT PLACED BEFORE THE CONCRETE IS CAST, FORMS AND THEIR SUPPORTS SHALL BE DESIGNED SO THAT A PORTION OF THE FORMS MAY BE REMOVED TO PERMIT THE INSTALLATION OF THE BEARING PLATES WITHOUT DISTURBING THE FORM SUPPORTS IN ORDER TO ASSURE THAT NO MOVEMENT OF THE BLOCK OCCURS PRIOR TO FULL SCALE TENSIONING OF THE TENDONS. IF THE CONTRACTOR SO ELECTS, THE TIEBACK TENDON EXTENDING THROUGH THE ANCHOR BLOCK MAY BE USED FOR AUXILIARY SUPPORT OF THE FORMWORK AND THE WEIGHT OF THE CONCRETE BLOCK. IF THE TENDON IS USED FOR THIS SUPPORT, IT SHALL PREVIOUSLY HAVE BEEN PRE-TENSIONED TO SUPPORT A LOAD OF APPROXIMATELY 30 TONS IN ORDER TO ASSURE THAT THE WIRES COMPRISING THE TENDON HAVE ASSUMED THEIR FINAL POSITIONS WITHIN THE TENDON. THE CONTRACTOR SHALL, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK, SUBMIT FOR APPROVAL BY THE ENGINEER DETAILED DRAWINGS SHOWING THE FORMS, THEIR SUPPORTS AND THE METHOD WHICH HE PROPOSES TO USE IN CONSTRUCTING THE ANCHOR BLOCKS, AND SUCH DATA MUST BE APPROVED BY THE ENGINEER PRIOR TO THE CONSTRUCTION OF THE BLOCKS.

SURFACE FINISH. IF THE TENDON BEARING PLATES ARE NOT IN PLACE WHEN THE ANCHOR BLOCK CONCRETE IS CAST, AND IF THE CONCRETE IS NOT PLACED DIRECTLY AGAINST THE BEARING PLATES, THE SURFACES UNDER THE BEARING PLATES SHALL BE GROUND WITH A CARBORUNDUM BRICK OR BY OTHER METHODS, SO THAT THERE IS NOT A VARIATION OF MORE THAN 1/16 INCHES UNDER ANY BEARING PLATE.

THE METHOD OF DEPOSITING THE CONCRETE SHALL BE SUCH AS TO ASSURE THAT ALL REINFORCING STEEL IS COMPLETELY ENVELOPED IN CONCRETE MORTAR, AND THAT ALL VOIDS ARE FILLED.

ALTERNATE. THE CONTRACTOR HAS THE OPTION OF USING PRECAST CONCRETE ANCHORAGE BLOCKS (SEE PRECAST CONCRETE SPECIFICATION, SHEET NO. 120); THE PRECAST ANCHOR BLOCKS SHALL BE GROUTED IN PLACE (SEE TUNNEL GROUTING SPECIFICATION, SHEET NO. 119).

METHOD OF MEASUREMENT. THE YARDAGE SHALL BE THE NUMBER OF CUBIC YARDS AS DETERMINED BY CALCULATIONS FROM PLAN DIMENSIONS (UNLESS THE SIZES HAVE BEEN REDUCED FROM PLAN DIMENSIONS BY THE ENGINEER, IN WHICH CASE YARDAGE WILL BE CALCULATED USING REVISED PLAN DIMENSIONS), IN PLACE, COMPLETED AND ACCEPTED.

A DEDUCTION WILL BE MADE FOR THE VOLUME OF THE HOLE IN THE CONCRETE ANCHORAGE BLOCK AND ANY CLIPPED CORNERS.

REINFORCING STEEL WILL BE PAID FOR AS SPECIFIED UNDER 509, "REINFORCING STEEL, GRADE 60".

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
511	CUBIC YARD	CLASS "C" CONCRETE, ANCHORAGE BLOCKS

STRUCTURAL SHOTCRETE FILLER

DESCRIPTION. THIS ITEM APPLIES TO THE FURNISHING AND PLACING OF SHOTCRETE BETWEEN THE CYLINDER PILES FROM THE BOTTOM OF THE CAP TO ELEVATION E SHOWN IN TABLE M ON SHEET NO. 151.

GENERAL. THE SHOTCRETE, EXCEPT FOR THE 2-INCH THICKNESS WHICH IS INITIALLY BEING USED TO COVER THE VERTICAL DRAIN AND FILTER MATERIAL FROM THE BOTTOM OF CAP TO BOTTOM OF INITIAL EXCAVATION ON THE DOWNHILL SIDE OF THE WALL FOR TENDON INSTALLATION, SHALL NOT BE APPLIED UNTIL ALL THE CYLINDER PILES HAVE BEEN CONSTRUCTED, TENDONS INSTALLED AND STRESSED AND ALL THE EXCAVATION DOWNHILL FROM THE CYLINDER PILES COMPLETED AND THE VERTICAL DRAIN PIPES INSTALLED UNLESS ADDITIONAL SHOTCRETE APPLICATION IS DEEMED NECESSARY TO MAINTAIN INTEGRITY OF THE VERTICAL DRAINAGE SYSTEM.

SEE SHOTCRETE SPECIFICATION, SHEET NO. 122.

REINFORCEMENT. REINFORCEMENT SHALL CONSIST OF 4-#5 VERTICAL BARS. VERTICAL BARS SHALL BE SECURELY HELD IN POSITION DURING SHOTCRETING BY #5, U-SHAPED TIES AT 24-INCH CENTERS. THE U-SHAPED BARS SHALL BE DRIVEN INTO THE EARTH.

METHOD OF MEASUREMENT. THE FOOTAGE FOR PAYMENT SHALL BE THE ACTUAL NUMBER OF LINEAR FEET OF SHOTCRETE, MEASURED VERTICALLY ALONG EACH SPACE BETWEEN CYLINDER PILES, APPLIED IN PLACE.

REINFORCING STEEL AND EXCAVATION WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THIS ITEM FOR PAYMENT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LINEAR FOOT	STRUCTURAL SHOTCRETE FILLER

REMOVAL OF EXISTING SOLDIER PILE WALL

DESCRIPTION. THIS ITEM SHALL BE IN ACCORDANCE WITH ITEM 202 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

THE WORK SHALL CONSIST OF THE REMOVAL OF A PORTION OR ALL OF THE HEAVY SOLDIER PILE WALL AND BRACING WHICH EXISTS AT THE EAST END OF KILGOUR STREET, AND WHICH WAS BUILT UNDER THE CONSTRUCTION OF THE HAM-471-0.08 PROJECT AND THEN BURIED DURING EMERGENCY BACKFILLING AFTER THE DECEMBER 1973 SLIDE. THIS WALL CONSISTS OF A TOTAL OF 49 SOLDIER PILES, HP 14x117, UP TO 40 FEET LONG, SPACED AT APPROXIMATELY 6-FOOT CENTERS, WITH 3-INCH WOOD LAGGING. THE WALL IS BRACED WITH HP 14x117 SECTIONS AGAINST A WALER OF THE SAME SECTION (OVER SOME SECTIONS A DOUBLE WALER WAS INSTALLED) LOCATED APPROXIMATELY 10 FEET BELOW GROUND LEVEL. EACH BRACE IS SUPPORTED AT ITS DOWNSLOPE TOE BY A SHORT RUN OF SHEET PILING OF RELATIVELY SHALLOW DEPTH.

GENERAL. IN ORDER TO CONSTRUCT THE CYLINDER PILE WALL, PORTIONS OF THE EXISTING SOLDIER PILE WALL WILL NEED TO BE REMOVED BECAUSE OF INTERFERENCE BETWEEN THE SOLDIER PILE WALL AND THE CYLINDER PILE WALL. THE ORDER OF REMOVAL OF THE SOLDIER PILE WALL SHALL BE COORDINATED WITH THE CONSTRUCTION OF THE CYLINDER PILES, AND IS SHOWN ON SHEET NO. 127.

THE REMOVAL SHALL BE MADE WITH CARE IN ORDER TO AVOID DISTURBING THE STABILITY OF THE HILLSIDE AND MINIMIZE LOST GROUND AND THE CREATION OF VOIDS OR SOFT AREAS.

THE APPROXIMATE LOCATION OF THE SOLDIER PILE WALL AND BRACING IS SHOWN ON THE SITE PLAN SHEET NO. 96; HOWEVER, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ACCURATELY LOCATE THESE UNITS IN THE FIELD. THE ORDER OF CONSTRUCTION OF THE CYLINDER PILES SHOWN ON SHEET NO. 127 MAY HAVE TO BE ALTERED, ONCE THE CONTRACTOR LOCATES THE SOLDIER PILE WALL AND BRACING AND ESTABLISHES THE LOCATIONS OF THE CYLINDER PILES IN THE FIELD.

CONSTRUCTION. THE REMOVAL SHALL BE DONE IN A PIECE-WISE MANNER DURING WALL CONSTRUCTION AS FOLLOWS: AFTER CONSTRUCTING AS MANY CYLINDER PILES AS POSSIBLE WITHOUT FOULING THE EXISTING BURIED STEELWORK, NARROW TRENCHES SHALL BE EXCAVATED PERPENDICULAR TO KILGOUR STREET, TO GAIN ACCESS TO AND REMOVE THE BRACES. THESE TRENCHES SHALL THEN BE BACKFILLED, AFTER WHICH THE REMAINDER OF THE CYLINDER PILES MAY BE CONSTRUCTED. AFTER CONSTRUCTION OF THE CAPPING BEAM, THE SOLDIER PILES SHALL BE BRACED OFF THE CYLINDER PILES OR CAPPING BEAM, AND EXCAVATION SHALL BE MADE IN 30-FOOT LENGTHS DOWN TO THE WALER AND THE WALER SHALL BE REMOVED. AT THE SAME TIME THE NEW SEWER PIPE MAY BE INSTALLED.

EXPOSED WOOD LAGGING SHALL, AS FAR AS POSSIBLE, BE REMOVED DURING EXCAVATION FOR CONSTRUCTION OF THE CAPPING BEAM AND SEWER. THE SOLDIER PILES SHALL THEN BE PULLED OUT ONE AT A TIME, EACH HOLE BEING IMMEDIATELY BACKFILLED WITH CEMENT GROUT.

AT THE WEST END OF THE SOLDIER PILE WALL, FIVE OF THE SOLDIER PILES (1 THRU 5) INTERFERE DIRECTLY WITH CYLINDER PILE CONSTRUCTION. THEREFORE, SOLDIER PILES 1 THRU 5 SHALL BE PULLED AND BACKFILLED WITH CEMENT GROUT, ONE BY ONE, PRIOR TO CONSTRUCTION OF THE RELATED CYLINDER PILES.

THIS METHOD OF REMOVING THE EXISTING SOLDIER PILE WALL IS AIMED AT MINIMIZING THE RISK OF SLOPE MOVEMENTS AND MINIMIZING DISTURBANCE OF THE GROUND BEHIND THE CYLINDER PILE WALL. IF THE CONTRACTOR DETERMINES THAT THE SOLDIER PILES CANNOT BE PULLED CLEANLY WITHOUT EXCESSIVE GROUND DISTURBANCE OR IF THE HOLE CANNOT BE COMPLETELY BACKFILLED, THEN THE SOLDIER PILES SHALL BE CUT OFF AND LEFT IN PLACE. HOWEVER, ANY PILES THAT MAY INTERFERE WITH TENDON DRILLING SHOULD EITHER BE REMOVED OR WILL HAVE TO BE CUT THROUGH DURING DRILLING. IT WOULD BE VERY UNDESIRABLE TO SEVERELY DISTURB THE SOIL IMMEDIATELY BEHIND THE CYLINDER PILE WALL AS THIS SOIL WILL BECOME HIGHLY STRESSED FOLLOWING TIE-BACK INSTALLATION.

EXISTING REMOVED SOLDIER PILE WALL MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED BY HIM FROM THE SITE.

METHOD OF MEASUREMENT. REMOVAL OF EXISTING SOLDIER PILE WALL WILL BE MEASURED AS A UNIT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
202	LUMP SUM	REMOVAL OF EXISTING SOLDIER PILE WALL

NOTES CONTINUED ON SHEET 103

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 102)

SPLICE FOR BEAMS

DESCRIPTION. THIS ITEM SHALL CONSIST OF LENGTHENING THE FABRICATED STEEL PLATE BEAMS OR STEEL PIPE BEAMS, IF NEEDED, BY AN EXTENSION BEING FIELD WELDED TO THE BEAM. IT SHALL BE IN ACCORDANCE WITH ITEM 513 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

GENERAL. THE BOTTOM OF THE DRILLED CYLINDER PILES (ELEVATION B SHOWN ON SHEET NO. 135) MAY BE LOWERED (1) IF INFORMATION OBTAINED FROM THE INITIAL FIELD TESTING PERFORMED BY THE ENGINEER INDICATES THAT THE EFFECTIVE RESIDUAL ANGLE OF INTERNAL FRICTION OF THE ROCK MASS IS LESS THAN ASSUMED FOR DESIGN; THUS GREATER EMBEDMENT OF THE PILE INTO THE ROCK WILL BE REQUIRED, OR (2) IF MINIMUM PILE EMBEDMENT SHOWN ON SHEETS NOS. 133 & 134 WILL NOT BE PROVIDED, AFTER THE ENGINEER DETERMINES IN THE FIELD THE TOP OF ROCK ELEVATIONS.

IF A BEAM NEEDS TO BE LENGTHENED, IT SHALL BE LENGTHENED ACCORDING TO THE DETAILS SHOWN ON SHEETS NOS. 139 & 142.

METHOD OF MEASUREMENT. SPLICES SHALL BE MEASURED AS UNITS. EXTENSIONS WILL BE PAID FOR AS SPECIFIED UNDER 513, "STRUCTURAL STEEL".

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
513	EACH	STEEL PIPE BEAM SPLICE
513	EACH	STEEL PLATE BEAM SPLICE

SPLICE FOR 14S REINFORCING STEEL BARS

DESCRIPTION. THIS ITEM SHALL CONSIST OF LENGTHENING THE 14S REINFORCING BARS, IF NEEDED, BY A 14S STEEL REINFORCING BAR EXTENSION BEING CONNECTED BY AN APPROVED MECHANICAL CONNECTOR. IT SHALL BE IN ACCORDANCE WITH 509 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

GENERAL. THE BOTTOM OF THE DRILLED CYLINDER PILES, ELEVATION B SHOWN ON SHEET NO. 135 MAY BE RAISED OR LOWERED. (1) IF INFORMATION OBTAINED FROM THE INITIAL FIELD TESTING PERFORMED BY THE ENGINEER INDICATES THE EFFECTIVE RESIDUAL ANGLE OF INTERNAL FRICTION OF THE ROCK MASS IS LESS THAN ASSUMED FOR DESIGN; THUS GREATER EMBEDMENT OF THE PILE INTO THE ROCK WILL BE REQUIRED, OR (2) IF MINIMUM PILE EMBEDMENT SHOWN ON SHEETS NOS. 133 & 134 WILL NOT BE PROVIDED, AFTER THE ENGINEER DETERMINES IN THE FIELD THE TOP OF ROCK ELEVATIONS.

IF BARS NEED TO BE LENGTHENED, THEY SHALL BE LENGTHENED ACCORDING TO THE DETAILS SHOWN ON SHEET NO. 145.

METHOD OF MEASUREMENT. MECHANICAL CONNECTOR SPLICE SHALL BE MEASURED AS A UNIT. 14S STEEL REINFORCING BAR EXTENSION SHALL BE MEASURED IN POUNDS AND PAID FOR AS SPECIFIED UNDER 509, "REINFORCING STEEL, GRADE 60".

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
509	EACH	MECHANICAL CONNECTOR SPLICE FOR 14S REINFORCING STEEL BARS

VERTICAL DRAINAGE HOLES

DESCRIPTION. THIS ITEM SHALL CONSIST OF DRILLING, FROM THE TUNNEL, VERTICALLY UPWARD TO THE TOP OF THE ROCK AND INSTALLING A 2-INCH MINIMUM I.D. PLASTIC CASING IN ACCORDANCE WITH THE PLANS AND 518 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

GENERAL. THE CASING SHALL BE FULLY SLOTTED OR PERFORATED EXCEPT FOR THE LOWERMOST 4 FEET AND SHALL BE FLUSH COUPLED; SLOT WIDTH OF 0.10?-INCH, 34 SLOTS PER ROW PER FOOT, 1-INCH LONG SLOTS. THE CASING SHALL FIT REASONABLY TIGHTLY IN THE HOLE WITH NO MORE THAN 1/4-INCH ANNULAR CLEAR SPACE. THE CASING SHALL BE RIGIDLY ANCHORED OR HELD IN PLACE IN THE HOLE. TEMPORARY ANCHORAGE MAY BE ACCOMPLISHED BY WEDGES, HOWEVER, FINAL ANCHORAGE SHALL BE ACCOMPLISHED BY GROUTING OVER THE LOWER 3 FEET OF PIPE. THE CASING SHALL EXTEND TO TOP OF ROCK AS DETERMINED BY THE ENGINEER. TOP OF CASING SHALL BE CAPPED WITH A PLUG OR FLUSH-TYPE CAP.

MATERIAL. 2-INCH MINIMUM POLYVINYLCHLORIDE PIPE, SCHEDULE 40, ASTM 1785, TYPE II OR U.S. COMMERCIAL STANDARD NO. CS-207-60.

CONSTRUCTION. HOLES SHALL BE APPROXIMATELY SPACED AS SHOWN ON SHEET NO. 97 AND SHALL BE DRILLED WITHIN 100 FEET OF THE ADVANCING HEADING. THIS WILL PERMIT EVALUATING OF WATER FLOW DATA FROM THE HOLES PRIOR TO COMPLETION OF THE TUNNEL SO THAT ADDITIONAL HOLES MAY BE ADDED, IF DETERMINED BY THE ENGINEER.

ALL HOLES SHALL BE CLEANED BY JETTING WITH AIR OR AIR AND WATER TO REMOVE MUD CAKE PRIOR TO INSTALLING DRAIN PIPE.

METHOD OF MEASUREMENT. THE LENGTH OF EACH COMPLETED DRAINAGE HOLE ACCEPTED FOR PAYMENT SHALL BE THE LENGTH IN FEET MEASURED ALONG THE CENTERLINE OF THE HOLE FROM THE TOP OF THE TUNNEL TO THE TOP OF THE ROCK.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
518	LINEAR FOOT	VERTICAL DRAINAGE HOLES

ACCESS SHAFT EXCAVATION AND SUPPORT

DESCRIPTION. THIS ITEM SHALL CONSIST OF EXCAVATING A SHAFT THROUGH THE FILL AND OVERBURDEN, AND INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS; FURNISHING AND INSTALLING AN INITIAL AND FINAL LINER IN THE SOIL AND ROCK; REMOVING THE SPOIL; SCALING LOOSE ROCK; DEWATERING; DISPOSING OF EXCAVATED MATERIAL; AND FURNISHING ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE THE CONSTRUCTION OF THE SHAFT IN ACCORDANCE WITH THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

GENERAL. THE ACCESS SHAFT SHALL BE LOCATED AS SHOWN ON THE PLANS. THE FINAL LINING OF THE SHAFT SHALL BE INSTALLED SO THAT IT IS NOT OUT OF PLUMB MORE THAN 1 PERCENT OF THE DEPTH. THE CONTRACTOR MAY EXCAVATE THE SHAFT TO ANY SIZE THAT HE CHOOSES; HOWEVER, THE FINISHED INSIDE DIAMETER OF THE FINAL ACCESS SHAFT LINING SHALL BE NOT LESS THAN 9 FEET AND ANY OVER-EXCAVATED SHAFT SHALL BE AT NO ADDITIONAL COST TO THE PROJECT.

THE CONTRACTOR SHALL, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK, SUBMIT FOR APPROVAL BY THE ENGINEER, A DESCRIPTION OF THE CONSTRUCTION METHODS, EQUIPMENT AND TYPE OF INITIAL EXCAVATION SUPPORT HE PROPOSES TO USE UNDER THIS ITEM. THE CONTRACTOR'S DRAWINGS SHALL SHOW DETAILS OF INITIAL SUPPORT SYSTEM, INCLUDING LOCATION AND TIMING OF INSTALLATION IN RELATION TO THE EXCAVATION PLAN AND SEQUENCE, AND DESIGN ASSUMPTIONS AND CALCULATIONS. THE CONTRACTOR'S DRAWINGS SHALL SHOW DETAILS OF THE RELATIONSHIP OF THE FINAL LINING TO THE INITIAL SUPPORT AND TO THE EXCAVATION PLAN, TIMING AND SEQUENCE OF EXCAVATION AND SUPPORT.

EXCAVATION FOR THE SHAFT SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DETAILED PLANS FOR THE INITIAL SUPPORT HAS BEEN RECEIVED FROM THE ENGINEER. THE CONTRACTOR SHALL SUBMIT FIVE COPIES OF THE PLANS AND TWO COPIES OF THE DESIGN COMPUTATIONS TO THE ENGINEER FOR APPROVAL. SUCH PLANS AND COMPUTATIONS SHALL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER AND SHALL BEAR HIS SIGNATURE AND NUMBER, OR PROFESSIONAL ENGINEERING SEAL.

SHAFT EXCAVATION. THE SHAFT SHALL BE EXCAVATED IN SUCH A MANNER AS TO PRECLUDE SURFACE SETTLEMENTS DUE TO RUNNING SANDS OR SILTS, LOOSE GROUND OR OVER-EXCAVATION. BLASTING WILL BE PROHIBITED. FOR MONITORING OF CONSTRUCTION OF SHAFT SEE NOTE "OBSERVATION AND MONITORING", SHEET NO. 116.

DEWATERING FROM THE BASE WILL BE REQUIRED.

DISPOSAL OF EXCAVATED MATERIAL. THE REMOVAL AND SATISFACTORY OFF-SITE DISPOSAL OF ALL EXCAVATED MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ON-SITE TEMPORARY STOCKPILING OF EXCAVATED MATERIAL WILL BE ALLOWED. HOWEVER, ON-SITE TEMPORARY STOCKPILING WILL BE AT A LOCATION SHOWN ON THE PLANS, AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AVOIDANCE AND CLEAN-UP OF STREET SPILLAGE TO THE SATISFACTION OF LOCAL AUTHORITIES. DISPOSAL SHALL BE IN ACCORDANCE WITH 203.05 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

INITIAL SHAFT SUPPORT. INITIAL SUPPORT OF THE ACCESS SHAFT SHALL BE DETERMINED BY THE CONTRACTOR. THE SHAFT SHALL BE INITIALLY SUPPORTED BY MEANS WHICH WILL PERMIT SAFE ACCESS DURING THE PERIOD OF CONSTRUCTION

THE INITIAL SUPPORT FOR THE SOIL PORTION OF THE SHAFT AND POSSIBLY THE UPPER 10 TO 20 FEET OF ROCK, MAY CONSIST OF STEEL RINGS OR RIBS WITH WOOD, CONCRETE OR STEEL PLATE LAGGING (SEE STEEL RIB TUNNEL AND SHAFT INITIAL SUPPORT SYSTEM SPECIFICATION, SHEET NO. 118) OR SHOTCRETE (SEE SHOTCRETE SPECIFICATION, SHEET NO. 122) OR LINER PLATES WITH RINGS OR A PIPE LINER OR OTHER APPROVED LINER.

THE CLAYSTONE PORTION OF THE SHAFT WILL REQUIRE SUPPORT THROUGHOUT THE SHAFT. THE MOST ACCEPTABLE INITIAL SUPPORT COMBINATIONS INCLUDE LIGHT TO MEDIUM STEEL RINGS, GROUTED OR EPOXY BOLTS AND/OR SHOTCRETE. BOTH THE STEEL SETS AND ROCK BOLTS SHALL BE COMBINED WITH EITHER WIRE MESH OR 2-INCH THICK LAYER OF SHOTCRETE TO INHIBIT SPALLING AND ROCKFALLS.

FINAL SHAFT LINER. IF THE CONTRACTOR CHOOSES TO CONSTRUCT THE FINAL ACCESS SHAFT LINING INSIDE AN OVER-EXCAVATED SHAFT, THE FINAL LINING SHALL HAVE A FINISHED INSIDE DIAMETER OF 9 FEET, BE A MINIMUM 12-INCH THICK CONCRETE AND BE PLACED IN PROPER FORMS. IF THE FINAL LINING IS CONSTRUCTED AGAINST AN EXCAVATED SHAFT, THE FINAL LINING SHALL HAVE A FINISHED INSIDE DIAMETER OF NOT LESS THAN 9 FEET NOR GREATER THAN 12 FEET AND BE A MINIMUM 12-INCH THICK CONCRETE OR SHOTCRETE (SEE SHOTCRETE SPECIFICATIONS, SHEET NO. 122).

FINAL LINING HAS BEEN DESIGNED FOR A 9-FOOT CIRCULAR SHAFT. IF THE CONTRACTOR ELECTS TO CONSTRUCT A LARGER DIAMETER SHAFT, HE WILL BE REQUIRED TO RE-DESIGN THE LINING AND SUBMIT DESIGN CALCULATIONS AS NOTED ABOVE. PRIOR TO PREPARING SUCH DETAILED DRAWINGS AND DESIGN COMPUTATIONS THE CONTRACTOR SHALL CONTACT THE ENGINEER IN ORDER TO ASCERTAIN THE LOADS WHICH MUST BE USED IN THE SHAFT DESIGN.

NOTES CONTINUED ON SHEET 104

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 103)

IF THE CONTRACTOR CHOOSES TO CONSTRUCT THE FINAL ACCESS SHAFT LINING INSIDE AN OVER-EXCAVATED SHAFT, HE SHALL BACKFILL THE AREA BETWEEN THE EXCAVATED SHAFT AND THE FINAL LINING WITH A FREE-DRAINING UNIFORM, COARSE-GRAINED SAND OR PEA GRAVEL (SIZE NUMBER 9, 5, 56 OR 6 AS DESCRIBED IN THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, TABLE 703-1). BACKFILL TO WITHIN 10 FEET OF THE BASE OF SHAFT SHALL BE COMPACTED IN LAYERS NOT TO EXCEED 4 INCHES IN THICKNESS WITH MECHANICAL TAMPERS IN ACCORDANCE WITH 203. BACKFILL GREATER THAN 10 FEET ABOVE BASE OF THE SHAFT MAY BE BACK DUMPED IN MAXIMUM TWO FOOT LAYERS AND COMPACTED IN ACCORDANCE WITH 203.

IF THE INITIAL LINING IS CONSTRUCTED AGAINST AN EXCAVATED SHAFT, THE FINAL LINER SHALL BE PROVIDED WITH FLEXIBLE JOINTS NEAR THE TOP OF ROCK. FLEXIBLE JOINTS SHALL CONSIST OF A SERIES OF THREE RUBBER WATERSTOPS (SEE RUBBER WATERSTOP SPECIFICATION, SHEET NO. 124) INCORPORATED INTO THE FINAL LINER ON 2-FOOT INTERVALS BEGINNING AT THE TOP OF ROCK AND EXTENDING UPWARD FOUR FEET.

REINFORCEMENT. REINFORCEMENT SHALL BE USED AND SHALL BE AS SHOWN ON THE PLANS, REINFORCING STEEL WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THIS ITEM FOR PAYMENT.

REINFORCING STEEL LIST FOR THE SHAFT LINER IS NOT INCLUDED IN THE PLANS. CONTRACTOR SHALL PREPARE A REINFORCING STEEL LIST. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND APPROVAL, THREE COPIES OF THE REINFORCING STEEL LIST. FABRICATION SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DRAWINGS HAS BEEN RECEIVED FROM THE ENGINEER.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL WORK AND MATERIAL HEREINBEFORE DESCRIBED.

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	ACCESS SHAFT EXCAVATION AND SUPPORT

GROUT FOR ROCK ANCHOR DRILL HOLES

DESCRIPTION. THIS ITEM SHALL CONSIST OF SUPPLYING AND PUMPING FIRST STAGE CEMENT GROUT AND SECOND STAGE CEMENT-BENTONITE GROUT INTO THE ANCHOR DRILL HOLES AT CYLINDER PILES 138 THRU 161 THROUGH A GROUT PIPE SYSTEM EXTENDING TO THE BOTTOM OF THE HOLE, AND FILLING THE LENGTH OF THE ANCHOR DRILL HOLE WITH GROUT AFTER INSTALLATION OF AN ANCHORAGE TENDON ASSEMBLY.

GENERAL. GROUTING SHALL BE IN GENERAL ACCORDANCE WITH "RECOMMENDED PRACTICE FOR GROUTING OF POST-TENSIONED PRESTRESSED CONCRETE" PUBLISHED BY THE PRESTRESSED CONCRETE INSTITUTE, VOL. 17, NO. 6, NOVEMBER - DECEMBER, 1972, EXCEPT AS REVISED AND AUGMENTED HEREIN.

MATERIALS. MATERIALS SHOWN SHALL CONFORM TO THE FOLLOWING:

(a) PORTLAND CEMENT SHALL BE AS SPECIFIED IN 701.04 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. THE CEMENT SHALL BE FRESH AND SHALL CONTAIN NO LUMPS OR OTHER INDICATION OF HYDRATION OR WAREHOUSE SET. FRESH CEMENT SHALL BE DELIVERED TO THE SITE, STORED UNDERCOVER FOR NO LONGER THAN ONE MONTH ON THE SITE AND MUST BE KEPT BELOW 100 DEGREES F. CEMENT SHALL BE USED IN ORDER OF DELIVERY.

(b) BENTONITE SHALL BE THE HIGH SWELLING WYOMING TYPE SODIUM BASE BENTONITE CONSISTING MAINLY OF THE CLAY MINERAL, MONTMORILLONITE.

(c) WATER SHALL BE CLEAN AND POTABLE.

(d) ADDITIVES ARE CONSIDERED GENERALLY UNDESIRABLE AND THEIR USE WILL BE PERMITTED ONLY IF PROPERLY JUSTIFIED. IF THE CONTRACTOR DESIRES TO USE AN ADDITIVE OF ANY TYPE IN THE GROUT, DETAILS OF THE PROPOSED ADDITIVE AND THE JUSTIFICATION FOR ITS USE SHALL BE SUBMITTED TO THE ENGINEER, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK, FOR APPROVAL IN WRITING.

FIRST STAGE CEMENT GROUT. GROUT SHALL CONSIST OF A MIXTURE OF PORTLAND CEMENT AND WATER. PROPORTIONS OF GROUTING MATERIALS SHALL BE BASED ON RESULTS OF TESTS ON FRESH AND HARDENED GROUT PRIOR TO BEGINNING THE WORK. THE WATER CONTENT SHALL BE THE MINIMUM NECESSARY FOR PROPER PLACEMENT BUT IN NO CASE SHALL THE WATER-CEMENT RATIO (BY WEIGHT) EXCEED 0.45.

THE GROUT SHALL BE PROPORTIONED TO OBTAIN THE FOLLOWING PROPERTIES:

(a) COMPRESSIVE STRENGTH. THE MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS SHALL BE 4,000 psi. GROUT SAMPLES SHALL BE PREPARED, CURED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C31, C39 AND C192.

(b) CONSISTENCY. THE CONSISTENCY OF THE GROUT SHALL BE DETERMINED IN ACCORDANCE WITH U.S. CORPS OF ENGINEERS METHOD CRD-C79-77. WHEN TESTED BY THIS METHOD THE EFFLUX TIME OF THE GROUT SAMPLE IMMEDIATELY AFTER MIXING SHALL BE NOT LESS THAN ELEVEN SECONDS.

(c) EXPANSION. THE GROUT MIX SHALL HAVE AN EXPANSION OF 3 PLUS OR MINUS 2 PERCENT WHEN TESTED BY U.S. CORPS OF ENGINEERS, METHOD CRD-C81-74, METHOD OF TEST OF OF EXPANSION OF GROUT MIXTURES.

(d) BLEEDING. BLEEDING OF THE GROUT MIX SHALL BE LESS THAN 2 PERCENT OF THE GROUT VOLUME THREE HOURS AFTER MIXING. THE TOTAL BLEED WATER SHALL NOT EXCEED 4 PERCENT OF THE GROUT VOLUME. IN ADDITION, ALL SEPARATED WATER SHALL BE ABSORBED WITHIN TWENTY-FOUR HOURS AFTER MIXING. BLEEDING SHALL BE MEASURED BY A SUITABLE TEST SUCH AS ASTM C232 METHOD A, WITH PROCEDURES MODIFIED TO OBTAIN THIS DATA.

TEST DATA FOR AT LEAST THREE LABORATORY SAMPLES OF THE GROUT PROPOSED FOR USE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AT LEAST 30 DAYS PRIOR TO USE IN GROUTING ANCHORS. ALL TESTS SHALL BE PERFORMED BY THE STATE.

THE BRAND OF CEMENT WHICH IS USED FOR THE APPROVED LABORATORY SAMPLES SHALL BE USED FOR ALL ON SITE GROUTING UNLESS A CHANGE IS APPROVED IN WRITING BY THE ENGINEER.

SECOND STAGE CEMENT-BENTONITE GROUT. AS A STARTING POINT THE GROUT MAY CONSIST OF A MIX ON THE ORDER OF ONE PART CEMENT TO FOUR PARTS BENTONITE WITH A WATER-SOLID (CEMENT PLUS BENTONITE) RATIO OF BETWEEN ONE AND TWO. THE GROUT SHALL BE AS THICK AS CAN BE INJECTED SLOWLY UNDER A RELATIVELY LOW PRESSURE (MAXIMUM 50 psi) TO AVOID HYDRAULIC FRACTURE IN THE SOIL AND TO MINIMIZE SEALING OPEN, WATER BEARING FISSURES IN THE WEATHERED ROCK NEAR THE SOIL/ROCK INTERFACE. SIGNIFICANT VARIATION FROM THE STARTING MIX MAY BE REQUIRED AND SOME FIELD TESTING WILL PROBABLY BE NECESSARY. THE CEMENT-BENTONITE GROUT MIX SHALL BE DESIGNED TO REMAIN RELATIVELY PLASTIC, IN SPITE OF ITS TENDENCY TO INCREASE IN STRENGTH WITH TIME, SO THAT IT CAN ACCOMMODATE FUTURE SMALL MOVEMENTS WITHOUT CRACKING.

THE GROUT MIX SHALL BE PROPORTIONED TO OBTAIN COMPRESSIVE STRENGTH AT 7 DAYS OF BETWEEN 50 AND 80 psi. GROUT SAMPLES SHALL BE PREPARED, CURED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C31, C39 AND C192.

TEST DATA FOR AT LEAST THREE LABORATORY SAMPLES OF THE FINAL GROUT MIX PROPOSED FOR USE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AT LEAST 30 DAYS PRIOR TO USE IN GROUTING ANCHORS. ALL TESTS OF THE FINAL MIX SHALL BE PERFORMED BY THE STATE.

THE BRANDS OF CEMENT AND OF BENTONITE WHICH ARE USED FOR THE APPROVED LABORATORY SAMPLES SHALL BE USED FOR ALL ON-SITE GROUTING UNLESS A CHANGE IS APPROVED IN WRITING BY THE ENGINEER.

EQUIPMENT AND MIXING. ONLY APPROVED MIXING AND PUMPING EQUIPMENT SHALL BE USED IN THE PREPARATION AND HANDLING OF GROUT. ALL OIL OR OTHER RUST INHIBITORS SHALL BE REMOVED FROM THE MIXING EQUIPMENT, STIRRING MECHANISMS AND OTHER PORTIONS OF THE EQUIPMENT IN CONTACT WITH THE GROUT BEFORE USE. ALL EQUIPMENT SHALL BE MAINTAINED IN FIRST CLASS OPERATING CONDITION AT ALL TIMES AND SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING ITEMS:

(a) A POWER OPERATED GROUT MIXER SPECIFICALLY DESIGNED FOR CONTINUOUS MECHANICAL MIXING OF A UNIFORM GROUT WHICH IS FREE OF LUMPS AND UNDISPERSED SOLIDS, TOGETHER WITH A MECHANICALLY AGITATED SUMP, IF NECESSARY, TO MAINTAIN AN UNINTERRUPTED, CONTINUOUSLY AGITATED, GROUT SUPPLY. THE MIXER SHALL HAVE A SUITABLE WATER MEASURING DEVICE CONSISTING OF A WATER METER OR A CALIBRATED WATER BATCHING TANK.

(b) A POSITIVE DISPLACEMENT TYPE GROUT PUMP CAPABLE OF OPERATING AT DISCHARGE PRESSURES REQUIRED BY SITE CONDITIONS. A PRESSURE GAGE HAVING A FULL SCALE READING OF NO GREATER THAN 300 psi SHALL BE PLACED AT SOME POINT IN THE GROUT LINE BETWEEN THE PUMP OUTLET AND THE GROUT PIPE IN THE ANCHOR DRILL HOLE.

(c) VALVES, PRESSURE GAGES, PIPE, PRESSURE HOSE, SUPPLY LINES, COUPLINGS, SCALES AND SMALL TOOLS AS MAY BE NECESSARY TO PROVIDE A CONTINUOUS SUPPLY OF GROUT AND SUITABLE PRESSURE CONTROL. THE PIPE AND HOSES SHALL BE OF SUFFICIENT SIZE TO CARRY THE PUMPED GROUT AT PRESSURES BELOW 250 psig.

(d) STANDBY WATER FLUSHING EQUIPMENT READY FOR USE, IF REQUIRED BY THE ENGINEER. THE STANDBY WATER FLUSHING EQUIPMENT SHALL UTILIZE A DIFFERENT POWER SOURCE THAN THE GROUTING EQUIPMENT, SHALL HAVE SUFFICIENT CAPACITY TO FLUSH OUT ANY PARTIALLY GROUTED HOLES, IF NECESSARY, DUE TO BLOCKAGE OR BREAKDOWN OF GROUTING EQUIPMENT AND SHALL BE CAPABLE OF DEVELOPING AT LEAST 200 psi AS INDICATED ON A 4-INCH DIAMETER PRESSURE GAGE PERMANENTLY AFFIXED TO THE EQUIPMENT.

(e) THE GROUTING EQUIPMENT SHALL BE CAPABLE OF PUMPING THE GROUT IN A MANNER WHICH WILL MAINTAIN THE GROUT IN A UNIFORM AND PROPERLY MIXED STATE WITHOUT INTRODUCTION OF OIL, AIR OR OTHER FOREIGN SUBSTANCES INTO THE GROUT. NO LOSS OF WATER FROM THE GROUT DUE TO POOR SEALS, CONNECTIONS OR OTHER CAUSES WILL BE PERMITTED. THE GROUTING EQUIPMENT SHALL CONTAIN A SCREEN WITH 0.125-INCH MAXIMUM CLEAR OPENING TO SIEVE THE GROUT BEFORE IT ENTERS THE GROUT PUMP. THIS SCREEN SHALL BE EASILY ACCESSIBLE FOR INSPECTION AND CLEANING.

(f) THE CEMENT AND THE BENTONITE SHALL BE MEASURED BY WEIGHT. WATER SHOULD BE ADDED TO THE MIXING DRUM BEFORE THE CEMENT OR BENTONITE IS ADDED.

NOTES CONTINUED ON SHEET 105

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		VPL	JHO 2-23-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

105
172

HAMILTON COUNTY
HAM. 471-0.24
PART ONE

NOTES (CONTINUED FROM SHEET 104)

FIRST STAGE GROUT INJECTION. AFTER INSTALLATION OF THE ANCHORAGE TENDON ASSEMBLY SYSTEM IN THE DRILL HOLE, FIRST STAGE CEMENT GROUT SHALL BE INJECTED INTO THE DRILL HOLE STARTING AT THE LOWER END OF THE HOLE. IMMEDIATELY PRIOR TO GROUTING, THE CONTRACTOR SHALL CHECK THE PIPE NETWORK WITH COMPRESSED AIR TO ENSURE THAT IT IS CLEAR. IF THE DRILL HOLE REMAINS OPEN MORE THAN TWENTY-FOUR HOURS BEFORE GROUTING THE ANCHORAGE LENGTH, THE CONTRACTOR MAY, AT THE ENGINEER'S REQUEST, BE REQUIRED TO RE-CLEAN THE HOLE. GROUT INJECTION SHALL BE CONTINUED UNTIL THE DRILL HOLE IS FILLED WITH GROUT TO THE TOP OF THE FIRST STAGE CEMENT GROUT LIMIT. ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO ENSURE THAT THE BELLED SECTIONS ARE COMPLETELY FILLED WITH GROUT. THE LOWER END OF THE GROUT PIPE SHALL BE BURIED IN THE GROUT AT ALL TIMES TO PREVENT ENTRAPMENT OF AIR OR WATER.

ALTERNATIVELY, THE DRILL HOLE MAY BE FILLED WITH CEMENT GROUT UP TO THE GROUND SURFACE. AFTER A SUITABLE TIME INTERVAL, THE EXCESS CEMENT GROUT SHALL BE REMOVED DOWN TO THE TOP OF THE ANCHORAGE LENGTH BY WATER JETTING, USING A LANCE WITH REVERSE DIRECTION JETS. THE APPLICABILITY OF THIS METHOD MAY BE DEPENDENT ON THE CONTRACTOR.

PRECAUTIONS SHALL BE TAKEN TO PREVENT THE TEMPERATURE OF THE FIRST STAGE CEMENT GROUT FROM RISING ABOVE 80 DEGREES F., OR DROPPING BELOW 40 DEGREES F., DURING MIXING OR PLACEMENT. DURING COLD WEATHER A HEATED SHELTER SHALL BE PROVIDED OVER THE ANCHORAGE HEAD AND ADJACENT GROUT MIXING EQUIPMENT, IF NECESSARY, TO MAINTAIN THE GROUT TEMPERATURE ABOVE 40 DEGREES F.

CHECK MEASUREMENTS OF WATER-CEMENT RATIO OF THE MIXED GROUT AT THE TIME OF INJECTION SHALL BE MADE BY THE ENGINEER BY MEASURING THE SPECIFIC GRAVITY USING A BAROID MUD BALANCE.

GROUT WHICH DOES NOT MEET THE CONSISTENCY REQUIREMENTS AS STIPULATED HEREIN AND GROUT WHICH IS NOT USED WITHIN FORTY-FIVE MINUTES OF THE TIME MIXING WAS INITIATED SHALL BE WASTED.

DETAILS OF THE PROPOSED GROUTING PROCEDURE, INCLUDING THE GROUT PIPE LAYOUT, SHALL BE SUBMITTED FOR THE APPROVAL OF THE ENGINEER, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK.

TEST SPECIMENS. THE CONTRACTOR SHALL MAKE AND CURE A MINIMUM OF THREE TEST CYLINDERS FOR THE FIRST STAGE CEMENT GROUT AND THREE TEST CYLINDERS FOR THE SECOND STAGE CEMENT-BENTONITE GROUT IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C31 FOR EACH ANCHOR GROUTED. THESE CYLINDERS WILL BE TESTED BY THE STATE AND TEST RESULTS WILL BE FURNISHED TO THE CONTRACTOR.

CURING AND LOADING. STRESSING OF TENDONS SHALL NOT BE STARTED UNTIL THE FIRST STAGE CEMENT GROUT HAS ATTAINED A MINIMUM AGE OF 7 DAYS AND A MINIMUM COMPRESSIVE STRENGTH OF 4000 psi AS DETERMINED BY CYLINDER TESTS.

SECOND STAGE GROUT INJECTION. AFTER THE STRESSING OF THE TENDON HAS BEEN COMPLETED, THE SECOND STAGE GROUTING CAN BEGIN. CEMENT-BENTONITE GROUT SHALL BE INJECTED INTO THE DRILL HOLE STARTING AT THE END OF THE FIRST STAGE GROUT. GROUT INJECTION SHALL BE CONTINUED UNTIL THE DRILL HOLE IS COMPLETELY FILLED WITH GROUT TO THE LIMITS SHOWN ON THE PLANS.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE MEASURED BY THE UNIT FOR EACH ANCHOR DRILL HOLE FILLED WITH GROUT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	GROUT FOR ROCK ANCHOR DRILL HOLES

GROUT FOR ANCHOR DRILL HOLES TO TUNNEL

DESCRIPTION. THIS ITEM CONSISTS OF PUMPING CEMENT-BENTONITE GROUT INTO THE ANCHOR DRILL HOLE AT CYLINDER PILES 1 THRU 137 THROUGH A GROUT PIPE, FILLING THE ANNULAR SPACE AROUND THE TENDON SLEEVE PIPE OVER THE FULL LENGTH OF THE ANCHOR DRILL HOLE FROM THE TUNNEL TO THE CYLINDER PILE WITH GROUT, AFTER INSTALLATION AND STRESSING OF THE ANCHORAGE TENDON ASSEMBLY.

GENERAL. GROUTING SHALL BE IN GENERAL ACCORDANCE WITH "RECOMMENDED PRACTICE FOR GROUTING OF POST-TENSIONED PRESTRESSED CONCRETE" PUBLISHED BY THE PRESTRESSED CONCRETE INSTITUTE, VOL. 17, NO. 6, NOVEMBER - DECEMBER, 1972, EXCEPT AS REVISED AND AUGMENTED HEREIN.

MATERIALS. MATERIALS SHALL BE AS DESCRIBED IN THE NOTE "GROUT FOR ROCK ANCHOR DRILL HOLES".

CEMENT-BENTONITE GROUT. CEMENT-BENTONITE GROUT SHALL BE AS DESCRIBED IN THE NOTE "GROUT FOR ROCK ANCHOR DRILL HOLES".

EQUIPMENT AND MIXING. EQUIPMENT AND MIXING SHALL BE AS DESCRIBED IN THE NOTE "GROUT FOR ROCK ANCHOR DRILL HOLES".

GROUT INJECTION. AFTER INSTALLING AND STRESSING OF THE TUNNEL ANCHORAGE TENDON ASSEMBLY SYSTEM IN THE ANCHOR DRILL HOLE, AND AFTER PRESSURE INJECTING GREASE AROUND THE TENDON, THE ANNULAR SPACE OUTSIDE THE STEEL LINER PIPE SHALL BE FILLED WITH CEMENT-BENTONITE GROUT SLOWLY INJECTED INTO THE DRILL HOLE FROM THE TUNNEL ANCHORAGE END UNDER A MAXIMUM PRESSURE OF 50 psi AS MEASURED AT THE TUNNEL WALL. GROUT INJECTION SHALL BE CONTINUED UNTIL THE DRILL HOLE IS FILLED WITH GROUT WITHIN THE LIMITS SHOWN ON THE PLANS. ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO ENSURE THAT THE ANCHOR DRILL HOLE IS COMPLETELY FILLED WITH GROUT.

PRECAUTIONS SHALL BE TAKEN TO PREVENT THE TEMPERATURE OF THE GROUT FROM RISING ABOVE 80 DEGREES F. OR DROPPING BELOW 40 DEGREES F. DURING MIXING OR PLACEMENT. DURING COLD WEATHER A HEATED SHELTER SHALL BE PROVIDED OVER THE ANCHORAGE HEAD AND ADJACENT GROUT MIXING EQUIPMENT, IF NECESSARY, TO MAINTAIN THE GROUT TEMPERATURE ABOVE 40 DEGREES F.

GROUT WHICH DOES NOT MEET THE CONSISTENCY REQUIREMENTS AS STIPULATED HEREIN AND GROUT WHICH IS NOT USED WITHIN FORTY-FIVE MINUTES OF THE TIME MIXING IS INITIATED SHALL BE WASTED.

DETAILS OF THE PROPOSED GROUTING PROCEDURE, INCLUDING THE GROUT PIPE LAYOUT, SHALL BE SUBMITTED FOR THE APPROVAL OF THE ENGINEER, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK.

TEST SPECIMENS. THE CONTRACTOR SHALL MAKE AND CURE A MINIMUM OF THREE TEST CYLINDERS IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM C31 FOR EACH ANCHOR GROUTED. THESE CYLINDERS WILL BE TESTED BY THE STATE AND TEST RESULTS WILL BE FURNISHED TO THE CONTRACTOR.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE MEASURED BY THE UNIT FOR EACH ANCHOR DRILL HOLE FILLED WITH GROUT.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	GROUT FOR ANCHOR DRILL HOLES TO TUNNEL

DRILLED VENTILATION SHAFT EXCAVATION AND SUPPORT

DESCRIPTION. THIS ITEM SHALL CONSIST OF EXCAVATING A SHAFT THROUGH THE FILL AND OVER-BURDEN INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS AND THROUGH THE CEILING OF THE TUNNEL; FURNISHING AND INSTALLING A TEMPORARY CASING THROUGH THE SOILS AND WEATHERED SHALE, IF NECESSARY IN ORDER TO PREVENT CAVING; FURNISHING AND INSTALLING A PERMANENT CASING IN THE SOIL AND ROCK; REMOVING THE SPOIL, DISPOSING OF EXCAVATED MATERIAL; AND FURNISHING ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO COMPLETE THE CONSTRUCTION OF THE SHAFT IN ACCORDANCE WITH THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

GENERAL. THE DRILLED SHAFT SHALL BE LOCATED AS SHOWN ON THE PLANS. THE SHAFT SHALL BE INSTALLED SO THAT IT IS NOT OUT OF PLUMB MORE THAN 1 1/2 INCHES IN THE FIRST 10 FEET OF DEPTH, AND NOT OUT OF PLUMB MORE THAN AN ADDITIONAL 1 PERCENT OF THE DEPTH OVER 10 FEET, FOR THE REMAINDER OF THE SHAFT DEPTH. THE FINISHED INSIDE DIAMETER OF THE SHAFT SHALL NOT BE LESS THAN 36 INCHES NOR GREATER THAN 72 INCHES.

EXCAVATION. EXCAVATION FOR THE SHAFT SHALL BE PERFORMED BY USING ANY PRACTICAL METHODS AND MACHINERY APPROVED BY THE ENGINEER. THE SHAFT SHALL BE EXCAVATED TO INTERSECT THE TUNNEL AS SHOWN ON THE PLANS.

THE CONTRACTOR SHALL, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK, SUBMIT FOR APPROVAL BY THE ENGINEER, A DESCRIPTION OF THE CONSTRUCTION METHODS AND EQUIPMENT HE PROPOSES TO USE UNDER THIS ITEM.

DISPOSAL OF EXCAVATED MATERIAL. EXCAVATED MATERIAL SHALL BE DISPOSED OF AS DESCRIBED IN THE NOTE FOR "ACCESS SHAFT EXCAVATION AND SUPPORT".

INITIAL SUPPORT. THE SOILS AND WEATHERED ROCK MAY REQUIRE TEMPORARY CASING TO PREVENT CAVING.

FINAL CASING. THE DRILLED HOLE SHALL BE PERMANENTLY CASED THROUGHOUT ITS ENTIRE LENGTH. CASING SHALL BE 1/2-INCH THICK ALLOY STEEL PIPE, 707.11 WITH AN INSIDE DIAMETER OF 36 INCHES. IF A LARGER DIAMETER IS USED, LINING SHALL BE APPROVED BY ENGINEER.

METHOD OF MEASUREMENT. THE DEPTH OF THE COMPLETED SHAFT, EXCAVATED AND PROPERLY SUPPORTED, SHALL BE MEASURED IN LINEAR FEET.

LENGTH FOR PAYMENT SHALL BE MEASURED WITHIN THE LIMITS SHOWN ON THE "PROFILE OF TUNNEL" DRAWING AND ALONG THE CENTERLINE OF THE SHAFT.

SEPARATE MEASUREMENTS SHALL BE MADE FOR THAT PORTION OF THE SHAFT EXCAVATED THROUGH SOIL AND FOR THAT PORTION OF THE SHAFT EXCAVATED THROUGH ROCK. THE DIVIDING LINE FOR MAKING THESE MEASUREMENTS SHALL BE THE FIRST OCCURRENCE OF A CONTINUOUS LIMESTONE LAYER, AND SHALL BE DETERMINED BY THE ENGINEER.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL THE WORK AND MATERIALS HEREINBEFORE DESCRIBED.

PAYMENT WILL BE MADE UNDER.

ITEM	UNIT	DESCRIPTION
SPECIAL	LINEAR FOOT	VENTILATION SHAFT EXCAVATION AND SUPPORT, IN SOIL
SPECIAL	LINEAR FOOT	VENTILATION SHAFT EXCAVATION AND SUPPORT, IN ROCK

NOTES CONTINUED ON SHEET 106

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		JRL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 105)

DRILLED CYLINDER PILES EXCAVATION AND SUPPORT

DESCRIPTION. THIS ITEM SHALL CONSIST OF EXCAVATING A SHAFT, OF THE SIZE CALLED FOR ON THE PLANS, THROUGH THE FILL AND OVERBURDEN AND INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS; FURNISHING AND INSTALLING A TEMPORARY CASING THROUGH THE SOILS AND WEATHERED ROCK, IF NECESSARY IN ORDER TO PREVENT CAVING; REMOVING THE SPOIL, SCALING LOOSE ROCK; DISPOSING OF EXCAVATED MATERIAL AND FURNISHING ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO COMPLETE THE EXCAVATION FOR THE CYLINDER PILES IN ACCORDANCE WITH 503 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

GENERAL. EACH CYLINDER PILE SHALL BE SO CONSTRUCTED THAT ITS CENTER AT THE ELEVATION OF THE BOTTOM OF THE CAPPING BEAM AT THE LOCATION OF THE PILE DOES NOT VARY BY MORE THAN 2 INCHES FROM ITS CORRECT LOCATION AS SHOWN ON THE PLANS. IN ADDITION EACH PILE SHALL BE CONSTRUCTED WITH A VARIATION OF NOT MORE THAN 0.1 INCHES PER FOOT FROM THE VERTICAL, EXCEPT THAT ALLOWABLE VARIATION SHALL BE DECREASED AS REQUIRED TO PREVENT INTERFERENCE WITH THE ADJACENT PILES. IF THE CAISSON AXIS VARIES MORE THAN THE ABOVE NOTED TOLERANCES OR THE NECESSARY SPACE BETWEEN CYLINDER PILES IS RESTRICTED, THE DESIGN SHALL BE MODIFIED AND/OR SHAFT RE-EXCAVATED TO WITHIN ALLOWABLE TOLERANCES OR SUCH THAT CYLINDER PILES CAN BE CONSTRUCTED THEIR FULL DIAMETERS AT NO ADDITIONAL COST TO THE STATE.

ALL SHAFTS SHALL BE AT LEAST AS LARGE IN DIAMETER AS SHOWN ON SHEETS NOS. 126 & 135.

EXCAVATION. EXCAVATION FOR THE CYLINDER PILES SHALL BE PERFORMED BY ROTARY DRILLING METHODS USING ANY PRACTICAL METHODS AND MACHINERY ACCEPTED BY THE ENGINEER. THE ORDER OF CONSTRUCTION OF THE CYLINDER PILES SHALL BE AS OUTLINED ON THE CONSTRUCTION PROCEDURE SHEET NO. 127. EACH CYLINDER PILE SHALL BE EXCAVATED TO ELEVATION B SHOWN ON SHEET NO. 135 UNLESS DIRECTED OTHERWISE BY THE ENGINEER. ELEVATION B MAY BE LOWERED (1) IF INFORMATION OBTAINED FROM THE INITIAL FIELD TESTING PERFORMED BY THE ENGINEER INDICATES THAT THE EFFECTIVE RESIDUAL ANGLE OF INTERNAL FRICTION OF THE ROCK MASS IS LESS THAN ASSUMED FOR DESIGN; THUS GREATER EMBEDMENT OF THE PILE INTO THE ROCK WILL BE REQUIRED, OR (2) IF MINIMUM PILE EMBEDMENT SHOWN ON SHEETS NOS. 133 & 134 WILL NOT BE PROVIDED, AFTER THE ENGINEER DETERMINES IN THE FIELD THE "TOP OF ROCK" ELEVATION.

THE CONTRACTOR SHALL NOT ALLOW A COMPLETED OR PARTIALLY COMPLETED CYLINDER PILE EXCAVATION TO REMAIN OPEN LONGER THAN FORTY-EIGHT HOURS WITHOUT PRIOR APPROVAL OF THE ENGINEER.

DISPOSAL OF EXCAVATED MATERIAL. EXCAVATED MATERIAL SHALL BE DISPOSED OF AS DESCRIBED IN NOTE "ACCESS SHAFT EXCAVATION AND SUPPORT".

PROTECTIVE CASING. THE TOP PORTION OF THE CONCRETE CYLINDER PILE IS INTENDED TO BE PLACED AGAINST THE EXISTING SUBSOILS WITHOUT THE USE OF PERMANENT FORMS. IF WATER IS ENCOUNTERED DURING THE INSTALLATION OF THE PILE, OR IF THE NATURE OF THE EXCAVATION IS SUCH THAT THERE IS DANGER OF FOREIGN SUBSTANCES, EARTH OR OTHER DEBRIS CONTAMINATING OR FALLING INTO THE CONCRETE MIX DURING THE PLACING OPERATIONS, THEN THE CONTRACTOR SHALL USE TEMPORARY STEEL SHELLS FOR THE PLACING OF THE CYLINDER CONCRETE. THESE STEEL SHELLS SHALL BE WITHDRAWN AS THE CONCRETE IS PLACED SO THAT THE CONCRETE COMPLETELY FILLS THE EXCAVATED SPACE TO THE TOP OF THE PILE.

THE CONTRACTOR SHALL NOT USE SLURRY OR MUD AS A SUPPORT MEDIUM, AND THE SHAFTS SHALL BE EXCAVATED IN THE DRY.

MATERIAL FOR PROTECTIVE CASING. METAL SHELLS, AT LEAST AS LARGE IN INSIDE DIAMETER AS THE NOMINAL SHAFT SIZE, SHALL BE WATER-TIGHT AND SHALL BE OF SUFFICIENT STRENGTH TO WITHSTAND THE EARTH AND WATER PRESSURES DURING THE INSTALLATION PROCEDURE.

WATER IN THE EXCAVATION. WATER SHALL NOT BE ALLOWED TO STAND IN THE BOTTOM OF THE EXCAVATION AT ANY TIME AND ANY COSTS RELATED TO MAINTAINING A DRY AREA SHALL BE INCIDENTAL TO THESE ITEMS OF WORK.

SAFETY PROVISIONS. THE CONTRACTOR SHALL HAVE AT THE JOB SITE ALL EQUIPMENT AND MATERIALS NEEDED TO PROVIDE SAFE DESCENT INTO THE CYLINDER PILE HOLES FOR THE ENGINEER AND ANY OTHER PERSONNEL WHO MAY NEED TO ENTER THE HOLES, AND SHALL PROVIDE PERSONNEL TO OBSERVE ANY PERSON AT ALL TIMES WHEN HE IS IN THE HOLE. ALSO, NO INSPECTOR SHALL BE PERMITTED TO ENTER A HOLE WHICH IS NOT CASED TO ROCK UNLESS SUITABLE TEMPORARY INSPECTION CASING IS PROVIDED. EQUIPMENT FURNISHED BY THE CONTRACTOR AND KEPT IMMEDIATELY ADJACENT TO THE HOLE WITH AN OPERATOR AT ALL TIMES WHEN ANY PERSON IS IN THE HOLE SHALL INCLUDE HOIST FOR DESCENT INTO THE HOLE AND HOIST LINE WITH SAFETY HOOK FOR RESERVE PURPOSES. IN ADDITION, THE CONTRACTOR SHALL HAVE ON THE SITE PROTECTIVE CASING (SEE ABOVE), LADDER OR OTHER BACKUP MEANS OF DESCENT INTO THE HOLE, AIR SUPPLY, ELECTRIC LIGHT (SAFETY LAMP) ON SAFETY CORD LONG ENOUGH TO REACH BOTTOM OF HOLE, AND SUBMERSIBLE PUMP. THE USE IN THE HOLE OF A PUMP DRIVEN BY AN INTERNAL COMBUSTION MOTOR WILL NOT BE PERMITTED. ELECTRICALLY DRIVEN PUMPS, IF USED IN THE HOLE, SHALL BE OF THE EXPLOSION-PROOF TYPE. ANY PERSON ENTERING HOLE SHALL BE REQUIRED TO WEAR A SAFETY HAT AND A SAFETY HARNESS. (THIS EQUIPMENT, WHEN WORN BY THE ENGINEER, SHALL BE FURNISHED BY THE CONTRACTOR.)

OBSERVATION. ALL HOLES WILL BE OBSERVED BY THE ENGINEER (1) AT THE TIME OF DRILLING TO VERIFY THE "TOP OF ROCK" FOR PAYMENT AND MAKE SURE OF THE MINIMUM EMBEDMENT DEPTHS INTO THE ROCK; AND (2) PRIOR TO PLACEMENT OF CONCRETE, TO MAKE SURE THE HOLE IS IN PROPER CONDITION FOR CONCRETING. SUFFICIENT TIME SHALL BE PROVIDED TO PERMIT OBSERVATION OF THE HOLE. THE LOCATION OF THE HOLE AS DRILLED AND ITS PLUMBNESS SHALL BE VERIFIED BY THE ENGINEER BEFORE CONCRETE IS PLACED. CONCRETE SHALL NOT BE PLACED UNTIL THE ABOVE NOTED TOLERANCES ARE ACHIEVED. SUFFICIENT EQUIPMENT AND PERSONNEL SHALL BE SUPPLIED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER TO PERMIT PROPER OBSERVATION OF ALL DRILLED EXCAVATIONS.

ONCE THE ENGINEER HAS FINISHED HIS OBSERVATIONS, THE STEEL BEAMS FOR PILES 1 THRU 137 AND STEEL REINFORCEMENT CAGES FOR PILES 138 THRU 161 MAY THEN BE INSTALLED AND THE CONCRETE PLACED.

PLACEMENT OF STEEL. STEEL BEAMS AND REINFORCING STEEL SHALL BE INSTALLED AS SHOWN ON THE PLANS. ALL STEEL SHALL BE FREE OF RUST, MUD OR ANY DELETERIOUS MATERIAL WHICH WOULD HINDER BONDING OF CONCRETE AND STEEL. REINFORCEMENT CAGES AND BEAMS SHALL BE STRAIGHT AND SHALL CONFORM TO THE DESIGN DIMENSIONS. ADEQUATE PROVISIONS SHALL BE MADE TO ENSURE THAT THE STEEL WILL REMAIN IN PLACE THROUGHOUT PLACEMENT OF CONCRETE AND THAT SPECIFIED CONCRETE COVER FOR THE STEEL IS ATTAINED AND MAINTAINED. THE USE OF PRECAST CONCRETE SPACER BLOCKS FOR THIS PURPOSE IS RECOMMENDED. EXTREME CARE MUST BE EXERCISED TO MAINTAIN BEAM IN PROPER ALIGNMENT AND ELEVATION AS NOTED ON SHEET NO. 133.

METHOD OF MEASUREMENT. THE DEPTH OF THE COMPLETED SHAFT, EXCAVATED AND PROPERLY SUPPORTED, SHALL BE MEASURED IN LINEAR FEET ALONG THE AXIS OF THE CYLINDER PILE WITHIN THE LIMITS SHOWN ON SHEET NO. 126.

IF THE BOTTOM OF THE CYLINDER PILE IS RAISED OR LOWERED BY THE ENGINEER FROM THE PLAN ELEVATIONS, IN ORDER TO PROVIDE MINIMUM PILE EMBEDMENT INTO THE ROCK; THEN, THE MEASURED LENGTH OF SHAFT EXCAVATION SHALL EXTEND TO THIS NEW ELEVATION.

SEPARATE MEASUREMENT WILL BE MADE FOR THAT PORTION OF THE SHAFT EXCAVATED THROUGH SOIL AND FOR THAT PORTION OF THE SHAFT EXCAVATED THROUGH ROCK. THE DIVIDING LINE FOR MAKING THESE MEASUREMENTS SHALL BE THE FIRST OCCURRENCE OF A CONTINUOUS LIMESTONE LAYER, AND SHALL BE DETERMINED BY THE ENGINEER.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL THE WORK AND MATERIAL HEREINBEFORE DESCRIBED.

PAYMENT WILL BE MADE UNDER:

ITEM	UNIT	DESCRIPTION
503	LINEAR FOOT	SOIL EXCAVATION, SIZE SPECIFIED CYLINDER PILES
503	LINEAR FOOT	ROCK EXCAVATION, SIZE SPECIFIED CYLINDER PILES

THE PLACEMENT OF THE STEEL BEAMS AND REINFORCING STEEL AS HEREINBEFORE DESCRIBED WILL BE PAID FOR AS SPECIFIED UNDER ITEM 513, "STRUCTURAL STEEL" AND ITEM 509, "REINFORCING STEEL, GRADE 60".

CLASS C CONCRETE CYLINDER PILES

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING PORTLAND CEMENT CONCRETE IN ACCORDANCE WITH 511 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN. THE CONCRETE SHALL BE PLACED IN THE CYLINDER PILES AS SHOWN ON THE PLANS.

GENERAL. FOR THE PURPOSE OF IDENTIFICATION IN THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, CONCRETE FOR THE CYLINDER PILES SHALL BE CONSIDERED STRUCTURAL CONCRETE (EXCLUDING SUPERSTRUCTURE CONCRETE). CONCRETE WITH A SLUMP OF 6 INCHES SHALL BE USED.

CONSTRUCTION. THE ORDER OF CONSTRUCTION OF THE CYLINDER PILES SHALL BE AS SHOWN ON THE PLANS. ONLY ONE CYLINDER PILE SHALL BE BACKFILLED WITH CONCRETE AT A TIME. PROMPTLY AFTER THE ENGINEER HAS COMPLETED HIS OBSERVATION AND THE STEEL BEAM/OR STEEL REINFORCEMENT CAGE HAS BEEN INSTALLED IN A CYLINDER PILE, CONCRETE SHALL BE PLACED IN A MANNER THAT WILL NOT CAUSE SEGREGATION OF THE PARTICLES OR PERMIT INFILTRATION OF WATER OR ANY OTHER OCCURRENCE WHICH WOULD TEND TO DECREASE THE STRENGTH OF THE CONCRETE OR THE CAPACITY OF THE FINISHED CYLINDER PILE. THE ENGINEER SHALL BE PRESENT THROUGHOUT THE CONCRETE PLACEMENT OPERATION FOR EACH AND EVERY CYLINDER PILE.

CONCRETE FOR CYLINDER PILES 1 THRU 26 AND 113 THRU 137 (CYLINDER PILES WITH STEEL PIPE BEAMS FOR REINFORCEMENT) SHALL BE PLACED BY PUMPING THE CONCRETE THROUGH A TREMIE PIPE EXTENDING TO THE BOTTOM OF THE HOLE, FILLING THE SHAFT FROM THE BOTTOM TO THE TOP OF THE CYLINDER PILE. HOWEVER, CONCRETE FOR CYLINDER PILES 27 THRU 112 AND 138 THRU 161 MAY BE PLACED AS NOTED ABOVE OR IN ACCORDANCE WITH 511.08 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. CONCRETE FOR CYLINDER PILES 27 THRU 112 SHALL PROCEED SIMULTANEOUSLY ON BOTH SIDES OF THE BEAM WEB.

NOTES CONTINUED ON SHEET 107

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		MK	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 106)

CONCRETE QUANTITIES SHALL BE ACCURATELY MEASURED, AND COMPLETE WRITTEN DETAILED RECORDS SHALL BE KEPT OF THE OPERATIONS FOR EACH CYLINDER PILE. THE LEVEL AND VOLUME OF THE CONCRETE IN THE SHAFT EXCAVATION AS FILLING PROCEEDS SHALL BE CAREFULLY CONTROLLED, PARTICULARLY DURING CASING WITHDRAWAL, TO PREVENT INGRESS OF WATER OR SOIL INTO THE SHAFT. THE ENTIRE CYLINDER PILE SHALL BE COMPLETELY BACKFILLED WITH CONCRETE IN ONE CONTINUOUS POUR, EXCEPT AS NOTED FOR PILES 31 & 90 FOR INSTALLATION OF CONTACT STRESS CELLS. THE EXPOSED SURFACE OF THE SET CONCRETE IN PILES 31 & 90 SHALL BE CLEANED OF LAITENCE, ROUGHENED AND SLUSHED WITH 1:1 CEMENT GROUT JUST BEFORE THE POUR IS RESUMED. A SIMILAR CLEANUP PROCEDURE WILL BE REQUIRED PRIOR TO POURING THE CAPPING BEAM.

THE VOLUME OF ALL THE CONCRETE PLACED IN THE HOLE SHALL BE CAREFULLY MONITORED BY THE ENGINEER. IF THIS VOLUME DIFFERS SIGNIFICANTLY FROM THEORETICAL ESTIMATES, THE ENGINEER SHALL STOP CONSTRUCTION OF THE CYLINDER PILE AND THE CONTRACTOR SHALL TAKE A CONTINUOUS CORE OF THE CYLINDER PILE AT NO EXPENSE TO THE STATE. THE ENGINEER SHALL BE PRESENT DURING CORING TO OBSERVE THE DRILLING AND RECOVERED CORE.

PULLING THE CASING. IF USED, CASING SHALL BE PULLED DURING BACKFILLING WITH CONCRETE. THE LEVEL OF CONCRETE SHALL BE MAINTAINED SUFFICIENTLY ABOVE THE BASE OF THE CASING AT ALL TIMES SO AS TO MORE THAN BALANCE ANY WATER PRESSURE OUTSIDE THE CASING. THE CASING SHALL BE PULLED AXIALLY (KEPT PLUMB), NOT ECCENTRICALLY, WITH A SMOOTH, STEADY, VERTICAL MOTION, WITHOUT JERKS.

IT MUST BE EMPHASIZED THAT IT IS VERY IMPORTANT TO CORRECTLY BACKFILL THE SHAFT EXCAVATION. ALL VOIDS AROUND THE BAR REINFORCEMENT/OR STEEL BEAMS SHALL BE COMPLETELY FILLED WITH CONCRETE. LOSS OF GROUND MUST BE PREVENTED.

FORMS. STEEL FORMS SHALL BE USED TO OBTAIN ARCHITECTURAL TREATMENT OF THE CYLINDER PILE AT THE TENDON ATTACHMENT SHOWN ON SHEET NO. 159.

DETAILS SHOWING THE FORMS THE CONTRACTOR PROPOSES TO USE AT THE TENDON ATTACHMENT SHALL BE SUBMITTED, AT LEAST 30 DAYS PRIOR TO THEIR USE, TO THE ENGINEER FOR APPROVAL. PLACEMENT OF CONCRETE SHALL NOT COMMENCE UNTIL APPROVAL OF SUCH DETAILS.

METHOD OF MEASUREMENT. THE LENGTH OF EACH CYLINDER PILE TO BE PAID FOR SHALL BE THE COMPLETED AND ACCEPTED LENGTH, MEASURED ALONG THE AXIS OF THE CYLINDER PILE WITHIN THE LIMITS SHOWN ON SHEET NO. 126.

IF THE BOTTOM OF THE CYLINDER PILE IS LOWERED OR RAISED BY THE ENGINEER FROM THE PLAN ELEVATION, IN ORDER TO PROVIDE MINIMUM PILE EMBEDMENT INTO THE ROCK; THEN THE MEASURED LENGTH SHALL EXTEND TO THIS NEW ELEVATION.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL THE WORK HEREINBEFORE DESCRIBED.

PAYMENT WILL BE MADE UNDER:

ITEM	UNIT	DESCRIPTION
511	LINEAR FOOT	CLASS "C" CONCRETE, SIZE SPECIFIED CYLINDER PILE

2-INCH PERFORATED POLYVINYLCHLORIDE PIPE

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING AND PLACING THE 2-INCH PERFORATED PVC PIPE BEHIND THE STRUCTURAL SHOTCRETE (BETWEEN THE CYLINDER PILES) AS SHOWN ON THE PLANS. THIS WORK SHALL INCLUDE: EXCAVATING FOR PIPE AND GRANULAR FILTER MATERIAL; FURNISHING AND PLACING GRANULAR FILTER MATERIAL; FURNISHING AND PLACING REINFORCING STEEL; FURNISHING AND INSTALLING WIRE CLOTH; FURNISHING AND WRAPPING 2-INCH PERFORATED PVC PIPE IN MIRAFI 140 OR EQUAL (3 WRAPS); AND FURNISHING AND INSTALLING ALL NECESSARY PIPE BENDS AND BRANCHES OF A TYPE AT LEAST EQUAL TO THE CONDUIT OF WHICH THEY BECOME A PART. THIS WORK SHALL BE IN ACCORDANCE WITH 518 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

GENERAL. THE PIPE SHALL EXTEND FROM THE 6-INCH BY 6-INCH BY 2-INCH TEE AT THE 6-INCH HORIZONTAL PVC DRAIN LOCATED IN FRONT OF THE WALL, UPWARD AND BEHIND THE SHOTCRETE TO THE UPPER LIMITS SHOWN ON THE PLANS. GRANULAR FILTER MATERIAL SHALL BE PLACED AROUND THE PIPE AS SHOWN ON PLANS, SHEET NO. 151.

MATERIAL. 2-INCH MINIMUM POLYVINYLCHLORIDE PIPE, SCHEDULE 40, ASTM 1785, TYPE II PVC OR U.S. COMMERCIAL STANDARD NO. CS-207-60. REINFORCING STEEL, 509.02 GRANULAR FILTER MATERIAL, 605.03 (C).

PIPE SHALL BE PERFORATED WITH THREE ROWS OF TRANSVERSE SLOTS, SLOT WIDTH OF 0.020-INCH, 46 SLOTS PER FOOT, 1 1/2-INCH LONG SLOTS. PVC PIPE MEETING THESE REQUIREMENTS ARE AVAILABLE FROM HYDROPHILIC INDUSTRIES, INC., PUYALLUP, WASHINGTON.

CONSTRUCTION. THE DRAINAGE PIPE SHALL BE INSTALLED BY TRENCHING IN FRONT AND BETWEEN THE PILES OF THE CYLINDER PILE WALL DOWN TO ROCK LEVEL. DURING THE EXCAVATION FOR THE CONSTRUCTION OF THE 2-INCH PVC PIPE, GRANULAR FILTER MATERIAL AND SHOTCRETE, THE CONTRACTOR SHALL PROTECT AGAINST PIPING THROUGH THE UPPER LAYER OF THE SILTS (EROSION OF THE SILTS).

METHOD OF MEASUREMENT. THE FOOTAGE SHALL BE THE ACTUAL LENGTH OF PIPE PLACED. PIPE SPECIALS SHALL BE MEASURED BY THE SAME METHOD AS THE PIPE PROPER, MEASURED ALONG ITS CENTERLINE.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
518	LINEAR FOOT	2-INCH PERFORATED POLYVINYLCHLORIDE PIPE

TUNNEL DRAINAGE PIPE

DESCRIPTION. THIS ITEM SHALL CONSIST OF CONTINUING THE DRAINAGE PIPE FROM THE ROCK AREA ABOVE THE TUNNEL ROOF (518, VERTICAL DRAINAGE HOLES) ALONG THE CURVED SIDES OF THE TUNNEL TO THE CENTER OF THE TUNNEL AS SHOWN ON THE PLANS, SHEET NO. 149. THIS WORK SHALL BE IN ACCORDANCE WITH 518 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

MATERIAL. 2-INCH PLASTIC PIPE, 711.29.

METHOD OF MEASUREMENT. THE BREAK IN PAY LIMITS BETWEEN 518, VERTICAL DRAINAGE HOLES AND DRAINAGE PIPE SHALL BE AS SHOWN ON THE PLANS, SHEET NO. 149.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
518	LINEAR FOOT	TUNNEL DRAINAGE PIPE

UNCLASSIFIED EXCAVATION

DESCRIPTION. THIS ITEM SHALL CONSIST OF EXCAVATING ALL MATERIALS, OF WHATEVER NATURE ENCOUNTERED, NECESSARY TO CONSTRUCT THE CONCRETE CAP. THE LIMITS OF EXCAVATION FOR THE CONCRETE CAP SHALL BE AS INDICATED ON THE PLANS. INCLUDED IN THIS ITEM ARE DEWATERING, BACKFILLING THE EXCAVATION, AND DISPOSING OF THE EXCAVATED MATERIAL. WORK UNDER THIS ITEM SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF 503 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN. THE EXCAVATION REQUIRED FOR THE CONCRETE CAP SHALL NOT BE MADE UNTIL SUCH TIME AS INDICATED ON THE PLANS. THE ORDER OF CONSTRUCTION OF THE CAP BEAM IS SHOWN ON SHEET NO. 127.

DEWATERING. WHEN WATER IS ENCOUNTERED DURING EXCAVATION OR DURING CONSTRUCTION OF THE CONCRETE CAP, THE CONTRACTOR SHALL PROVIDE ALL PUMPING NECESSARY TO COMPLETE THE REQUIRED CONSTRUCTION.

DISPOSAL OF EXCAVATED MATERIAL. EXCAVATED MATERIAL SHALL BE DISPOSED OF AS DESCRIBED IN THE NOTE FOR "ACCESS SHAFT EXCAVATION AND SUPPORT".

METHOD OF MEASUREMENT. THE CUBIC YARDS OF UNCLASSIFIED EXCAVATION SHALL BE MEASURED AS A SOLID BOUNDED BY THE LIMITS SHOWN ON THE PLANS.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
503	CUBIC YARD	UNCLASSIFIED EXCAVATION

POST-TENSIONING SYSTEM TO TUNNEL

DESCRIPTION. THIS WORK SHALL CONSIST OF PREPARING WORKING AREAS FOR THE DRILL RIG; ALIGNING AND DRILLING ALIGNED HOLES FROM THE GROUND SURFACE THROUGH THE CYLINDER PILES, FILL AND OVERBURDEN, AND INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS TO TARGET IN THE TUNNEL; AND FURNISHING, FABRICATING, INSTALLING AND INITIALLY STRESSING OF THE POST-TENSIONING SYSTEM OF THE LOAD CAPACITY SPECIFIED, INCLUDING GREASE CAPS, TENDON ANCHORAGE ASSEMBLY, TRUMPETS, TRANSITION PIECES, GALVANIZED RIGID PIPE, TENDON-END ANCHORAGE ASSEMBLY AND GREASE.

NOTES CONTINUED ON SHEET 108

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		DRL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 107)

THE ENTIRE ANCHORAGE ASSEMBLY INCLUDING ALL COMPONENTS AND ACCESSORIES, SHALL BE A STANDARD PRODUCT OF A RECOGNIZED REPUTABLE MANUFACTURER OF POST-TENSIONED ANCHORS OF THE TYPE AS SHOWN ON THE PLANS. DURING FABRICATION AND INSTALLATION OF THE ANCHORAGE ASSEMBLIES, THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ASSURE THAT EACH ASSEMBLY IS SATISFACTORILY FABRICATED, FREE FROM CORROSION, DAMAGE OR OTHER DEFECTS AND PROPERLY INSTALLED.

MATERIALS. HIGH TENSILE STRENGTH SINGLE WIRE, TYPE BA, FOR MULTIWIRE TYPE STEEL ANCHOR TENDONS SHALL CONSIST OF WIRES CONFORMING TO THE REQUIREMENTS OF ASTM DESIGNATION A421-77, "UNCOATED STRESS-RELIEVED WIRE FOR PRESTRESSED CONCRETE". THE WIRES SHALL HAVE A NOMINAL DIAMETER OF 1/4-INCH OR LARGER AND A MINIMUM TENSILE STRENGTH OF 240,000 psi. OIL TEMPERED WIRES SHALL NOT BE USED.

WIRE TENDON AND ANCHORAGE SHALL BE SO DESIGNED THAT IT IS POSSIBLE TO RELAX, RETENSION OR PERMIT LIFT-OFF READINGS ON ANY ONE OF THE TENDONS AT ANYTIME DURING ITS LIFE.

TENDON AND ANCHORAGE SHALL BE DESIGNED TO PERMIT DETENSIONING, REMOVAL OF WIRES AND RETENSIONING OF THE TENDON DURING THE SURVEILLANCE OPERATION.

TRUMPLATE ASSEMBLY. THE TRUMPET INCLUDING TRANSITION PIECE SHALL BE OF FERROUS MATERIAL, AND SHALL NOT CAUSE HARMFUL ELECTROLYTIC ACTION. THE TRUMPET SHALL BE HOT-DIP GALVANIZED.

THE TRUMPET, INCLUDING THE TRANSITION PIECE AND RIGID PIPE SHALL BE DESIGNED, WHEN BACKED BY GROUT, TO WITHSTAND AN INTERNAL PRESSURE, EQUAL TO 150 PERCENT OF THE REQUIRED PUMPING PRESSURE FOR INSTALLATION OF THE GREASE.

ANCHORAGE ASSEMBLY. THE ANCHORAGE ASSEMBLY, INCLUDING SHIMS AND STRESSING WASHERS, SHALL BE COMPATIBLE WITH THE TENDON MATERIAL USED. THE ANCHORAGE ASSEMBLY SHALL DEVELOP THE FULL ULTIMATE FORCE OF THE TENDON.

GREASE RETAINER CAP. THE GREASE RETAINER CAP AND GASKETS SHALL BE DESIGNED TO REMAIN LEAKTIGHT UNDER A PRESSURE EQUAL TO 150 PERCENT OF THE REQUIRED PUMPING PRESSURE FOR INSTALLATION OF THE GREASE.

THE GREASE RETAINER CAP AND GASKETS SHALL BE DESIGNED TO REMAIN LEAKTIGHT FOR AT LEAST 40 YEARS.

THE GASKETS SHALL BE MADE OF A MATERIAL THAT WILL NOT DETERIORATE IN AN ATMOSPHERE ENVIRONMENT FOR AT LEAST 40 YEARS.

THE GREASE RETAINER CAP SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123.

GREASE. PERMANENT CORROSION PROTECTION SHALL BE PROVIDED BY INJECTING THE GREASE INTO THE LINER PIPE AND AROUND THE ANCHORAGES AS RECOMMENDED BY THE MANUFACTURER. GREASE SHALL BE VISCONORUST 2090 P-4 FILLER CORROSION PREVENTATIVE AS MANUFACTURED BY VISCOSITY OIL COMPANY, OR AN APPROVED EQUAL.

GALVANIZED RIGID PIPE. SEALED GALVANIZED STRAIGHT RIGID PIPE (LINER PIPE) SHALL COMPLY WITH 707.11 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. PIPE SHALL HAVE A MINIMUM WALL THICKNESS OF 1/4-INCH. OUTSIDE DIAMETER OF LINER PIPE SHALL BE AS SHOWN ON THE PLANS. LENGTHS OF PIPE SHALL BE JOINED BY THREADED COUPLERS, WELDING IS NOT ACCEPTABLE. THREE 0.5-INCH HIGH, CURVED STEEL SPACERS EQUISPACED AT 120 DEGREES ABOUT THE CIRCUMFERENCE SHALL BE TACK WELDED TO THE PIPE AT TEN-FOOT INTERVALS TO CENTER THE PIPE IN THE DRILL HOLE AND FACILITATE GROUTING OF THE ANNULAR SPACE.

BEARING PLATE. THE STEEL FOR THE BEARING PLATES SHALL COMPLY WITH ASTM A36, SILICON KILLED FINE-GRAIN PRACTICE.

THE BEARING PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123.

DRAWINGS. SHOP DRAWINGS SHALL BE FURNISHED IN ACCORDANCE WITH 501.05 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

THE CONTRACTOR SHALL FURNISH THE FOLLOWING DOCUMENTATION AND ERECTION DRAWINGS TO THE ENGINEER. THIS DOCUMENTATION SHALL BE SUBJECT TO APPROVAL AND SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

(a) DRAWING CONTROL LOG IDENTIFYING EACH SHOP DETAIL AND ERECTION DRAWING WITH RESPECT TO TITLE, ITEM SHOWN, SEQUENCE NUMBER, SCHEDULE DATE OF ISSUE AND REVISION NUMBER.

(b) SHOP DETAIL DRAWINGS OF THE POST-TENSIONING SYSTEM, EQUIPMENT AND MATERIALS FOR PLACING TENDONS, INSTALLING ANCHORAGE ASSEMBLIES, TENSIONING TENDONS AND GREASE FILLING AND GROUTING OPERATIONS.

(c) SHOP DETAIL DRAWINGS OF ANCHORAGE ASSEMBLIES, TRUMPLATE ASSEMBLIES, GREASE FILLER RETAINER CAPS AND OTHER ACCESSORIES PERTINENT TO THE POST-TENSIONING SYSTEM.

(d) SEQUENCE AND METHODS OF ASSEMBLY AND INSTALLATION.

FABRICATION SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DRAWINGS HAS BEEN RECEIVED FROM THE ENGINEER.

TENDON SYSTEM FABRICATION. THE SUPPLIER SHALL SPECIFY THE METHODS AND PROCEDURE FOR THE TENDON CUTTING AND CUTTING TOLERANCE.

THE TENDON SHALL BE FURNISHED IN CONTINUOUS LENGTH WITHOUT SPLICES OR WELDS.

THE TENDON SHALL BE COMPLETELY PROTECTED AGAINST CORROSION DURING AND AFTER FABRICATION. A TEMPORARY CORROSION PROTECTION SUCH AS A THIN FILM OF VISCONORUST 1601 AMBER, AS MANUFACTURED BY VISCOSITY OIL COMPANY, OR AN APPROVED EQUAL, SHALL BE APPLIED ON THE TENDON STEEL. THE COATING MATERIAL SHALL BE COMPATIBLE WITH THE PERMANENT CORROSION PREVENTATIVE COATING AND SHALL BE CAPABLE OF EASY REMOVAL IN THE FIELD WITH THE USE OF NON-CHLORINATED PETROLEUM SOLVENTS FOR THE INSTALLATION OF FIELD ATTACHED ANCHORAGES.

TENDON-END ANCHORAGE. WIRE TENDON-END BUTTONHEADS SHALL BE COLD FORMED IN ACCORDANCE WITH THE SUPPLIER'S QUALITY CONTROL PERFORMANCE AND ACCEPTANCE CRITERIA FOR THE BUTTONHEADS. THE BUTTONHEAD SHALL BE FORMED SYMMETRICALLY ABOUT THE AXIS OF EACH WIRE AND SHALL BE FREE FROM HARMFUL SEAMS, FRACTURES OR OTHER FLAWS. NO HEADING PROCEDURE SHALL BE USED WHICH WILL CAUSE INDENTATION OF THE WIRE.

WIRE TENDON-END ANCHORAGE SHALL BE PROVIDED AT ONE END (SHOP END) BY MEANS OF SHOP BUTTONHEADS COLD FORMED AFTER THREADING THROUGH THE STRESSING WASHER AND AT THE OTHER END (FIELD END) BY MEANS OF FIELD BUTTONHEADS FORMED AFTER THE TENDON HAS BEEN PLACED IN ITS PROPER LINER PIPE IN THE STRUCTURE.

THE ANCHOR ASSEMBLY AND TENDON MATERIAL AND ACCESSORIES SHALL BE HANDLED AND PROTECTED PRIOR TO INSTALLATION IN SUCH A MANNER AS TO AVOID CORROSION OR PHYSICAL DAMAGE TO THE PRESTRESSING STEEL OR ANCHORAGE ASSEMBLIES.

STORAGE OF STEEL TENDONS AND ACCESSORIES SHALL BE IN WEATHERPROOF BUILDINGS, HEATED IF NECESSARY TO PREVENT CONDENSATION AND CORROSION. IMMEDIATELY PRIOR TO PLACING EACH ANCHORAGE ASSEMBLY IN AN ANCHOR HOLE, THE ASSEMBLY SHALL BE INSPECTED BY THE CONTRACTOR AND ENGINEER FOR ANY DAMAGED, NICKED OR SCARRED TENDON MATERIAL OR OTHER INJURIOUS DETERIORATION. ANY CORRODED OR DAMAGED TENDON OR OTHER PART OF AN ANCHOR ASSEMBLY WHICH IN THE OPINION OF THE CONTRACTOR OR ENGINEER IS UNSUITABLE FOR USE IN THE PROJECT, SHALL BE REPLACED BY THE CONTRACTOR AT NO EXPENSE TO THE STATE.

WELDING. THE GROUNDING OF WELDING MACHINES, OR THE GROUNDING OF ELECTRICAL CIRCUITS WILL NOT BE PERMITTED ON OR ADJACENT TO ANY ANCHORAGE ASSEMBLY, OR MATERIALS TO BE USED IN ANCHORAGE ASSEMBLIES, OR ANY METAL IN CONTACT WITH AN ANCHORAGE ASSEMBLY, UNLESS SPECIFICALLY APPROVED BY THE ENGINEER.

WELDING PROCEDURES AND WELDER'S QUALIFICATIONS SHALL CONFORM TO 513.17 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

TRUMPLATE ASSEMBLY. BEARING PLATE. FABRICATION OF BEARING PLATE SHALL CONFORM TO CONSTRUCTION AND MATERIAL SPECIFICATIONS.

THE BEARING PLATE SHALL BE PROVIDED WITH ALL APPURTENANCES FOR THE ATTACHMENT OF TENSIONING AND LINER PIPE FILLING EQUIPMENT CONSISTENT WITH THE SYSTEM THE SUPPLIER PROPOSES TO USE. THE CONTRACTOR SHALL ALSO PROVIDE FOR ATTACHMENT OF CONCRETE FORMS, AND SUCH ATTACHMENT SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

THE TRUMPET AND RIGID LINER PIPE SHALL BE CUT TO LENGTH WITHOUT WRINKLING THE METAL. DENTED OR WRINKLED TRUMPET AND LINER PIPE SHALL BE REPLACED. TRUMPET SHALL EXTEND BEYOND THE BACKFACE OF THE CYLINDER PILE WALL AT LEAST FIVE FEET AND BEYOND THE BASE OF THE TUNNEL ANCHOR BLOCK ABOUT THREE FEET.

A SEALED TELESCOPIC JOINT SHALL BE PROVIDED BETWEEN THE LINER PIPE AND THE TRUMPET TO PERMIT AXIAL COMPRESSION DURING TENDON STRESSING.

ANCHORAGE ASSEMBLY. THE ANCHORAGE ASSEMBLY SHALL BE COMPLETELY PROTECTED AGAINST CORROSION DURING AND AFTER FABRICATION. A TEMPORARY CORROSION PROTECTION SHALL BE APPLIED TO THE ANCHORAGE ASSEMBLY IN ACCORDANCE WITH FILLER MATERIAL MANUFACTURER'S WRITTEN RECOMMENDATIONS.

NOTES CONTINUED ON SHEET 109

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

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NOTES (CONTINUED FROM SHEET 108)

INSPECTION AND TESTING. CERTIFIED MILL TEST REPORTS AND OTHER VERIFICATION DOCUMENTS SHOWING THE RESULTS OF CHEMICAL ANALYSIS AND PHYSICAL TESTS REQUIRED BY THE ASTM SPECIFICATIONS ON THE MATERIAL TO BE USED IN THE POST-TENSIONING SYSTEM SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL NOT LATER THAN 60 DAYS PRIOR TO FABRICATION OR COMMENCEMENT OF INSTALLATION WORK, WHICHEVER IS APPLICABLE. ALL TESTS SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE ASTM SPECIFICATIONS.

DRILLED HOLES. THIS WORK CONSISTS OF ALIGNING AND DRILLING HOLES THROUGH THE CYLINDER PILE, FILL AND OVERBURDEN, AND INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS TO TARGET THE TUNNEL. THE ALIGNMENT OF THE COMPLETED DRILL HOLE SHALL BE SUCH THAT THE LINER PIPE CAN BE INSERTED IN THE HOLE WITHOUT DAMAGE TO THE PIPE. NO DRILLING WILL BE PERMITTED NEXT TO A HOLE CONTAINING A TENDON. UNDER EXTREME CONDITIONS, AND WITH THE ENGINEER'S APPROVAL, AN EXISTING TENSIONED TENDON COULD BE DETENSIONED AND ADJACENT DRILLING PERMITTED.

DRILLED HOLES, FOR TENDON INSTALLATION, SHALL BE DRILLED AT THE LOCATIONS AND IN THE DIRECTIONS SHOWN ON THE PLANS AND SHALL INTERSECT THE TUNNEL WITHIN THE TOLERANCES STATED HEREIN. IT IS DESIRABLE THAT THE DRILL HOLE TARGET THE WALL OF THE TUNNEL WITHIN A CIRCLE OF RADIUS OF TWO FEET. HOLES WITHIN THIS LIMIT MAY REQUIRE RE-DESIGN OF ANCHOR BLOCKS IN ORDER TO ACCOMMODATE TWO TENDON ANCHORAGES. HOLES WHICH FALL OUTSIDE THIS LIMIT AND FOR WHICH REASONABLE LOCAL OVER-EXCAVATION IN THE TUNNEL DOES NOT PERMIT AN ADEQUATE ANCHORAGE TO BE CONSTRUCTED WILL REQUIRE REDRILLING, AT LEAST OVER THE LOWER LENGTH OF THE DRILL HOLE. ANY ABANDONED DRILL HOLE, OR ABANDONED PORTION OF A DRILL HOLE SHALL BE BACKFILLED WITH CEMENT GROUT TO THE SATISFACTION OF THE ENGINEER.

REDRILLING NEXT TO ABANDONED HOLES COULD BE VERY AWKWARD. IT MAY BE ADVANTAGEOUS FOR THE CONTRACTOR TO EXCAVATE AN ADDITIONAL 10 TO 20 FOOT ADIT TO THE NORTHWEST (ADJACENT TO THE ACCESS SHAFT) AND TEST DRILL A FEW INCLINED HOLES TO THIS ADIT TO DETERMINE WHAT ALIGNMENT CORRECTIONS ARE NEEDED PRIOR TO BEGINNING DRILLING OF THE PRODUCTION TUNNEL TENDON ANCHOR HOLES. ALTERNATIVELY, HE MAY CHOOSE TO DRILL THE GROUTED ANCHOR HOLES AT THE EAST END OF THE TIED BACK CYLINDER PILE WALL FIRST AND CAREFULLY SURVEY THE ALIGNMENT OF THESE HOLES WITH A DEFLECTOMETER TYPE INSTRUMENT. IN EITHER CASE SUCH WORK SHALL BE AT NO COST TO THE STATE.

DRILLED HOLES SHALL BE AT LEAST TWO INCHES LARGER THAN OUTSIDE DIAMETER OF LINER PIPE. THE DRILLER SHALL MAINTAIN AN ACCURATE LOG OF EACH DRILL HOLE INCLUDING THE DRILLING EQUIPMENT USED, DEPTH AND SIZE OF CASING, DOWN PRESSURE, DRILLING RATES AND TIMES, DRILLING FLUIDS, DEPTH OF MATERIAL CHANGES AND DESCRIPTION OF ALL MATERIALS ENCOUNTERED, GROUND WATER AND ALL OTHER DATA PERTINENT TO DEFINING THE DRILL HOLE AND DRILLING PROCESS, INCLUDING TECHNIQUES AND AS BUILT DETAILS OF EFFORTS USED TO MODIFY THE ALIGNMENT OF THE HOLE DURING DRILLING.

DRILLING EQUIPMENT. THE DRILLING EQUIPMENT SHALL BE SUITABLE FOR THE STRATA ENCOUNTERED, DESIRED ALIGNMENT ACCURACY, AND SPECIFIED MINIMUM DRILL HOLE DIMENSIONS.

THE EQUIPMENT AND TECHNIQUES EMPLOYED SHALL BE CONSISTENT WITH OBTAINING A CLEAN, UNDISTURBED HOLE, AND SHALL BE SUBJECT TO REVIEW AND ACCEPTANCE BY THE ENGINEER AS THE WORK PROGRESSES.

ALL DRILLING SHALL BE ACCOMPLISHED BY CORE DRILLING, ROTARY DRILLING OR DOWN THE HOLE PERCUSSIVE DRILLING IN SUCH A MANNER AS TO MINIMIZE DAMAGE TO THE SURROUNDING ROCK.

THE CONTRACTOR SHALL FOLLOW THE BEST DRILLING PRACTICE IN ORDER TO MAINTAIN THE REQUIRED ALIGNMENT OF THE DRILL HOLE THROUGHOUT ITS LENGTH INCLUDING THE USE OF A PILOT HOLE, HEAVY DRILL ROD, SPACER COLLARS, OR OTHER APPROPRIATE MEANS. THE DRILLING RIG SHALL BE EQUIPPED WITH A HYDRAULIC RAM FOR APPLYING DOWNWARD PRESSURE AND FITTED WITH A HYDRAULIC PRESSURE GAGE.

CASING DRILL HOLES. ALL HOLES SHALL BE CASED WITH STEEL DRILL CASING THROUGH THE OVERBURDEN AND WEATHERED ROCK.

BACKFILLING ABANDONED ANCHOR DRILL HOLES. ANY PARTIALLY OR COMPLETELY DRILLED HOLES, WHICH ARE ABANDONED FOR ANY REASON, SHALL BE BACKFILLED WITH GROUT TO THE GROUND SURFACE USING THE PROCEDURE, MATERIALS AND EQUIPMENT REQUIRED BY SPECIFICATIONS. THE ENGINEER MAY PERMIT MODIFICATION OF THE GROUT MIX USED IN FILLING ABANDONED HOLES. THE STEEL CASING SHALL BE REMOVED AS THE HOLE IS BACKFILLED. NO PAYMENT WILL BE MADE FOR BACKFILLING WITH GROUT THE HOLES THAT ARE ABANDONED BECAUSE THEIR ALIGNMENT FAILS TO MEET THE PRESCRIBED TOLERANCES, AND ALL COSTS IN CONNECTION THEREWITH SHALL BE AT NO EXPENSE TO THE STATE.

CLEANING ANCHOR DRILL HOLE. EACH ANCHOR DRILL HOLE SHALL BE GIVEN A FINAL CLEANING BEFORE INSTALLING THE ANCHORAGE TENDON ASSEMBLY.

BEFORE INSTALLING THE ANCHORAGE TENDON ASSEMBLY, EACH DRILL HOLE SHALL BE FLUSHED WITH AIR AND/OR WATER TO CLEAN IT THOROUGHLY OF ALL DRILL CUTTINGS, GREASE OR ANY OTHER DEBRIS OR DIRT, USING METHODS ACCEPTED BY THE ENGINEER.

INSTALLATION OF POST-TENSIONING SYSTEM, BEARING PLATE, LINER PLATE AND TRUMPET ASSEMBLIES. THE CONTRACTOR SHALL ERECT THE BEARING PLATE, LINER PIPE AND TRUMPET ASSEMBLIES AS SHOWN ON THE PLANS AND SHOP DRAWINGS. BEARING PLATE SURFACES SHALL BE MAINTAINED FREE FROM RUST, GREASE AND OTHER FOREIGN MATTER PRIOR TO AND AFTER INSTALLATION.

ATTACHMENT OF STRESSING EQUIPMENT TO THE BEARING PLATE ASSEMBLIES SHALL BE AS SPECIFIED BY THE SUPPLIER. THE CONTRACTOR SHALL PROTECT ANY ATTACHED APPURTENANCES, AS WELL AS NUTS OR THREADS, FROM CONCRETE ENTRY OR FROM OTHER DAMAGE DURING CONSTRUCTION.

THE CONTRACTOR SHALL NOT MAKE ANY MODIFICATIONS TO THE BEARING PLATE AND TRUMPET ASSEMBLIES BY DRILLING, WELDING OR OTHER MEANS WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.

TENDON INSTALLATION. THE CONTRACTOR HAS THE OPTION TO PUSH OR PULL THE TENDON, OR BOTH, THROUGH THE LINER PIPE. THE ANCHORAGE TENDON ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THESE SPECIFICATIONS, PLANS, AND CONTRACTOR'S APPROVED DESIGN DRAWINGS USING PERSONNEL EXPERIENCED, TRAINED AND QUALIFIED IN THIS TYPE OF WORK. THE ASSEMBLED TENDON SHALL BE LOWERED INTO THE HOLE IN A CONTROLLED MANNER USING A CRANE OR OTHER ACCEPTED METHOD.

AFTER TENDON INSTALLATION, THE CONTRACTOR MAY CUT THE TIPS OF EACH WIRE TO PERMIT THE THREADING OF EACH WIRE INTO THE ANCHOR ASSEMBLY AND BUTTONHEADING. SUCH CUTTING SHALL IN NO WAY PRECLUDE JACKING THE TENDON FROM EITHER ENDS OR PREVENT LIFT-OFF READINGS FROM BEING TAKEN DURING SURVEILLANCE. ALL INSTALLED TENDON ANCHORAGES SHALL BE TEMPORARILY PROTECTED.

TENDON TENSIONING. HYDRAULIC JACKS SHALL BE CAPABLE OF STRESSING EQUALLY AND SIMULTANEOUSLY STRESSED ELEMENTS OF THE TENDON. EACH JACK SHALL BE EQUIPPED WITH A PRESSURE GAGE FOR DETERMINING THE JACKING STRESS. THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM SHALL BE CAPABLE OF MEASURING THE TENDON LOAD TO AN ACCURACY OF PLUS OR MINUS THREE PERCENT OF THE TENDON DESIGN LOAD. SIXTY DAYS PRIOR TO BEGINNING TENSIONING THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER CERTIFIED CALIBRATION DATA FOR THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM, AND INCLUDING AT AT LEAST ONE SPARE PRESSURE GAGE. THE TENSIONING PROCESS SHALL BE SO CONDUCTED THAT THE APPLIED LOAD AND THE ELONGATION OF THE ANCHOR MAY BE MEASURED AT ANY TIME. ELONGATION MEASUREMENTS SHALL BE ACCURATE TO 1/100-INCH AND JACK SYSTEM READINGS TO PLUS OR MINUS THREE PERCENT OF JACKING LOAD.

EACH TUNNEL ANCHOR TENDON SHALL BE INITIALLY LOADED INCREMENTALLY UP TO THE REQUIRED TENDON LOAD AS NOTED IN THE ACCOMPANYING TABLE.

INITIAL LOADING SEQUENCE ON TUNNEL ANCHOR TENDONS									
CYCLE	PERCENTAGE OF REQUIRED TENDON LOAD								
1	5	25	50	75	100	75	50	25	5
2	5	25	50	75	100				

DURING THE SECOND LOADING CYCLE, AT THE END OF EACH APPLIED LOAD INCREMENT, THE MOVEMENT OF THE EXPOSED END OF THE TENDON ASSEMBLY SHALL BE MEASURED TO 0.001-INCH AND THE LOAD MAINTAINED UNTIL THE RATE OF MOVEMENT IS LESS THAN 0.010-INCH OVER A FIVE-MINUTE PERIOD. THE MAXIMUM LOAD OF 100 PERCENT OF THE REQUIRED TENDON LOAD SHALL BE HELD AND THE DEFORMATION MAINTAINED FOR A MINIMUM PERIOD OF ONE HOUR AFTER THE RATE OF MOVEMENT HAS DECREASED BELOW 0.010-INCH IN FIVE MINUTES.

DURING ANY LOADING CYCLE THE APPLIED LOADS, AS MEASURED BY THE ELONGATIONS AND THE PRESSURE GAGE READINGS, SHALL BE WITHIN PLUS OR MINUS FIVE PERCENT OF AGREEMENT UP TO THE MAXIMUM LOAD APPLIED IN THE PREVIOUS LOADING CYCLE, AND IF NOT, STRESSING OPERATIONS MAY BE SUSPENDED BY THE ENGINEER UNTIL CAUSE FOR THE DIFFERENCE IS FOUND AND CORRECTED. ALL STRESSING ELEMENTS OF THE TENDON SHALL BE STRESSED SIMULTANEOUSLY. SAFETY PRECAUTIONS SHALL BE TAKEN TO PREVENT WORKERS FROM STANDING BEHIND THE JACKS WHEN TENDONS ARE STRESSED. THE STRESSING ANCHORAGE SHALL BE CAPABLE OF LIFT-OFF IN ORDER TO CHECK THE TENDON LOAD. THE PRESTRESSING SYSTEM SHALL THEREFORE BE CAPABLE OF STRESS ADJUSTMENT. ALL TENSIONING SHALL BE DONE IN THE PRESENCE OF THE ENGINEER.

AS SOON AS THE ANCHOR BLOCK INSTALLATION HAS CURED FOR A MINIMUM OF SEVEN DAYS AND HAS ATTAINED A STRENGTH OF 4000 psi AS DETERMINED FROM CUBE TESTS, EACH TENDON SHALL BE INITIALLY STRESSED TO PULL THE CYLINDER PILE UPSLOPE AND PERMIT FURTHER EXCAVATION AHEAD OF THE STRESSED PORTION OF THE WALL SO THAT DRILLING AND INSTALLATION OF MORE GROUTED TENDONS MAY PROCEED.

THE REQUIRED TENDON LOAD SHALL BE SUCH THAT THE REMAINING LOAD AFTER LOSSES SHALL EQUAL 60 PERCENT OF THE GUARANTEED ULTIMATE STRENGTH OF STEEL (LOADS SHOWN IN TABLE A, SHEET NO. 127) OR TO A LOAD SUCH THAT HORIZONTAL UPHILL DEFLECTION OF THE TOP OF CAP IS NOT GREATER THAN 2 INCHES (1-INCH AT TENDON). BASED ON DESIGN CALCULATIONS, IT WILL BE POSSIBLE TO INITIALLY STRESS UP THE TENDON TO AT LEAST FORTY PERCENT OF LOAD SHOWN IN TABLE A WITHOUT OVERSTRESSING THE CYLINDER PILE DUE TO EXCESSIVE DEFLECTION. HOWEVER, FIELD EXPERIENCE INDICATES THAT ACTUAL DEFLECTIONS WILL LIKELY BE LESS THAN CALCULATIONS SUGGEST AND HENCE LARGER PERCENTAGES OF DESIGN LOAD MAY BE ATTAINABLE DURING INITIAL STRESSING.

WITH FOUR OR MORE OF THE CYLINDER PILES FASTENED TOGETHER BY A CONCRETE CAP, THE INITIAL REQUIRED TENDON LOAD MAY HAVE TO BE APPLIED TO EACH PILE IN TWO OR MORE SEPARATE STRESSINGS. THE CYLINDER PILES SHALL BE STRESSED SUCH THAT EVERY PILE IN A CAP UNIT WILL EITHER BE STRESSED TO THE LOADS SHOWN IN TABLE A OR PROPORTIONALLY LOADED SUCH THAT UPHILL DEFLECTION OF TOP OF THE ENTIRE LENGTH OF CAP UNIT IS NOT GREATER THAN 2-INCHES (1-INCH AT TENDON). RESULTS OBTAINED FROM THE TWO TEST SECTIONS MAY BE USED TO MODIFY THE TENDON STRESSING SEQUENCE.

TENDON SHEATH FILLING OPERATIONS. WITHIN 48 HOURS AFTER THE TENDON HAS BEEN INITIALLY STRESSED AND LOCKED-OFF, THE GREASE FILLER MATERIAL SHALL BE INJECTED INTO THE SHEATHS AND AROUND THE ANCHORAGES AT A PLACEMENT TEMPERATURE SPECIFIED BY THE MANUFACTURER OF THE FILLER MATERIAL. THE INSTALLATION AND INJECTION OF THE GREASE FILLER MATERIAL SHALL BE IN ACCORDANCE WITH THE FILLER MANUFACTURER'S PRINTED RECOMMENDATIONS. THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT LEAKS AND SPILLAGE TO TUNNEL.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE THE NUMBER OF TENDONS INSTALLED TO TUNNEL. BEARING PLATES SHALL BE MEASURED IN POUNDS AND PAID FOR AS SPECIFIED UNDER 513, "STRUCTURAL STEEL".

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL WORK AND MATERIAL HEREINBEFORE DESCRIBED.

PAYMENT WILL BE UNDER:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	POST-TENSIONING SYSTEM TO TUNNEL

NOTES CONTINUED ON SHEET 110

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 109)

POST-TENSIONING ROCK ANCHOR SYSTEM

DESCRIPTION. THIS WORK SHALL CONSIST OF PREPARING WORKING AREAS FOR THE DRILL RIG; ALIGNING AND DRILLING ALIGNED HOLES FROM THE GROUND SURFACES THROUGH THE CYLINDER PILES, FILL AND OVERBURDEN, AND INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS TO THE PRESCRIBED ANCHOR LENGTH SHOWN ON TABLE G, SHEET NO. 143; FURNISHING AND MAINTAINING INSTRUMENTS AND EQUIPMENT FOR MAKING ALIGNMENT SURVEYS TO DETERMINE THE DEVIATION, BOTH HORIZONTAL AND VERTICAL, OF ANY POINT ALONG THE COMPLETED DRILL HOLE FROM A STRAIGHT LINE BETWEEN THE ACTUAL ENTRY AND THE FINAL POINT; WATER PRESSURE TESTING OF ANCHOR HOLE; AND FURNISHING, FABRICATING, INSTALLING AND INITIALLY STRESSING POST-TENSIONING SYSTEM FOR CYLINDER PILES 138 THRU 161 OF THE LOAD CAPACITY SPECIFIED; INCLUDING GREASE CAP, TENDON ANCHORAGE ASSEMBLY, GALVANIZED RIGID PIPE, FIXED ROCK ANCHOR HEAD AND GUIDE AND GREASE. THE DESIGN LOADS FOR THE ROCK ANCHOR TENDONS ARE SHOWN ON SHEET NO. 143.

THE ENTIRE ANCHORAGE ASSEMBLY INCLUDING ALL COMPONENTS AND ACCESSORIES, SHALL BE A STANDARD PRODUCT OF A RECOGNIZED REPUTABLE MANUFACTURER OF POST-TENSIONED ANCHORS OF THE TYPE AS SHOWN ON THE PLANS. DURING FABRICATION AND INSTALLATION OF THE ANCHORAGE ASSEMBLIES, THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ASSURE THAT EACH ASSEMBLY IS SATISFACTORILY FABRICATED, FREE FROM CORROSION, DAMAGE OR OTHER DEFECTS AND PROPERLY INSTALLED.

MATERIALS. MATERIALS SHALL BE AS DESCRIBED IN THE NOTE "POST-TENSIONING SYSTEM TO TUNNEL".

FIXED ROCK ANCHOR HEAD. THE FIXED ROCK ANCHOR HEAD SHALL BE COMPATIBLE WITH THE TENDON MATERIAL USED. THE FIXED ROCK ANCHOR HEAD ASSEMBLY SHALL DEVELOP THE FULL ULTIMATE FORCE ON THE TENDON.

DRAWINGS, TENDON SYSTEM FABRICATION, TENDON-END ANCHORAGE, WELDING, ANCHORAGE ASSEMBLY AND INSPECTION AND TESTING. ALL THESE SECTIONS SHALL BE AS DESCRIBED IN THE NOTE, "POST-TENSIONING SYSTEM TO TUNNEL".

DRILLED HOLES. THIS WORK CONSISTS OF ALIGNING AND DRILLING HOLES THROUGH THE CYLINDER PILE, FILL AND OVERBURDEN, AND INTO BEDROCK CONSISTING OF CLAYSTONE (CLAY SHALE) WITH LIMESTONE STRINGERS. THE ALIGNMENT OF THE COMPLETED DRILL HOLE SHALL BE SUCH THAT THE LINER PIPE CAN BE INSERTED IN THE HOLE WITHOUT DAMAGE TO THE PIPE. NO DRILLING WILL BE PERMITTED NEXT TO A HOLE CONTAINING A TENDON. UNDER EXTREME CONDITIONS, AND WITH THE ENGINEER'S APPROVAL, AN EXISTING TENSIONED TENDON COULD BE DETENSIONED AND ADJACENT DRILLING PERMITTED.

DRILLED HOLES, FOR TENDON INSTALLATION, SHALL BE DRILLED AT THE LOCATIONS, DEPTHS AND IN THE DIRECTIONS SHOWN ON THE PLANS, AND WITHIN THE TOLERANCES, AS SPECIFIED BELOW UNDER "TESTING OF ANCHOR HOLES", EXCEPT AS MODIFIED BY ENGINEER. THE DRILLER SHALL MAINTAIN AN ACCURATE LOG OF EACH DRILL HOLE INCLUDING THE DRILLING EQUIPMENT USED, DEPTH AND SIZE OF CASING, DOWN PRESSURE, DRILLING RATES AND TIMES, DRILLING FLUIDS, DEPTH OF MATERIAL CHANGES AND DESCRIPTION OF ALL MATERIALS ENCOUNTERED, GROUND WATER AND ALL OTHER DATA PERTINENT TO DEFINING THE DRILL HOLE AND DRILLING PROCESS, INCLUDING TECHNIQUES AND AS BUILT DETAILS OF EFFORTS USED TO MODIFY THE ALIGNMENT OF THE HOLE DURING DRILLING.

DRILLED HOLES SHALL BE OF THE SIZES SHOWN ON THE PLANS. ANCHORAGE DESIGN 138 THRU 161 SHOWN ON PLANS AND SPECIFICATIONS, AS IT PERTAINS TO HOLE SIZE, ANCHORAGE LENGTH, NUMBER AND SIZE OF BELLS REPRESENTS MINIMUM DESIGN PARAMETER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING AND INSTALLING ANCHORAGES OF THE REQUIRED CAPACITY BUT IN NO EVENT SHALL THE DIMENSIONS WITHIN THE ANCHORAGE ZONE BE LESS THAN THOSE SHOWN ON THE PLANS.

DRILLING EQUIPMENT, CASING DRILL HOLES AND BACKFILLING ABANDONED ANCHOR DRILL HOLES. ALL THESE SECTIONS SHALL BE AS DESCRIBED IN THE NOTE, "POST-TENSIONING SYSTEM TO TUNNEL".

TESTING OF ANCHOR HOLES. AFTER THE DRILLING OF THE ANCHOR HOLE IS COMPLETED AND BEFORE THE CONSTRUCTION OF THE BELLS, THE ANCHOR HOLE SHALL BE CLEANED OUT TO THE SATISFACTION OF THE THE ENGINEER, AND AN ALIGNMENT SURVEY SHALL BE MADE OF THE ANCHOR HOLE. THESE SURVEYS WILL BE MADE BY THE ENGINEER AND THIS ITEM SHALL INCLUDE FURNISHING ASSISTANCE TO THE ENGINEER WHEN REQUIRED TO MAKE THE SURVEYS.

INSTRUMENTS AND EQUIPMENT THAT ARE REQUIRED FOR ALIGNMENT SURVEY SHALL BE FURNISHED BY THE CONTRACTOR UNDER THIS ITEM AND SHALL BE AT THE PROJECT SITE AND AVAILABLE FOR USE BY THE ENGINEER BEFORE THE DRILLING CONTRACTOR BEGINS DRILLING THE FIRST TEST HOLE THAT IS TO BE SURVEYED.

THE INSTRUMENT AND EQUIPMENT REQUIRED FOR ALIGNMENT SURVEYS OF THE COMPLETED DRILL HOLES SHALL CONSIST OF A DOWN-THE-HOLE PORTABLE BOREHOLE DEFLECTOMETER AS MADE BY TERRAMETRICS, GOLDEN, COLORADO, OR APPROVED EQUAL. THE DEFLECTOMETER SHALL CONSIST OF TWO 5-FOOT GAGE LENGTH TUBES JOINED BY AN ARTICULATED CENTRAL JOINT AND FITTED WITH WHEEL ASSEMBLIES AT THE JOINT AND AT EACH END. THE ANGLE BETWEEN THE TWO LEGS OF THE DEFLECTOMETER SHALL BE MEASURED BY A STRAIN-GAGED STEEL BEAM CLAMPED TO EACH LEG AND FORMING A SINGLE AXIS SENSOR APPROPRIATELY SET RELATIVE TO THE GUIDE WHEELS. THE DEFLECTOMETER AND CABLE SHALL BE COMPLETELY WATERPROOF AND CAPABLE OF CONTINUOUSLY OPERATING PROPERLY IN MUDDY WATER. THE WHEEL ASSEMBLIES SHALL BE DESIGNED TO PROPERLY LOCATE THE INSTRUMENT IN ALUMINUM INCLINOMETER CASING AS MADE BY SLOPE INDICATOR COMPANY, SEATTLE, WASHINGTON, OR APPROVED EQUAL. THE DEFLECTOMETER SHALL BE SUPPLIED WITH 200 FEET OF CONTROL CABLE CONNECTING IT TO A PORTABLE BATTERY POWERED READOUT BOX SUCH AS THE TERRAMETRICS MODEL P350A OR APPROVED EQUAL.

THE EQUIPMENT SHALL INCORPORATE SUITABLE CALIBRATION CHECKING DEVICES. THESE SHALL INCLUDE A DEVICE WHICH ENABLES ONE LEG OF THE DEFLECTOMETER TO BE FIXED WHILE THE SECOND LEG IS MOVED BY KNOWN AMOUNTS, MEASURED INDEPENDENTLY. A CALIBRATION CHART SHALL BE PROVIDED BY THE MANUFACTURER.

THE DEFLECTOMETER SHALL OPERATE WITHIN ALUMINUM INCLINOMETER CASING WHICH IS TEMPORARILY INSERTED IN TURN IN EACH DRILL HOLE. THE CASING SHALL BE SUPPLIED IN 10-FOOT LENGTHS, WITH A MINIMUM OF 200 FEET OF CASING TO BE ON THE SITE, AND SHALL BE JOINED BY TELESCOPIC ALUMINUM COUPLINGS PERMANENTLY FIXED TO ONE END OF EACH CASING AND TEMPORARILY AFFIXED TO THE SECOND TUBE. EACH INCLINOMETER CASING SECTION SHALL BE PROVIDED WITH GUIDE SPRINGS TO LOCATE IT CENTRALLY WITHIN THE DRILL HOLE. THE GUIDE SPRINGS SHALL BE STIFF ENOUGH THAT THE INCLINOMETER CASING IS NOT LOCALLY DEFLECTED BY THE WEIGHT OF THE DEFLECTOMETER.

THE DEFLECTOMETER SHALL PREFERABLY BE ABLE TO ROLL DOWN THE INCLINED INCLINOMETER CASING UNDER GRAVITY. IF THIS IS NOT POSSIBLE, IT SHALL BE CAPABLE OF BEING RODDED DOWN THE CASING FROM THE GROUND SURFACE.

THE CONTRACTOR SHALL SUBMIT FOR APPROVAL THE MAKE, MODEL AND SPECIFICATION, INCLUDING PRECISION, FOR THE MEASURING EQUIPMENT WHICH HE PLANS TO SUPPLY FOR USE BY THE ENGINEER UNDER THIS ITEM. THIS EQUIPMENT IS SUBJECT TO FINAL APPROVAL BY THE ENGINEER.

THE ALIGNMENT OF EACH COMPLETED AND CASED TEST DRILL HOLE WILL BE SURVEYED UNDER THIS ITEM BY THE ENGINEER. IF THE DRILLING CONTRACTOR DESIRES TO MAKE INTERMEDIATE ALIGNMENT SURVEYS OF A DRILL HOLE DURING DRILLING OR SURVEYS OF COMPLETED DRILL HOLES, HE SHALL PROVIDE PERSONNEL ACCEPTABLE TO THE ENGINEER TO OPERATE THIS INSTRUMENT. IF ANY SUCH SURVEYS ARE MADE BY THE DRILLING CONTRACTOR, THE ALIGNMENT VERSUS DEPTH RECORD FOR EACH SURVEY SHALL BE PROVIDED TO THE ENGINEER ON A TIMELY BASIS.

THE CONTRACTOR SHALL MAINTAIN AT LEAST ONE-FOOT SPACING BETWEEN ANY TWO GROUTED ANCHORS.

IF THE DEFLECTOMETER SURVEY INDICATES THAT THE NEW DRILL HOLE IS UNACCEPTABLY CLOSE TO ITS NEIGHBORING ANCHOR IN THE ANCHORAGE ZONE THE DRILL HOLE SHALL, IF POSSIBLE, BE EXTENDED TO AVOID THE ANCHORAGE LENGTH (INCLUDING THE UNDER-REAMS) BEING TOO CLOSE. OTHERWISE, IT SHALL BE NECESSARY FOR THE CONTRACTOR TO GROUT AT LEAST PART OF THE HOLE AND REDRILL. THE INCLINATIONS OF THE GROUTED ANCHOR DRILL HOLES CAN ALSO BE ADJUSTED PLUS OR MINUS 2 DEGREES TO FURTHER AVOID CONFLICT IN THE ANCHORAGE ZONE.

WHEN DRILLING THE LOWER TIER ANCHOR, WHERE DOUBLE ANCHORS ARE USED, THE CONTRACTOR SHALL TEMPORARILY DESTRESS THE UPPER ANCHOR.

AFTER IT HAS BEEN DETERMINED THAT THE ALIGNMENT OF AN ANCHOR HOLE IS SATISFACTORY, AN INSPECTION OF THE ANCHOR HOLE SHALL BE MADE BY THE CONTRACTOR, AND THE LENGTH OF THE HOLE SHALL BE DETERMINED.

AFTER COMPLETION OF THE INSPECTION THE ANCHOR HOLES SHALL BE WATER PRESSURE TESTED PRIOR TO UNDER-REAMING USING APPROVED METHODS AND EQUIPMENT. THE HOLE, CASED THROUGH THE OVERBURDEN AND INTO TIGHT COMPETENT ROCK, SHALL FIRST BE TESTED BY FILLING WITH WATER UP TO THE TOP OF THE CASING AND MEASURING THE WATER LOSS IN THE BOREHOLE, IF ANY, OVER AN INITIAL 10 MINUTE PERIOD. IF THE WATER TAKE IS GREATER THAN 0.5 gpm THE ANCHORAGE LENGTH PLUS AN ADDITIONAL 10 FEET ABOVE IT SHALL BE WATER PRESSURE TESTED USING A PACKER SYSTEM. IF THE WATER TAKE USING THIS PACKER SYSTEM IS GREATER THAN 0.5 gpm THEN THE HOLE SHALL BE BACKFILLED WITH CEMENT GROUT TO THE SURFACE USING A TREMIE PIPE EXTENDING TO THE BOTTOM OF THE BOREHOLE. THE GROUTED HOLE SHALL BE REDRILLED WHILE THE GROUT IS RELATIVELY WEAK, AS FAR AS POSSIBLE ALONG THE LINE OF THE ORIGINAL BORING. THE REDRILLED HOLE SHALL BE RETESTED FOR WATER-TIGHTNESS. THE CONTRACTOR SHALL BE REQUIRED TO HAVE ON HAND A DOUBLE PACKER SYSTEM TO ENABLE INDIVIDUAL SECTIONS OF THE UNCASED DRILL HOLE UP TO 5 FEET IN LENGTH TO BE ISOLATED AND WATER PRESSURE TESTED IF REQUIRED.

AFTER COMPLETION OF A SATISFACTORY WATER PRESSURE TEST THE UNDER-REAMS SHALL BE EXCAVATED. THE EQUIPMENT SHOULD BE CAPABLE OF FORMING THE UNDER-REAMS WITHOUT EXCESSIVELY DISTURBING THE CLAYSTONE (CLAY SHALE) AND TO BE OF A FINISHED DIAMETER BETWEEN 2.5 AND 3.0 TIMES THE DRILLHOLE DIAMETER. THE SHAPE OF THE UNDER-REAMS SHALL GENERALLY BE AS SHOWN IN THE PLANS BUT MAY BE MODIFIED TO SUIT AVAILABLE EQUIPMENT. RE-ENTRANT ANGLES THAT PRECLUDE PROPER BACKFILLING WITH GROUT SHALL NOT BE PERMITTED. BEFORE PLACING THE ANCHOR TENDON, THE DRILLHOLE AND UNDER-REAM SHALL BE FLUSHED WITH AIR AND/OR WATER TO CLEAN IT THOROUGHLY OF ALL DRILL CUTTINGS, GREASE OR ANY OTHER DEBRIS, USING METHODS APPROVED BY THE ENGINEER. PRIOR TO INSERTION OF THE ANCHOR TENDON THE CONTRACTOR SHALL BE REQUIRED TO DEMONSTRATE TO THE SATISFACTION OF THE ENGINEER THAT THE HOLE IS CLEAN, PROPERLY FORMED AND OF THE REQUIRED DIMENSIONS. IF CAVED MATERIAL OR DEBRIS IS DETECTED IN THE HOLE, SUCH DEBRIS OR MATERIAL SHALL BE REMOVED BY INSERTING THE DRILL TOOL TO THE BOTTOM OF THE HOLE AND FLUSHING WITH AIR AND/OR WATER. IF THESE PROCEDURES ARE NOT EFFECTIVE, THE HOLE SHALL BE REDRILLED TO REMOVE THE MATERIALS.

THE COMPLETED DRILL HOLE SHALL BE LINED DOWN TO THE TOP OF THE ANCHORAGE LENGTH WITH THE LINER PIPE.

INSTALLATION OF POST-TENSIONING SYSTEM, BEARING PLATE, LINER PIPE AND TRUMPET ASSEMBLIES. THIS SECTION SHALL BE AS DESCRIBED IN THE NOTE, "POST-TENSIONING SYSTEM TO TUNNEL".

TENDON INSTALLATION. IMMEDIATELY PRIOR TO INSTALLATION OF TENDONS, LINER PIPE SHALL BE DRAINED, IF REQUIRED, OF ACCUMULATED WATER AND ANY DELETERIOUS FOREIGN MATTER WHICH MAY BE PRESENT.

ROCK ANCHORS SHALL BE SECURELY FASTENED IN PLACE TO PREVENT ANY MOVEMENT DURING THE GROUTING.

NOTES CONTINUED ON SHEET 111

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

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NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		JH	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 110)

THE ANCHORAGE TENDON ASSEMBLIES SHALL BE INSTALLED IN ACCORDANCE WITH THE PLANS, CONTRACTOR'S APPROVED DESIGN DRAWINGS AND AS SPECIFIED HEREIN USING PERSONNEL EXPERIENCED, TRAINED, AND QUALIFIED IN THIS TYPE OF WORK. THE ASSEMBLED TENDON SHALL BE LOWERED INTO THE HOLE IN A CONTROLLED MANNER USING A CRANE OR OTHER APPROVED METHOD.

THE TENDON SHALL BE CENTERED IN THE DRILL HOLE BY SUITABLE SPACERS AND THE WIRES SHALL BE ADEQUATELY SEPARATED IN THE ANCHORAGE LENGTH TO FACILITATE COMPLETE PENETRATION OF THE CEMENT GROUT. THE TENDON SHALL BE CAPABLE OF TRAVERSING THE UNDER-REAM DURING INSTALLATION WITHOUT DAMAGING THE ADJACENT BORE HOLE. THE BOTTOM END OF THE TENDON SHALL BE SET AT LEAST ONE HOLE DIAMETER FROM THE END OF THE DRILL HOLE AND THE TENDON SHALL BE SECURELY FASTENED AT THE REACTION BLOCK ON THE CYLINDER PILE TO PREVENT MOVEMENT DURING GROUTING.

AFTER TENDON INSTALLATION, THE CONTRACTOR MAY CUT THE TIPS OF EACH WIRE TO PERMIT THE THREADING OF EACH WIRE INTO THE ANCHOR ASSEMBLY AND BUTTONHEADING. SUCH CUTTING SHALL IN NO WAY PREVENT LIFT-OFF READINGS FROM BEING TAKEN DURING SURVEILLANCE.

GROUTING. THE ANCHORAGE ZONE, INCLUDING THE UNDER-REAMS, SHALL BE COMPLETELY BACKFILLED WITH CEMENT GROUT.

THE GROUT MUST BE PROPERLY MIXED, UNCONTAMINATED AND BE PUMPED IN A CONTROLLED MANNER THROUGH A PIPE SYSTEM TO THE BOTTOM OF THE DRILL HOLE. TEST MIXES SHALL BE MADE TO VERIFY THAT THE PROPOSED CEMENT GROUT IS SATISFACTORY AND ACHIEVES THE REQUIRED MINIMUM STRENGTH.

THE DOWNHOLE GROUT PIPE NETWORK MAY BE INCORPORATED INTO THE TENDON BUNDLE AND CAN BE LEFT IN THE GROUND PROVIDED IT IS FILLED WITH GROUT. IMMEDIATELY PRIOR TO GROUTING, THE CONTRACTOR SHALL CHECK THE PIPE NETWORK WITH COMPRESSED AIR TO ENSURE THAT IT IS CLEAR. STANDBY WATER FLUSHING EQUIPMENT UTILIZING A SEPARATE POWER SOURCE SHALL BE MAINTAINED AT THE SITE TO FLUSH OUT ANY PARTIALLY GROUTED HOLES IF NECESSARY DUE TO BLOCKAGE OR BREAKDOWN OF THE GROUTING EQUIPMENT.

THE DRILL HOLE SHALL BE FILLED WITH CEMENT GROUT IN ONE CONTINUOUS OPERATION UP TO THE TOP OF THE FIRST STAGE CEMENT GROUT. ALTERNATIVELY, AND WE RECOMMEND THAT THIS BE DONE IF CONSIDERED FEASIBLE BY THE CONTRACTOR, THE DRILL HOLE MAY BE FILLED WITH CEMENT GROUT UP TO THE GROUND SURFACE. AFTER A SUITABLE TIME HAS ELAPSED, THE EXCESS CEMENT GROUT CAN BE REMOVED DOWN TO THE TOP OF THE ANCHORAGE LENGTH BY WATER JETTING USING A LANCE WITH REVERSE DIRECTION JETS. WHETHER THIS CAN BE DONE IS DEPENDENT ON THE CONTRACTOR'S ABILITY TO WORK IN THE RESTRICTED ANNULAR SPACE AROUND THE TENDON SLEEVE. ITS ADVANTAGE IS THAT THE ANCHORAGE ZONE GROUT CURES UNDER A SIGNIFICANTLY HIGHER PRESSURE AND SHOULD, IN OUR OPINION, PROVIDE A BETTER STRESS TRANSFER MEDIUM BETWEEN THE STEEL AND THE CLAYSTONE (CLAY SHALE). IN ADDITION, POOR QUALITY GROUT AT THE TOP OF THE ANCHORAGE ZONE DUE TO BLEED IS AVOIDED.

AT ALL TIMES, AFTER TENDON INSTALLATION AND ANCHOR HEAD ASSEMBLY, THE EXPOSED END OF THE TENDON AND ANCHOR HEAD SHALL BE PROTECTED AGAINST PHYSICAL DAMAGE OR CORROSION BY TEMPORARY COVERS IF NECESSARY.

TENDON TENSIONING. HYDRAULIC JACKS SHALL BE CAPABLE OF STRESSING EQUALLY AND SIMULTANEOUSLY ALL STRESSED ELEMENTS OF THE ROCK ANCHOR. EACH JACK SHALL BE EQUIPPED WITH A PRESSURE GAGE FOR DETERMINING THE JACKING STRESS. THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM SHALL BE CAPABLE OF MEASURING THE TENDON LOAD TO AN ACCURACY OF PLUS OR MINUS THREE PERCENT OF THE TENDON DESIGN LOAD. SIXTY DAYS PRIOR TO BEGINNING TENSIONING, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER CERTIFIED CALIBRATION DATA FOR THE HYDRAULIC JACK AND PRESSURE GAGE SYSTEM, AND INCLUDING AT LEAST ONE SPARE PRESSURE GAGE. THE TENSIONING PROCESS SHALL BE SO CONDUCTED THAT THE APPLIED LOAD AND THE ELONGATION OF THE ANCHOR MAY BE MEASURED AT ANY TIME. ELONGATION MEASUREMENTS SHALL BE ACCURATE TO 1/100-INCH AND JACK SYSTEM READINGS TO PLUS OR MINUS THREE PERCENT OF THE JACKING LOAD. DURING ANY LOADING CYCLE THE APPLIED LOADS, AS MEASURED BY THE ELONGATION AND THE PRESSURE GAGE READINGS, SHALL BE WITHIN PLUS OR MINUS FIVE PERCENT OF AGREEMENT UP TO THE MAXIMUM LOAD APPLIED IN THE PREVIOUS LOADING CYCLE, AND IF NOT, STRESSING OPERATIONS MAY BE SUSPENDED BY THE ENGINEER UNTIL CAUSE FOR THE DIFFERENCE IS FOUND AND CORRECTED. ALL STRESSING ELEMENTS OF THE ROCK ANCHOR SHALL BE STRESSED SIMULTANEOUSLY. SAFETY PRECAUTIONS SHALL BE TAKEN TO PREVENT WORKERS FROM STANDING BEHIND THE JACKS WHEN ROCK ANCHORS ARE STRESSED. THE STRESSING ANCHORAGE SHALL BE CAPABLE OF LIFT-OFF IN ORDER TO CHECK THE TENDON LOAD. THE PRESTRESSING SYSTEM SHALL THEREFORE BE CAPABLE OF STRESS ADJUSTMENT. ALL TENSIONING SHALL BE DONE IN THE PRESENCE OF THE ENGINEER.

AS SOON AS THE CEMENT GROUT HAS CURED FOR A MINIMUM OF SEVEN DAYS AND HAS ATTAINED A STRENGTH OF 4000 psi AS DETERMINED FROM CUBE TESTS, EACH TENDON SHALL BE INITIALLY STRESSED TO PULL THE CYLINDER PILE UPSLOPE AND PERMIT FURTHER EXCAVATION AHEAD OF THE STRESSED PORTION OF THE WALL SO THAT DRILLING AND INSTALLATION OF MORE GROUTED TENDONS MAY PROCEED.

THE REQUIRED TENDON LOAD SHALL BE SUCH THAT THE REMAINING LOAD AFTER LOSSES SHALL EQUAL 60 PERCENT OF THE GUARANTEED ULTIMATE STRENGTH OF STEEL (LOADS SHOWN IN TABLE G, SHEET NO. 143) OR TO A LOAD SUCH THAT HORIZONTAL UPHILL DEFLECTION OF THE TOP OF CAP IS NOT GREATER THAN 1-INCH (1/2-INCH AT TENDON). BASED ON DESIGN CALCULATIONS, IT WILL BE POSSIBLE TO INITIALLY STRESS UP THE TENDON TO AT LEAST FORTY PERCENT OF LOAD SHOWN IN TABLE G WITHOUT OVERSTRESSING THE CYLINDER PILE DUE TO EXCESSIVE DEFLECTION. HOWEVER, FIELD EXPERIENCE INDICATES THAT ACTUAL DEFLECTIONS WILL LIKELY BE LESS THAN CALCULATIONS SUGGEST AND HENCE LARGER PERCENTAGES OF DESIGN LOAD MAY BE ATTAINABLE DURING INITIAL STRESSING.

TEST PROCEDURE. PERFORMANCE TESTS SHALL BE SUCCESSFULLY PERFORMED ON SIX REPRESENTATIVE ROCK ANCHORS. THREE OF THESE ANCHORS SHALL BE UPPER TIER TENDONS 138, 139 AND 140. THE OTHER THREE ANCHORS SHALL BE TESTED AS THE JOB PROGRESSES.

PERFORMANCE TESTING. UPPER TIER TENDONS 138, 139 AND 140 SHALL BE PERFORMANCE TESTED TO 150 PERCENT OF DESIGN LOAD TO VERIFY CAPACITY AND ESTABLISH A DETAILED PATTERN OF BEHAVIOR AGAINST WHICH TO COMPARE THE REMAINING GROUTED ANCHORS. PERFORMANCE TEST LOADING SHALL BE IMPOSED AFTER APPLYING AN INITIAL SEATING LOAD EQUAL TO 5 PERCENT OF DESIGN LOAD. LOADING SHALL BE APPLIED INCREMENTALLY AS NOTED IN THE ACCOMPANYING TABLE AND FINALLY LOCKED-OFF AT 40 PERCENT OF DESIGN LOAD OR WHATEVER OTHER INITIAL LOCK-OFF LOAD IS FOUND TO BE ACCEPTABLE UP TO A MAXIMUM LOAD EQUAL TO DESIGN LOAD. AT THE END OF EACH APPLIED INCREMENT OF LOAD, THE MOVEMENT OF THE EXPOSED END OF THE TENDON ASSEMBLY SHALL BE MEASURED TO 0.001-INCH AND THE LOAD MAINTAINED UNTIL THE RATE OF MOVEMENT IS LESS THAN 0.010-INCH OVER A FIVE MINUTE PERIOD. THE MAXIMUM LOAD OF 150 PERCENT OF DESIGN LOAD SHALL BE HELD AND THE DEFORMATIONS MONITORED FOR A MINIMUM PERIOD OF TWO HOURS AFTER THE RATE OF MOVEMENT HAS DECREASED BELOW 0.010-INCH IN FIVE MINUTES.

	PERFORMANCE TESTING OF UPPER TIER TENDONS 138, 139 AND 140 AND THREE OTHER SELECTED LOCATIONS										
CYCLE	PERCENTAGE OF DESIGN LOAD										
1	5	25	5								
2	5	25	50	25	5						
3	5	25	50	75	50	25	5				
4	5	25	50	75	100	75	50	25	5		
5	5	25	50	75	100	125	100	75	50	25	5
6	5	25	50	75	100	125	150	125	100	75	40*

* LOCK-OFF LOAD EQUAL TO 40 PERCENT OF DESIGN LOAD OR WHATEVER OTHER INITIAL LOCK-OFF LOAD IS FOUND TO BE ACCEPTABLE TO A MAXIMUM OF DESIGN LOAD.

THE SIX PERFORMANCE TEST ANCHORS WILL REQUIRE ADDITIONAL STEEL IN ORDER THAT THE MAXIMUM LOAD TESTED IS BELOW 80 PERCENT OF THE GUARANTEED ULTIMATE STRENGTH OF THE STEEL. THEREFORE, THE CONTRACTOR SHALL HAVE ANCHORS FOR THREE PERFORMANCE TESTS AVAILABLE AT ALL TIMES, THAT MAY BE PLACED AT ANY LOCATION ALONG THE WALL CHOSEN BY THE ENGINEER, AND BE ABLE TO WITHSTAND THE LOAD REQUIRED FOR THE PERFORMANCE TEST. THE ENGINEER WILL SELECT A PARTICULAR LOCATION FOR A PERFORMANCE TEST AFTER AN ANCHOR HOLE IS DRILLED AND BELLED BUT PRIOR TO THE INSERTION OF THE TENDON.

IN ORDER TO STRESS THE PERFORMANCE TEST TENDONS TO 150 PERCENT OF DESIGN LOAD, IT MAY BE NECESSARY TO TEMPORARILY EXTEND THE TENDON AND INSTALL A WALER BEAM TO DISTRIBUTE THE REACTION OVER A NUMBER OF ADJACENT PILES AND TO TEMPORARILY DESTRESS ANY ADJACENT TENDONS. TENDONS SHALL AT ALL TIMES BE STRESSED IN A SINGLE OPERATION WITH A HOLLOW HYDRAULIC JACK. THE JACK AND ASSOCIATED PRESSURE GAGE SHALL BE CALIBRATED TO BE ACCURATE TO PLUS OR MINUS 3 PERCENT OF ACTUAL LOAD AND PRESSURE. THE PRESTRESSING CONTRACTOR SHALL BE REQUIRED TO SUBMIT DETAILS OF HIS PROPOSED PROCEDURES FOR ALL STRESSING OPERATIONS FOR REVIEW BY THE ENGINEER.

PROOF LOAD TESTS. PROOF LOAD TESTS SHALL BE CARRIED OUT ON ALL OF THE GROUTED ANCHORS WHICH ARE NOT PERFORMANCE TESTED IN ORDER TO VERIFY ANCHORAGE CAPACITY AND TO PRELOAD THE TENDON. PROOF LOADING SHALL BE IMPOSED AFTER APPLYING AN INITIAL SEATING LOAD EQUAL TO 5 PERCENT OF DESIGN LOAD. LOADING SHALL BE APPLIED INCREMENTALLY AS NOTED IN THE ACCOMPANYING TABLE AND FINALLY LOCKED-OFF AT 40 PERCENT OR WHATEVER OTHER INITIAL LOCK-OFF LOAD IS FOUND TO BE ACCEPTABLE TO A MAXIMUM OF DESIGN LOAD. AT THE END OF EACH APPLIED INCREMENT OF LOAD, THE MOVEMENT OF THE EXPOSED END OF THE TENDON SHALL BE MEASURED TO 0.001-INCH AND THE LOAD MAINTAINED UNTIL THE RATE OF MOVEMENT IS LESS THAN 0.010-INCH OVER A 5-MINUTE PERIOD.

PROOF LOAD TESTING ON REMAINING ROCK ANCHORS										
CYCLE	PERCENTAGE OF DESIGN LOAD									
1	5	25	50	75	100	130	100	75	50	25	5
2	5	25	50	75	100	130	100	75	40*		

* LOCK-OFF LOAD EQUAL TO 40 PERCENT OF DESIGN LOAD OR WHATEVER OTHER INITIAL LOCK-OFF LOAD IS FOUND TO BE ACCEPTABLE TO A MAXIMUM OF DESIGN LOAD.

NOTES CONTINUED ON SHEET 112

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET III)

ANY GROUTED ANCHORAGE THAT DOES NOT SUCCESSFULLY PASS A PROOF TEST WILL GENERALLY NEED TO BE REPLACED BY AN ACCEPTABLE ANCHOR. THIS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO COST TO THE STATE. AN UNACCEPTABLE ANCHOR IS ONE THAT SHOWS CONTINUED MOVEMENT AT A RATE GREATER THAN 0.01-INCH OVER A 5-MINUTE PERIOD AT OR BELOW 130 PERCENT OF DESIGN LOAD IN A PROOF TEST OR 150 PERCENT OF DESIGN LOAD IN A PERFORMANCE TEST.

WITH SIX OF THE CYLINDER PILES FASTENED TOGETHER BY A CONCRETE CAP, THE INITIAL LOAD MAY HAVE TO BE APPLIED TO EACH PILE IN TWO OR MORE SEPARATE STRESSINGS. THE CYLINDER PILES WILL BE STRESSED SUCH THAT EVERY PILE IN A CAP UNIT WILL EITHER BE STRESSED TO DESIGN LOAD OR PROPORTIONALLY LOADED SUCH THAT UPHILL DEFLECTION OF TOP OF ENTIRE LENGTH OF CAP UNIT IS EQUAL AND NOT GREATER THAN 1-INCH (1/2-INCH AT TENDON).

THE LOCK-OFF LOAD ON EACH TENDON SHALL BE MEASURED ON A CALIBRATED PRESSURE GAGE ATTACHED TO THE STRESSING JACK WHICH, TOGETHER WITH THE JACK, IS CAPABLE OF INDICATING THE JACK LOAD TO AN ACCURACY OF THREE PERCENT. A SECOND CALIBRATED PRESSURE GAGE SHALL BE KEPT AS A SPARE FOR EACH JACKING ASSEMBLY. AS A CHECK THE LOAD IN THE TENDON SHALL BE CALCULATED FROM THE KNOWN TENDON STEEL PROPERTIES AND THE MEASURED EXTENSION OF THE TENDON.

SECONDARY GROUTING. WITHIN 48 HOURS AFTER FINAL COMPLETION OF INITIAL STRESSING AND LIFT-OFF, THE ANNULAR SPACE OUTSIDE THE LINER PIPE SHALL BE FILLED WITH CEMENT-BENTONITE GROUT INJECTED SLOWLY THROUGH A GROUT PIPE EXTENDING TO THE TOP OF THE PREVIOUSLY CEMENT GROUTED ANCHORAGE LENGTH. THE PRESTRESSING SYSTEM USED SHALL PERMIT THE VENTING OF AIR FROM WITHIN THE TENDON LENGTH DURING SECONDARY GROUTING TO ASSURE THAT THE TENDON SYSTEM IS ADEQUATELY PROTECTED AGAINST CORROSION.

TENDON SHEATH FILLING OPERATIONS. WITHIN FORTY-EIGHT HOURS AFTER THE TENDON HAS BEEN INITIALLY STRESSED AND LOCKED-OFF THE GREASE FILLER MATERIAL SHALL BE INJECTED INTO THE SHEATHS AND AROUND THE ANCHORAGES AT A MINIMUM PLACEMENT TEMPERATURE SPECIFIED BY THE MANUFACTURER OF THE FILLER MATERIAL.

THE INSTALLATION AND INJECTION OF THE GREASE FILLER MATERIAL SHALL BE IN ACCORDANCE WITH THE FILLER MANUFACTURER'S PRINTED RECOMMENDATIONS.

THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT LEAKS AND SPILLAGE OF GREASE.

METHOD OF MEASUREMENT. THE QUANTITY SHALL BE THE NUMBER OF TENDONS INSTALLED.

BEARING PLATES WILL BE PAID FOR AS SPECIFIED UNDER 513, "STRUCTURAL STEEL".

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL WORK AND MATERIALS HEREINBEFORE DESCRIBED.

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	POST-TENSIONING ROCK ANCHOR SYSTEM

TUNNEL WEEP HOLES

DESCRIPTION. THIS ITEM SHALL CONSIST OF THE DRILLING OF HOLES INTO THE TUNNEL WALL, FURNISHING AND INSTALLING A 1-1/4-INCH MINIMUM I.D., FULLY SLOTTED OR PERFORATED PLASTIC CASING WITH A SLOT WIDTH OF 0.102-INCH, 34 SLOTS PER ROW PER FOOT, 1-INCH LONG SLOTS IN ACCORDANCE WITH THE PLANS AND 518 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

GENERAL. THE 1 1/4-INCH MINIMUM I.D. CASING SHALL FIT REASONABLY TIGHTLY IN THE HOLE WITH NO MORE THAN 1/4-INCH ANNULAR CLEAR SPACE. THE CASING SHALL BE RIGIDLY ANCHORED OR WEDGED IN PLACE IN THE HOLE.

MATERIAL. 1 1/4-INCH MINIMUM POLYVINYLCHLORIDE PIPE, SCHEDULE 40, ASTM 1785, TYPE II PVC OR U.S. COMMERCIAL STANDARD NO. CS-207-60.

METHOD OF MEASUREMENT. THE HOLES SHALL BE DRILLED AT THE LOCATION AND TO THE LENGTHS SHOWN ON THE PLANS. THE HOLES SHALL BE SPACED AT APPROXIMATELY 15-FOOT CENTERS, FOR THE FULL LENGTH OF TUNNEL.

BASIS OF PAYMENT. PAYMENT SHALL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
518	EACH	TUNNEL WEEP HOLES

RESTRESSING OF TENDONS

DESCRIPTION. THIS ITEM SHALL CONSIST OF RESTRESSING OF THE TENDONS, IF AND WHEN REQUESTED BY THE ENGINEER. THIS WORK SHALL INCLUDE: REMOVING THE GREASE CAPS; REMOVING THE EXCESS GREASE; CLEANING THE ANCHORS AND SHIMS; FURNISHING ADDITIONAL SHIMS; RESTRESSING THE TENDONS; PLACING ADDITIONAL SHIMS; FURNISHING GREASE; INSTALLING GREASE CAPS; AND INJECTING GREASE, UNDER PRESSURE, TO REPLACE THE LOST GREASE.

MATERIALS. MATERIALS SHALL BE AS STIPULATED IN THE NOTE, "POST-TENSIONING SYSTEM TO THE TUNNEL".

GENERAL. IF THE INITIAL LOCK-OFF LOAD ON THE TENDONS OR SUBSEQUENT RESTRESSING WAS CONTROLLED BY DEFLECTION RESTRICTIONS OF THE TOP OF THE CAP BEAM OR ANCHOR POINT, EXCAVATION IN FRONT OF THE WALL DOWN TO ROCK MAY INCREASE THE LOAD ON THE WALL, CAUSING ELONGATION OF THE TENDONS, ALLOWING THE TOP OF THE WALL TO MOVE DOWNHILL. IF THIS DOWNHILL MOVEMENT IS OF A SUBSTANTIAL AMOUNT, THE ENGINEER MAY REQUIRE THAT THIS ITEM OF WORK BE PERFORMED. WITH FOUR OR MORE OF THE CYLINDER PILES FASTENED TOGETHER BY A CONCRETE CAP, THE RESTRESSING LOAD MAY NEED TO BE APPLIED TO EACH PILE IN TWO OR MORE SEPARATE STRESSINGS. THE CYLINDER PILES WILL BE RESTRESSED SUCH THAT EVERY PILE IN A CAP UNIT WILL EITHER BE STRESSED TO THE LOADS SHOWN IN TABLE A, SHEET NO. 127, FOR TENDONS 1 THRU 137 AND TABLE G, SHEET NO. 143, FOR TENDONS 138 THRU 161, OR PROPORTIONALLY LOADED SUCH THAT UPHILL DEFLECTION OF THE TOP OF ENTIRE LENGTH OF CAP UNIT IS NOT GREATER THAN 2-INCHES (1-INCH AT TENDON) (FROM ITS AS CONSTRUCTED POSITION) FOR CYLINDER PILES 1 THRU 137 AND 1-INCH (1/2-INCH AT TENDON) FOR CYLINDER PILES 138 THRU 161.

CONSTRUCTION. CONSTRUCTION SHALL BE AS STIPULATED IN THE NOTES, "POST-TENSIONING SYSTEM TO TUNNEL" AND "POST-TENSIONING ROCK ANCHOR SYSTEM".

METHOD OF MEASUREMENT. THE QUANTITY, IF PERFORMED, SHALL BE THE NUMBER OF TENDONS RESTRESSED. IF, AFTER RESTRESSING RESULTING IN THE MAXIMUM UPHILL WALL DEFLECTION NOTED ABOVE THE WALL AGAIN DEFLECTS DOWNHILL A SUBSTANTIAL AMOUNT, A SECOND RESTRESSING MAY BE REQUIRED AND THE TOTAL QUANTITY SHALL BE THE NUMBER OF TENDONS INITIALLY RESTRESSED PLUS THE NUMBER OF TENDONS RESTRESSED A SECOND TIME.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE, WHICH PRICE SHALL BE PAYMENT IN FULL FOR ALL WORK AND MATERIALS HEREINBEFORE DESCRIBED.

PAYMENT WILL BE UNDER:

ITEM	UNIT	DESCRIPTION
SPECIAL	EACH	RESTRESSING OF TENDON (FOR CYLINDER PILES 1 THRU 137)
SPECIAL	EACH	RESTRESSING OF TENDON (FOR CYLINDER PILES 138 THRU 161)

ACCESS RECEPTACLES

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING THE ACCESS RECEPTACLES AT THE LOCATIONS SHOWN ON THE PLANS. THIS ITEM SHALL BE IN ACCORDANCE WITH 518 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED AND AUGMENTED HEREIN.

GENERAL. THE ACCESS RECEPTACLES SHALL BE AS FOLLOWS:

TYPE 1 - WADE W-7112-X CAST IRON HEAVY DUTY ADJUSTABLE FLOOR CLEANOUTS OR APPROVED EQUAL.

TYPE 2 - WADE W-7144-X CAST IRON HEAVY DUTY ADJUSTABLE FLOOR CLEANOUT WITH TAPERED BRASS PLUG AND THREADED OUTLET OR APPROVED EQUAL.

TYPE 3 - NEENAH R-1976 CAST IRON, HEAVY DUTY, ROUND, BOLTED LID INSPECTION FRAME (OR APPROVED EQUAL) HAVING STEEL PLATE FLOOR WITH HOLE FOR 5-INCH STEEL PIPE. STEEL PIPE CAPPED WITH LOCKABLE STEEL COVER PLATE.

TYPE 4 - HOPE H5815 CAST IRON, GALVANIZED, SQUARE, WATERTIGHT, SIDEWALK BOX (OR APPROVED EQUAL) WITH BOTTOM HOLE FOR 5-INCH STEEL PIPE. STEEL PIPE CAPPED WITH LOCKABLE STEEL COVER PLATE.

TYPE 5 - HOPE H5844 CAST IRON, GALVANIZED, RECTANGULAR, WATERTIGHT SIDEWALK BOX (OR APPROVED EQUAL) WITH BOTTOM HOLES FOR TWO 5-INCH STEEL PIPES. STEEL PIPE CONTAINING INCLINOMETER CASING TO BE CAPPED WITH LOCKABLE STEEL COVER PLATE.

TYPE 6 - WADE W-7015-XF CAST IRON HEAVY DUTY ADJUSTABLE FLOOR CLEANOUT WITH THREADED OUTLET AND VANDAL PROOF COVER OR APPROVED EQUAL.

THE TOP OF THE RECEPTACLE SHALL BE FLUSH WITH THE TOP OF SIDEWALK, PAVEMENT OR GROUND LINE.

NOTES CONTINUED ON SHEET 113

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-23-79	

NOTES (CONTINUED FROM SHEET 112)

METHOD OF MEASUREMENT. THE COMPLETED AND ACCEPTED RECEPTACLE SHALL BE MEASURED BY THE UNIT FOR EACH RECEPTACLE.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
518	EACH	ACCESS RECEPTACLE - TYPE 1
518	EACH	ACCESS RECEPTACLE - TYPE 2
518	EACH	ACCESS RECEPTACLE - TYPE 3
518	EACH	ACCESS RECEPTACLE - TYPE 4
518	EACH	ACCESS RECEPTACLE - TYPE 5
518	EACH	ACCESS RECEPTACLE - TYPE 6

ACCESS SHAFT BUILDING AND VENTILATION SHAFT BUILDING

DESCRIPTION. THESE ITEMS OF WORK SHALL CONSIST OF FURNISHING ALL MATERIALS AND LABOR FOR CONSTRUCTION OF THE BUILDINGS IN ACCORDANCE WITH THE DIMENSIONS AND DETAILS SHOWN ON THE PLANS AND AS DESCRIBED HEREIN.

ALL CONSTRUCTION METHODS, MATERIALS AND WORKMANSHIP, EXCEPT AS MODIFIED HEREIN OR ON THE DRAWINGS, SHALL CONFORM TO THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

EXCAVATION. EXCAVATION SHALL BE IN ACCORDANCE WITH ITEM 503.

CONCRETE. CONCRETE SHALL BE IN ACCORDANCE WITH ITEM 511. WALLS OF THE ACCESS SHAFT BUILDING SHALL BE SANDBLASTED FROM FLOOR TO RUSTICATION JOINT. ROOF SHALL HAVE SMOOTH FORM FINISH ON TOP AND EDGES.

REINFORCING STEEL. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ITEM 509. REINFORCING STEEL WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THIS ITEM FOR PAYMENT.

REINFORCING STEEL LIST FOR THE BUILDINGS IS NOT INCLUDED IN THE PLANS. CONTRACTOR SHALL PREPARE A REINFORCING STEEL LIST. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND APPROVAL, THREE COPIES OF THE REINFORCING STEEL LIST. FABRICATION SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DRAWINGS HAS BEEN RECEIVED FROM THE ENGINEER.

LOUVERS. LOUVERS SHALL BE TYPE EL-4-103R AS MANUFACTURED BY LOUVER AND DAMPER, INC., OR APPROVED EQUAL. THEY SHALL BE CONSTRUCTED OF GALVANIZED STEEL, 4 INCHES DEEP, WITH CHAINED FRAMES AND STATIONARY LOUVERS SET AT 30 DEGREES. THE FRAME SHALL BE COVERED WITH 1/2-INCH, 19 GA. GALVANIZED STEEL BIRD SCREEN AND THE ENTIRE ASSEMBLY SHALL BE OF HEAVY DUTY CONSTRUCTION AND LEAKPROOF. LOUVERS SHALL BE FURNISHED WITH A CHARCOAL BROWN, BAKED ENAMEL FINISH.

ACCESS SHAFT COVER AND PROTECTIVE RAILING AND CHAIN. THE ACCESS SHAFT COVER SHALL BE FABRICATED FROM 3/8-INCH GALVANIZED STEEL. HINGES SHALL BE HEAVY DUTY STEEL. RAILING SHALL BE FABRICATED FROM 1 1/2-INCH ALUMINUM PIPE. PROTECTIVE CHAIN SHALL FABRICATED FROM 0.135-INCH DIAMETER ZINC PLATED STEEL, INSIDE LINK SIZE 0.34-INCH x 1.35-INCH, APPROXIMATELY 135-INCH LENGTH PER 100 LINKS AND APPROXIMATE WORKING LOAD OF 340 POUNDS (TRADE SIZE NO. 135).

DOORS. SERVICE DOOR SHALL BE CRAWFORD ROLLING DOOR NO. 511-2-501, CORNELL ROLLING DOOR TYPE PBI, OR APPROVED EQUAL. IT SHALL BE HAND OPERATED AND HAVE GALVANIZED STEEL SLATS.

ENTRANCE DOOR SHALL BE STEELCRAFT TYPE L-18, REPUBLIC STEEL TYPE DE418 OR APPROVED EQUAL. IT SHALL BE HOLLOW CORE, FLUSH TYPE, CONSTRUCTED OF GALVANIZED STEEL. LOCK SHALL BE HEAVY-DUTY STAINLESS STEEL AS MANUFACTURED BY YALE, SCHLAGE OR APPROVED EQUAL.

FRAME SHALL BE GALVANIZED STEEL AND SUPPLIED BY THE SAME MANUFACTURER AS THE DOOR TO ASSURE A PROPER FIT.

DOOR AND FRAME SHALL BE FURNISHED WITH A CHARCOAL BROWN, BAKED ENAMEL FINISH.

MANHOLE FRAME AND COVER. MANHOLE FRAME AND COVER IN THE VENTILATION SHAFT BUILDING SHALL BE NEENAH NO. R-6660-KH WITH TYPE J LOCKING DEVICE OR APPROVED EQUAL.

STEPS. STEPS IN THE VENTILATION SHAFT BUILDING SHALL BE IN ACCORDANCE WITH STANDARD DRAWING MH-1.

INSTALLATION PROCEDURES. LOUVER FRAMES SET IN THE WALLS SHALL BE CAULKED AND WATERTIGHT. DOORS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICES FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	ACCESS SHAFT BUILDING
SPECIAL	LUMP SUM	VENTILATION SHAFT BUILDING

MECHANICAL EQUIPMENT

DESCRIPTION. THIS ITEM OF WORK SHALL CONSIST OF FURNISHING ALL MATERIALS AND LABOR REQUIRED FOR THE COMPLETE INSTALLATION OF ACCESS SHAFT AND VENTILATION SHAFT MECHANICAL FACILITIES IN ACCORDANCE WITH THE DIMENSIONS AND DETAILS SHOWN ON THE PLANS AND AS DESCRIBED HEREIN.

ALL CONSTRUCTION METHODS, MATERIALS AND WORKMANSHIP, EXCEPT AS MODIFIED HEREIN OR ON THE DRAWINGS SHALL CONFORM TO THE MANUFACTURER'S SPECIFICATIONS AND/OR INSTRUCTIONS AND APPLICABLE SECTIONS OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

MANLIFT. MANLIFT SHALL BE A GILLESPIE CORPORATION - GILCO TYPE ML-CD WITH ENCLOSED CAB AND TWO WIRE ROPES FOR A TRAVEL OF 102 FEET.

MANLIFT SHALL CONSIST OF A PLATFORM OF STRUCTURAL STEEL SHAPES OF WELDED AND BOLTED CONSTRUCTION. "T" SHAPED GUIDE RAILS WITH NEEDLE BEARING GUIDE WHEELS SHALL BE PROVIDED. EACH PAIR OF GUIDE RAILS SHALL HAVE WELDED NON-SLIP LADDER RUNGS ON 12-INCH CENTERS.

UNIT SHALL BE COMPLETE WITH RIGHT ANGLE WORM GEAR REDUCER WITH 2 HP 230 VOLT, SINGLE PHASE, DIRECT-CONNECTED MOTOR WITH AN ELECTRICALLY RELEASED, MECHANICALLY OPERATED, BRAKE TO STOP THE LIFT UPON POWER OR CONTROL FAILURE AND TO PREVENT COASTING DURING NORMAL OPERATIONS.

POWER TO THE PLATFORM SHALL BE SUPPLIED THROUGH A HEAVY DUTY TRAVELING CABLE. THE CORD SHALL ENTER THE LIFT THROUGH STRAIN RELIEF BUSHINGS. MAIN CONTROL PANEL NEMA 9 ENCLOSURE SHALL BE MOUNTED INSIDE THE BUILDING. SEPARATE MOTOR CONTROLLERS SHALL BE USED FOR EACH DIRECTION OF TRAVEL AND EQUIPPED WITH THERMAL OVERLOAD RELAYS SIZED TO PREVENT OPERATION WITH LOADS IN EXCESS OF 150 PERCENT OF RATED CAPACITY.

A TWO BUTTON SWITCH, CONSTANT PRESSURE TYPE MARKED "UP" AND "DOWN" SHALL BE MOUNTED IN THE CAR PLATFORM CONTROL PANEL. CALL STATION SWITCHES SHALL BE LOCATED AT THE UPPER AND LOWER LANDING, ADJACENT TO THE CAB PLATFORM.

A PUSHBUTTON SWITCH MARKED "EMERGENCY STOP" SHALL BE PROVIDED ON THE CAB. INTERIOR OF CAB SHALL BE PROVIDED WITH LIGHT AND SWITCH. CAB GATE SHALL BE PROVIDED WITH A SWITCH TO DE-ENERGIZE CONTROL CIRCUIT IF GATE REMAINS OPEN.

UNIT SHALL ALSO BE PROVIDED WITH SAFETY PRESSURE SCREEN, TWO MECHANICALLY OPERATED INSTANTANEOUS WEDGE TYPE CAR SAFETY DEVICES AND TRAVEL LIMIT SWITCHES. DRIVE UNIT MOTOR, CONTROLS AND LIGHTS SHALL BE EXPLOSION PROOF.

SUPPLY FAN. SUPPLY FAN SHALL BE BUFFALO FORGE COMPANY TYPE "B" VANEAXIAL, SIZE 15, OR EQUAL, ARRANGEMENT NO. 9, ALL ALUMINUM WHEEL, SPARK PROOF BELTS AND EXPLOSION PROOF DRIVE COVER.

FAN SHALL BE FOR VERTICAL MOUNTING AND SHALL HAVE A CAPACITY OF 2,725 cfm AT 1-INCH S. P.

FAN SHALL BE EQUIPPED WITH A 2 HP, TOTALLY ENCLOSED, EXPLOSION PROOF, 1,170 rpm, 230 VOLT, 1 PHASE, 60 CYCLE, BALL BEARING MOTOR AND MOUNTED ON OUTSIDE ADJUSTABLE BASE FOR REGULATING BELT TENSION. MOTOR AND STARTER SHALL BE FOR REVERSIBLE DUTY.

FAN SHALL BE COMPLETELY FINISH PAINTED AT FACTORY, BOTH INSIDE AND OUTSIDE, WITH GOOD QUALITY PAINT.

FAN SHALL BE CAPABLE OF REVERSIBLE OPERATION DELIVERING APPROXIMATELY 2,000 cfm AT 3/4-INCH S. P. IN REVERSE MODE.

VENTILATION SHAFT EMERGENCY LADDER. THE LADDER SHALL BE TYPE I, HEAVY DUTY ALUMINUM, IN ACCORDANCE WITH ANSI A14.2 STANDARDS. RUNGS SHALL BE D SHAPED, CORRUGATED, NON-SLIP, 1 3/4-INCH WIDE. SIDE RAILS SHALL BE OF I-BEAM CONSTRUCTION. THE LADDER SHALL BE FURNISHED IN 12-FOOT LENGTHS AND FASTENED TO THE INSIDE OF THE VENTILATION SHAFT AS SHOWN IN THE PLANS.

THE CONTRACTOR SHALL FURNISH AND INSTALL A "DUBL-LOCK" LADDER CLIMBERS SAFETY DEVICE AS MANUFACTURED BY INDUSTRIAL SAFETY AND SECURITY COMPANY, LIMA, OHIO OR APPROVED EQUAL. THE STAINLESS STEEL CABLE AND SAFETY SLEEVE SHALL BE PERMANENTLY ATTACHED TO THE LADDER AND THE NYLON SAFETY BELT GIVEN TO THE ENGINEER.

INSTALLATION PROCEDURES. ALL ITEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS OR AS ORDERED BY THE ENGINEER.

MECHANICAL TESTS. THE MANLIFT SHALL BE TESTED AT ITS MAXIMUM RATED CAPACITY USING DUMMY LOADS. ALL SAFETY DEVICES SHALL BE TESTED TO INSURE THEIR SATISFACTORY OPERATION.

THE FAN SHALL BE TESTED FOR ITS RATED CAPACITY IN BOTH DIRECTIONS.

THE NUMBER AND TYPE OF TEST SHALL BE AS DIRECTED BY THE ENGINEER.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICES FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	MECHANICAL EQUIPMENT

NOTES CONTINUED ON SHEET 114

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		JHZ	JHO 2.23-79	

NOTES (CONTINUED FROM SHEET 113)

ELECTRICAL EQUIPMENT

DESCRIPTION. THIS ITEM OF WORK SHALL CONSIST OF FURNISHING ALL MATERIALS AND LABOR REQUIRED FOR THE COMPLETE INSTALLATION OF TUNNEL, ACCESS SHAFT AND VENTILATION SHAFT ELECTRICAL FACILITIES IN ACCORDANCE WITH THE DIMENSIONS AND DETAILS SHOWN ON THE PLANS AND AS DESCRIBED HEREIN.

ALL CONSTRUCTION METHODS, MATERIALS AND WORKMANSHIP, EXCEPT AS MODIFIED HEREIN OR ON THE DRAWINGS SHALL CONFORM TO THE GENERAL REQUIREMENTS OF ITEM 625 ELECTRICAL EQUIPMENT, ITEM 713 LIGHTING AND ELECTRICAL MATERIALS AND OTHER APPLICABLE SECTIONS OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

SERVICE NO. 1 PANELBOARD. ARROW-HART CORP. TYPE NLAB WITH ITEC CORP. TYPE EQ-B CIRCUIT BREAKERS OR WESTINGHOUSE, GENERAL ELECTRIC, SQUARE-D OR APPROVED EQUAL. PANEL SHALL BE SURFACE MOUNTING TYPE WITH MAIN CIRCUIT BREAKER ARRANGED FOR TOP CABLE ENTRY. MAIN BUS SHALL BE COPPER AND BRANCH CIRCUIT BREAKERS SHALL BE BOLT-IN TYPE. PANEL SHALL HAVE HINGED LOCKING DOOR AND SHALL BE UL APPROVED AS SERVICE ENTRANCE EQUIPMENT.

SERVICE NO. 2 PANEL ENCLOSURE. PANEL ENCLOSURE SHALL BE GASKETED, RAINTIGHT, NEMA 3R CONSTRUCTION WITH HINGED DOORS AND LOCK, MOUNTED ON FOUR 1 1/4-INCH x 1 1/4-INCH x 1/8-INCH STEEL ANGLES. LOAD CENTER SHALL HAVE COPPER BUS WITH MAIN LUGS ONLY AND EQ-B CIRCUIT BREAKERS OF RATINGS SHOWN.

SUPPLY FAN CONTROLS. CONTRACTOR SHALL BE ALLEN-BRADLEY BULLETIN 702 OR APPROVED EQUAL, NEMA SIZE 0, 2 POLE WITH 120 VOLT COIL. RELAYS FOR FORWARD AND REVERSE OPERATION SHALL BE ALLEN-BRADLEY TYPE OR WITH 4 CONVERTIBLE CONTACTS AND 120 VOLT COIL. SELECTOR SWITCH SHALL BE TYPE 800-H, 3 POSITION WITH CENTER POSITION OFF. CONTACTOR, RELAYS AND SELECTOR SWITCH SHALL BE MOUNTED IN A NEMA TYPE 1 ENCLOSURE WITHIN THE SERVICE NO. 2 PANEL ENCLOSURE.

COMBUSTIBLE GAS DETECTION SYSTEM. DETECTION SYSTEM SHALL BE OF THE TYPE DESIGNED TO CONTINUOUSLY ANALYZE A SAMPLE ATMOSPHERE TO DETECT THE PRESENCE OF FLAMMABLE GASES OR VAPORS UP TO THEIR LOWER EXPLOSIVE LIMIT IN AIR. SYSTEM SHALL BE MANUFACTURED BY MINE SAFETY APPLIANCE CO. OR AN APPROVED EQUAL.

CONTROL INDICATING UNITS SHALL BE MSA MODEL 511. SENSING HEAD ASSEMBLIES SHALL BE MSA SERIES 510.

LIGHTING FIXTURES. TYPE A - CROUSE HINDS CAT. NO. VXHF22 OR KILLARK, APPLETON OR APPROVE EQUAL, COMPLETE WITH GUARD AND 200 WATT LAMP AND CEILING MOUNTING JUNCTION BOX.

TYPE B - CROUSE HINDS CAT. NO. EVBX104 OR KILLARK, APPLETON OR APPROVED EQUAL, COMPLETE WITH GUARD AND 100 WATT LAMP.

TYPE C - CROUSE HINDS CAT. NO. EVJ140 OR KILLARK, APPLETON OR APPROVED EQUAL, COMPLETE WITH GUARD AND 100 WATT LAMP.

RECEPTACLES. CROUSE HINDS CAT. NO. CPS152-101 OR KILLARK, APPLETON OR APPROVED EQUAL SINGLE GANG, 20 amp., 125 VOLT, 3 WIRE, RECEPTACLE ASSEMBLY.

CONDUIT AND WIRE. ALL CONDUIT SHALL BE RIGID GALVANIZED STEEL, TYPE I, UNLESS OTHERWISE NOTED. CONDUIT AND WIRING METHODS FOR ELECTRIC WORK IN THE ACCESS SHAFT AND TUNNEL SHALL COMPLY WITH ARTICLE 501 OF THE NATIONAL ELECTRIC CODE FOR CLASS 1, DIVISION 1, GROUP D HAZARDOUS LOCATIONS.

WIRE SHALL BE OKONITE, HATFIELD, GENERAL ELECTRIC OR SOUTHWIRE, MINIMUM SIZE NO. 12 AWG, SINGLE CONDUCTOR WITH 600 VOLT INSULATION AND COPPER CONDUCTORS. WIRE NO. 10 AWG AND LARGER SHALL BE STRANDED.

WIRE SMALLER THAN NO. 4 AWG SHALL BE TYPE THWN.

WIRE NO. 4 AWG AND LARGER SHALL BE TYPE XHHW.

GROUND RODS. GROUNDING RODS AND CABLE SHALL BE FURNISHED AND INSTALLED AS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE SPECIFICATIONS.

JUNCTION BOXES. TYPE A - HOPE CAT. NO. H1211 OR APPLETON, CROUSE HINDS OR APPROVED EQUAL. TYPE B - HOP CAT. NO. H1220 OR APPLETON, CROUSE HINDS OR APPROVED EQUAL.

INSTALLATION PROCEDURES. ALL ITEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS OR AS REQUESTED BY THE ENGINEER.

CONDUITS SHALL BE SUPPORTED ON APPROVED TYPE HANGERS AT 6-FOOT MAXIMUM SPACING. RIGID EXPANSION FITTINGS SHALL BE PROVIDED AT 100 FOOT MAXIMUM SPACING.

1/4-INCH HOLES SHALL BE DRILLED IN CONDUITS AT THE LOW POINTS TO PREVENT COLLECTION OF CONDENSATE.

CONDUITS ENTERING BOXES, FITTINGS AND EQUIPMENT SHALL TERMINATE IN THREADED WATER-TIGHT HUBS.

ELECTRICAL TESTS. TESTS SHALL BE MADE IN ACCORDANCE WITH 625.23 EXCEPT THAT PERFORMANCE TESTS SHALL BE MADE ON ALL LIGHTS, SWITCHES, RECEPTACLES, CONTROLS, ETC. AS DIRECTED BY THE ENGINEER.

POWER SUPPLY. THE POWER SUPPLY AGENCY FOR THIS PROJECT IS:

CINCINNATI GAS & ELECTRIC COMPANY
4th & MAIN STREETS
CINCINNATI, OHIO 45202

POWER REQUIREMENTS: 3 WIRE 120/240 VOLT SERVICE.

CONTRACTOR TO SUPPLY AND INSTALL 100 amp - 3 WIRE METER SOCKETS AS SHOWN ON PLANS, INCLUDING CONDUIT, WEATHERHEADS, WOOD SERVICE POLE AND INCIDENTALS FOR COMPLETE ELECTRICAL SERVICE.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	ELECTRICAL EQUIPMENT

FINAL TUNNEL LINING

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING THE FINAL SUPPORT SYSTEM FOR THE EXCAVATED TUNNEL.

GENERAL. THE TUNNEL SHALL BE PROVIDED WITH A FLEXIBLE SEGMENTED LINER SYSTEM WHICH PREVENTS SLAKING AND ROCK FALLS AND SUPPORTS THE ROCK AND WATER LOADS. THE FINAL LINER MUST HAVE FULL BEARING AGAINST ALL AREAS OF CONTACT WITH THE SURROUNDING ROCK AND THE TIEBACK ANCHOR BLOCK.

THE FINAL LINING SHALL NOT BE PLACED UNTIL AFTER TENSIONING OF THE TIEBACKS.

THE FINAL LINER THICKNESS SHALL TOTAL A MINIMUM OF 8 INCHES OF SHOTCRETE (SEE SHOTCRETE SPECIFICATION, SHEET NO. 122) OR CAST-IN-PLACE CONCRETE (SEE CONCRETE LINING SPECIFICATION, SHEET NO. 120), AND PROVIDE A SMOOTH, CONTINUOUS ARCH, SIDEWALLS AND INVERT, REGARDLESS OF OVERBREAK, WITH A MINIMUM INSIDE TUNNEL DIAMETER OF 9 FEET.

IN THE EVENT THAT SHOTCRETE WAS USED FOR THE INITIAL LINING AND IS STILL INTACT AND OF GOOD QUALITY, IT MAY BE INCLUDED IN THE TOTAL THICKNESS OF A FINAL SHOTCRETE LINER. WHEN APPLYING THE FINAL THICKNESS OF SHOTCRETE TO AN ORIGINAL SHOTCRETE LINER, THE OLD SURFACE SHALL BE CLEAN, DAMP, AND OF SUFFICIENT ROUGHNESS TO PERMIT A GOOD COLD-JOINT BOND.

FINAL LINER SHALL BE PROVIDED WITH CIRCUMFERENTIAL AND LONGITUDINAL JOINTS AS SHOWN ON THE PLANS. THE JOINTS BETWEEN THE ANCHOR BLOCKS AND TUNNEL LINER SHALL BE ORIENTED AS SHOWN ON SECTION AE-AE SHEET NO. 149.

THE MINIMUM THICKNESS OF THE FINAL TUNNEL LINING HAS BEEN DETERMINED FOR A 9-FOOT INSIDE DIAMETER CIRCULAR TUNNEL. IF THE CONTRACTOR CHOOSES TO USE SOME OTHER SHAPE OR DIAMETER, HE WILL BE REQUIRED TO RE-DESIGN THE TUNNEL LINING AND SHALL, AT LEAST 30 DAYS PRIOR TO COMMENCING WORK SUBMIT FOR APPROVAL BY THE ENGINEER, DESIGN CALCULATIONS. COMPUTATIONS SHALL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER AND SHALL BEAR HIS SIGNATURE AND REGISTRATION NUMBER, OR PROFESSIONAL ENGINEERING SEAL. PRIOR TO PREPARING SUCH DETAILED DRAWINGS AND DESIGN COMPUTATIONS THE CONTRACTOR SHALL CONTACT THE ENGINEER IN ORDER TO ASCERTAIN THE LOADS WHICH MUST BE USED IN THE TUNNEL LINING DESIGN.

REINFORCEMENT. REINFORCEMENT SHALL BE USED AND SHALL BE AS SHOWN ON THE PLANS. REINFORCING STEEL WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THIS ITEM FOR PAYMENT.

REINFORCING STEEL LIST FOR THE TUNNEL LINING IS NOT INCLUDED IN THE PLANS. CONTRACTOR SHALL PREPARE A REINFORCING STEEL LIST. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND APPROVAL, THREE COPIES OF THE REINFORCING STEEL LIST. FABRICATION SHALL NOT BEGIN UNTIL WRITTEN APPROVAL OF THE SUBMITTED DRAWINGS HAS BEEN RECEIVED FROM THE ENGINEER.

ALTERNATE. THE CONTRACTOR HAS THE OPTION OF USING PRECAST CONCRETE SEGMENTS FOR FOUR OF THE SIX SEGMENTS OF THE FINAL TUNNEL LINER IN LIEU OF CAST-IN-PLACE CONCRETE OR SHOTCRETE (SEE PRECAST CONCRETE SPECIFICATION, SHEET NO. 120). HOWEVER, IF THE

NOTES CONTINUED ON SHEET 115

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NOTES (CONTINUED FROM SHEET 114)

CONTRACTOR ELECTS TO USE THE PRECAST CONCRETE SEGMENTS, HE SHALL COMPLETELY BACKFILL WITH GROUT THE ANNULAR SPACE BETWEEN THE SEGMENTS AND THE TUNNEL BORE (SEE TUNNEL GROUTING SPECIFICATION, SHEET NO. 119).

METHOD OF MEASUREMENT. THE FOOTAGE FOR PAYMENT SHALL BE MEASURED WITHIN THE PAY LIMITS SHOWN ON THE "PROFILE OF TUNNEL" DRAWING AND ALONG THE CENTERLINE OF THE TUNNEL.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LINEAR FOOT	FINAL TUNNEL LINING

NO ADJUSTMENT WILL BE MADE IN THE LINEAR FOOT UNIT PRICE BID FOR "FINAL TUNNEL LINING" REGARDLESS OF THE SQUARE FOOTAGE OF TUNNEL LINING USED.

CONTRACTOR ASSISTANCE TIME FOR TESTS

DESCRIPTION. THIS ITEM SHALL CONSIST OF THOSE TIME PERIODS DURING WHICH IT IS REQUESTED BY THE ENGINEER THAT THE CONTRACTOR AMEND HIS REGULAR CONSTRUCTION OPERATIONS TO PERMIT PREPARATIONS FOR AND PERFORMANCE OF CERTAIN TESTS, AS DESCRIBED HEREINAFTER. ANY OF THE CONTRACTOR'S OPERATIONS WHICH WOULD NOT, IN THE OPINION OF THE ENGINEER, INTERFERE WITH TESTING PROCEDURES NEED NOT BE AFFECTED. DURING THESE ASSISTANCE TIME INTERVALS, THE CONTRACTOR SHALL FURNISH, AS A PART OF THIS ITEM, SUCH PERSONNEL AND CONSTRUCTION EQUIPMENT AS ARE REQUIRED TO PREPARE FOR AND PERFORM THE TESTS, AND AS ARE REQUESTED BY THE ENGINEER. HE SHALL ALSO FURNISH CERTAIN OF THE MATERIALS AND EQUIPMENT REQUIRED IN THE PERFORMANCE OF THE TESTS THEMSELVES AS STIPULATED HEREIN AND AS CALLED FOR ON THE PLANS.

GENERAL. THE OBJECTIVES OF THE IN SITU PLATE BEARING AND DIRECT SHEAR TESTS ARE FOR THE EVALUATION OF ROCK AND SOIL STRENGTH AND DEFORMATION CHARACTERISTICS. THESE OBJECTIVES WILL BE ACCOMPLISHED BY THE ENGINEER WITH THE ASSISTANCE AND SUPPORT OF THE CONTRACTOR.

SCOPE OF WORK. THE ENGINEER WILL REQUEST THE CONTRACTOR TO USE EQUIPMENT AND PERSONNEL TO PERFORM WORK OR PROVIDE ASSISTANCE WHICH WILL AID HIM IN PREPARATIONS FOR AND PERFORMANCE OF TESTS WITHIN THE CYLINDER PILES AND TUNNEL. SUCH USE OF EQUIPMENT, WORK AND ASSISTANCE SHALL BE WITHIN THE SCOPE OF THE WORK WHICH IS PERFORMED UNDER THE VARIOUS ITEMS OF THIS CONTRACT OR WORK WHICH IS HEREINAFTER DESCRIBED.

EQUIPMENT SUPPLIED BY CONTRACTOR. DURING ASSISTANCE TIME, ANY OF THE CONTRACTOR'S EQUIPMENT WHICH IS NECESSARY FOR PERFORMING WORK OR PROVIDING ASSISTANCE REQUESTED BY THE ENGINEER SHALL REMAIN MOBILIZED AT THE TEST SITE. THE CONTRACTOR SHALL ALSO PROVIDE ANY ADDITIONAL EQUIPMENT NECESSARY TO PERFORM THE EXCAVATION AND OTHER PREPARATORY WORK FOR THE ROCK TESTS WHICH ARE DESCRIBED IN THIS ITEM. ALL EXCAVATION AND ROCK CORING EQUIPMENT SHALL BE SUBJECT TO REVIEW BY THE ENGINEER. THE CONTRACTOR SHALL FURNISH ALL EQUIPMENT NECESSARY TO PROVIDE SAFE AND EFFICIENT ACCESS BY CRANE, HOIST OR MANLIFT, AT LEAST 1,000 WATTS OF DIRECT LIGHTING, AND ADDITIONAL LIGHTING IN THE TEST AREAS WHEN REQUESTED BY THE ENGINEER, 110 VOLT AC ELECTRICAL OUTLETS, FORCED AIR VENTILATION, DE-WATERING, IF NEEDED, GAS OR ELECTRIC HEATERS IF TEMPERATURES DROP BELOW 40 DEGREES F., AND A SUITABLE ENVIRONMENT AND ALL SAFETY AND SUPPORT ITEMS AND SERVICES NEEDED FOR ALL PERSONNEL ENTERING AND WORKING WITHIN THE CYLINDER PILES AND TUNNEL. SET UP AND PERFORMANCE OF THE TESTS REQUIRES THAT THE BASE OF THE TUNNEL OR CYLINDER PILE BE FREE OF STANDING WATER AND ALL OBSTACLES AND THAT THE SOIL OR ROCK IN THE TEST AREAS BE CLEARLY ACCESSIBLE.

MATERIALS FOR PLATE BEARING TEST. THE SET UP OF TEST APPARATUS REQUIRED FOR THE PLATE BEARING TEST IN THE CYLINDER PILE AND THE TUNNEL WILL GENERALLY BE AS SHOWN ON THE PLANS. THE ENGINEER WILL SUPPLY THE HYDRAULIC JACK, PUMP AND GAGES, CYLINDRICAL SPACERS, SPHERICAL SEATS AND BEARING PLATES AND NECESSARY MEASURING DEVICES. THE CONTRACTOR WILL BE REQUIRED TO CONVEY TEST EQUIPMENT TO AND REMOVE IT FROM THE TEST LOCATIONS AND ASSIST IN ITS SET UP. THE CONTRACTOR SHALL PREPARE MINIMUM THREE-FOOT DIAMETER SMOOTH, FLAT, UNDISTURBED, PARALLEL SURFACES ON OPPOSITE WALLS OF THE TUNNEL OR CYLINDER PILE EXCAVATION ON WHICH TO CONDUCT THE PLATE BEARING TESTS.

PLATE BEARING TEST PROCEDURE. THREE PLATE BEARING TESTS WILL BE PERFORMED IN EITHER THE INITIAL 100 FEET OF RUNNING TUNNEL OR IN AN APPROPRIATE SIDE ADIT. ALSO TWO OR THREE PLATE BEARING TESTS WILL BE PERFORMED IN EACH OF TWO OR THREE OF THE INITIAL CYLINDER PILES. THE PLATE BEARING TESTS WILL BE PERFORMED BY THE ENGINEER. SET UP AND PERFORMANCE OF EACH TEST WILL TAKE APPROXIMATELY TWO DAYS. IF THE THREE PLATE BEARING TESTS ARE PERFORMED IN THE TUNNEL, THEY WILL INTERRUPT TUNNEL EXCAVATION. PLATE BEARING TESTS PERFORMED IN A SPECIALLY PREPARED TEST ADIT WOULD HINDER TUNNEL EXCAVATION TO A MINIMAL DEGREE. THE CONTRACTOR SHALL PROVIDE AT LEAST ONE MAN TO ASSIST THE ENGINEER IN THE SET UP AND PERFORMANCE OF EACH TEST.

MATERIALS FOR DIRECT SHEAR TESTS. SCHEMATIC LAYOUTS SHOWING THE APPARATUS REQUIRED FOR DIRECT SHEAR TESTING IN THE CYLINDER PILES AND IN THE TUNNEL ARE SHOWN ON THE PLANS.

THE ENGINEER WILL SUPPLY THE STEEL SHEAR BOX AND PLATES, HYDRAULIC JACKS, PUMPS AND GAGES, SPHERICAL SEATS, CYLINDRICAL SPACERS, AND NECESSARY MEASURING DEVICES. THE CONTRACTOR SHALL BE REQUIRED TO CONVEY TEST EQUIPMENT TO AND REMOVE IT FROM THE TEST LOCATIONS AND ASSIST IN ITS SET UP. THE SHEAR BOX WILL BE OPEN AT THE TOP AND BOTTOM WITH THE TOP CORNERS BEING REINFORCED. THE SHEAR BOX SHALL BE PLACED OVER THE ROCK TEST BLOCK IMMEDIATELY AFTER EACH BLOCK HAS BEEN EXCAVATED. THE BOX WILL EXTEND DOWN TO 2 INCHES ABOVE THE TEST PLANE, AS SHOWN SCHEMATICALLY ON THE PLANS. THE GAP BETWEEN THE SAMPLE AND THE BOX SHALL BE FILLED WITH QUICK SETTING GROUT, SMOOTHED OFF ON TOP FOR BEARING OF THE STEEL PLATE. A STEEL BEARING PLATE WILL BE SET IN THE GROUT AND LEVELED BEFORE THE GROUT HARDENS.

IN THE CYLINDER PILES, THE CONTRACTOR SHALL INSTALL REACTION SURFACES FOR NORMAL AND SHEAR JACKING SIMILAR TO THOSE SHOWN ON THE PLANS. THE NORMAL JACKING REACTION SURFACE SHALL CONSIST OF A WEIGHTED OR SIMILAR REACTION BEAM CAPABLE OF RESISTING 30,000 POUNDS OF UPLIFT PRESSURE FROM THE NORMAL LOAD JACK. PREPARATION OF THE REACTION SURFACE FOR THE SHEAR LOAD JACK WILL REQUIRE EXCAVATION AND SMOOTHING OF A PLANE SURFACE BEYOND THE WALL OF THE CYLINDER PILE AND THE PLACEMENT OF A CONCRETE REACTION PAD IF NEEDED. THE CONTRACTOR SHALL SET UP A WORKING PLATFORM, SIMILAR TO THAT SHOWN ON THE PLANS, ABOVE THE REACTION BEAM FROM WHICH THE TEST CAN BE RUN AND OBSERVED.

IN THE TUNNEL, THE CONTRACTOR SHALL EXCAVATE PLANE SURFACES, AND FORM AND POUR QUICK SETTING CONCRETE REACTION PADS, IF NEEDED, ON THE TUNNEL WALLS FOR USE AS REACTION SURFACES. THE CONTRACTOR SHALL ERECT TIMBER CRIBBING IN THE TUNNEL CROWN AS SHOWN ON THE PLANS AS A REACTION SURFACE FOR THE VERTICAL JACK.

ALL MATERIALS FOR CONCRETE OR TIMBER REACTION PADS, THE REACTION BEAMS IN THE CYLINDER PILES AND THE WORKING PLATFORMS IN THE CYLINDER PILES SHALL BE FURNISHED AND INSTALLED UNDER THIS ITEM. HARDWOOD LAGGING, TIMBER CRIBBING, WELDED RE-BAR FRAMES AND WEDGES FOR SPACERS BETWEEN THE JACKS AND REACTION SURFACES WILL ALSO BE FURNISHED AND INSTALLED UNDER THIS ITEM. THE COST OF THESE MATERIALS AND THEIR INSTALLATION SHALL BE INCIDENTAL TO THIS ITEM.

DIRECT SHEAR TEST PROCEDURE. TWO DIRECT SHEAR TESTS WILL BE PERFORMED IN EACH OF A MINIMUM OF TWO AND POSSIBLY THREE CYLINDER PILES, AND, IF THE RESULTS INDICATE STRENGTHS LESS THAN ASSUMED IN DESIGN, THEN AT A MAXIMUM OF THREE LOCATIONS DIRECT SHEAR TESTS WILL BE PERFORMED IN EITHER THE INITIAL 100 FEET OF RUNNING TUNNEL OR IN AN APPROPRIATE SIDE ADIT. THE ACTUAL DIRECT SHEAR TESTS WILL BE PERFORMED BY THE ENGINEER. SET UP AND PERFORMANCE OF EACH TEST WILL TAKE APPROXIMATELY FOUR DAYS INCLUDING TEST BLOCK PREPARATION, EQUIPMENT SET UP, TEST PERFORMANCE AND EQUIPMENT REMOVAL. IF THE DIRECT SHEAR TESTS ARE PERFORMED IN THE TUNNEL, THEY WILL INTERRUPT TUNNEL EXCAVATION. DIRECT SHEAR TESTS PERFORMED IN A SPECIALLY PREPARED TEST ADIT WOULD HINDER TUNNEL EXCAVATION TO A MINIMAL DEGREE. THE CONTRACTOR SHALL PROVIDE AT LEAST ONE MAN TO ASSIST THE ENGINEER IN THE SET UP AND PERFORMANCE OF EACH TEST.

LOCATION OF TESTABLE SHEAR PLANES IN TUNNEL. THE LOCATION OF POTENTIAL TESTABLE SHEAR PLANES IN THE TUNNEL WILL BE DETERMINED BY THE ENGINEER DURING EXCAVATION OF THE TUNNEL. TESTABLE SHEAR PLANES ARE LIKELY TO EXIST AT SEVERAL ELEVATIONS IN THE TUNNEL, THEREFORE, AN IRREGULAR STEPPED TUNNEL INVERT MAY BE REQUIRED TO PROVIDE ACCESS TO THE DIFFERENT TESTABLE SHEAR PLANES. A MAXIMUM OF THREE DISTINCT BENCHES OR LEVELS MAY BE REQUIRED. AFTER THE INITIAL EXCAVATION HAS BEEN COMPLETED, THE TOP SURFACE OF THE TEST BLOCKS SHALL BE EXPOSED USING HAND EXCAVATION TECHNIQUES WHICH ARE ACCEPTABLE TO THE ENGINEER.

LOCATING TESTABLE SHEAR PLANES IN CYLINDER PILES. PRECISE DETERMINATION OF THE ELEVATION OF SURFACES FOR DIRECT SHEAR TESTING IN THE CYLINDER PILES WILL REQUIRE THE EXCAVATION OF A MAXIMUM 2-FOOT WIDE TRENCH INSIDE AND ADJACENT TO THE WESTERLY PORTION OF THE SHAFT WALL. THE CONTRACTOR SHALL BEGIN EXCAVATION OF THE TRENCH ONCE THE SHAFT EXCAVATION HAS PROGRESSED INTO AN OLIVE-BROWN STIFF TO HARD, SILTY CLAY LOCATED 2 TO 10 FEET ABOVE TOP OF ROCK. THE BOTTOM OF THE TRENCH SHALL BE MAINTAINED A MINIMUM OF TWO FEET AHEAD OF THE EXCAVATED BOTTOM OF THE SHAFT SO THAT TESTABLE SURFACES CAN BE DETECTED BEFORE THEY ARE DISTURBED BY SHAFT EXCAVATION. ONE OR MORE OF THE TESTS WITHIN THE SHAFT WILL BE PERFORMED IN THE EXISTING SLIDE SHEAR ZONE. ADDITIONAL TRENCHING WITHIN THE SHAFT MAY BE REQUIRED BY THE ENGINEER TO PRECISELY LOCATE TESTABLE PLANES IN THE WEATHERED CLAYSTONE (CLAY SHALE).

EXCAVATION PROCEDURES ADJACENT TO DIRECT SHEAR TEST BLOCKS. ALL SOIL OR ROCK WITHIN ONE-FOOT OF THE SELECTED SHEAR TEST BLOCKS SHALL BE EXCAVATED USING SMALL HAND TOOLS AND CAREFUL EXCAVATION TECHNIQUES WHICH WILL NOT DISTURB THE TEST PLANE OR IMPART VIBRATIONS TO THE TEST BLOCKS. JACKING OR PRYING AGAINST TEST BLOCKS SHALL BE PROHIBITED. THE TOOLS AND EXCAVATION TECHNIQUES SHALL BE ACCEPTABLE TO THE ENGINEER.

AFTER THE TOPS OF THE SHEAR TEST BLOCKS HAVE BEEN EXPOSED, THE CONTRACTOR SHALL ADVANCE TWO OR MORE 4-INCH (MINIMUM) DIAMETER CORE HOLES AT LEAST 2 FEET IN DEPTH, ADJACENT TO EACH TEST BLOCK. THE CORING EQUIPMENT SHALL BE CAPABLE OF RETRIEVING A MINIMUM 12-INCH LONG CORE SAMPLE.

NOTES CONTINUED ON SHEET 116

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NOTES

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NOTES (CONTINUED FROM SHEET 115)

AFTER CORING ADJACENT TO A TEST BLOCK IS COMPLETED, THE TEST BLOCK SHALL BE OUTLINED USING A PORTABLE ROCK SAW CAPABLE OF CUTTING AT LEAST A 12-INCH DEEP GROOVE AROUND THE BLOCK. IN LIEU OF A ROCK SAW, THE CONTRACTOR MAY SUPPLY AND USE A ROTARY AIR-COOLED CORE DRILL TO OUTLINE THE BLOCK WITH OVERLAPPING DRILL HOLES. AFTER THE BLOCK WALLS HAVE BEEN CUT FREE, THE SURROUNDING ROCK MATERIAL SHALL BE CAREFULLY EXCAVATED AWAY FROM THE BLOCK TO A DEPTH OF 2 INCHES BELOW THE TEST PLANE.

METHOD OF MEASUREMENT. ASSISTANCE TIME SHALL BE MEASURED IN HOURS. THE PERIOD OF TIME SHALL BEGIN WHEN SATISFACTORY ACCESS IS MADE AVAILABLE TO THE ENGINEER FOLLOWING A REQUEST BY THE ENGINEER FOR ASSISTANCE TIME. THE PERIOD OF TIME SHALL END WHEN THE ENGINEER NOTIFIES THE DESIGNATED REPRESENTATIVE OF THE CONTRACTOR THAT THE ASSISTANCE PERIOD HAS ENDED. ALL ASSISTANCE TIME WILL BE MEASURED TO THE NEAREST ONE-HALF HOUR.

ALL ASSISTANCE TIME WILL BE MEASURED FOR PAYMENT AS TIME "AT REGULAR PAYING RATE" OR TIME "AT OVERTIME PAYING RATE".

ASSISTANCE TIME WILL NOT BE MEASURED FOR PAYMENT DURING ANY PERIOD OF TIME WHEN AN ACTION OR FAILURE TO ACT BY THE CONTRACTOR, OR WHEN A FAILURE OF THE CONTRACTOR'S EQUIPMENT DELAYS OR PREVENTS THE OPERATIONS HEREIN DESCRIBED FROM BEING PERFORMED.

BASIS OF PAYMENT. PAYMENT WILL BE MADE AT THE CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	HOUR	ASSISTANCE TIME FOR TESTS IN CYLINDER PILES AT REGULAR PAYING RATE.
SPECIAL	HOUR	ASSISTANCE TIME FOR TESTS IN CYLINDER PILES AT OVERTIME PAYING RATE.
SPECIAL	HOUR	ASSISTANCE TIME FOR TESTS IN TUNNEL AT REGULAR PAYING RATE.
SPECIAL	HOUR	ASSISTANCE TIME FOR TESTS IN TUNNEL AT OVERTIME PAYING RATE.

OBSERVATION AND MONITORING

DESCRIPTION. THIS ITEM SHALL CONSIST OF FURNISHING, INSTALLING AND PROVIDING ALL PERSONNEL, INSTRUMENTS AND EQUIPMENT NEEDED TO INSTALL THE INCLINOMETERS, EXTENSOMETERS, CONTACT STRESS CELLS, LOAD CELLS, RESISTANCE STRAIN GAGES, SURVEY EDM CONTROL POINTS AND BENCHMARKS HEREAFTER MENTIONED. ALL SURVEYING AND MONITORING HEREINAFTER MENTIONED WILL BE DONE BY THE ENGINEER USING EQUIPMENT SUPPLIED AND MAINTAINED BY THE CONTRACTOR.

DIVISION OF RESPONSIBILITIES, CONTRACTOR ASSISTANCE AND COOPERATION, APPROVAL OF INSTRUMENTS, INSTRUMENT PROCUREMENT, STORAGE PROVISIONS, INSTALLATION, ACCESS, REFERENCE IDENTIFICATION AND MONITORING. THESE SECTIONS SHALL BE AS DESCRIBED IN THE NOTE, "TEMPORARY WALL MONITORING", SHEET NO. 84.

GROUND SURFACE MOVEMENTS AROUND ACCESS SHAFT. MOVEMENTS AT GROUND SURFACE IN RESPONSE TO EXCAVATION OF THE ACCESS SHAFT, MAY BE IMPORTANT TO NEIGHBORING STRUCTURES AND WILL BE DETERMINED WITH PRECISION SURVEY TECHNIQUES. SURFACE SETTLEMENTS WILL BE DETERMINED BY LEVELING TO THE NEAREST 0.005-FOOT. SURVEY POINTS, SUITABLE FOR THE REQUIRED ACCURACY SHALL BE DRIVEN OR ANCHORED APPROXIMATELY 2 FEET BELOW GROUND SURFACE. POINTS SHALL BE ESTABLISHED AT THE QUARTER POINTS AROUND THE ACCESS SHAFT AND BE LOCATED NO FURTHER THAN 20 FEET APART. TWO ADDITIONAL RINGS OF POINTS SHALL BE LOCATED AT DISTANCES OF APPROXIMATELY 20 AND 60 FEET FROM THE SHAFT TO MONITOR ANY POSSIBLE LARGE-SCALE SUBSIDENCE. THEIR EXACT LOCATION CAN NOT BE DETERMINED UNTIL THE CONTRACTOR'S SHAFT EXCAVATION PLANS ARE KNOWN. THESE SURVEYS WILL BE MADE BY THE ENGINEER. TWO VERTICALLY STABLE BENCH MARKS WILL BE ESTABLISHED BEYOND THE ZONE OF SLIDE AND EXCAVATION INDUCED GROUND MOVEMENTS. HORIZONTAL SURFACE MOVEMENTS ADJACENT TO THE SHAFT WILL BE DETERMINED BY TAPING WITH A TENSIONED STEEL TAPE ACROSS THE SHAFT EXCAVATION TO PREVIOUSLY DISCUSSED SURFACE POINTS, AS AND WHEN ACCESS PERMITS.

SUBSURFACE MOVEMENTS AROUND SHAFTS. MOVEMENTS OF THE HILLSIDE CAN ADVERSELY AFFECT THE INTEGRITY AND STABILITY OF THE ACCESS AND VENT SHAFTS AND SHAFT LININGS. SIMILARILY, MEASURED SUBSURFACE DEFORMATIONS IN RESPONSE TO SHAFT EXCAVATION PROVIDE AN INDEPENDENT CHECK ON SHAFT STABILITY AND ADJACENT GROUND MOVEMENTS. THEREFORE, INSTRUMENTATION SHALL BE INSTALLED TO MONITOR SUBSURFACE MOVEMENTS OUTSIDE AND ADJACENT TO THE SHAFTS AND INSIDE THE ACCESS SHAFT. HORIZONTAL SUBSURFACE DEFORMATIONS IN THE SOIL AND ROCK ADJACENT TO THE SHAFTS WILL BE MONITORED WITH INCLINOMETER INSTALLATIONS SIMILAR TO THOSE ALREADY PRESENT AT THE SITE. INCLINOMETER CASINGS SHALL BE INSTALLED APPROXIMATELY 3 TO 4 FEET UPHILL FROM BOTH THE ACCESS AND VENT SHAFTS. THE CASINGS SHALL BE INSTALLED AT LEAST 15 FEET INTO ROCK TO PROVIDE STABLE REFERENCE POINTS BELOW THE SOIL-ROCK INTERFACE. THESE CASINGS SHALL BE INSTALLED SEVERAL WEEKS IN ADVANCE OF ANY EXCAVATION ACTIVITY AT THE TWO SHAFTS SO THAT STABLE BASE READINGS MAY BE ESTABLISHED BY THE ENGINEER. INCLINOMETER CASINGS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AND SHALL BE OBTAINED FROM AN ESTABLISHED MANUFACTURER OR AGENT OF QUALITY GEOTECHNICAL INSTRUMENTS. THE INCLINOMETER CASING SHALL BE 3.34-INCH OUTSIDE DIAMETER PLASTIC, FLUSH COUPLED, GROUTED THROUGH A ONE-WAY GROUT VALVE FITTED TO THE LOWER END OF THE CASING W/BENTONITE-CEMENT MIX. THE CASING SHALL BE COMPATIBLE WITH DIGITILT INCLINOMETER OWNED BY ODOT AND ALREADY IN USE AT THE SITE. ACCEPTABLE INCLINOMETER CASING AND GROUT VALVES ARE AVAILABLE FROM SLOPE INDICATOR CO., 3668 ALBION PLACE NORTH, SEATTLE, WASHINGTON 98103.

ACCESS SHAFT LINER DISTORTION. DISTORTION OF THE TEMPORARY AND PERMANENT LINING OF THE ACCESS SHAFT WILL BE DETECTED BY MEASUREMENTS ACROSS THE SHAFT. THESE MEASUREMENTS WILL BE ACCOMPLISHED WITH A PORTABLE TELESCOPING TUBE EXTENSOMETER, SUCH AS THE REED INVARTUBE EXTENSOMETER AVAILABLE FROM SOILTEST, INC., 2205 LEE STREET, EVANSTON, ILLINOIS 60202. THIS TUBE EXTENSOMETER MONITORS THE CHANGE IN DISTANCE BETWEEN PERMANENT REFERENCE POINTS LOCATED FROM 3 TO 25 FEET APART, TO WITHIN PLUS OR MINUS 0.005-INCH. ANCHORS FOR THE TUBE EXTENSOMETER SHALL CONSIST OF HEMISPHERICAL NAIL HEADS SET INTO THE LINING. APPROXIMATELY 12 OF THESE ANCHOR POINTS SHALL BE LOCATED WITHIN THE SHAFT TO MONITOR SHAFT DISTORTIONS AT 3 LEVELS. THE TOP LEVEL SHALL BE APPROXIMATELY 3 FEET BELOW GROUND SURFACE AND THE OTHER 2 LEVELS SHALL BE PLACED APPROXIMATELY 3 FEET ABOVE AND 3 FEET BELOW THE SLIDE SURFACE, NEAR TOP OF ROCK, AS DETERMINED BY THE ENGINEER DURING EXCAVATION. THE TUBE EXTENSOMETER AND ANCHOR POINTS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. MONITORING OF THESE REFERENCE ANCHORS MAY TAKE 20 MINUTES PER LEVEL AND WILL REQUIRE THE USE OF THE CONTRACTOR'S CRANE OR MANLIFT TO PROVIDE DIRECT ACCESS TO THE ANCHOR POINTS. THE MONITORING OF SHAFT ANCHOR POINTS BY THE ENGINEER WILL BE SCHEDULED TO MINIMIZE INTERRUPTIONS TO THE CONTRACTOR'S OPERATIONS.

TUNNEL AND ANCHOR BLOCK DEFORMATION. DEFORMATIONS OF THE TUNNEL AND ANCHOR BLOCKS IN RESPONSE TO THE TENSIONING OF THE TIEBACKS WILL BE MONITORED BY THE ENGINEER FOR A MINIMUM OF 5 OF THE INITIAL 12 BLOCKS AND AT ROUGHLY 50-FOOT INTERVALS THROUGHOUT THE TUNNEL AND COINCIDING WITH THE LOCATION OF THE TENDON EXTENSOMETER RODS (SEE SHEET NO. 128). IT MAY PROVE NECESSARY TO SIMILARLY INSTRUMENT ADDITIONAL BLOCKS IF ANOMALOUS MOVEMENTS ARE DETECTED. ALL REMAINING ANCHOR BLOCKS WILL BE MONITORED, BUT WITH LESS RIGOROUS METHODS.

DEFORMATIONS DURING TENSIONING OF A MINIMUM OF 5 SELECTED INITIAL ANCHOR BLOCK PLUS ANCHOR BLOCKS SPACED ROUGHLY 50 FEET APART OVER THE LENGTH OF THE TUNNEL WILL BE PRECISELY MONITORED USING A PORTABLE TELESCOPIC TUBE EXTENSOMETER AS SHOWN ON SHEET NO. 128. EACH OF THESE ANCHOR BLOCKS SHALL BE PROVIDED WITH FIVE TELESCOPIC TUBE EXTENSOMETER REFERENCE POINTS, SIMILAR TO THOSE USED IN THE SHAFT, WITH ONE POINT FOR EACH CORNER OF THE BLOCK AND ONE NEAR THE CENTER OF THE BLOCK. SIMILAR REFERENCE POINTS SHALL BE EMBEDDED ON THE OPPOSITE TUNNEL WALL AND IN THE TUNNEL CROWN ADJACENT TO EACH INSTRUMENTED ANCHOR BLOCK. THIS WILL ENABLE THE MONITORING OF ECCENTRIC BLOCK MOVEMENTS AND DEFORMATIONS OF THE TUNNEL DURING TENSIONING OF THE TIEBACKS. IMMEDIATELY FOLLOWING PLACEMENT OF THE FINAL LINER, REPLACEMENT REFERENCE POINTS SHALL BE EMBEDDED IN THE LINER, AS SHOWN ON SHEET NO. 128, ADJACENT TO THE EXISTING BURIED REFERENCE POINTS FOR THE PURPOSE OF MEASURING DISTORTIONS OF THE FINAL TUNNEL LINER. ALL EXTENSOMETER REFERENCE POINTS AND THE TELESCOPIC TUBE EXTENSOMETER SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR. THE REFERENCE POINTS SHALL BE INSTALLED, IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS UNDER THE OBSERVATION OF THE ENGINEER.

MECHANICAL BOREHOLE EXTENSOMETERS SHALL BE INSTALLED ON THE TUNNEL WALL OPPOSITE EACH OF THE 5 INITIAL INSTRUMENTED ANCHOR BLOCKS (ADJACENT TO THE TELESCOPIC TUBE EXTENSOMETER REFERENCE POINTS AS SHOWN ON SHEET NO. 128). ADDITIONAL BOREHOLE EXTENSOMETERS SHALL BE PLACED AT APPROXIMATELY 50 FOOT INTERVALS OVER THE LENGTH OF THE TUNNEL. THESE BOREHOLE EXTENSOMETERS WILL BE USED TO MONITOR LATERAL DEFORMATIONS OF THE TUNNEL AS WELL AS PROVIDE STABLE DEEP REFERENCE POINTS FOR TUBE EXTENSOMETER MEASUREMENTS, WHICH WHEN USED IN CONJUNCTION WITH ROD EXTENSOMETERS INCORPORATED IN TENDON ASSEMBLIES, PROVIDE A DIRECT MEASUREMENT OF CYLINDER PILE WALL MOVEMENTS. THE BOREHOLE EXTENSOMETERS SHALL BE INSTALLED IN APPROXIMATELY 20-FOOT DEEP BOREHOLES ALIGNED AXIALLY WITH THE TIEBACK TENDON AND FULLY GROUTED BEFORE PLACEMENT OF THE ANCHOR BLOCKS. HOLE DIAMETERS WILL DEPEND UPON THE INSTRUMENT SELECTED AND WILL LIKELY RANGE FROM 1-5/8 TO 2 INCHES. THE EXTENSOMETERS SHALL CONSIST OF A SINGLE 1/4-TO 1/2-INCH DIAMETER FLUSH COUPLED STAINLESS STEEL ROD WITH A MACHINED REFERENCE SURFACE AND ENCASED IN A PLASTIC SLEEVE, A HYDRAULICALLY EXPANDED BORROS POINT ANCHOR AND AN EXPANDABLE REFERENCE HEAD ASSEMBLY, AS SHOWN ON SHEET NO. 128. MINIMUM 9-INCH DIAMETER BLOCKOUTS SHALL BE PROVIDED IN THE TEMPORARY AND PERMANENT LINERS FOR CONTINUED MONITORING OF THE EXTENSOMETERS. INSTALLATION OF THE EXTENSOMETER BY THE CONTRACTOR SHALL BE ACCOMPLISHED IN THE PRESENCE OF THE ENGINEER AND WITH THE APPROPRIATE TOOLS AND TECHNIQUES AS SUGGESTED BY THE MANUFACTURER.

THE BOREHOLE EXTENSOMETER WILL BE MONITORED BY THE ENGINEER WITH A PORTABLE PROBE MICROMETER WITH A 4.0-INCH RANGE AND A SENSITIVITY OF 0.001 INCHES. THE EXTENSOMETERS, PROBE MICROMETER AND ALL NECESSARY INSTALLATION EQUIPMENT SHALL BE PROVIDED BY THE CONTRACTOR.

AS PRESENTLY ENVISIONED 3 OF THE FIRST 4 TENSIONED ANCHOR BLOCKS AND 2 ANCHOR BLOCKS OF THE SUCCEEDING 8 TENSIONED ANCHOR BLOCKS SHALL BE INSTRUMENTED WITH TELESCOPIC TUBE EXTENSOMETER REFERENCE POINTS. BOREHOLE EXTENSOMETERS SHALL BE PLACED OPPOSITE ALL OF THE 5 INSTRUMENTED BLOCKS. ADDITIONAL ANCHOR BLOCKS SHALL BE SIMILARLY INSTRUMENTED WITH TELESCOPIC TUBE EXTENSOMETER REFERENCE POINTS AND ACCOMPANYING BOREHOLE EXTENSOMETERS AT 50-FOOT INTERVALS ALONG THE TUNNEL. ADDITIONAL ANCHOR BLOCKS MAY BE INSTRUMENTED THROUGHOUT THE LENGTH OF THE TUNNEL IF WARRANTED BY ANOMALOUS INITIAL TEST BLOCK DEFORMATIONS OR ADVERSE GEOLOGIC CONDITIONS.

DEFORMATIONS OF THE REMAINING ANCHOR BLOCKS MAY BE MONITORED WITH A TELESCOPIC TUBE EXTENSOMETER BUT USING FEWER POINTS ON THE ANCHOR BLOCKS.

NOTES CONTINUED ON SHEET 117

HAZELET & ERDAL
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CYLINDER PILE WALL

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	TLB		JH	JHO 2-28-79	

NOTES (CONTINUED FROM SHEET 116)

VERTICAL MOVEMENTS OF PERMANENT CYLINDER PILE WALL. AFTER THE CAPPING BEAM IS CAST, POINTS SHALL BE ESTABLISHED ABOVE EVERY CYLINDER PILE ALONG THE TOP OF THE WALL FOR THE PURPOSE OF MEASURING VERTICAL MOVEMENTS OF THESE POINTS. VERTICAL MOVEMENTS WILL BE MEASURED BY LEVELING ALONG THE TOP OF THE CAPPING BEAM AND SUBSEQUENTLY ALONG THE TOP OF THE CONCRETE RAILING. PERMANENT BENCH MARKS SHALL BE ESTABLISHED IN ROCK NEAR EACH END OF THE WALL AND SHALL CONSIST OF A SLEEVED STEEL PIPE GROUTED AT LEAST 10 FEET INTO COMPETENT ROCK AS SHOWN ON SHEET NO. 129 . THESE BENCHMARKS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. VERTICAL MOVEMENTS WILL BE MEASURED BY THE ENGINEER USING A HIGH QUALITY ENGINEER'S LEVEL AND ROD. POINTS ON THE WALL SHALL CONSIST OF A PLATED DOMED NAIL SET IN THE CONCRETE. THESE POINTS SHALL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.

HORIZONTAL MOVEMENTS OF PERMANENT CYLINDER PILE WALL. IT IS DESIRABLE TO MONITOR HORIZONTAL WALL MOVEMENTS TO AN OVERALL ACCURACY BETTER THAN 1/4-INCH DURING AND AFTER CONSTRUCTION. HORIZONTAL MOVEMENTS OF THE WALL SHALL BE MEASURED USING AN ELECTRONIC DISTANCE MEASURING (EDM) INSTRUMENT OF HIGH ACCURACY, SUCH AS THE TELLUROMETER MA100, OR APPROVED EQUAL. THE QUOTED ACCURACY OF THE TULLUROMETER MA100 IS 2ppm PLUS OR MINUS 1.5mm USING A TRIPLE PRISM GLASS REFLECTOR. THE EDM INSTRUMENT SHALL BE FURNISHED AND MAINTAINED BY THE CONTRACTOR, AND IT SHALL BE MADE AVAILABLE TO THE ENGINEER AT HIS REQUEST. UPON COMPLETION OF ALL WORK IN THIS CONTRACT, THE EDM INSTRUMENT SHALL BECOME THE PROPERTY OF THE STATE AND SHALL BE TURNED OVER TO THE ENGINEER. STATIONS FOR THE EDM INSTRUMENT SHALL BE PROVIDED AT SEVEN CONTROL POINTS ALONG COLUMBIA PARKWAY VIADUCT AND AT ONE CONTROL POINT ADJACENT TO THE EXISTING RAMP WEST OF THE INTERSECTION OF CULVERT STREET AND EAST 5TH STREET AS SHOWN ON SHEET NO. 129A. AT EACH OF CYLINDER PILE NOS. 1, 12, 21, 31, 40, 49, 60, 68, 80, 92, 101, 108, 117, 130, 140, 150 AND 161, A HIGH QUALITY GLASS PRISM REFLECTOR SHALL BE USED FOR THE HORIZONTAL SURVEY POINT. BECAUSE OF THE SHORT SIGHT DISTANCES INVOLVED, PLASTIC TRUCK REFLECTORS AS APPROVED BY THE ENGINEER MAY BE USED AT THE OTHER CYLINDER PILES. SEE SHEET NO. 128C FOR TYPICAL INSPALLATION OF PLASTIC AND GLASS PRISM REFLECTORS.

THE EDM EQUIPMENT WILL ALSO BE USED BY THE ENGINEER TO MONITOR THE HORIZONTAL MOVEMENTS OF THE TEMPORARY SOLDIER PILE WALL.

DETAILED HORIZONTAL MOVEMENTS OF THE PERMANENT TIED-BACK CYLINDER PILE WALL AS A FUNCTION OF DEPTH SHALL BE DETERMINED FROM INCLINOMETER CASINGS INSTALLED THROUGH CYLINDER PILES 7, 19, 31, 43, 54, 66, 78, 90, 102, 116, 129 AND 147 (SEE SHEET NO. 128). A STEEL TUBE WITH A WOOD PLUG IN THE BASE SHALL BE INSTALLED ALONG WITH THE REINFORCEMENT IN THE EXCAVATED CYLINDER PILE SHAFT AS SHOWN ON SHEET NO. 128. THE STEEL PIPE SHALL BE WELDED ONTO BRACKETS CLOSE TO THE NEUTRAL AXIS OF THE REINFORCING BEAM AND ALONGSIDE THE TIE-BACK TENDON BLOCKOUT. AFTER THE PILE AND CAPPING BEAM ARE CAST AND CURED, THE WOOD PLUG IN THE END OF THE STEEL TUBE SHALL BE DRILLED OUT AND THE HOLE EXTENDED 15 FEET BEYOND THE BASE OF THE PILE. THE INCLINOMETER CASING SHALL THEN BE GROUTED IN BY THE CONTRACTOR.

INCLINOMETER CASINGS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AND SHALL BE OBTAINED FROM AN ESTABLISHED MANUFACTURER OR AGENT OF QUALITY GEOTECHNICAL INSTRUMENTS. THE INCLINOMETER CASING SHALL BE 3.34-INCH OUTSIDE DIAMETER PLASTIC, FLUSH COUPLED, GROUTED THROUGH A ONE-WAY GROUT VALVE FITTED TO THE LOWER END OF THE CASING W/BENTONITE-CEMENT MIX. THE CASING SHALL BE COMPATIBLE WITH DIGITILT INCLINOMETER OWNED BY ODOT AND ALREADY IN USE AT THE SITE. ACCEPTABLE INCLINOMETER CASING AND GROUT VALVES ARE AVAILABLE FROM SLOPE INDICATOR CO., 3668 ALBION PLACE NORTH, SEATTLE, WASHINGTON 98103.

THE PROTECTIVE STEEL PIPE AND INCLINOMETER CASING SHALL BE EXTENDED ABOVE THE CAPPING BEAM INTO A PERMANENT LOCKABLE ACCESS BOX INSTALLED IN THE KILGOUR STREET SIDEWALK. THIS BOX SHALL HAVE A WATERTIGHT LID AND BE ADEQUATELY DRAINED.

THE CONTRACTOR SHALL FURNISH TEN (10) REFLECTOR PRISMS, AND SIX (6) PRISM RODS/RANGING POLES. REFLECTOR PRISMS SHALL BE EQUAL TO K&E CO. CATALOG NO. 76 0304 CIRCULAR RETRO-REFLECTOR PRISM , 2 1/4 INCH DIAMETER PRECISION GROUND GLASS, WITH MOUNT. MOUNT SHALL BE AN ALUMINUM ALLOY HOUSING WITH 5/8"x11" FEMALE THREAD IN BASE AND 5/8"x11" MALE STUD WITH LOCK NUT AT TOP FOR MOUNTING TARGET POLE. PRISM RODS/RANGING POLES SHALL BE EQUAL K&E CO. CATALOG NO.- 76 0319, WITH A LEVEL BUBBLE VIAL ACCURATE TO ONE MINUTE OF ARC TO ASSURE THAT THE PRISM ROD IS HELD TRULY VERTICAL. THE PRISM ROD/RANGING POLE SHALL BE FURNISHED IN SECTIONS SO THAT IT CAN BE EXTENDED TO A TOTAL LENGTH OF 12 FEET AND SO THAT THE REFLECTOR PRISM CAN BE MOUNTED AT THE BASE OF THE RANGING POLE, AT A POINT FOUR FEET ABOVE THE BASE OF THE RANGING POLE OR AT THE TOP OF THE RANGING POLE. THE SECTIONS OF THE PRISM ROD/RANGING POLE SHALL BE PROVIDED WITH CARRYING BAGS. A SPARE SHOE SHALL BE PROVIDED WITH EACH PRISM ROD/RANGING POLE. REFLECTOR REFERENCE POINTS SHALL CONSIST OF ANGLES FASTENED TO THE CAPPING BEAMS, TWO ANGLES TO A SECTION OF CAPPING BEAM, WITH AN 11/16-INCH HOLE IN THE HORIZONTAL LEG OF THE ANGLE. A REFLECTOR CAN BE MOUNTED DIRECTLY TO THE HORIZONTAL LEG OF THE ANGLE OR THE PRISM ROD/RANGE POLE WITH REFLECTOR ATTACHED CAN BE SET INTO THE HOLE IN THE HORIZONTAL LEG OF THE ANGLE, SEE SHEET NO. 129C.

CYLINDER PILE WALL MOVEMENTS WILL ALSO BE MONITORED BY INSTALLING IN CYLINDER PILES 2, 7, 13, 19, 25, 31, 37, 43, 49, 54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 118, 121, 129 AND 137 A 1/4-INCH DIAMETER FLUSH COUPLED STAINLESS-STEEL EXTENSOMETER ROD SLEEVED IN A FLUSH COUPLED PVC TUBE ALONGSIDE THE TENDON. THIS ENABLES MEASUREMENT OF THE MOVEMENT OF THE TENDON ANCHOR HEAD ON THE CYLINDER PILE WALL RELATIVE TO THE DEADMAN ANCHOR BLOCK IN THE TUNNEL. IN ADDITION, IT CAN ALSO BE USED TO INDICATE THE LOAD IN THE TENDON. THE EXTENSOMETER ROD CAN BE CHECKED FOR FREEDOM OF MOVEMENT DURING TENDON INSTALLATION AND STRESSING SINCE ACCESS IS AVAILABLE AT BOTH ENDS. THE EXTENSOMETER ROD SYSTEM IS DESIGNED TO BE ABLE TO MAKE MEASUREMENTS OF THE DISPLACEMENT EITHER FROM WITHIN THE TUNNEL OR AT THE WALL ANCHOR HEAD. SHEET NO. 129A SHOWS A SUITABLE EXTENSOMETER DESIGNED BY SHANNON & WILSON, INC. AND MANUFACTURED BY SLOPE INDICATOR COMPANY, SEATTLE, WASHINGTON. MEASUREMENTS WILL BE MADE BY THE ENGINEER AT EITHER END WITH A STEEL SCALE GRADUATED TO 1/64-INCH OR WITH A TEMPORARILY SETUP DIAL GAGE MEASURING TO 0.001-INCH DURING STRESSING. AT THE EAST END OF THE CYLINDER PILE WALL A SIMILAR SLEEVED EXTENSOMETER ROD SHALL BE INSTALLED ALONGSIDE THE GROUTED TENDONS IN CYLINDER PILES 147 (TWO EXTENSOMETERS) AND 156. THE LOWER END OF THE EXTENSOMETER ROD SHALL BE GROUTED DIRECTLY INTO THE ROCK BEYOND THE END OF THE 20-FOOT ANCHORAGE LENGTH (SHEET NO. 143) WITH A BOND BREAKER BETWEEN THE EXTENSOMETER ANCHOR AND THE LOWER END OF THE ANCHORAGE LENGTH OF THE TENDON.

INSTRUMENTATION TEST SECTION. IN ADDITION TO THE GENERAL INSTRUMENTATION DESCRIBED ABOVE TWO TEST SECTIONS OF FIVE PILES EACH SHALL BE LOCATED CENTERED AROUND PILES 31 AND 90. ADDITIONAL INCLINOMETERS SHALL BE INSTALLED IN PILES 29, 30, 32, 33, 88, 89, 91 AND 92 (SEE SHEET NO. 128) IN THE SAME FASHION AS DESCRIBED ABOVE. ALSO, TWO INCLINOMETERS SHALL BE INSTALLED IN DRILL HOLES ON THE UPSLOPE SIDE OF THE WALL ALONG KILGOUR STREET FOR MORE DETAILED MEASUREMENT OF MOVEMENTS, ONE TEN FEET AND THE OTHER 20 FEET BEHIND BOTH PILES 31 AND 90, AND EXTENDING TO THE SAME ELEVATION AS INCLINOMETERS INCORPORATED IN THE CYLINDER PILES. EACH INCLINOMETER SHALL HAVE A HEAVY DUTY, WATERTIGHT, LIDDED, LOCKABLE, ADEQUATELY DRAINED ACCESS BOX INSTALLED IN THE KILGOUR STREET PAVEMENT OR SIDEWALK.

TENDON LOAD. AT EACH OF THE TWO TEST SECTIONS, AT CYLINDER PILES 31 AND 90, ONE PERMANENT LOAD CELL SHALL BE INSTALLED ON EACH TENDON IN THE TUNNEL TO MONITOR ITS LOAD WITHOUT DISTURBING THE TENDON. THE LOAD CELL SHALL CONSIST OF A HOLLOW CENTER CELL WHICH SEATS COAXIALLY WITH THE ANCHOR TENDON. EACH CELL SHALL BE A HYDRAULIC JACK-TYPE LOAD CELL AS MANUFACTURED BY V S L CORP. OR BE INSTRUMENTED WITH A MINIMUM OF FOUR FULL BRIDGE RESISTANCE GAGES OR FOUR VIBRATING WIRE STRAIN GAGES TO AVERAGE OUT ECCENTRIC LOADS ON THE CELL. WORKING CAPACITY OF THE CELL SHALL BE AT LEAST EQUAL TO THE YIELD LOAD OF THE TENDON. ULTIMATE LOAD CELL CAPACITY SHALL BE EQUAL TO 1.5 TIMES THE WORKING LOAD OF THE CELL OR AS OTHERWISE RECOMMENDED BY THE MANUFACTURER. THE COMBINED CELL AND READOUT UNIT SHALL BE SENSITIVE TO AT LEAST PLUS OR MINUS 0.25 PERCENT OF THE FULL LOADING CAPACITY. CELLS SHALL BE FULLY TEMPERATURE COMPENSATED OVER A RANCE OF 0 TO 150 DEGREES F. THE CELL, LEADS AND READOUT BOX SHALL BE DESIGNED FOR CONSTRUCTION USE, SUCH THAT THEY ARE WATER AND DUST PROOF, AND CORROSION AND SHOCK RESISTANT. THE CELL SHALL BE FITTED WITH A HEAVY DUTY CONNECTOR TO WHICH THE PORTABLE READOUT UNIT CAN BE CONNECTED. THE CELLS SHALL BE PROVIDED WITH CALIBRATION GRAPHS RELATING STRAIN TO LOAD FOR BOTH LOADING AND UNLOADING. THE LOAD CELL SHALL BE INSTALLED ON THE TENDON IN SUCH A MANNER THAT ALL LOAD IS REMOVED FROM IT DURING A LIFT-OFF TEST SO THAT THE LOAD CELL ZERO CAN BE CHECKED.

WALL LOADS. PILES 31 AND 90 SHALL EACH BE INSTRUMENTED WITH TEN CONTACT STRESS CELLS, EACH DESIGNED TO MEASURE THE STRESS AT THE SOIL/PILE AND ROCK/PILE INTERFACE. SUITABLE CELLS CONSIST OF A 9-INCH DIAMETER EARTH PRESSURE CELL, LIQUID FILLED AND WITH A VERY STIFF BACK PLATE. FLUID PRESSURE WITHIN THE CELL IS MEASURED BY A PNEUMATIC PRESSURE TRANSDUCER ATTACHED TO THE CELL AND MONITORED AT THE GROUND SURFACE WITH A PORTABLE READOUT SYSTEM. SUCCESSFUL OPERATION OF THESE CELLS DEMAND THAT THEY BE IN GOOD CONTACT WITH THE SOIL OR ROCK AFTER THE CONCRETE IS CAST AND CURED. IN ORDER TO ACHIEVE THIS GOOD CONTACT, THE CONTACT STRESS CELLS SHALL BE HELD AGAINST THE WALL OF THE EXCAVATION DURING BACKFILLING BY AN EXPENDABLE HYDRAULIC JACK REACTING AGAINST THE REINFORCEMENT AS SHOWN ON SHEET NO. 129 . FOR THE UPPER PORTION OF THE HOLE THE CELLS SHALL BE JACKED OUT AGAINST THE WALL AFTER WITHDRAWL OF THE CASING. THE DETAILED DESIGN OF THESE CONTACT STRESS CELLS AND THEIR INSTALLATION IS PROBLEMATIC AND THEY SHALL BE CUSTOM DESIGNED BY THE SLOPE INDICATOR COMPANY, SEATTLE, WASHINGTON, OR OTHER APPROVED INSTRUMENT MANUFACTURER, IN COORDINATION WITH SHANNON & WILSON, INC.

THE INSTALLATION OF THE CELLS WILL REQUIRE INTERRUPTION OF THE CONCRETE BACKFILLING OF THE CYLINDER PILES FOR A PERIOD OF UP TO ONE HOUR. PLYWOOD SHEETS SHALL BE LOWERED ON EITHER SIDE OF THE REINFORCEMENT WEB TO PROVIDE A WORKING PLATFORM FOR TWO MEN, ONE ON EITHER SIDE OF THE WEB. THE CONTACT STRESS CELL, MOUNTED ON THE END OF THE RETRACTED HYDRAULIC JACK, SHALL BE LOWERED DOWN AND ENGAGED ON A PRE-WELDED JIG ON THE OUTERFACE OF THE FLANGE. THE JACK LEADS AND CONTACT STRESS CELL LEADS SHALL BE CLIPPED TO THE REINFORCING BEAM AT 5-FOOT INTERVALS UP TO THE SURFACE. THE SOIL OR ROCK SURFACE SHALL BE PREPARED BY HAND AND GYPSUM PLASTER CONTAINED IN A FLAT BAG SUSPENDED IN FRONT OF THE CONTACT STRESS CELL WHICH SHALL THEN BE JACKED OUT TO SQUEEZE THE GYPSUM PLASTER INTO INTIMATE CONTACT WITH THE CELL AND THE SOIL OR ROCK. JACK PRESSURE SHALL BE MAINTAINED UNTIL THE CONCRETE BACKFILL HAS INITIALLY SET.

PROVIDING CASING IS NOT REQUIRED TO RETAIN THE SURROUNDING SOIL FROM CAVING INTO THE CYLINDER PILE EXCAVATION, A SAFETY CASING CAN BE SUSPENDED A FEW FEET ABOVE THE CONTACT STRESS CELL LOCATION TO PROVIDE WORKING ACCESS. IF CAVING OCCURS AN 18-TO 20-INCH WIDE OPEN-ENDED SLOT SHALL BE FORMED IN THE CASING EXTENDING 6-8 FEET UP FROM THE BOTTOM. THE CASING SHALL BE DRAWN UP TO EXPOSE THE UPPER 2 FEET OF THIS WINDOW WHILE 4-6 FEET OF CASING REMAINS SUBMERGED BELOW THE FLUID CONCRETE DURING STRESS CELL INSTALLATION.

THE LEADS FROM EACH OF THE TEN CONTACT STRESS CELLS SHALL BE COLLECTED TOGETHER AT THE TOP OF THE REINFORCING BEAM AND FED INTO A PROTECTIVE STEEL TUBE EXTENDING THROUGH THE CAPPING BEAM AND UP INTO AN ACCESS BOX INSTALLED IN THE KILGOUR STREET SIDEWALK. THIS BOX SHALL HAVE A WATERTIGHT LID AND A PANEL INSTALLED ON THE SIDE OF THE ACCESS BOX WITH EACH PAIR OF LEADS PERMANENTLY ATTACHED TO A QUICK DISCONNECT FITTING AND LABELED. READINGS SHALL BE OBTAINED WITH A PORTABLE PNEUMATIC PRESSURE INDICATOR INCORPORATING A NITROGEN SUPPLY TANK AND PRESSURE GAGE ACCURATE TO 0.25 PERCENT FULL SCALE. THE HYDRAULIC JACK LEADS SHALL BE CUT OFF AT THE SURFACE AND ABANDONED AFTER THE CONCRETE HAS CURED FOR A MINIMUM OF SEVEN DAYS.

REINFORCEMENT STRESSES. RESISTANCE STRAIN GAGES SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR ON THE STEEL BEAMS IN PILES 31 AND 90 TO CHECK THE STRESS IN THE STEEL AND THE VALIDITY OF DESIGN ASSUMPTIONS. GROUPS OF FOUR GAGES SHALL BE INSTALLED AT 5-FOOT INTERVALS ON THE INSIDE OF THE FLANGES ADJACENT TO THE WEB AS SHOWN ON SHEET NO. 129 . THEY SHALL BE INSTALLED ON THE STEEL BEAM AND ADEQUATELY WATERPROOFED AND PROTECTED PRIOR TO INSERTING THE BEAM INTO THE CYLINDER PILE EXCAVATION. THE CONTRACTOR SHALL, AT LEAST 30 DAYS PRIOR TO THEIR INSTALLATION SUBMIT FOR APPROVAL BY THE ENGINEER, THE DETAILED DESIGN OF THIS INSTALLATION. THE INSTALLATION SHALL BE PERFORMED BY A PERSON OR ORGANIZATION THOROUGHLY EXPERIENCED IN FIELD STRAIN GAGE INSTALLATION AND MONITORING IN SIMILAR SITUATIONS.

THE LOCATIONS OF THE GAGES WILL REQUIRE SOME ADJUSTMENT ADJACENT TO THE TENDON RECESS. THE ELECTRICAL LEADS SHALL BE CLIPPED TO THE WEB AT SUITABLE LOCATIONS TO AVOID DAMAGE BY THE CONCRETE TREMIE PIPE. THE LEADS SHALL BE COLLECTED TOGETHER AT THE TOP OF THE REINFORCING BEAM AND FED INTO A PROTECTIVE STEEL TUBE EXTENDING THROUGH THE CAPPING BEAM AND UP INTO AN ACCESS BOX INSTALLED IN THE KILGOUR STREET SIDEWALK. THIS BOX SHALL HAVE A WATERTIGHT LID AND THE LEADS CONNECTED INTO A WATERPROOF PANEL FIXED ON THE SIDE OF THE ACCESS BOX. THE ACCESS BASE SHALL BE ADEQUATELY DRAINED AND EACH LEAD SHALL BE PERMANENTLY LABELED. READINGS SHALL BE OBTAINED WITH A PORTABLE BATTERY-OPERATED STRAIN GAGE BRIDGE SUITABLE FOR USE UNDER FIELD CONDITIONS.

BASIS OF PAYMENT: PAYMENT WILL BE AT CONTRACT PRICE FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	LUMP SUM	OBSERVATION AND MONITORING

NOTES CONTINUED ON SHEET 118

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-28-79	9-19-80

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

118/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

NOTES (CONTINUED FROM SHEET 117)

CONSTRUCTION OBSERVATION AND MONITORING

IN ADDITION TO NORMAL EVALUATION OF CONSTRUCTION FOR COMPLIANCE WITH THE SPECIFICATIONS, ADDITIONAL OBSERVATION AND MONITORING WILL BE NECESSARY. THE CONTRACTOR SHALL PROVIDE ACCESS AND ASSISTANCE TO THE ENGINEER WHEN REQUESTED TO ENABLE THE ENGINEER TO ACCOMPLISH ALL OBSERVATION AND MONITORING TO THE ENGINEER'S SATISFACTION. THIS OBSERVATION AND MONITORING INCLUDES:

(a) PRECONSTRUCTION TESTING. IF THE CONTRACTOR ELECTS TO USE EITHER ROCK BOLTS OR SHOTCRETE FOR HIS TEMPORARY SUPPORT SYSTEM, HE SHALL PERFORM PRECONSTRUCTION TESTS AS DISCUSSED IN NOTES, ROCK REINFORCEMENT, SHEET NO. 121 AND SHOTCRETE, SHEET NO. 122. THE CONTRACTOR SHALL PERFORM PRECONSTRUCTION TESTS ON HIS FINAL SUPPORT SYSTEM MATERIALS. EITHER SHOTCRETE OR CONCRETE, AND ON THE CONCRETE MIX SELECTED FOR THE ANCHOR BLOCKS. ALL ON-SITE TESTING SHALL BE PERFORMED IN THE PRESENCE OF THE ENGINEER AND SUITABLE SAMPLES SHALL BE SUBMITTED TO THE ENGINEER FOR FURTHER TESTING, AS DIRECTED BY THE ENGINEER.

(b) MAPPING OF GEOLOGIC FEATURES OF ENGINEERING SIGNIFICANCE. THE SOIL AND ROCK SURFACES EXPOSED DURING EXCAVATION OF THE SHAFT AND TUNNEL SHALL BE OBSERVED FOR FEATURES WHICH MIGHT ALTER THE DESIGN ASSUMPTIONS AS WELL AS AID IN A BETTER UNDERSTANDING OF IN SITU TEST DATA AND INSTRUMENTATION DATA. GEOLOGIC OBSERVATIONS AND MAPPING SHALL INCLUDE EXCAVATION OF:

(1) THE SOIL AND ROCK MATERIALS ENCOUNTERED.
(2) THE SOIL-ROCK INTERFACE
(3) LIMESTONE LAYERS AND THEIR ACCOMPANYING SEEPAGE QUANTITIES.
(4) SOFT SEAMS OR ZONES IN THE ROCK WHICH MAY AFFECT PERFORMANCES.
(5) FRACTURES OR DISCONTINUITIES IN THE ROCK WHICH COULD AFFECT THE PERFORMANCE OF THE SHAFT, TUNNEL OR ANCHORAGE BLOCKS.

(e) OBSERVATION OF EXCAVATION AND SUPPORT TECHNIQUES. THE CONTRACTOR'S ACTIVITIES WILL BE OBSERVED WHERE QUANTITIES ARE TO BE MEASURED FOR PAYMENT; HOWEVER, NUMEROUS OTHER ASPECTS OF CONSTRUCTION WILL ALSO BE OBSERVED INCLUDING THE FOLLOWING:

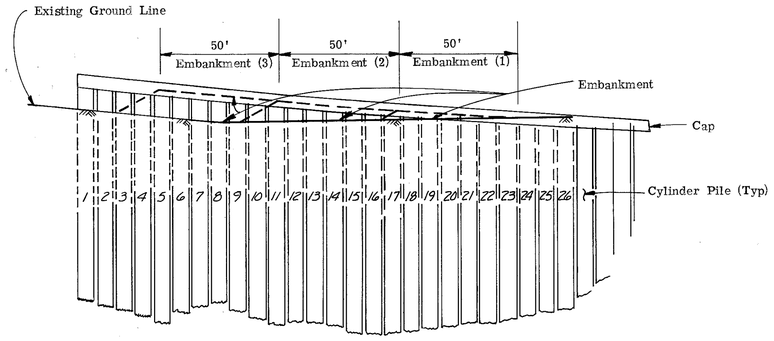
(1) METHODS EMPLOYED FOR SOIL AND ROCK EXCAVATION AND SUPPORT TO INHIBIT ADVERSE GROUND DETERIORATION AND MOVEMENT.
(2) METHODS USED TO DRAIN SEEPS TO PRECLUDE THE BUILDUP OF ADVERSE HYDROSTATIC PRESSURES AROUND THE LINER.
(3) PREPARATION OF THE SHAFT AND TUNNEL WALLS FOR OPTIMUM BONDING OF THE TEMPORARY AND PERMANENT LINER AND ANCHORAGE BLOCKS TO THE SOIL AND ROCK.
(4) TEMPORARY SUPPORT TECHNIQUES AND/OR GROUTING FOR THE ANCHOR BLOCKS TO ENSURE PROPER SEATING AND PRECLUDE DEBONDING OR SEPARATION FROM THE TUNNEL WALL UNTIL TIEBACK TENDONS ARE TENSIONED.
(5) EFFECTS OF TIEBACK ANCHOR BLOCK TENSIONING ON TUNNEL SUPPORT AND DEFORMATION.

DAMAGES TO EXISTING STRUCTURES

IF ANY EXISTING RETAINING WALLS OR STEPS THAT ARE TO REMAIN ARE DAMAGED BY THE CONTRACTOR DURING HIS CONSTRUCTION OF THE ACCESS SHAFT AND ACCESS SHAFT BUILDING, HE SHALL EITHER REPAIR OR RE-CONSTRUCT TO THE SATISFACTION OF THE ENGINEER, THE EXISTING DAMAGED STRUCTURE AT NO COST TO THE PROJECT.

EMBANKMENT

PLACEMENT OF EMBANKMENT AT WEST END OF CYLINDER PILES. EMBANKMENT SHALL BE PLACED IN 50-FOOT LENGTHS, WORKING FROM EAST END OF EMBANKMENT AND WORKING WEST. BEFORE A 50-FOOT LENGTH OF EMBANKMENT CAN BE ADVANCED, 50 FEET EAST OF ADVANCING EDGE MUST CONTAIN 2 CONSTRUCTED CYLINDER PILES (FILLED WITH CONCRETE TO BOTTOM OF CAP AND CURED) AND NEXT 50 FEET FURTHER EAST MUST CONTAIN 4 CONSTRUCTED CYLINDER PILES.



FOR EXAMPLE, BEFORE EMBANKMENT (3) CAN BE PLACED, EMBANKMENT (2) MUST CONTAIN 2 CONSTRUCTED CYLINDER PILES AND EMBANKMENT (1) MUST CONTAIN 4 CONSTRUCTED CYLINDER PILES.

REFERENCED SPECIFICATIONS

COPIES OF REFERENCED SPECIFICATIONS ARE AVAILABLE FOR INSPECTION BY PROSPECTIVE BIDDERS AT THE ENGINEERING DIVISION, ROOM 314, CITY HALL IN CINCINNATI.

SUMMARY GEOTECHNICAL REPORT I-471 MT. ADAMS

COPIES OF SHANNON & WILSON'S SUMMARY GEOTECHNICAL REPORT I-471 MT. ADAMS ARE AVAILABLE FOR INSPECTION BY PROSPECTIVE BIDDERS AT THE ENGINEERING DIVISION, ROOM 314, CITY HALL, IN CINCINNATI. THIS SUMMARY IS AVAILABLE FOR INFORMATION ONLY AND IS NOT A PART OF THE PLANS. INFORMATION SHOWN IN THIS SUMMARY WAS OBTAINED SOLELY FOR USE IN DEVELOPING THE DESIGN FOR THE PROJECT. NO WARRANTY IS MADE FOR THE ACCURACY OF THE DATA CONTAINED IN THE SUMMARY AND IT IS NOT TO BE CONSTRUED AS A PART OF THE PLANS GOVERNING CONSTRUCTION OF THE PROJECT.

FIELD AND LABORATORY INVESTIGATIONS

A REPORT OF FIELD AND LABORATORY INVESTIGATIONS FOR THIS PROJECT IS CONTAINED IN APPENDIX I TO THE SUMMARY GEOTECHNICAL REPORT. THIS APPENDIX IS PROVIDED FOR INFORMATION ONLY AND IS NOT A PART OF THE PLANS. NO WARRANTY IS MADE FOR THE ACCURACY OF BORINGS, TEST PITS, LABORATORY INVESTIGATIONS, ROCK ELEVATIONS, GROUND WATER, OR INTERPRETATIONS OF SUBSURFACE CONDITIONS, EVEN THOUGH THIS INFORMATION IS THE RESULT OF FIELD INVESTIGATIONS FOR THE EVALUATION OF SLOPE STABILIZATION MEASURES ON MT. ADAMS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, IF HE DEEMS IT NECESSARY, TO CONDUCT HIS OWN SUBSURFACE DRILLING PROGRAM TO VERIFY SOIL AND ROCK CONDITIONS.

STEEL RIB TUNNEL AND SHAFT INITIAL SUPPORT SYSTEM SPECIFICATIONS

DESCRIPTION. THIS SECTION INCLUDES SPECIFICATIONS FOR TUNNEL AND ACCESS SHAFT INITIAL SUPPORT SYSTEMS, IN ROCK USING STEEL RIBS, LAGGING AND BLOCKING.

DESIGN CRITERIA. STEEL RIBS, LAGGING AND BLOCKING SHALL HAVE SUFFICIENT CAPACITY TO SUPPORT THE GROUND SAFELY AND MAINTAIN THE SHAPE OF THE TUNNEL OR SHAFT WITHOUT ENCROACHING BEYOND THE TOLERANCES STATED HEREIN, UNTIL THE FINAL LINING IS COMPLETE AND READY TO ACCEPT LOADING.

SUBMITTALS. THE CONTRACTOR SHALL AT LEAST 30 DAYS PRIOR TO COMMENCING WORK SUBMIT TO THE ENGINEER FOR REVIEW WORKING DRAWINGS SHOWING INITIAL SUPPORT SYSTEMS FOR TUNNEL AND SHAFT, RIBS AND LAGGING, DETAILED METHOD OF CONSTRUCTION, AND DETAILED INSTALLATION PROCEDURES AND ALL NECESSARY CALCULATIONS FOR THE TUNNEL AND SHAFT INITIAL SUPPORT SYSTEM.

MATERIALS. STEEL FOR RIBS, BEAMS, CHANNELS, AND PLATES SHALL CONFORM TO ASTM A36.

TIMBER FOR BLOCKING, LAGGING, FOOT BLOCKS, AND CRIBBINGS SHALL BE SOUND, DENSE TIMBER OF RECTANGULAR CROSS SECTION, WITH AN ASTM D2555 MODULUS OF ELASTICITY NOT LESS THAN 1,200,000 psi.

INSTALLATION OF INITIAL SUPPORT.

(a) EXPANSION OF CIRCULAR RIBS:

(1) THE CONTRACTOR SHALL EXPAND THE RIBS IMMEDIATELY AFTER ADVANCING THE TUNNEL OR SHAFT.
(2) THE ENGINEER WILL MONITOR THE EXPANSION PROCESS ACCORDING TO APPROVED TEST PROCEDURES SUBMITTED WITH THE WORKING DRAWINGS.
(3) THE CONTRACTOR SHALL CONSTRUCT JOINTS BETWEEN SEGMENTS OF RIBS SO THAT FULL BEARING ACROSS THE JOINT IS MAINTAINED AFTER COMPLETE EXPANSION OF THE RIB. UPON COMPLETION OF EXPANSION, THE CONTRACTOR SHALL FILL THE KEY JOINT WITH STEEL WEDGES OR PLATES IN A MANNER THAT WILL NOT ALLOW RELAXATION OR INWARD MOVEMENT OF THE RIB.

(b) THE CONTRACTOR SHALL CONNECT STEEL RIBS POSITIVELY ONE TO ANOTHER BY BLOCKING OR BRACING AND BY TIE RODS SPACED AT NOT MORE THAN FOUR FEET CENTERS. THE CONTRACTOR SHALL MAINTAIN BRACING IN PLACE UNTIL ALL TENDENCY OF THE RIBS TO DISTORT HAS CEASED.

(c) THE CONTRACTOR SHALL PROVIDE AND INSTALL FOOT BLOCKS OF SUFFICIENT SIZE TO PREVENT RIB SETTLEMENT UNDER LOAD.

(d) LAGGING AND BLOCKING SHOULD BE INSTALLED WHERE NECESSARY TO PROVIDE A POSITIVE MEANS OF TRANSFERRING ROCK LOADS TO THE STEEL SETS.

NOTES CONTINUED ON SHEET 119

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-23-79	

N24103

NOTES (CONTINUED FROM SHEET 118)

TOLERANCES.

(a) STEEL RIB FABRICATION:

(1) CHORD, MEASURED ON CENTERLINE OF RIB SHALL BE THE THEORETICAL LENGTH PLUS OR MINUS 1/16-INCH.
(2) FACE OF BUTT OR FOOT PLATES SHALL BE WITHIN PLUS OR MINUS 1/16-INCH OF THEORETICAL PLANE.
(3) GAP BETWEEN ENDS OF RIBS AND BUTT OR FOOT PLATES PRIOR TO WELDING SHALL NOT EXCEED 1/16-INCH FOR AT LEAST 75 PERCENT OF THE CROSS SECTIONAL AREA OF THE RIB. GAPS IN EXCESS OF 1/16-INCH SHALL BE FILLED BY ADDITIONAL WELDING.
(4) TIE ROD HOLES IN RIB WEBS SHALL BE WITHIN PLUS OR MINUS 3/8-INCH OF LOCATIONS SHOWN ON APPROVED SHOP DRAWINGS.
(5) WIDTH OR LENGTH OF SHEARED PLATES SHALL BE WITHIN THE THEORETICAL DIMENSION PLUS OR MINUS 1/8-INCH.
(6) CENTER TO CENTER OF BOLT HOLE DIMENSIONS ON BUTT OR SPLICE PLATES SHALL HAVE THEORETICAL DIMENSION PLUS OR MINUS 1/16-INCH.
(7) BOLT HOLE GROUPS IN BUTT OR SPLICE PLATES AFTER FABRICATION SHALL BE WITHIN PLUS OR MINUS 1/16-INCH OF THE THEORETICAL LOCATION REGARDLESS OF THE VARIATIONS IN THE RIB RESULTING FROM OTHER TOLERANCES.
(8) HOLES IN INVERT STRUT PLATES WELDED TO RIBS SHALL BE WITHIN PLUS OR MINUS 1/16-INCH OF THE THEORETICAL LOCATION.

(b) STEEL RIB BENDING:

(1) CONFORMANCE TO TRUE TEMPLATES SHALL BE PLUS OR MINUS 3/8-INCH BETWEEN END PLATES AND PLUS OR MINUS 1/8-INCH IN THREE-FOOT GAGE DEPTH.
(2) BENDING CURVATURE SHALL BE UNIFORM.
(3) OUTER FLANGE SHALL BE PERMITTED TO DROOP 1/8-INCH MAXIMUM TOWARD THE INNER FLANGE FOR RADII OF BEND LESS THAN 14 TIMES THE RIB DEPTH.
(4) BUCKLING OF THE WEB FOR A DISTANCE OF 1/2 THE RIB DEPTH FROM EITHER END SHALL BE PERMITTED WITH DEVIATION FROM THE FLAT NO GREATER THAN PLUS OR MINUS 1/8-INCH FOR RADII OF BEND EQUAL TO 14 TIMES THE RIB DEPTH OR GREATER.
(5) BUCKLING OF THE WEB FOR A DISTANCE EQUAL TO THE DEPTH OF THE RIB FROM EITHER END SHALL BE PERMITTED WITH DEVIATION FROM THE FLAT NO GREATER THAN PLUS OR MINUS 3/16-INCH FOR RADII OF BEND LESS THAN 14 TIMES THE RIB DEPTH.
(6) RIB DEPTH AT THE WEB SHALL BE NOT LESS THAN THE THEORETICAL DEPTH MINUS 1/4-INCH.

(c) DURING CONSTRUCTION:

(1) NO PORTION OF THE LAGGING OR FOOTBLOCKS SHALL EXTEND INTO THE TUNNEL WITHIN THE TUNNEL NEAT LINE.
(2) NO PORTION OF THE STEEL RIB SETS, INCLUDING SECONDARY BRACING, SHALL EXTEND CLOSER THAN THREE INCHES TO THE THEORETICAL INSIDE FACE OF THE TUNNEL, AS SHOWN ON THE PLANS.

TEMPORARY TIMBER SUPPORTS. THE CONTRACTOR MAY, AT NO ADDITIONAL COST TO THE STATE AND WITH THE APPROVAL OF THE ENGINEER, INSTALL TEMPORARY TIMBER SUPPORTS WHICH DO NOT CONFORM TO THE CLEARANCE LINES OR DIMENSIONS SHOWN ON THE CONCRETE DRAWINGS. THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SUPPORTS FROM THE TUNNEL BEFORE PLACING THE FINAL LINING.

TUNNEL GROUTING SPECIFICATION

DESCRIPTION. THIS SECTION INCLUDES SPECIFICATIONS FOR TUNNEL GROUTING, GROUT, EQUIPMENT AND METHODS FOR PLACING THE GROUT.

SUBMITTALS. THE CONTRACTOR SHALL:

(a) MAINTAIN AND SUBMIT WEEKLY A LOG OF ALL DRILL HOLES, THE TIME OF EACH CHANGE OF GROUTING OPERATIONS, PRESSURES, RATES OF PUMPING, AMOUNT OF CEMENT FOR EACH CHANGE IN WATER-CEMENT RATIO, AND SUCH OTHER DATA AS ARE REQUIRED BY THE ENGINEER.

(b) SUBMIT DETAILS OF THE GROUT MIX TO THE ENGINEER FOR APPROVAL AT LEAST 30 DAYS PRIOR TO GROUTING.

GROUT. THE CONTRACTOR SHALL PROPORTION THE GROUT MIX AS INDICATED, APPROVED OR AS REQUIRED BY THE ENGINEER, BUT IN ANY CASE CONTAINING NOT MORE THAN THREE PARTS SAND TO ONE PART CEMENT BY WEIGHT, AND WITH A WATER-CEMENT RATIO OF APPROXIMATELY 0.4. WATER, PORTLAND CEMENT, AND SAND SHALL CONFORM TO THE APPLICABLE REQUIREMENTS FOR SUCH MATERIALS SET FORTH IN THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT THAT 100 PERCENT OF THE SAND SHALL PASS A NO. 8 SIEVE.

EQUIPMENT. THE CONTRACTOR SHALL:

(a) USE EQUIPMENT FOR MIXING AND INJECTING CONTACT GROUT WHICH IS DESIGNED FOR GROUTING SERVICE, AND MAINTAIN IT IN FIRST-CLASS OPERATING CONDITION AT ALL TIMES, CAPABLE OF SATISFACTORILY MIXING AND AGITATING THE GROUT AND FORCING IT INTO THE GROUT HOLES IN A CONTINUOUS FLOW AT THE REQUIRED PRESSURES.

(b) PROVIDE GROUT PLANT TO INCLUDE TWO AIR-DRIVEN, DUPLEX, DOUBLE-ACTING SLUSH PUMPS OF THE LONG-STROKE TYPE, WITH LARGE VALVE OPENINGS AND REMOVABLE VALVE SEATS, AND WITH LIQUID END LINERS CAPABLE OF DEVELOPING THE REQUIRED PRESSURE AT THE GROUT HOLE CONNECTION.

(c) USE HOSE FOR PRESSURE GROUTING HAVING AN INSIDE DIAMETER NOT LESS THAN 1-1/2 INCHES, AND CAPABLE OF WITHSTANDING THE MAXIMUM WATER AND GROUT PRESSURES TO BE USED.

(d) KEEP EQUIPMENT AND LINES CLEAN BY CONSTANT CIRCULATION OF GROUT AND BY PERIODIC FLUSHING WITH WATER.

(e) USE GROUTING EQUIPMENT OF SUCH A CONFIGURATION THAT FLUSHING CAN BE ACCOMPLISHED WITH THE GROUT INTAKE VALVES CLOSED, WITH THE WATER SUPPLY VALVE OPEN, AND WITH THE GROUT PUMP RUNNING AT FULL SPEED.

(f) USE A MIXER WITH CAPACITY OF NOT LESS THAN 20 CUBIC FEET, AND PROVIDED WITH AN ACCURATE METER READING IN CUBIC FEET TO THE NEAREST ONE-TENTH OF A CUBIC FOOT, FOR MEASURING THE AMOUNT OF MIXING WATER ADDED IN THE GROUT.

(g) IN ADDITION TO THE GROUT MIXER, PROVIDE MECHANICAL AGITATOR TANKS EQUIPPED WITH SUITABLE SCREENS.

(h) PROVIDE TWO PRESSURE GAGES, ONE AT THE GROUT PUMP AND THE OTHER ON THE MANIFOLD HOOKUP AT THE COLLAR OF THE HOLE BEING GROUTED. USE RANGES OF PRESSURE GAGES AS REQUIRED FOR EACH PART OF THE GROUTING PROGRAM.

(i) PROVIDE SUITABLE STOP VALVES AT THE COLLAR OF THE HOLE FOR USE IN MAINTAINING PRESSURE AS REQUIRED UNTIL THE GROUT HAS SET.

(j) PROVIDE THE GROUTING EQUIPMENT WITH MEANS OF ACCURATELY DETERMINING THE AMOUNT OF GROUT INJECTED.

(k) FURNISH AN ACCURATELY CALIBRATED, HIGH-PRECISION PRESSURE GAGE AND USE IT FOR PERIODIC CHECKING OF THE ACCURACY OF ALL GAGES USED IN THE GROUTING.

MIXING AND INJECTION OF GROUT.

(a) GENERAL.

(1) THE CONTRACTOR SHALL MIX AND INJECT, WITH THE APPLICATION OF PRESSURE, GROUT OF CEMENT AND WATER, WITH OR WITHOUT SAND, IN THE PROPORTIONS INDICATED, APPROVED OR AS REQUIRED BY THE ENGINEER. THE CONTRACTOR SHALL EXERCISE CARE NOT TO CONTINUE EXCESSIVE AIR PRESSURE AFTER GROUT HAS BEEN DISCHARGED FROM THE MIXER OR NOT TO EXCEED THE MAXIMUM PRESSURES DETERMINED BY THE ENGINEER.
(2) THE CONTRACTOR SHALL EXERCISE CARE TO PREVENT THE SETTING OF GROUT WHICH MAY ESCAPE UPON EXPOSED SURFACES, AND REMOVE SUCH GROUT AND RESTORE THE SURFACES TO THEIR ORIGINAL CONDITION.
(3) THE CONTRACTOR SHALL INJECT GROUT CONTINUOUSLY UNTIL COMPLETED UNLESS OTHERWISE EXPRESSLY INDICATED.
(4) THE CONTRACTOR SHALL OPERATE AND CONTROL GROUT PUMPS SO THAT THE GROUT IS DELIVERED UNIFORMLY AND STEADILY. THE CONTRACTOR SHALL GROUT PROGRESSIVELY FROM PIPE TO PIPE IN THE SEQUENCE REQUIRED OR APPROVED.
(5) THE CONTRACTOR SHALL GROUT IN PROGRESSION FROM LOWER TO HIGHER PIPES, NOT CONNECTING TO THE HIGHER PIPES UNTIL THE GROUT HAS COMPLETELY FILLED THE SPACE BELOW THE HIGHER PIPES. THE ESCAPE OF GROUT FROM THE UPPER HOLES WILL BE PERMITTED, TO INDICATE SATISFACTORY FILLING OF SPACES. THE CONTRACTOR SHALL WASTE SUCH ESCAPING GROUT UNTIL GROUT OF NORMAL CONSISTENCY APPEARS.
(6) GROUTING SHALL BE CONSIDERED TO BE COMPLETED WHEN NO MORE GROUT OF THE REQUIRED MIX AND CONSISTENCY CAN BE FORCED IN UNDER THE REQUIRED PRESSURE.

NOTES CONTINUED ON SHEET 120

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

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NOTES (CONTINUED FROM SHEET 119)

(b) CONTACT GROUTING FOR PRECAST ANCHOR BLOCKS. THE CONTRACTOR SHALL:

(1) PERFORM GROUTING IN TWO STAGES; PERFORM THE FIRST INJECTION AFTER PLACEMENT, ANCHORING AND SEALING OF THE ANCHOR BLOCK, AT A NOZZLE PRESSURE WHICH WILL NOT CAUSE MOVEMENT OF THE ROCK OR BLOCK, NOR DAMAGE TO THE BLOCK, BUT NOT EXCEED THE PRESSURE SPECIFIED (10 psi MAXIMUM). THE CONTRACTOR SHALL KEEP THE TOPMOST HOLE IN THE BLOCK OPEN AS AN AIR VENT.
(2) ASSIST THE ENGINEER IN CHECKING THE ADEQUACY OF THE FIRST STAGE GROUTING AND PERFORM A SECOND GROUTING TO FILL SOFT SPOTS OR VOIDS WHICH MAY BE DETECTED, NO LATER THAN 24 HOURS AFTER THE FIRST STAGE GROUTING. THE CONTRACTOR SHALL USE NOZZLE PRESSURES INDICATED OR SPECIFIED.
(3) EXERCISE CARE TO CONFINE THE GROUT IN SECTIONS, AND TO PREVENT ITS RETURN INTO THE TUNNEL, OR OTHERWISE BEING WASTED.
(4) REMOVE EACH GROUT PLUG AND CONNECT THE GROUT-MIXING MACHINE TO THE HOLE BY MEANS OF A HOSE AND NIPPLE CUT TO THE SAME THREAD AS THE SCREW PLUG.
(5) PLACE SUCH PIPES IN THE UPPER HOLES, AND ELSEWHERE, AS NECESSARY TO DETERMINE THE EXTENT OF PROGRESS OF THE GROUTING, AND TO SERVE AS VENTS.
(6) WHEN THE GROUTING IN A PORTION OF TUNNEL IS COMPLETED, CLEAN THE THREADS OF BOTH THE HOLES AND THE PLUGS, CAST THE PLUG THREADS WITH WHITE LEAD, AND REPLACE THE PLUGS IN THE HOLE FOR THEIR FULL LENGTH, SCREWED TIGHT.

(c) BACKFILL GROUTING FOR PRECAST TUNNEL LININGS. GROUTING SHALL BE COMPLETED BEHIND EACH SEGMENT AS IT IS BEING ERECTED.

CLEANUP. THE CONTRACTOR SHALL:

(a) DURING GROUTING WORK, PROVIDE FOR ADEQUATE DISPOSAL OF ALL WASTE AND WASTE WATER AND REMOVE ALL WASTE GROUT CAUSED BY GROUTING OPERATIONS.

(b) PRIOR TO FINAL ACCEPTANCE OF THE WORK, CLEAN THE INTERIOR SURFACE OF THE TUNNEL LINING AND RESTORE IT TO ITS ORIGINAL CONDITION, AS NEARLY AS PRACTICABLE, TO THE SATISFACTION OF THE ENGINEER.

CONCRETE LINING SPECIFICATIONS

DESCRIPTION. THIS SECTION INCLUDES SPECIFICATIONS FOR FURNISHING AND INSTALLING CAST-IN-PLACE CONCRETE LINING, INITIAL AND FINAL, FOR EARTH, AND ROCK, TUNNELS AND SHAFTS.

SUBMITTALS. PRIOR TO COMMENCING CONCRETE TUNNEL LINING WORK, THE CONTRACTOR SHALL AT LEAST 30 DAYS PRIOR TO COMMENCING WORK SUBMIT TO THE ENGINEER FOR APPROVAL THE TYPE OF EQUIPMENT TO BE USED FOR TRANSPORTING AND PLACING CONCRETE; THE SEQUENCE OF CONCRETE PLACEMENT FOR INVERT, WALLS, AND ROOF; THE METHOD OF CURING; AND THE LOCATION AND SPACING OF CONTROL AND CONSTRUCTION JOINTS FOR THE LINING.

MATERIALS. AGGREGATE SHALL HAVE 1-1/2 INCH MAXIMUM SIZE UNLESS A SMALLER MAXIMUM SIZE IS REQUIRED TO SUIT THE CONDITIONS OF PLACEMENT.

GROUT SHALL BE IN ACCORDANCE WITH THE TUNNEL GROUTING SPECIFICATION ON SHEET NO. 119. PORTLAND CEMENT SHALL BE IN ACCORDANCE WITH 511 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. CONCRETE REINFORCEMENT SHALL BE IN ACCORDANCE WITH 509 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. THE CONCRETE SHALL BE PROPORTIONED OF MATERIAL SPECIFIED IN 499.03 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, CLASS C, TO PROVIDE A MINIMUM CYLINDER STRENGTH OF 5000 psi IN 28 DAYS.

FORMWORK. THE CONTRACTOR SHALL:

(a) USE STEEL EXCEPT WHERE SPECIAL CONDITIONS MAKE THE USE OF STEEL FORMS IMPRACTICAL, IN WHICH CASE WOODEN FORMS MAY BE USED.

(b) REMOVE FORMS AS SOON AS THE CONCRETE HAS HARDENED SUFFICIENTLY TO ALLOW THEIR REMOVAL WITHOUT DAMAGE TO THE CONCRETE.

PLACEMENT OF CONCRETE. THE CONTRACTOR SHALL:

(a) INSTALL GROUT PIPES AS INDICATED OR AS REQUIRED.

(b) PRIOR TO PLACEMENT OF CONCRETE, REMOVE TIMBER BLOCKS OR WEDGES EXTENDING WITHIN THE CONCRETE NEAT DESIGN LINE BY SUCH MEANS AS TO NOT ENDANGER THE STABILITY OF THE INITIAL SUPPORT AND SURROUNDING GROUND.

(c) PLACE CONCRETE AS CLOSE AS POSSIBLE TO ITS FINAL POSITION, AND WORK INTO PLACE AND THOROUGHLY COMPACT AROUND REINFORCEMENT, PIPES, AND OTHER ITEMS BUILT INTO THE WORK. THE CONTRACTOR SHALL FORCE THE CONCRETE INTO CLOSE CONTACT WITH THE LAGGING AND STEEL RIB SUPPORTS.

(d) PLACE CONCRETE FOR LINING THE UPPER PORTION OF THE TUNNEL BY MECHANICAL OR PNEUMATIC METHODS THROUGH PIPES WHICH DISCHARGE AS NEARLY AS PRACTICABLE TO THE HIGHEST POINT OF THE STRUCTURE.

(e) FILL SPACES AROUND THE POSTS, RIBS AND LAGGING BEYOND THE LIMITS OF THE CONCRETE LINING COMPLETELY, USING MORTAR WHERE REQUIRED. THE CONTRACTOR SHALL FILL WITH GROUT THE SPACES WHICH CANNOT BE FILLED BY PRACTICABLE MEANS WITH CONCRETE OR MORTAR.

(f) FILL ENLARGEMENTS OF THE TUNNEL EXCAVATION BEYOND THE DIMENSIONS SHOWN EITHER WITH CONCRETE OR WITH GROUTED PREPACKING AT NO ADDITIONAL EXPENSE TO THE STATE, SUBJECT TO THE APPROVAL OF THE ENGINEER.

(g) CONSOLIDATE CONCRETE IN UNFORMED TUNNEL LINING INVERT BY ELECTRICALLY OR PNEUMATICALLY DRIVEN, IMMERSION-TYPE VIBRATORS, VIBRATING AT SPEEDS OF 6000 TO 7000 rpm. CONSOLIDATE CONCRETE IN THE SIDEWALLS AND ARCH OF TUNNEL LINING BY ELECTRICALLY OR PNEUMATICALLY DRIVEN FORM VIBRATORS SUPPLEMENTED WHERE PRACTICABLE BY IMMERSION TYPE VIBRATORS. THE CONTRACTOR SHALL RIGIDLY ATTACH FORM VIBRATORS TO THE FORMS AND OPERATE AT SPEEDS OF AT LEAST 8000 rpm WHEN VIBRATING CONCRETE.

(h) NOT PLACE CONCRETE IN WATER, OR ALLOW WATER TO RISE OVER CONCRETE UNTIL THE FINAL SET HAS BEEN OBTAINED.

TEST SPECIMENS. THE CONTRACTOR SHALL MAKE AND CURE A MINIMUM OF TWO TEST CYLINDERS FOR EACH 100-FOOT OF RUNNING TUNNEL, WITH NOT LESS THAN TWO TEST CYLINDERS PER DAY IN ACCORDANCE WITH 511 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. THESE CYLINDERS WILL BE TESTED BY THE STATE AND TEST RESULTS WILL BE FURNISHED TO THE CONTRACTOR.

FINISHING. TUNNEL, EXCEPT FLOOR, AND SHAFT SURFACES SHALL HAVE NO ADDITIONAL FINISHING AFTER REMOVAL OF FORMWORK, EXCEPT HONEYCOMBS SHALL BE CLEANED, DAMPENED AND COMPLETELY FILLED.

THE CONTRACTOR SHALL APPLY A COATING OF AN APPROVED EPOXY RESIN CONCRETE ADHESIVE TO CONCRETE SURFACES IMMEDIATELY BEFORE THE PLACEMENT OF DRY PACK ON CONCRETE FOR REPAIRS.

PRECAST CONCRETE SPECIFICATION

DESCRIPTION. THIS SECTION INCLUDES SPECIFICATIONS FOR PRECAST CONCRETE WORK FOR TUNNEL INITIAL AND FINAL SUPPORT, AND ANCHOR BLOCKS ALTERNATIVES.

GENERAL. INCIDENTALS SHALL BE IN ACCORDANCE WITH 515 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, EXCEPT AS MODIFIED HEREIN.

SUBMITTALS. THE CONTRACTOR SHALL AT LEAST 30 DAYS PRIOR TO COMMENCING WORK SUBMIT FOR APPROVAL SHOP DRAWINGS SHOWING UNIT DIMENSIONS AND SECTION DETAILS, FINISHES, REINFORCEMENT AND CONNECTION DETAILS, LIFTING AND ERECTION INSERTS, ALL OTHER EMBEDDED ITEMS INCLUDING RELATED MECHANICAL AND ELECTRICAL WORK, AND LAYOUT DIAGRAMS IDENTIFYING INSTALLATION LOCATIONS AND MEMBER IDENTIFICATION MARKS.

THE CONTRACTOR SHALL SUBMIT REPORTS OF COMPRESSIVE STRENGTH TESTS ON CONCRETE.

INSTALLATION SCHEDULE SHALL ACCOMPANY DELIVERED UNITS WITH A SCHEDULE INDICATING SEQUENCE OF INSTALLATION, JOINTS, SUPPORT AND BRACING AND ATTACHMENT SYSTEMS.

DELIVERY HANDLING AND STORAGE. THE CONTRACTOR SHALL DELIVER, HANDLE AND STORE PRECAST CONCRETE UNITS IN ACCORDANCE WITH 515 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS AND AS SPECIFIED HEREIN.

THE CONTRACTOR SHALL:

(a) LIFT AND SUPPORT UNITS ONLY AT DESIGNATED LIFTING AND SUPPORTING POINTS.

(b) TRANSPORT UNITS IN VERTICAL OR NEAR VERTICAL POSITION AND USE SUPPORTING SYSTEMS WHICH WILL RESULT IN THE LEAST AMOUNT OF DEFLECTION OR DISTORTION DURING DELIVERY, HANDLING AND STORAGE OF UNITS.

(c) NOT PLACE UNITS DIRECTLY ON EARTH. THE CONTRACTOR SHALL PROVIDE NON-STAINING RESILIENT SPACERS OF UNIFORM THICKNESS BETWEEN UNITS.

(d) PLACE STORED UNITS SO THAT IDENTIFICATION MARKS ARE DISCERNIBLE.

MATERIALS. CONCRETE SHALL BE IN ACCORDANCE WITH 515 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS AND AIR ENTRAINED. MINIMUM CYLINDER STRENGTH SHALL BE 5500 psi IN 28 DAYS.

NOTES CONTINUED ON SHEET 121

HAZELET & ERDAL
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NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

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NOTES (CONTINUED FROM SHEET 120)

REINFORCING STEEL SHALL BE IN ACCORDANCE WITH 509 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

FORMWORK SHALL BE IN ACCORDANCE WITH 515 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. THE CONTRACTOR SHALL USE CONTINUOUS MATERIAL TO PRODUCE UNITS WITHOUT VISIBLE JOINTS.

FORM RELEASE AGENT SHALL BE SYNTHETIC RESIN OR ORGANIC COMPOUNDS CONTAINING NO WAX, OIL, SILICATES, OR VARNISH AND SHALL BE COMPATIBLE WITH SPECIFIED COATINGS, SEALANTS AND ADHESIVES TO BE APPLIED.

FABRICATION OF TEST UNITS. THE CONTRACTOR SHALL:

(a) WHERE INDICATED, CAST TWO FULL SIZE TEST UNITS, USING THE FORMS AND CONCRETE MIX PROPORTIONS, ADMIXTURES, COLORS AND METHODS PROPOSED FOR PRODUCTION WORK.

(b) CAST TEST UNITS TO SIMULATE A PRODUCTION RUN, INCORPORATING REINFORCING AND EMBEDDED ITEMS AS INDICATED.

(c) MAINTAIN A COMPLETE RECORD OF PROPORTIONS, MIXING AND CONSOLIDATION AND CURING PROCEDURES DURING CASTING.

(d) PREPARE A SET OF FOUR TEST CYLINDERS DURING THE CASTING OF EACH TEST UNIT FOR COMPRESSIVE TESTS AS SPECIFIED IN 515.06 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. THE CONTRACTOR SHALL CURE THE TEST CYLINDERS IN THE SAME ENVIRONMENT AND AT THE SAME TIME AS THE TEST UNITS.

(e) CURE PRECAST CONCRETE ELEMENTS BY STEAM AS INDICATED IN 515.06 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

(f) IF THE STRENGTH, TEXTURE, FINISH OR WORKMANSHIP OF THE TEST UNITS DOES NOT MEET THE REQUIREMENTS AS DETERMINED BY THE ENGINEER, CAST ADDITIONAL UNITS UNTIL UNITS MEETING THE APPROVAL OF THE ENGINEER ARE OBTAINED.

FABRICATION OF PRODUCTION UNITS. WHEN THE TEST UNITS ARE APPROVED, THE CONTRACTOR SHALL PROCEED WITH THE FABRICATION OF PRODUCTION UNITS USING THE FORMS, MIX PROPORTIONS AND CONCRETE INGREDIENTS, CASTING, CONSOLIDATION, AND CURING METHODS, USED IN THE PREPARATION OF THE TEST UNITS. APPROVED TEST UNITS MAY BE FURNISHED FOR INSTALLATION. THE CONTRACTOR SHALL MAKE PATCHES OF THE SAME COLOR AND TEXTURE AS THE UNIT BEING PATCHED.

ERECTION. THE CONTRACTOR SHALL:

(a) FIT AND ALIGN PRECAST CONCRETE UNITS STRAIGHT, PLUMB, LEVEL, AND SQUARE USING THE FOLLOWING:

NONCUMULATIVE ERECTION TOLERANCES:

(1) JOINT DIMENSION. NOMINAL 3/8-INCH; TO VARY NOT MORE THAN +3/16-INCH OR -1/4-INCH.

(2) EDGE ALIGNMENT AND OFFSET. NOT TO EXCEED 1/4-INCH.

(b) ADJUST DIFFERENTIAL CAMBER BETWEEN UNITS TO WITHIN TOLERANCE BEFORE FINAL CONNECTION IS MADE.

(c) SET UNITS DRY, WITHOUT MORTAR, ATTAINING SPECIFIED JOINT DIMENSION WITH LEAD OR PLASTIC SPACERS.

CLEANING. THE CONTRACTOR SHALL CLEAN PRECAST UNITS WITH FRESH WATER AND MILD DETERGENT OR BY STEAM CLEANING. THE USE OF COMMERCIAL CLEANERS OR ACID SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

ROCK REINFORCEMENT SPECIFICATION

DESCRIPTION. THIS SECTION INCLUDES SPECIFICATIONS FOR ROCK REINFORCEMENT FOR INITIAL SUPPORT OF TUNNEL AND PORTION OF SHAFT IN ROCK BY MEANS OF ROCK BOLTS USED WITH ROCK SURFACE REINFORCEMENT.

SUBMITTALS. THE CONTRACTOR SHALL AT LEAST 30 DAYS PRIOR TO COMMENCING WORK SUBMIT FOR APPROVAL SHOP AND WORKING DRAWINGS SHOWING THE FOLLOWING INFORMATION:

(a) LOCATIONS, INSTALLATION PROCEDURES AND LAYOUTS OF ROCK BOLT AND OTHER REINFORCEMENT INSTALLATIONS, SHOWING SPACING, TYPE, SIZE, LENGTH, AND ANY SPECIAL ACCESSORIES; AND RELATIONSHIP TO ROCK DISCONTINUITIES.

(b) SEQUENCE AND TIMING OF INSTALLATION, AND DISTANCE FROM FACE OF HEADING.

DESIGN CRITERIA. THE CONTRACTOR SHALL DESIGN ROCK REINFORCEMENT TO HAVE SUFFICIENT CAPACITY TO SUPPORT THE GROUND SAFELY AND TO MAINTAIN THE SHAPE OF THE TUNNEL OR SHAFT WITHOUT ENCROACHING BEYOND THE TOLERANCES STATED HEREIN UNTIL THE FINAL LINING IS COMPLETE AND READY TO ACCEPT LOADING.

ROCK BOLT ASSEMBLIES.

(a) EACH ROCK BOLT ASSEMBLY SHALL BE ONE OF THE FOLLOWING TYPES:

(1) TYPE 1: MECHANICAL ANCHORED, TENSIONED AND FULLY GROUTED.
(2) TYPE 2: PERFORATED GROUT TUBE, UNTENSIONED TYPE.
(3) TYPE 3: RESIN ANCHORED, FULL LENGTH TENSIONED.
(4) TYPE 4: RESIN ANCHORED, FULL LENGTH UNTENSIONED.

(b) ROCK BOLT ASSEMBLIES SHALL CONSIST OF BOLT, BEARING PLATE, WASHERS AND NUTS AS REQUIRED; AND MECHANICAL ANCHOR, GROUT TUBE, OR RESIN CARTRIDGES AS APPROPRIATE.

(c) ROCK BOLTS SHALL HAVE A MINIMUM NOMINAL DIAMETER OF 5/8-INCH AND SHALL BE QUENCHED AND TEMPERED STEEL STUD BOLTS, CONFORMING TO ASTM A449.

THREADS ON THE EXPOSED END SHALL BE IN ACCORDANCE WITH ANSI B1.1 COARSE THREAD SERIES WITH CLASS 2A TOLERANCES.

THREADS ON THE EMBEDMENT END SHALL BE IN ACCORDANCE WITH ROCK BOLT MANUFACTURER'S STANDARD DESIGN FOR THE TYPE AND SIZE OF BOLT.

EXPOSED THREAD AFTER INSTALLATION SHALL HAVE A LENGTH OF 5-1/2 INCHES.

(d) BEARING PLATES SHALL BE ASTM A36 STEEL PLATE, SQUARE, 3/8-INCH THICK, WITH NOT LESS THAN 36 SQUARE INCHES OF BEARING SURFACE. BEARING PLATES SHALL BE PROVIDED WITH HOLES FOR INJECTION OF GROUT, FOR EFFECTIVE RELEASE OF AIR, AND FOR BOLT AS REQUIRED. BOLT HOLES SHALL BE PROVIDED WHICH ARE REAMED AND BEVELED ON THE ROCK SIDE AND LARGE ENOUGH TO PERMIT 30 DEGREE BOLT SKEW IN ALL DIRECTIONS FROM NORMAL CENTERLINE.

(e) WASHERS SHALL BE ASTM A325, 1/8-INCH THICK, TWO INCHES NOMINAL DIAMETER, WITH HOLE APPROXIMATELY 1/8-INCH LARGER THAN BOLT DIAMETER. ONE FLAT AND TWO BEVELED WASHERS SHALL BE PROVIDED WITH EACH ASSEMBLY.

(f) NUTS SHALL BE IN ACCORDANCE WITH ASTM A325.

(g) EXPANSION SHELLS FOR MECHANICAL ANCHORS SHALL BE MALLEABLE IRON CASTINGS OR FORGED STEEL, CAPABLE OF DEVELOPING THE GUARANTEED MINIMUM YIELD STRENGTH OF THE ROCK BOLT. BASE METAL FOR MALLEABLE IRON SHELLS SHALL BE ASTM A47, GRADE 32510.

(h) RESIN CARTRIDGES SHALL BE PROVIDED WITH A CASING CONSTRUCTED OF A SATURATED POLYESTER PROVIDING OPTIMUM RESISTANCE TO MOISTURE BUT EASILY RUPTURED TO ENABLE COMPLETE MIXING DURING INSTALLATION, AND CONTAINING TWO DISTINCT FRACTIONS OF UNSATURATED POLYESTER RESIN AND CATALYST WITHOUT AN INTERVENING MECHANICAL MEMBRANE. THE RESIN SHALL BE A HIGH STRENGTH POLYESTER WITH NON-REACTIVE INORGANIC FILLER. THE MATERIALS SHALL HAVE THIXOTROPIC AND VISCOUS PROPERTIES TO PERMIT ADEQUATE MIXING OF THE MATERIALS BY MANIPULATING THE BOLT AND TO PREVENT THE MIXTURE FROM RUNNING OUT OF THE HOLE AFTER MIXING. COMPRESSIVE STRENGTH OF THE MIXED AND CURED RESIN SHALL BE NOT LESS THAN 14,000 psi WHEN TESTED IN ACCORDANCE WITH ASTM C39. THE SHELF LIFE SHALL BE NOT LESS THAN SIX MONTHS. GEL AND CURE TIME SHALL PERMIT BOLT TENSIONING WITHIN 10 MINUTES AFTER COMPLETION OF INSTALLATION.

(i) APPLY AT THE FACTORY A HEAVY BILGE PROTECTION TYPE NON-CORROSIVE RUST INHIBITING GREASE TO THE ENTIRE SURFACE OF ALL UNGALVANIZED BOLTS, WASHERS, NUTS AND MECHANICAL ANCHORS.

ROCK SURFACE REINFORCEMENT. WIRE FABRIC SHALL BE IN ACCORDANCE WITH ASTM A185.

GROUT. GROUT SHALL BE IN ACCORDANCE WITH THE TUNNEL GROUTING SPECIFICATION ON SHEET NO. 119.

GENERAL REQUIREMENTS. AFTER EACH EXPOSURE OF THE FINAL ROCK SURFACE, EXAMINE THE SURFACE TO DETERMINE WHETHER THE ROCK BOLT PATTERN TO BE INSTALLED WILL BE ADEQUATE. THE CONTRACTOR SHALL PROVIDE ROCK REINFORCEMENT THAT IS ADEQUATE TO PROVIDE FOR THE SAFETY OF PERSONNEL, THE CONSTRUCTION OPERATIONS, AND ADJACENT PROPERTY.

FOR INSTALLATION OF SURFACE REINFORCEMENT AND ROCK BOLTS SIMULTANEOUSLY, THE CONTRACTOR SHALL PLACE THE REINFORCING MATERIALS OVER THE ROCK BOLTS BETWEEN THE ROCK SURFACE AND THE STEEL BEARING PLATE, AND TENSION THE BOLT TO DRAW THE REINFORCING MATERIALS UP TIGHTLY TO THE ROCK SURFACE. WHERE STEEL FABRIC IS USED, THE CONTRACTOR SHALL PROVIDE OVERLAPS OF 1-1/2 TIMES WIRE SPACING AT JOINTS.

WHERE SURFACE COVERING OR REINFORCEMENT IS PLACED AFTER INSTALLATION OF ROCK BOLTS, THE CONTRACTOR SHALL ATTACH THE MATERIALS TO THE PREVIOUSLY INSTALLED BOLTS BY THE USE OF AN ADDITIONAL STEEL PLATE AND NUT, OR BY APPROVED WELDING.

NOTES CONTINUED ON SHEET 122

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WJ	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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HAM. - 471 - 0.24
PART ONE

NOTES (CONTINUED FROM SHEET 121)

THE CONTRACTOR SHALL RETENSION OR REPLACE INSTALLED BOLTS WHICH BECOME LOOSE DURING OR AFTER ATTACHMENT OF THE SURFACE REINFORCEMENT.

THE CONTRACTOR SHALL FIRMLY SECURE SURFACE COVERING OF REINFORCEMENT SO THAT IT FOLLOWS CLOSELY THE APPROXIMATE CONTOUR OF THE ROCK.

FOR MECHANICALLY ANCHORED BOLTS, THE CONTRACTOR SHALL DRILL HOLES IN THE ROCK TO THE REQUIRED DEPTH AND DIAMETER TO GIVE THE OPTIMUM ANCHORAGE FOR THE TYPE OF ANCHOR BEING USED. THE CONTRACTOR SHALL GROUT AS SOON AS PRACTICABLE AS FACE OF HEADING ADVANCES.

THE CONTRACTOR SHALL INSTALL TENSIONED OR UNTENSIONED ROCK BOLTS WITHIN FIVE FEET OF THE HEADING, WITHIN EIGHT HOURS AFTER CONVENTIONAL EXCAVATION. WHEN EXCAVATING WITH TUNNELING MACHINES, THE CONTRACTOR SHALL INSTALL TENSIONED OR UNTENSIONED ROCK BOLTS AS CLOSE TO THE FACE AS THE MACHINE DESIGN WILL PERMIT, BUT NOT FARTHER THAN TEN FEET, IN THE EVENT THAT THE CONFIGURATION OF THE TBM RESTRICTS THE PLACEMENT OF BOLTS TO FURTHER THAN TEN FEET FROM THE TUNNEL HEADING THEN ONLY FULLY TENSIONED BOLTS WILL BE USED.

THE CONTRACTOR SHALL REMOVE PROTECTIVE GREASE FROM BOLTS, WASHERS AND NUTS, USING AN APPROVED NON-TOXIC SOLVENT. THE CONTRACTOR SHALL APPLY LUBRICANT TO THE EXPOSED END THREADS, BEING CAREFUL TO KEEP THE PORTION TO BE EMBEDDED FREE FROM ALL GREASE, LUBRICANT AND CONTAMINATION. THE CONTRACTOR SHALL AVOID DAMAGING THE THREADS DURING INSTALLATION.

THE CONTRACTOR SHALL SET ROCK BOLT BEARING PLATES AS NEARLY FLAT AGAINST THE ROCK FACE AS PRACTICABLE. THE CONTRACTOR SHALL APPLY LUBRICANT BETWEEN WASHER AND NUT AND SET THE BEARING SURFACE OF ALL NUTS FLAT AGAINST WASHER BY THE USE OF BEVELED WASHERS WHERE REQUIRED. IF NECESSARY FOR GOOD BEARING, THE CONTRACTOR SHALL ADJUST WASHER BEVEL BY GRINDING OR FILING IN THE FIELD.

PRIOR TO COVERING WITH SHOTCRETE, CONCRETE OR GROUT, THE CONTRACTOR SHALL REMOVE ALL LUBRICANT, USING AN APPROVED NON-TOXIC SOLVENT.

ROCK BOLT INSTALLATION.

(a) TYPE 1, MECHANICAL ANCHORED BOLTS. THE CONTRACTOR SHALL INSERT BOLT IN HOLE AND SET ANCHORAGE AT THE REQUIRED DEPTH, TENSION BOLT, PERFORM PULL TESTS, AND GROUT AS SPECIFIED HEREIN.

(b) TYPE 2, GROUT TUBE BOLTS. THE CONTRACTOR SHALL FILL THE SPLIT PERFORATED TUBE WITH GROUT AND INSERT TUBE INTO THE HOLE. THE CONTRACTOR SHALL INSERT THE BOLT INTO THE PERFORATED TUBE USING AN APPROVED ELECTRIC OR AIR HAMMER.

(c) TYPE 3 AND TYPE 4, RESIN ANCHORED BOLTS:

(1) THE CONTRACTOR SHALL INSERT THE NUMBER AND TYPE OF RESIN CARTRIDGES REQUIRED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR THE ANCHORAGE CONDITIONS, INTO THE DRILLED HOLE. AVOID PREMATURE RUPTURE OF THE CARTRIDGE SKIN.

(2) TO RUPTURE THE CARTRIDGE AND MIX THE RESIN, THE CONTRACTOR SHALL INSERT THE BOLT IN THE HOLE ROTATING IT AT A PENETRATION RATE OF APPROXIMATELY TWO INCHES PER SECOND THROUGH THE CARTRIDGE. THE CONTRACTOR SHALL ROTATE THE BOLT FOR FIVE TO TEN SECONDS AFTER THE BOLT REACHES THE BOTTOM OF THE HOLE OR FOR A MINIMUM OF 20 SECONDS TOTALLY, WHICHEVER IS LESS.

(3) FOR TENSIONED BOLTS, THE CONTRACTOR SHALL APPLY TENSION AFTER THE RECOMMENDED CURE TIME HAS ELAPSED, CONDUCT PULL TESTS, IF REQUIRED, AND GROUT AS SPECIFIED HEREIN.

TENSIONING ROCK BOLTS. THE CONTRACTOR SHALL TENSION ROCK BOLTS TO BETWEEN 60 AND 80 PERCENT OF THE BOLT GUARANTEED MINIMUM YIELD STRENGTH, AND TIGHTEN THE NUT TO RETAIN THE BOLT TENSION. FOR ROCK BOLTS TO BE PULL-TESTED, USE APPROVED HYDRAULIC JACKS; FOR ROUTINE TENSIONING, THE CONTRACTOR SHALL USE A TORQUE WRENCH.

IN THE EVENT THAT DUE TO THE NATURE OF THE ROCK, IT IS NOT POSSIBLE TO OBTAIN THE REQUIRED TENSION, THE CONTRACTOR SHALL ADVISE THE ENGINEER IMMEDIATELY SO THAT A MODIFIED PROCEDURE CAN BE DETERMINED.

AFTER TENSIONING OF THE BOLT HAS BEEN COMPLETED, THE CONTRACTOR SHALL NOT RELAX THE TENSION FOR ANY REASON.

THE CONTRACTOR SHALL REPLACE THE BOLTS WHICH WILL NOT TAKE THE REQUIRED TENSION WITHOUT ANCHORAGE SLIP.

PRIOR TO PLACING SHOTCRETE, CONCRETE LINING, OR GROUTING THE BOLT, THE CONTRACTOR SHALL CHECK AND RETENSION AS MAY BE NECESSARY.

IN PLACE PULL TESTS. THE CONTRACTOR SHALL:

(a) PERFORM TESTING IN THE PRESENCE OF THE ENGINEER TO CHECK THE GROUTING PROCEDURE AND THE GROUT OR RESIN STRENGTH.

(b) CONDUCT THE PULL TESTS AS REQUIRED BY THE ENGINEER ON BOLTS SELECTED AT RANDOM, TO INCLUDE AT LEAST TEN OF THE FIRST 100 OF EACH TYPE BOLT INSTALLED, AND AT LEAST ONE PERCENT OF ALL OTHER ROCK BOLTS.

(c) PROVIDE AND MAINTAIN IN GOOD WORKING CONDITION THE EQUIPMENT TO BE USED FOR PERFORMING PULL TESTS AND SHALL STORE EQUIPMENT IN THE ENGINEER'S OFFICE AND USE FOR NO OTHER PURPOSE.

(d) PROVIDE PULL TEST EQUIPMENT CONSISTING OF A SUITABLY SIZED HOLLOW RAM JACK, ADJUSTABLE BEARING TRUSS FOR ALIGNING THE DIRECTION OF PULL WITH THE CENTER-LINE OF THE BOLT, AN EXTENSION BAR FOR ATTACHING THE JACK TO THE BOLT, A HYDRAULIC PUMP WITH A GAGE CALIBRATED TO READ DIRECTLY IN POUNDS FOR THE RAM BEING USED, A DIAL GAGE WHICH READS IN INCREMENTS OF 0.001-INCH OVER A RANGE OF AT LEAST ONE-INCH, A MAGNETIC OR INDEPENDENT DIAL GAGE MOUNTING, AND ALL OTHER NECESSARY ACCESSORIES.

(e) CALIBRATE THE PUMP GAGE WHILE CONNECTED TO THE JACK BY AN UNIAXIAL TESTING MACHINE BEFORE PERFORMING PULL TESTS AND AT SUBSEQUENT TIMES AS REQUIRED BY THE ENGINEER DURING THE COURSE OF CONSTRUCTION.

(f) KEEP IN STOCK, OR HAVE READY ACCESS TO, SPARE PARTS FOR THE TESTING EQUIPMENT, SO THAT THE WORK WILL NOT BE DELAYED.

(g) TEST ROCK BOLTS NOT EARLIER THAN 24 HOURS, NOR LATER THAN 72 HOURS AFTER INSTALLATION.

(h) TEST ROCK BOLTS TO AT LEAST 80 PERCENT OF THE MINIMUM SPECIFIED YIELD STRENGTH.

(i) REPLACE TESTED BOLTS THAT FAIL OR PULL OUT WITH BOLTS MEETING THESE TESTING REQUIREMENTS.

(j) PERFORM FURTHER TESTING, UP TO A MAXIMUM OF FIVE ROCK BOLTS, IN THE VICINITY OF ANY FAILED BOLT AS REQUIRED BY THE ENGINEER.

FOR TEST PURPOSES, THE BOLT WILL BE CONSIDERED TO HAVE FAILED IF ANY OUTWARD MOVEMENT OF THE BOLT ANCHORAGE OCCURS AND CONTINUES TO OCCUR AT A SUSTAINED LOADING BELOW THE REQUIRED TEST TENSION.

GROUTING OF ROCK BOLTS. THE CONTRACTOR SHALL:

(a) PACK OR SEAL HOLES IN BEARING PLATE AND BETWEEN BEARING PLATE AND THE ROCK OR SHOTCRETE SURFACE SO THAT THE GROUT WILL BE RETAINED IN THE HOLE.

(b) INJECT THE GROUT INTO THE LOWEST POINT OF THE HOLE AT A PRESSURE NOT GREATER THAN IS REQUIRED TO FILL THE HOLE ADEQUATELY.

(c) CONTINUE INJECTING GROUT UNTIL THERE IS A FULL RETURN OF GROUT THROUGH THE AIR VENT.

(d) CONTINUE THE INJECTION OF THE GROUT UNTIL THE ANCHORAGE AND BOLT ARE ADEQUATELY GROUTED.

(e) COMPLETE GROUTING AS SOON AS PRACTICABLE.

IF DURING THE GROUTING OF BOLT, THE GROUT IS FOUND TO FLOW FROM POINTS IN THE ADJACENT ROCK SURFACE, PLUG OR CAULK THE LEAKS UNTIL THE LEAKAGE IS STOPPED.

SHOTCRETE SPECIFICATIONS

DESCRIPTION. THIS SECTION INCLUDES SPECIFICATIONS FOR FURNISHING AND APPLYING SHOTCRETE LINING, INITIAL AND FINAL, FOR ROCK TUNNELS, SHAFTS AND OTHER LOCATIONS SUCH AS CYLINDER PILE WALLS.

DEFINITION. SHOTCRETE IS DEFINED AS A PORTLAND CEMENT CONCRETE MIXTURE APPLIED FROM A SPRAY NOZZLE BY MEANS OF COMPRESSED AIR WITH WATER ADDED AT THE NOZZLE, AND CONTAINING AN APPROVED ADMIXTURE SUITABLE TO ATTAIN QUICK SET AND HIGH EARLY STRENGTH AS SPECIFIED HEREIN.

QUALITY ASSURANCE.

(a) DESIGN MIX.

(1) THE CONTRACTOR SHALL DEVELOP THE SHOTCRETE MIX BY LABORATORY TESTS AND FIELD TRIALS AS INDICATED HEREIN AT LEAST 60 DAYS PRIOR TO THE ACTUAL APPLICATION OF SHOTCRETE.

(2) LABORATORY TRIAL MIXES SHALL HAVE THE SAME INGREDIENTS THAT ARE PROPOSED FOR USE IN THE WORK.

NOTES CONTINUED ON SHEET 123

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+ 34.67 W TO STA. 15+ 09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
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NOTES (CONTINUED FROM SHEET 122)

(3) TO ASCERTAIN THE COMPATIBILITY OF THE INGREDIENTS AND THEIR OPTIMUM PROPORTIONS, THE CONTRACTOR SHALL DEVELOP A SHOTCRETE MIX HAVING THE SAME STRENGTH AND CHARACTERISTICS AS REQUIRED FOR ACTUAL APPLICATION. THE CONTRACTOR SHALL USE AT LEAST THE TWO AGGREGATE GRADATIONS AS SPECIFIED HEREINAFTER FOR THE DEVELOPMENT OF SHOTCRETE MIXES IN ORDER TO COVER THE RANGE OF CONDITIONS EXPECTED TO BE ENCOUNTERED.
(4) PROPORTIONS OF SHOTCRETE DRY MIXES SHALL BE EQUIVALENT TO THOSE OF A CONCRETE MIX HAVING 6.5 BAGS OF CEMENT PER CUBIC YARD AND A WATER-CEMENT RATIO OF NOT MORE THAN 0.45 BY WEIGHT.
(5) PROPORTION OF ADMIXTURE SHALL NOT EXCEED SIX PERCENT OF THE CEMENT DRY WEIGHT AS SPECIFIED IN THE APPROVED MIX DESIGN.
(6) SHOTCRETE THAT HAS NOT BEEN APPROVED BY THE ENGINEER SHALL NOT BE USED IN PERMANENT WORK.
(7) THE EXACT PROPORTIONS OF INGREDIENTS AS DETERMINED ON THE BASIS OF TRIAL MIXES SHALL BE USED IN THE ACTUAL APPLICATION OF CONCRETE AND SHALL NOT BE VARIED.

(b) ACCELERATING ADMIXTURES.

(1) THE CONTRACTOR SHALL USE AN APPROVED ACCELERATING ADMIXTURE TO DEVELOP QUICK SET AND HIGH EARLY STRENGTH, AS FOLLOWS:

TIME OF INITIAL SETTING:	3 MINUTES MAXIMUM
TIME OF FINAL SETTING :	12 MINUTES MAXIMUM
COMPRESSIVE STRENGTH IN 8 HOURS :	600 psi MINIMUM

(2) TIME OF SETTING SHALL BE DETERMINED IN ACCORDANCE WITH ASTM C266 MODIFIED AS FOLLOWS:

ADD ACCELERATOR OF 50 GRAMS OF CEMENT IN THE PREPARATION OF THE PASTE, TOGETHER WITH WATER TO PRODUCE THE DESIRED WATER-CEMENT RATIO IN VARYING PERCENTAGES EXPECTED TO BE USED IN ACTUAL SHOTCRETE APPLICATION.

USE THE MINIMUM POSSIBLE TIME INTERVAL TO ATTAIN THE PROPER MIXING WITHOUT DISTURBING INITIAL SET OF THE PASTE.

(3) THE COMPRESSIVE STRENGTH SHALL BE DETERMINED IN ACCORDANCE WITH ASTM C109, EXCEPT THAT THE ACCELERATOR IN VARYING PERCENTAGES EXPECTED TO BE USED IN THE SHOTCRETE MIX DESIGN SHALL BE ADDED TO THE PREPARED MORTAR HAVING A WATER-CEMENT RATIO NOT OVER 0.45. IN ORDER TO ACCOMPLISH THE MOLDING OF A SPECIMEN WITHOUT DISTURBING THE INITIAL SETTING OF THE MORTAR, THE INTERVALS OF TIME SPECIFIED NEED NOT BE OBSERVED.

(c) LABORATORY TESTS. 3-INCH TESTING CUBES AND 3-INCH BY 3-INCH BY 12-INCH TESTING BEAMS SHALL BE MADE FOR EACH TYPE OF SHOTCRETE MIX SPECIFIED AND DEVELOPED. SUFFICIENT TEST SPECIMENS SHALL BE FURNISHED TO HAVE LABORATORY TESTS MADE FOR COMPRESSIVE AND FLEXURAL STRENGTH AT INTERVALS OF 8 HOURS, 72 HOURS, AND 28 DAYS. THESE LABORATORY TRIAL TESTS SHALL BE PERFORMED AT NO ADDITIONAL COST TO THE STATE.

(d) FIELD TRIALS.

(1) FIELD TRIALS SHALL BE MADE USING SELECTED LABORATORY MIXES TO DEMONSTRATE CAPABILITY OF EQUIPMENT, WORKMANSHIP, AND MATERIAL UNDER FIELD CONDITIONS AT LEAST 30 DAYS PRIOR TO APPLICATION OF SHOTCRETE IN THE PERMANENT WORK.
(2) FOR EACH MIX SELECTED, AT LEAST ONE HORIZONTAL AND ONE VERTICAL TEST PANEL SHALL BE MADE, TO SIMULATE CONSTRUCTION CONDITIONS, ON WOOD FORMS MEASURING 36 INCHES BY 36 INCHES BY 3 INCHES THICK. THE PANELS SHALL BE CURED IN ACCORDANCE WITH ASTM C31.
(3) SPECIMENS SHALL BE OBTAINED FROM TEST PANEL BY NEATLY BORING 3-INCH DIAMETER CORES OR SAWING 3-INCH CUBES AS WELL AS 3-INCH BY 3-INCH BY 12-INCH BEAMS FROM THE TEST PANELS.
(4) SPECIMENS SHALL BE PREPARED AND TESTED IN ACCORDANCE WITH ASTM C42 AND ASTM C78. ALL TESTS OF SPECIMENS OBTAINED DURING FIELD TRIALS SHALL BE PERFORMED BY THE STATE.

(e) REQUIRED STRENGTHS.

(1) MINIMUM COMPRESSIVE STRENGTH AS DETERMINED BY APPLYING THE LOAD NORMAL TO THE DIRECTION IN WHICH THE MATERIAL WAS SHOT SHALL BE:

600 psi AT 8 HOURS
2,500 psi AT 72 HOURS
5,000 psi AT 28 DAYS

(2) MINIMUM FLEXURAL STRENGTH OF BEAMS SHALL BE 750 psi AT 28 DAYS.

SUBMITTALS.

(a) LABORATORY TESTS AND REPORTS.

(1) PRIOR TO MAKING LABORATORY TESTS, THE CONTRACTOR SHALL SUBMIT A DETAILED PLAN SHOWING THE METHODS, MATERIALS AND PROPORTIONS TO BE USED IN SUCH TESTS.
(2) THE CONTRACTOR SHALL FURNISH A COMPLETE REPORT OF TEST RESULTS TO THE ENGINEER, TOGETHER WITH CERTIFICATION THAT THE MATERIALS CONFORM TO THESE SPECIFICATIONS.

(b) FIELD TRIAL SAMPLES AND REPORTS.

(1) THE CONTRACTOR SHALL SUBMIT 12 TEST SPECIMENS FOR EACH FIELD TRIAL MIX THAT IS PROPOSED FOR USE IN THE WORK TOGETHER WITH ALL THE RELEVANT DATA WHICH DEMONSTRATES CONFORMANCE TO THESE SPECIFICATIONS IN ALL RESPECTS.
(2) THESE SPECIMENS WILL BE TESTED BY THE ENGINEER TO VERIFY CONFORMANCE WITH THESE SPECIFICATIONS.

MATERIALS.

(a) PORTLAND CEMENT SHALL BE ASTM C150, TYPE II. TYPE III PORTLAND CEMENT MAY BE USED IF APPROVED BY THE ENGINEER, AT NO ADDITIONAL COST TO THE STATE.

(b) AGGREGATE SHALL BE ASTM C33 WITH THE FOLLOWING ADDITIONAL REQUIREMENTS:

(1) GRADATIONS OF THE COMBINED COARSE AND FINE AGGREGATE MIXTURE SHALL BE WITHIN THE FOLLOWING LIMITS:

U.S. STANDARD SIEVE SIZE	PERCENT PASSING, BY WEIGHT GRADATION NO. 1	GRADATION NO. 2
1-INCH	100.	-
3/4-INCH	90 - 100	-
1/2-INCH	75 - 95	100
3/8-INCH	65 - 88	95 - 100
NO. 4	48 - 74	72 - 85
NO. 8	34 - 57	52 - 73
NO. 16	22 - 44	36 - 55
NO. 30	12 - 31	20 - 38
NO. 50	5 - 20	7 - 20
NO. 100	2 - 10	2 - 12
NO. 200	0 - 5	0 - 5

(2) THE MAXIMUM SIZE OF THE AGGREGATES MAY BE VARIED SUBJECT TO THE APPROVAL OF THE ENGINEER.
(3) SPECIFIC GRAVITY OF AGGREGATE SHALL BE BETWEEN 2.55 AND 2.65.

(c) WATER SHALL BE CLEAN AND POTABLE.

(d) ADMIXTURE SHALL BE ASTM C494, TYPE C, WITH THE FOLLOWING ADDITIONAL REQUIREMENTS:

(1) ACCELERATING TYPE SHALL CONTAIN NO WATER-SOLUBLE CHLORIDES OR MATERIALS CORROSIVE TO STEEL NOR ENTAILING OTHER DETRIMENTAL EFFECTS SUCH AS CRACKING OR SPALLING.
(2) ADMIXTURE SHALL HAVE A FIVE YEAR MINIMUM HISTORY OF SATISFACTORY PERFORMANCE IN SIMILAR APPLICATIONS.

(e) THICKNESS PINS SHALL BE NONCORROSIVE THICKNESS INDICATION PINS DESIGNED NOT TO CAUSE INFILTRATION OF WATER THROUGH SHOTCRETE.

EQUIPMENT.

(a) AGGREGATE AND CEMENT SHALL BE PROPORTIONED ON A WEIGHT BASIS BY A SUITABLE BATCHING FACILITY. THE BATCHING FACILITY AND PROPORTIONING DEVICES SHALL BE CAPABLE OF PROVIDING THE EXACT REQUIRED INGREDIENTS IN PROPORTIONS AS DETERMINED BY TESTS AND APPROVED BY THE ENGINEER.

(b) PLACING EQUIPMENT.

(1) PLACING EQUIPMENT SHALL CONSIST OF A SPRAY NOZZLE PROVIDING FOR EJECTION OF DRY MATERIALS AND WATER IN AN INTIMATE MIXTURE, SEPARATE HOSES TO DELIVER DRY MATERIALS AND WATER TO THE NOZZLE, A SUITABLE MACHINE TO INTRODUCE THE DRY MATERIALS TO THE DELIVERY HOSE UNDER AIR PRESSURE, AND AIR AND WATER SUPPLY SYSTEM.

NOTES CONTINUED ON SHEET 124

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

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NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
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NOTES (CONTINUED FROM SHEET 123)

(2) EQUIPMENT SHALL ENABLE THE NOZZLEMAN TO USE AIR AND WATER IN ANY COMBINATION TO PREPARE SURFACES ON WHICH SHOTCRETE WILL BE APPLIED. A SEPARATE AIR HOSE AND BLOW PIPE SHALL BE AVAILABLE TO REMOVE DUST AND REBOUND DURING SHOTCRETE APPLICATION.

(3) EQUIPMENT SHALL ALLOW APPLICATION OF SHOTCRETE TO SURFACES AT AN APPROXIMATE RANGE OF 3-1/2 FEET FROM THE NOZZLE.

(c) WATER SUPPLY SYSTEM SHALL HAVE A LOCAL RESERVOIR AND A POSITIVE DISPLACEMENT PUMP CAPABLE OF SUPPLYING WATER THROUGH A REGULATING VALVE, EASILY AND ACCURATELY CONTROLLED BY A NOZZLEMAN, IN SUFFICIENT AMOUNT AND AT PRESSURE SLIGHTLY ABOVE THE OPERATING AIR PRESSURE RECOMMENDED BY THE MANUFACTURER OF THE DELIVERY MACHINE.

(d) AIR SUPPLY SYSTEM SHALL BE CAPABLE OF SUPPLYING THE DELIVERY MACHINE AND HOSE WITH AIR AT THE PRESSURES AND VOLUMES RECOMMENDED BY THE MANUFACTURER OF THE MACHINE. NO AIR SUPPLY SYSTEM SHALL BE USED THAT DELIVERS AIR CONTAMINATED BY OIL, OR THAT IS INCAPABLE OF MAINTAINING CONSTANT PRESSURE.

(e) DELIVERY EQUIPMENT SHALL CONSIST OF AN APPROVED MACHINE HAVING AN ACCEPTABLE PERFORMANCE RECORD IN APPLYING COARSE AGGREGATE SHOTCRETE. DELIVERY MACHINE SHALL BE CAPABLE OF INTRODUCING DRY MATERIALS TO THE DELIVERY HOSE AT A UNIFORM RATE, WITH EJECTION FROM THE NOZZLE AT VELOCITIES THAT WILL AFFORD ADHERENCE OF MATERIAL TO THE SURFACE TO BE TREATED WITH A MINIMUM REBOUND AND MAXIMUM ADHERENCE AND DENSITY.

PREPARATION. SURFACES THAT ARE TO RECEIVE SHOTCRETE SHALL BE CLEANED OF LOOSE MATERIAL, MUD AND OTHER FOREIGN MATTER. THE CONTRACTOR SHALL MAINTAIN THE SURFACES MOIST FROM THE TIME CLEANING IS COMPLETED UNTIL SHOTCRETE IS APPLIED.

PRIOR TO APPLICATION OF SHOTCRETE, THE CONTRACTOR SHALL INSTALL THICKNESS MEASURING PINS ON FIVE-FOOT CENTERS IN EACH DIRECTION.

THE CONTRACTOR SHALL CONTROL GROUND WATER FLOWS AND SEEPAGE IN SUCH A MANNER THAT EFFECTS DETRIMENTAL TO THE INSTALLATION ARE ELIMINATED. THE CONTRACTOR SHALL DRAIN SUCH WATER BY PIPES, CHASES, OR OTHER APPROPRIATE METHODS APPROVED BY THE ENGINEER.

MIXING CONTROLS. THE MOISTURE CONTENT OF THE COMBINED AGGREGATE AT THE TIME OF MIXING WITH CEMENT SHALL BE IN THE RANGE OF THREE TO SIX PERCENT OF THE OVEN-DRY WEIGHT OF THE AGGREGATE.

THE ACCELERATOR SHALL BE ADDED IN ACCORDANCE WITH ASTM C494.

SHOTCRETE APPLICATION. MIXED MATERIALS SHALL BE APPLIED WITHIN THE SPECIFIED TIME LIMIT DETERMINED FROM THE TRIAL MIXES.

SHOTCRETE SHALL BE BUILT UP TO INDICATED THICKNESS WITH INDIVIDUAL LAYERS NOT MORE THAN TWO INCHES THICK. EACH COAT SHALL BE SO PLACED THAT IT WILL NOT SAG OR DECREASE THE BOND OF THE PRECEDING COAT.

NOZZLE SHALL BE HELD AT A CONSISTENT PREDETERMINED DISTANCE AND POSITION FROM SURFACE TO BE TREATED SO THAT THE STREAM OF FLOWING MATERIAL IS APPLIED AS NEARLY AS POSSIBLE AT RIGHT ANGLES TO THE SURFACE. NOZZLE SHALL BE HELD STEADY AND SHOTCRETE APPLIED WITH A UNIFORM CONSISTENCY IN ORDER TO MAXIMIZE BINDING, COHESION AND DENSITY, MINIMIZE REBOUND AND SEGREGATION, AND PREVENT SAGGING OF THE APPLIED SHOTCRETE.

NOZZLEMEN SHALL HAVE HAD PREVIOUS EXPERIENCE IN THE APPLICATION OF COARSE AGGREGATE SHOTCRETE ON AT LEAST TWO PROJECTS OF COMPARABLE NATURE, OR SHALL WORK UNDER THE IMMEDIATE SUPERVISION OF A FOREMAN OR INSTRUCTOR WITH AT LEAST FIVE YEARS OF SUCH EXPERIENCE. EACH CREW SHALL DEMONSTRATE, TO THE SATISFACTION OF THE ENGINEER, ACCEPTABLE PROFICIENCY IN THE APPLICATION OF SHOTCRETE TO VERTICAL AND OVERHEAD TEST PANELS BEFORE BEGINNING PRODUCTION WORK.

TUNNEL WORK APPLICATION. SHOTCRETE TUNNEL LININGS SHALL BE APPLIED IN TWO OR MORE LAYERS. FIRST APPLICATION SHALL BE APPLIED WHENEVER SURFACE IS READY TO BE LINED. SUCCEEDING LAYERS SHALL BE APPLIED NOT LESS THAN EIGHT HOURS, NOR MORE THAN 24 HOURS, AFTER THE APPLICATION OF A PRECEDING LAYER. THE ENGINEER RESERVES THE RIGHT TO EXTEND THE SAME SEQUENCE OF OPERATIONS IN SHAFTS. THE TOTAL THICKNESS OF SHOTCRETE LAYERS APPLIED ON ANY SURFACE SHALL NOT EXCEED THE INDICATED TOTAL THICKNESS BY MORE THAN ONE-INCH.

ROCK BOLTS, REINFORCEMENT AND OTHER DIRECT SUPPORTS SHALL BE INSTALLED AFTER THE FIRST LAYER HAS BEEN APPLIED.

ALL LAITANCE, LOOSE MATERIAL AND REBOUND SHALL BE REMOVED. THE SURFACE LAYER SHALL BE TESTED BY SOUNDING WITH A HAMMER FOR VOIDS, REBOUND OR AGGREGATE POCKETS AND UNBONDED AREAS BEFORE APPLICATION OF THE NEXT LAYER, AND ALL IMPERFECTIONS SHALL BE CORRECTED BY THE CONTRACTOR BEFORE PLACING NEXT LAYER.

CYLINDER PILE APPLICATION. A SUFFICIENT NUMBER OF COATS SHALL BE APPLIED TO OBTAIN THE REQUIRED THICKNESS OF 8 INCHES. WHERE A SUCCESSIVE COAT IS APPLIED ON SHOTCRETE WHICH HAS SET MORE THAN 2 HOURS THE SURFACE SHALL BE WATER BLASTED.

U-SHAPED BARS INSTALLED IN CONJUNCTION WITH SHOTCRETE BETWEEN CYLINDER PILES SHALL BE DRIVEN INTO EARTH IN ADVANCE OF FIRST LAYER OF SHOTCRETE. BACK LAYER OF VERTICAL REINFORCING BARS SHALL BE INSTALLED AFTER THE FIRST LAYER OF SHOTCRETE HAS BEEN APPLIED. FRONT LAYER OF VERTICAL REINFORCING BARS SHALL BE INSTALLED IMMEDIATELY BEFORE THE FINAL LAYER OR ADJACENT LAYER OF SHOTCRETE.

ALL LAITANCE, LOOSE MATERIAL AND REBOUND SHALL BE REMOVED. THE SURFACE LAYER SHALL BE TESTED BY SOUNDING WITH A HAMMER FOR VOIDS, REBOUND OR AGGREGATE POCKETS AND UNBONDED AREAS BEFORE APPLICATION OF THE NEXT LAYER AND ALL IMPERFECTIONS SHALL BE CORRECTED BY THE CONTRACTOR BEFORE PLACING NEXT LAYER.

AT THE END OF EACH DAY'S WORK, OR AT ANY STOPPING PERIOD REQUIRING A CONSTRUCTION JOINT, THE SHOTCRETE SHALL BE SLOPED OFF TO A THIN EDGE. SQUARED OFF JOINTS WILL NOT BE PERMITTED.

CURING. THE FINAL SHOTCRETE LAYER SHALL BE COVERED WITH BURLAP OR COTTON MATS AND KEPT WET FOR 7 DAYS AFTER PLACING, BUT WHERE NOT PRACTICABLE TO USE MATS, IT SHALL BE KEPT WET BY SPRINKLING FOR THE SAME LENGTH OF TIME. WHERE THE ENGINEER DETERMINES THAT THE ABOVE CURING PROCEDURES ARE IMPRACTICABLE, BECAUSE OF THE INACCESSIBILITY OF ISOLATED AREAS, THE FINAL SHOTCRETE SURFACE MAY BE CURED IN ACCORDANCE WITH 511.14 METHOD (b) OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS.

SHOTCRETE SHALL NOT BE PLACED WHEN THE AIR TEMPERATURE IS BELOW 50 DEGREES F. NOR MORE THAN 120 DEGREES F., OR AGAINST A SURFACE IN WHICH THERE REMAINS ANY FROST. ALL SHOTCRETE PLACED AFTER NOVEMBER 15 AND BEFORE APRIL 1 SHALL BE PROTECTED IN ACCORDANCE WITH THE REQUIREMENTS OF 511.12 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. SHOTCRETE SHALL NOT BE PLACED IN FREEZING WEATHER UNLESS PROVISION HAS BEEN MADE TO MAINTAIN THE TEMPERATURE OF THE SHOTCRETE AT NOT LESS THAN 50 DEGREES F. FOR AT LEAST 72 HOURS AFTER PLACING, OR UNTIL THE SHOTCRETE HAS THOROUGHLY HARDENED.

FIELD QUALITY CONTROL.

(a) ACCEPTABLE SHOTCRETE WILL CONSIST OF A DENSE AND UNIFORM CONCRETE WITHOUT REBOUND INCLUSIONS, SEGREGATION, OR DISCERNIBLE WEAKNESS OF BOND BETWEEN LAYERS.

(b) DEFECTIVE SHOTCRETE.

(1) SHOTCRETE WHICH LACKS UNIFORMITY, EXHIBITS SEGREGATION, HONEYCOMBING, LAMINATION, SHOWS CRACKING, OR LACKS WATER-TIGHTNESS WILL BE CONSIDERED DEFECTIVE SHOTCRETE.
(2) THE CONTRACTOR SHALL REMOVE AND REPLACE OR STRENGTHEN ALL DEFECTIVE SHOTCRETE AS REQUIRED BY THE ENGINEER.

(c) TESTS DURING SHOTCRETING OF ROCK TUNNELS.

(1) TEST SPECIMENS SHALL BE FURNISHED WITHOUT EXTRA COST TO THE STATE.

(2) THREE-INCH DIAMETER STANDARD CORE TEST SPECIMENS SHALL BE FURNISHED AT THE RATE OF TWO FOR EACH 50 CUBIC YARDS OF MATERIAL OR EACH 25 LINEAR FEET OF LINING, WHICHEVER IS LESS. THESE SPECIMENS SHALL HAVE A MINIMUM LENGTH EQUAL TO THE DIAMETER AND SHALL EXPOSE THE BOND BETWEEN SHOTCRETE AND ROCK. CORE SPECIMENS SHALL BE TAKEN FROM COMPLETED WORK AT LOCATIONS REQUIRED BY THE ENGINEER. THE TEST CORES WILL BE TESTED BY THE ENGINEER IN ACCORDANCE WITH ASTM C42. CURING SHALL BE IN ACCORDANCE WITH ASTM C31.
(3) AT THE DISCRETION OF THE ENGINEER, TEST SPECIMENS SHALL BE FURNISHED AT THE REDUCED RATE OF TWO FOR EACH 100 CUBIC YARDS OF MATERIAL, OR EACH 50 LINEAR FEET OF LINING, WHICHEVER IS LESS, AFTER APPLICATION OF THE FIRST 500 CUBIC YARDS OF SHOTCRETE.
(4) THE COMPRESSIVE STRENGTH OF CORES SHALL NOT BE LESS THAN THE REQUIREMENTS AS SPECIFIED HEREINBEFORE.
(5) VOIDS CAUSED BY THE CORING OPERATION SHALL BE PLUGGED BY THE USE OF MATERIAL AND WORKMANSHIP EQUAL TO THE SHOTCRETING IN-PLACE TO ENSURE CONTINUITY OF THE LINING AS TO WATER-TIGHTNESS, STRENGTH AND APPEARANCE.

RUBBER WATERSTOP SPECIFICATION

DESCRIPTION. THIS SECTION INCLUDES SPECIFICATIONS FOR RUBBER WATERSTOP IN THE ACCESS SHAFT.

MATERIAL. ALL WATERSTOPS SHALL BE PRODUCED BY A MOLDED OR EXTRUSION PROCESS SUCH THAT, AS SUPPLIED FOR USE, THEY WILL BE DENSE, HOMOGENEOUS, AND FREE FROM HOLES AND OTHER IMPERFECTIONS. THE CROSS SECTION OF THE WATERSTOP SHALL BE UNIFORM ALONG ITS LENGTH AND SHALL BE SYMMETRICAL TRANSVERSELY SO THAT THE THICKNESS AT ANY GIVEN DISTANCE FROM EITHER EDGE OF THE WATERSTOP WILL BE UNIFORM.

THE WATERSTOP SHALL BE FABRICATED FROM A HIGH GRADE THREAD-TYPE COMPOUND. THE BASIS POLYMER SHALL BE OF NATURAL RUBBER OR A CO-POLYMER OF BUTADIENE AND STYRENE, OR A BLEND OF BOTH. THE COMPOUND SHALL CONTAIN NOT LESS THAN 70 PERCENT BY VOLUME OF THE BASIC POLYMER, AND THE REMAINDER SHALL CONSIST OF REINFORCING CARBON BLACK, ZINC OXIDE, ACCELERATORS, ANTIOXIDANTS, VULCANIZING AGENTS, AND PLASTICIZERS, BUT SHALL CONTAIN NO FACTICE.

TEST SAMPLES. THE STATE WILL SAMPLE THE RUBBER WATERSTOP AT THE PROJECT SITE. TWO SPECIMENS EACH 1.5 FEET LONG, WILL BE REQUIRED FOR EACH 500 FEET, OR LESS, OF WATERSTOP FURNISHED. THE MANUFACTURER SHALL FURNISH THE STATE WITH THE DATE OF MANUFACTURE AND THE LOT OR UNIT OF MATERIAL REPRESENTED BY THE TEST SPECIMENS. THE TEST SPECIMENS SHALL BE FURNISHED WITHOUT COST TO THE STATE. A MINIMUM OF 14 DAYS WILL BE REQUIRED BETWEEN THE TIME OF SAMPLING AND THE TIME OF REPORTING RESULTS OF TESTS.

THE SUPPLIER SHALL SUBMIT A CERTIFICATE STATING THAT THE PERFORMANCE REQUIREMENTS (e), (f) AND (g) UNDER "PHYSICAL REQUIREMENTS" OF THIS SPECIFICATION HAVE BEEN COMPLIED WITH.

CONTINUED ON SHEET 125

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CONSULTING ENGINEERS
CINCINNATI, OHIO

NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		JWL	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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NOTES (CONTINUED FROM SHEET 124)

PHYSICAL REQUIREMENTS. SAMPLES TAKEN FROM THE FINISHED WATERSTOP SHALL MEET THE FOLLOWING REQUIREMENTS:

(a) THE TENSILE STRENGTH USING DIE "C" OF THIS MATERIAL SHALL NOT BE LESS THAN 2500 psi WHEN TESTED IN ACCORDANCE WITH THE CURRENT SPECIFICATION FOR TENSION TESTING OF VULCANIZED RUBBER, ASTM DESIGNATION: D 412.

(b) THE ULTIMATE ELONGATION OF THIS MATERIAL USING DIE "C" SHALL NOT BE LESS THAN 450 PERCENT WHEN TESTED IN ACCORDANCE WITH THE CURRENT SPECIFICATION FOR TENSION TESTING OF VULCANIZED RUBBER, ASTM DESIGNATION: D 412.

(c) THIS MATERIAL SHALL HAVE A SHORE DUROMETER HARDNESS OF 60 TO 70 WHEN TESTED IN ACCORDANCE WITH THE CURRENT SPECIFICATION FOR INDENTATION OF RUBBER BY MEANS OF A DUROMETER, ASTM DESIGNATION: D 676.

(d) THIS MATERIAL SHALL HAVE A SPECIFIC GRAVITY OF 1.5 ± 0.03 WHEN TESTED IN ACCORDANCE WITH THE CURRENT SPECIFICATION FOR CHEMICAL ANALYSIS OF RUBBER PRODUCTS, SECTION 15, ASTM DESIGNATION: D 297.

(e) THE ABSORPTION OF WATER BY WEIGHT SHALL BE NOT GREATER THAN 5 PERCENT WHEN TESTED IN ACCORDANCE WITH THE CURRENT SPECIFICATION ASTM D 570.

(f) THE COMPRESSION SET OF THIS MATERIAL SHALL NOT BE GREATER THAN 30 PERCENT AFTER 22 HOURS AT 158 DEGREES F. WHEN TESTED IN ACCORDANCE WITH METHOD B OF THE CURRENT SPECIFICATION FOR COMPRESSION SET OF VULCANIZED RUBBER, ASTM DESIGNATION: D 395.

(g) THE TENSILE STRENGTH OF THIS MATERIAL AFTER AN ACCELERATED AGING TEST OF 48 HOURS IN OXYGEN AT 70 DEGREES C. AND 300 psi SHALL BE NOT LESS THAN 80 PERCENT OF THE ORIGINAL TENSILE STRENGTH.

INSTALLATION AND SPLICES. ADEQUATE PROVISIONS SHALL BE MADE TO SUPPORT THE WATERSTOPS DURING THE PROGRESS OF WORK AND TO INSURE THEIR PROPER EMBEDMENT IN THE FINAL LINER. THE SYMMETRICAL HALVES OF THE WATERSTOPS SHALL BE EQUALLY DIVIDED BETWEEN THE JOINTS. SUITABLE GUARDS SHALL BE PROVIDED TO PROTECT EXPOSED PROJECTING EDGES AND ENDS OF PARTIALLY EMBEDDED WATERSTOPS FROM MECHANICAL DAMAGE.

ALL SPLICES IN THE CONTINUITY OR AT INTERSECTION OF RUNS OF WATERSTOPS SHALL BE PERFORMED IN ACCORDANCE WITH THE SUPPLIER'S RECOMMENDATIONS. ALL SPLICES SHALL BE NEAT WITH THE END OF THE JOINED MATERIAL IN TRUE ALIGNMENT. THE CONTINUITY OF CHARACTERISTIC MEMBERS OF THE WATERSTOP DESIGN (RIBS, TUBULAR CENTER AXIS, PROTRUSIONS, AND THE LIKE) SHALL BE MAINTAINED ACROSS THE SPLICE.

THE CONTRACTOR SHALL REPLACE OR REPAIR AT HIS EXPENSE ANY WATERSTOPS DAMAGED BEFORE FINAL ACCEPTANCE OF THE WORK.

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NOTES

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 12-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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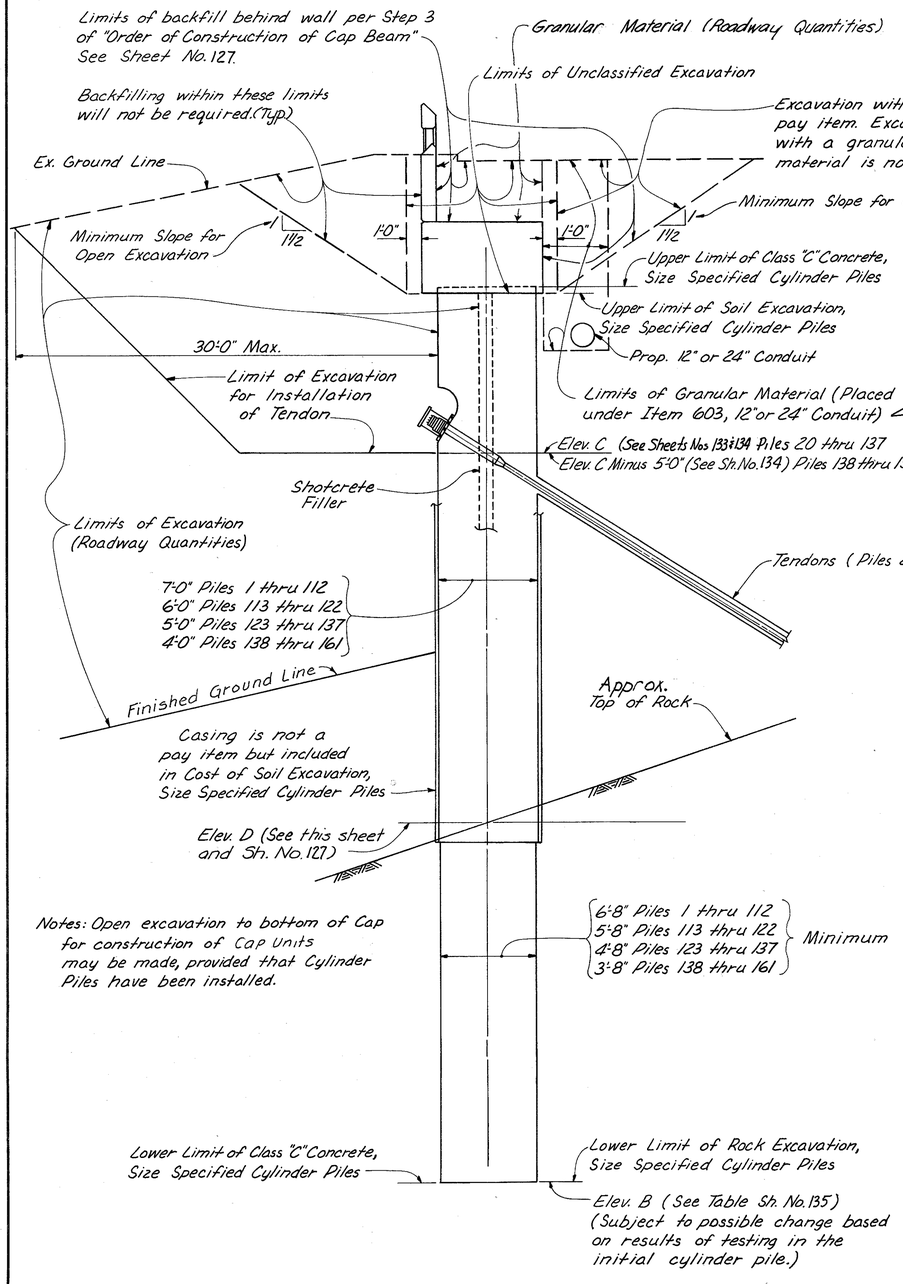
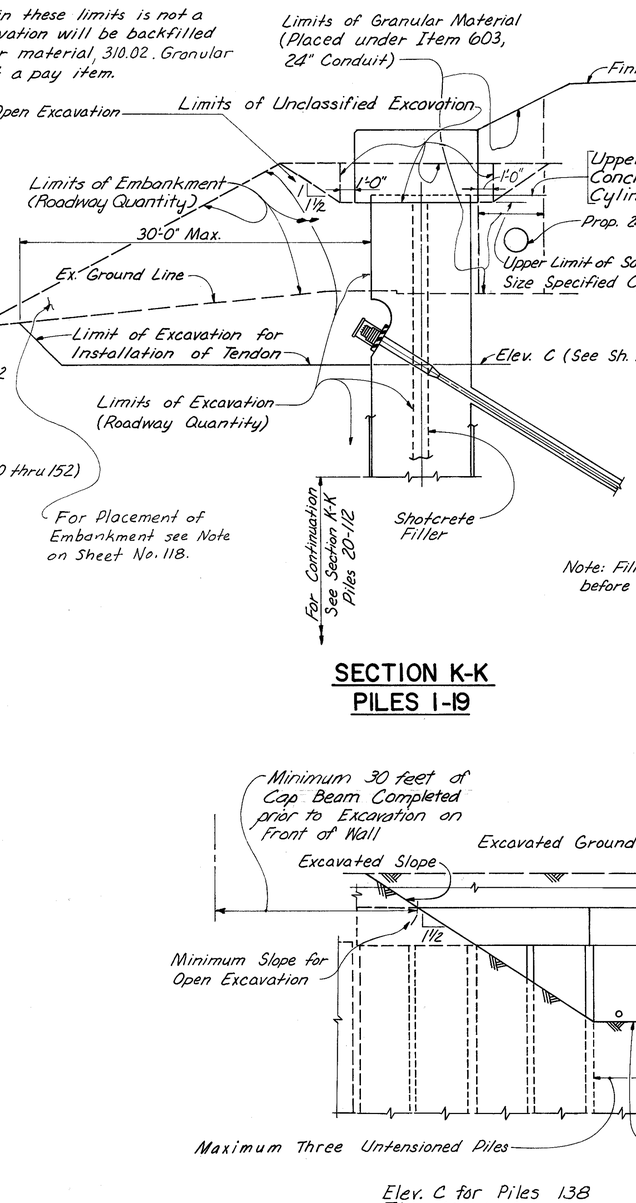


Notes: Open excavation to bottom of Cap for construction of Cap Units may be made, provided that Cylinder Piles have been installed.

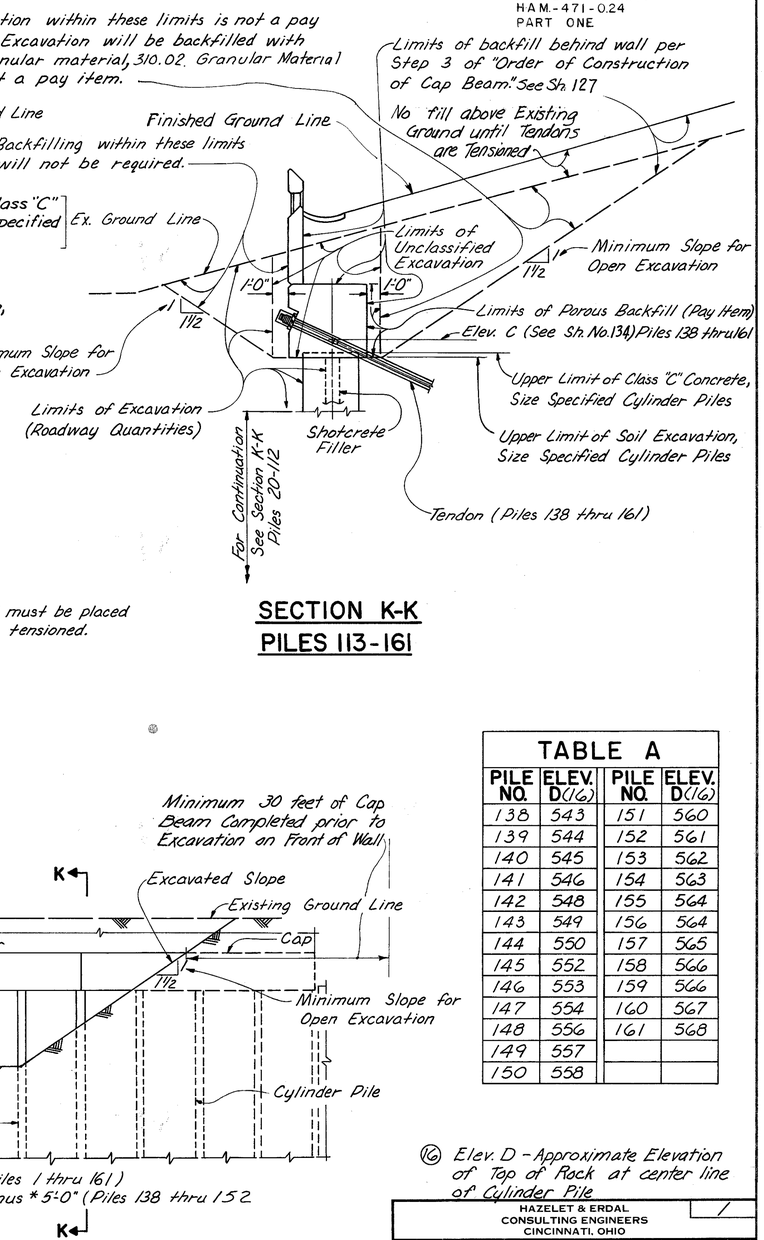
SECTION K-K PILES 20-112

WATER COMPACTION OF GRANULAR OR POROUS MATERIAL WILL NOT BE PERMITTED.

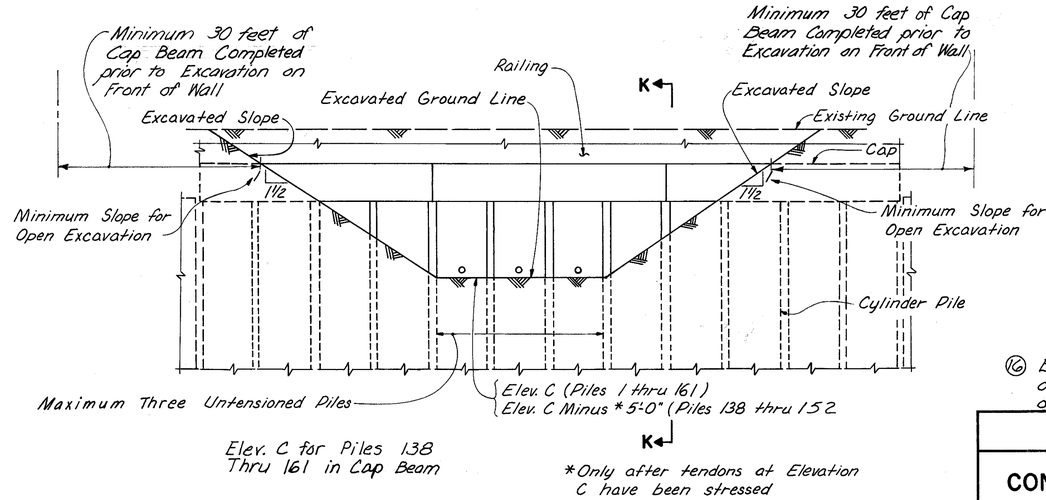


SECTION K-K PILES 1-19

Note: Fill behind wall must be placed before tendons are tensioned.



SECTION K-K PILES 113-161



PROFILE SHOWING EXCAVATION FOR INSTALLATION OF TENDONS IN CUT SECTION

TABLE A			
PILE NO.	ELEV. D(16)	PILE NO.	ELEV. D(16)
138	543	151	560
139	544	152	561
140	545	153	562
141	546	154	563
142	548	155	564
143	549	156	564
144	550	157	565
145	552	158	566
146	553	159	566
147	554	160	567
148	556	161	568
149	557		
150	558		

(16) Elev. D - Approximate Elevation of Top of Rock at center line of Cylinder Pile

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CONSTRUCTION DRAWING

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MRT		WL	JHo 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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CONSTRUCTION PROCEDURE

The cylinder piles and cap beam shall be constructed prior to any general excavation downslope of the wall. Concurrently, but independently, the tunnel can be driven. Excavation in front of the wall down to tendon anchor level to permit access for drilling shall proceed in sections of limited extent in order to limit loads and wall deflections prior to stressing the anchors. The Contractor shall at all times limit excavation in front of the wall and stockpile material as allowed in the plans and specifications.

A number of the cylinder piles may be constructed concurrently; however, excavation shall progress in a leap frog fashion such that excavation on any cylinder pile cannot begin within two pile diameters of (1) any other pile under construction or (2) an already constructed cylinder pile until the existing cylinder pile has been allowed to cure for seven days. The Contractor shall not allow a completed or partially completed cylinder pile excavation to remain open longer than 48 hours without approval of the Engineer. While excavating the cylinder piles it will be necessary for the Contractor to maneuver his heavy drill rig back and forth adjacent to completed piles with open hole portions above the base level of the cap beam. The Contractor may alleviate this situation by backfilling the open hole portions with sand (at no cost to State) and/or installing a heavy steel liner above the level of the base of the cap beam (at no cost to State).

In situ tests shall be performed in a minimum of two and possibly three cylinder piles (Nos. 100, 105 and/or 110). Plate bearing tests and large scale shear box tests shall be performed in these cylinder pile excavations to verify design assumptions. Therefore, cylinder piles Nos. 100, 105 and 110 shall be the first cylinder piles constructed. The Contractor may elect to construct other cylinder piles while the tests are in progress; however, the depth of embedment into rock for such cylinder piles must be increased by 5 feet from plan lengths (at no cost to State) to provide for additional resistance should the in situ test results be poorer than anticipated in the pre-construction wall design.

Cylinder Piles

Cylinder Pile No. 100 shall be drilled directly to rock in which two horizontal plate bearing and two direct shear tests are to be performed, one of each in the weathered and unweathered rock. During testing in this cylinder pile, and with the aid of detailed observations made within the overburden portions of the first pile, a second pile No. 105 shall be advanced to successive levels for testing in the overburden materials. Three additional plate bearing tests and two direct shear tests, all in the soil materials, are to be performed in Pile No. 105. In the event additional tests are required, Pile No. 110 shall be advanced. With the information obtained from these tests, cylinder pile design can then be finalized.

Once the pile design has been finalized, the remaining cylinder piles can be constructed, using the above prescribed leap-frog fashion; however, in the vicinity of the existing soldier pile wall, the cylinder piles shall be constructed as follows:

(1) First construct cylinder piles 79, 81, 82, 85, 92, 94, 97, 103 and 106 in any preferred order observing the above prescribed leap-frog fashion.

(2) After the piles of Item 1 have been completed (concrete has been poured to top of pile and concrete has cured for seven days) the existing bracing and soldier piles of the existing soldier pile wall can be removed, in accordance with the note "Removal of Existing Soldier Pile Wall", Sheet No. 102, allowing piles 75 thru 78, 80, 83, 84, 86 thru 91, 93, 95, 96, 98, 99, 101, 102, 104, 107, 108 and 109 to be constructed, using the above prescribed leap-frog fashion.

Cap Beam and Railing

For construction of cap beam and railing see order of construction of cap beam listed below under "Profile showing Excavation and Backfill for Construction of Cap Beam and Railing in Cut Section".

Excavation, Installing and Tensioning of Tendons

Appropriate measurements are to be made to monitor both the overall long term performance of the cylinder pile wall and its detailed behavior during initial excavation in front of the wall, initial tendon stressing and subsequent tendon restressing (if required). Such measurements shall be made at locations shown on Sheet No.128 together with surface survey measurements discussed in the Note "Observations and Monitoring" on Sheet No. 116.

After completion of the cylinder piles and cap beam, excavation in front of the wall can proceed as required for tendon hole drilling and tendon installation. Material between the piles shall be excavated back to the limit for installation of granular filter material and in situ soils observed by the Engineer to check that the gap between adjacent piles is not closed up by concrete due to overbreak during shaft excavation or pile misalignment. If seepage in the silts appears to be excessive, then 2-inch diameter slotted pvc drain pipe (same as 2-inch vertical pipe, except slot width of 0.010-inch) shall be pushed or drilled in horizontally to pick up the water at some distance behind excavated surface and discourage surface ravelling of the soil. The 2-inch diameter slotted pvc drain shall be wrapped with filter cloth, placed vertically between piles and connected to the access pipe extending from below the cap beam. The granular filter material shall be placed with a wire cloth bottom to contain the filter material during later excavation underneath. If horizontal drains are stubbed into the silt they shall be connected to the vertical drain. The vertical drain and granular filter material shall be initially covered with a 2-inch thickness of shotcrete to hold them in place and prevent ravelling of the soil.

Excavation downslope from the cylinder pile for installation of tendons shall begin as shown on "Profile showing Excavation for Installation of Tendon in Cut Section", Sheet No.126. At least 30 plus feet of cap beam shall be completed either side of any open excavation in front of the wall. Not more than three separate excavations shall be opened up in front of the wall without prior approval of the Engineer. Excavation in front of the wall, drilling and tendon installation can proceed sequentially along the wall beginning from an excavation over a width measured at the base of the excavation, not exceeding three pile spacings. After tendons are installed and initially stressed, excavation in front of the wall can proceed along the length of the wall provided that not more than three of the piles in the open excavation within 100 feet adjacent to the advancing head of the excavation, remain unsupported by a tensioned anchor. The slope of the advancing head of the excavation shall not be flatter than 1 1/2 (H):1(V). When two excavations approach one another closer than 100 feet, concurrent advancement will not be permitted. All of the cylinder piles shall be tensioned right up to, within one pile at the adjacent end of the non-advancing excavation.

The tendons located in cylinder piles 31 and 90, in the two test sections and the adjacent piles in the test sections shall be the first tendons installed and stressed. With the information obtained from these two test sections, initial tensioning procedures and loads for the tendons can be determined.

All the upper tier tendons of cylinder piles 138 thru 152 shall be installed and stressed prior to further excavation to allow drilling and installation of the lower tier tendons. Excavation adjacent to the tunnel anchors shall not commence until the holes for tendons 130 thru 137 have been drilled and lined and all but tendon 137 have a tendon installed and tensioned. Tendon drill hole 137 shall remain empty until the tendon holes for the upper and lower tiers for pile 138 have been drilled. Stressing of a tendon may commence once the tendon has been installed and the concrete anchorage block has attained its seven day strength. All the wires of a tendon shall be stressed simultaneously. Each tendon shall be initially stressed to the loads shown in Table A and Table G (Sheet No. 143) or to a load such that uphill deflection of the top of the cap beam is not greater than 2 inches (1-inch at anchor tie point) for piles 1 thru 137 and 1-inch (1/2-inch at anchor tie point) for piles 138 thru 161. If the deflection controls, then each cylinder pile in a cap unit must be proportionally loaded so that none of the piles experience more than the allowable deflection at the cap beam.

After all the tendons have been installed and initially stressed, the remaining grading downslope from the cylinder piles can be started. Concurrently with the excavation, the horizontal drain, remainder of 2 inch vertical pipe, granular filter material and structural shotcrete can be placed and installed (See Sheet No. 151).

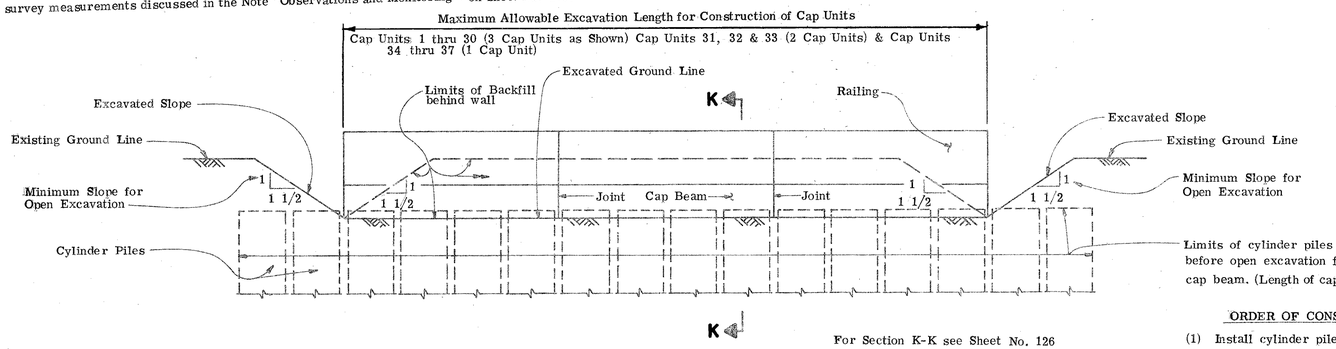
Excavation in front of the wall down to rock will increase the load on the wall as downslope support is removed. This should encourage maximum load development onto the wall. If the limiting deflection of the top of the wall controlled the initial load of the tendon, this increased load on the wall will increase the load on the tendon, causing elongation of tendon and allowing the top of the wall to move downhill. As this downhill movement of wall progresses, it may become necessary to restress the tendon. During the restressing the load on the tendon shall not exceed the amounts given in Table A and Table G or to a load such that uphill deflection of the top of wall (from its original location) is not greater than the allowables. If initial load applied to tendons was equal to amounts shown in Table A and Table G, then no restressing is anticipated.

TABLE A

PILE NO.	ELEV. D (16)	TENDON LOAD (KIPS)(17)	PILE NO.	ELEV. D (16)	TENDON LOAD (KIPS)(17)	PILE NO.	ELEV. D (16)	TENDON LOAD (KIPS)(17)
1	542	730	47	519	1,465	93	517	1,190
2	541	740	48	519	1,465	94	517	1,175
3	539	750	49	519	1,465	95	518	1,160
4	538	755	50	519	1,465	96	518	1,145
5	536	785	51	519	1,465	97	518	1,130
6	534	805	52	519	1,465	98	518	1,120
7	533	835	53	518	1,465	99	519	1,105
8	532	855	54	518	1,465	100	519	1,090
9	531	885	55	517	1,465	101	520	1,025
10	531	905	56	517	1,465	102	520	1,020
11	530	925	57	518	1,465	103	520	1,005
12	529	955	58	518	1,465	104	520	990
13	529	975	59	517	1,465	105	521	975
14	528	1,000	60	517	1,465	106	521	970
15	528	1,020	61	518	1,465	107	522	955
16	527	1,040	62	518	1,465	108	522	940
17	527	1,055	63	518	1,465	109	523	935
18	527	1,075	64	518	1,465	110	523	920
19	527	1,095	65	519	1,465	111	524	905
20	527	1,115	66	519	1,465	112	525	900
21	527	1,145	67	519	1,465	113	525	780
22	526	1,165	68	519	1,465	114	525	765
23	526	1,190	69	519	1,465	115	526	755
24	526	1,200	70	519	1,465	116	526	740
25	525	1,215	71	519	1,465	117	526	735
26	525	1,230	72	520	1,440	118	526	720
27	524	1,245	73	520	1,435	119	527	715
28	524	1,265	74	520	1,420	120	527	700
29	524	1,290	75	520	1,410	121	528	695
30	523	1,310	76	521	1,395	122	528	680
31	523	1,330	77	521	1,380	123	529	575
32	522	1,335	78	520	1,365	124	529	560
33	522	1,350	79	520	1,350	125	530	550
34	521	1,360	80	519	1,330	126	530	535
35	521	1,365	81	519	1,310	127	531	525
36	521	1,370	82	518	1,295	128	532	510
37	520	1,385	83	518	1,275	129	533	500
38	520	1,400	84	518	1,260	130	533	490
39	520	1,405	85	517	1,245	131	534	480
40	519	1,420	86	517	1,230	132	535	475
41	519	1,435	87	517	1,215	133	536	470
42	519	1,465	88	517	1,200	134	538	460
43	519	1,465	89	517	1,190	135	539	455
44	519	1,465	90	517	1,175	136	540	440
45	519	1,465	91	517	1,160	137	541	430
46	519	1,465	92	517	1,200			

(16) ELEV. D - Approx.. Elevation of Top of Rock at centerline of Cylinder Pile See Sheet No. 126

(17) Tendon Load equal to 60% of Guaranteed Ultimate Tensile Strength.



For Section K-K see Sheet No. 126

PROFILE SHOWING EXCAVATION AND BACKFILL FOR CONSTRUCTION OF CAP BEAM AND RAILING IN CUT SECTION

ORDER OF CONSTRUCTION OF CAP BEAM

(1) Install cylinder piles to limits shown on Profile.
(2) Open excavate, as shown on Profile, to construct units of cap beam & railing.
(3) Backfill behind wall to limits shown on Profile.
(4) After area has been backfilled, proceed to Step 2 at another location once Step 1 has been fulfilled.
(5) No two adjacent areas may be opened simultaneously for construction of cap beam & railing.

During construction of the cap beam and railing and before backfilling, the portion of the 2 inch diameter slotted PVC drain pipe from just below the base of the cap beam up to its ends shall be constructed.

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CONSTRUCTION DRAWING
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		H.L.	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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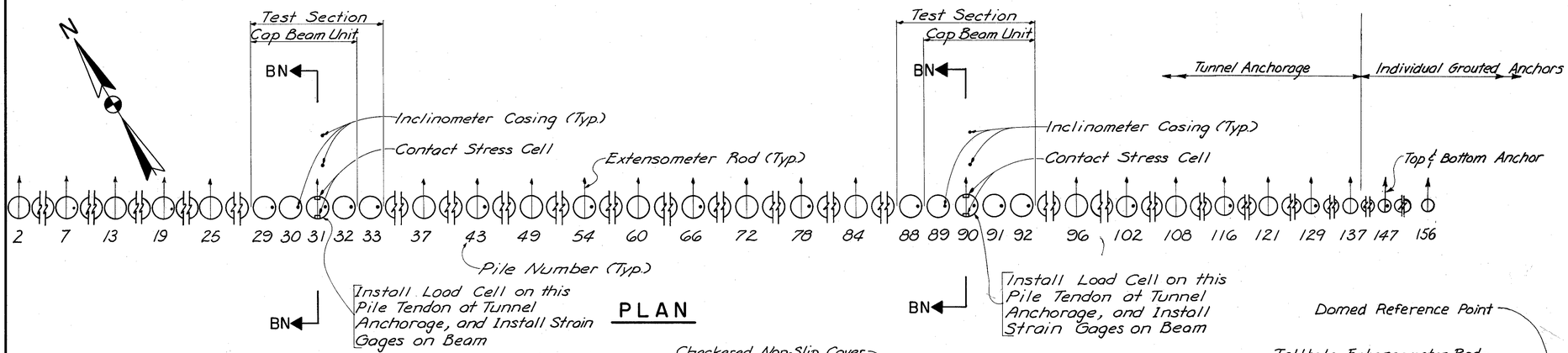
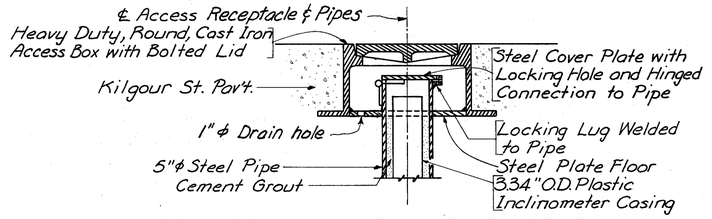
HAMILTON COUNTY
HAM.-471-0.24
PART ONE

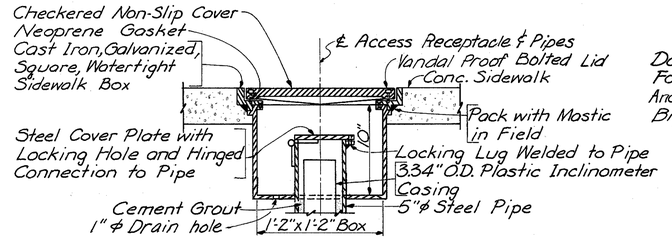


PLAN



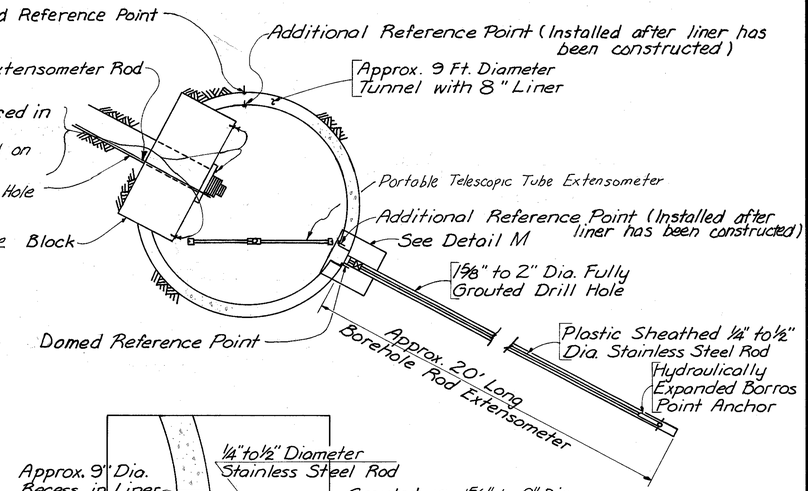
ACCESS RECEPTACLE, TYPE 3

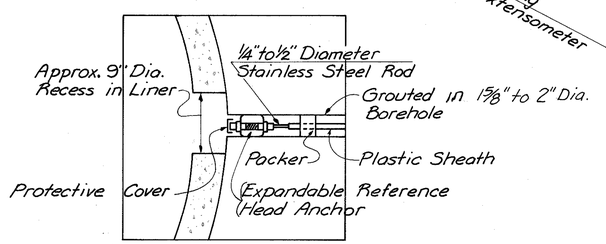
(Piles 7, 19, 29, 31, 90)



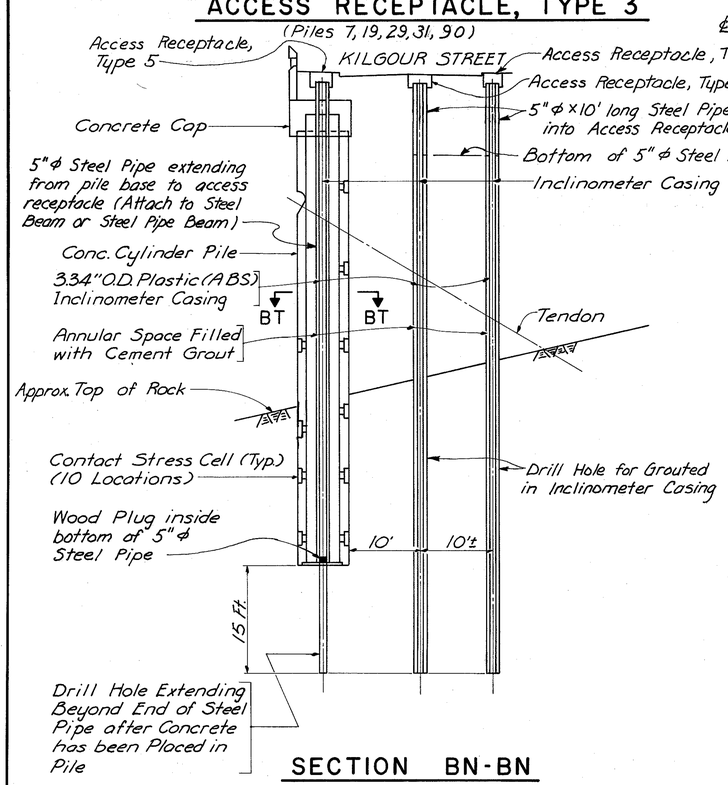
ACCESS RECEPTACLE, TYPE 4

(Piles 30-33, 43, 54, 66, 78, 88-92, 102)

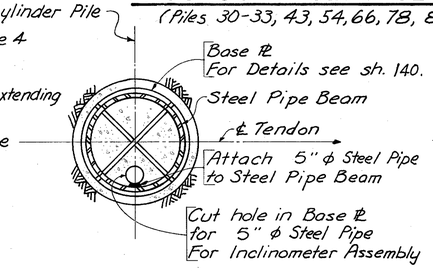




DETAIL M

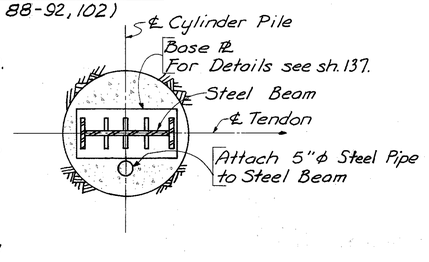


SECTION BN-BN



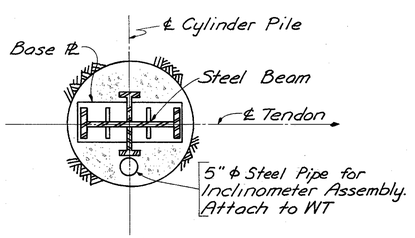
SECTION BT-BT

(Piles 7, 19, 116, 129)



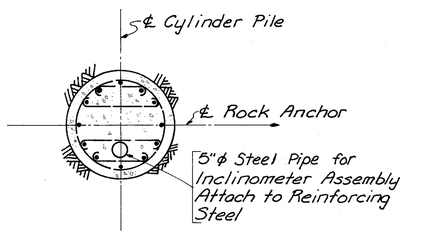
SECTION BT-BT

(Piles 66, 78, 88 thru 92, 102)



SECTION BT-BT

(Piles 29, 30 thru 33, 43, 54)



SECTION BT-BT

(Pile 147)

ANCHORAGE TUNNEL INSTRUMENTATION

(See General Notes on sheet 116)

NOTE: Access Receptacles for Piles 7, 19 29, 30, 31, 32 and 33 will have to be temporarily installed under this contract and later permanently installed under a future contract.

Work with sheet 129.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CONSTRUCTION DRAWING

CYLINDER PILE WALL

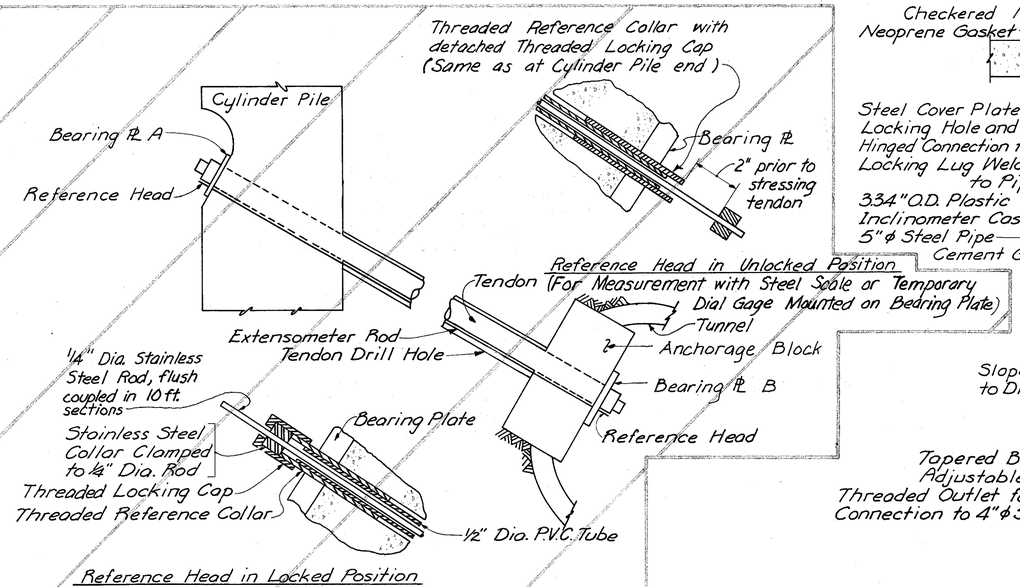
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		JH	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

129/172

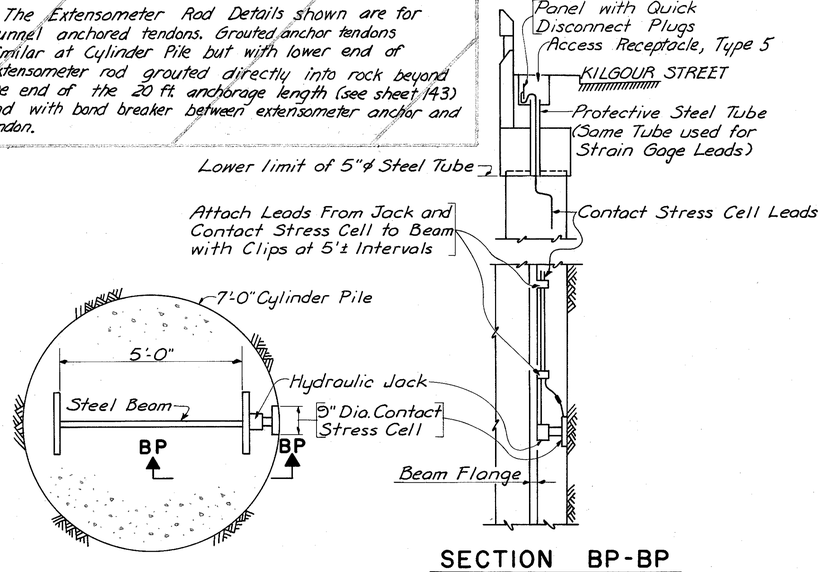
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



EXTENSOMETER ROD DETAIL

(See Plan for Locations)
(See General Notes on sheet 116)

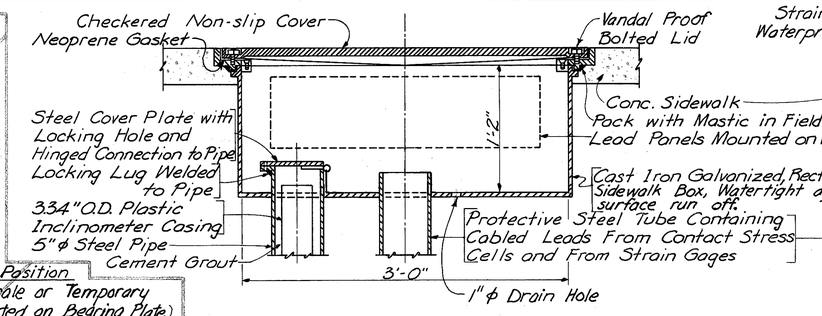
Note: The Extensometer Rod Details shown are for tunnel anchored tendons. Grouted anchor tendons similar at Cylinder Pile but with lower end of extensometer rod grouted directly into rock beyond the end of the 20 ft. anchorage length (see sheet 143) and with bond breaker between extensometer anchor and tendon.



SECTION BP-BP

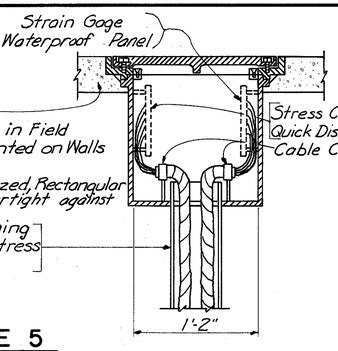
CONTACT STRESS CELL INSTALLATION

(Piles 31, 90)
(See General Notes on sheet 117)



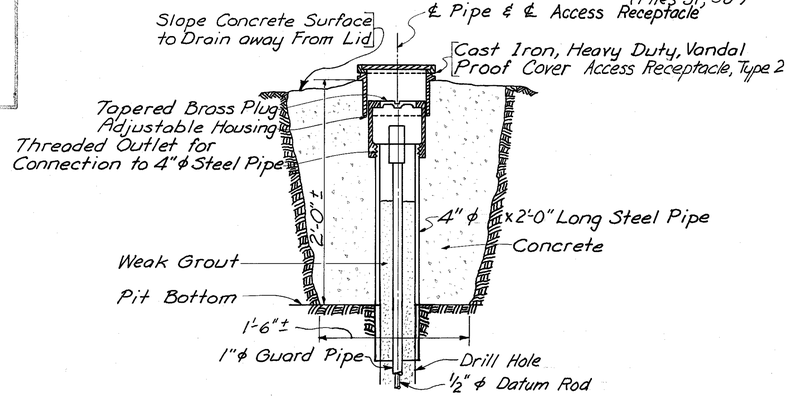
ACCESS RECEPTACLE, TYPE 5

(Piles 31, 90)



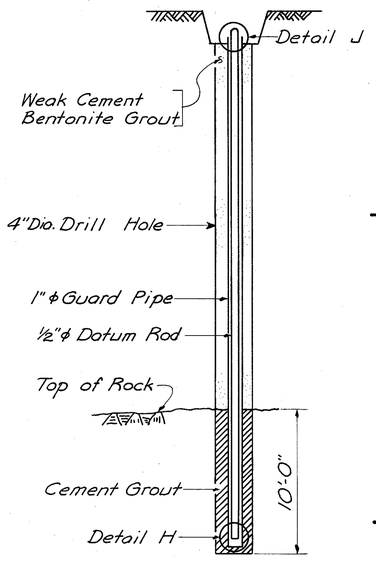
Elev. A (Bottom of access receptacle)

Pile No.	RECEPTACLE No.	ELEV. A
9	3	580.24
19	3	576.44
29	3	567.85
30	4	567.94
31	5	568.58
32	4	567.83
33	4	568.85



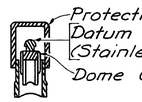
SURFACE PROTECTION DETAIL

(Permanent Bench Mark)

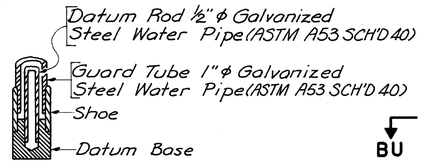


PERMANENT BENCH MARK

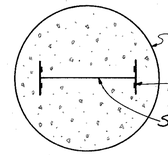
(See General Notes on sheet 117)



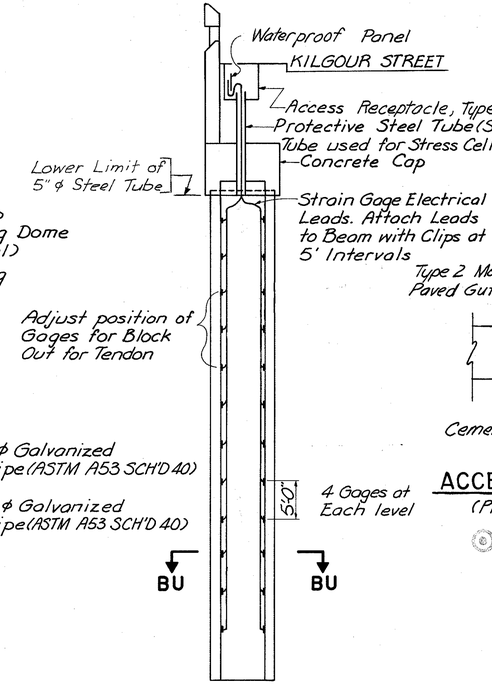
DETAIL J



DETAIL H

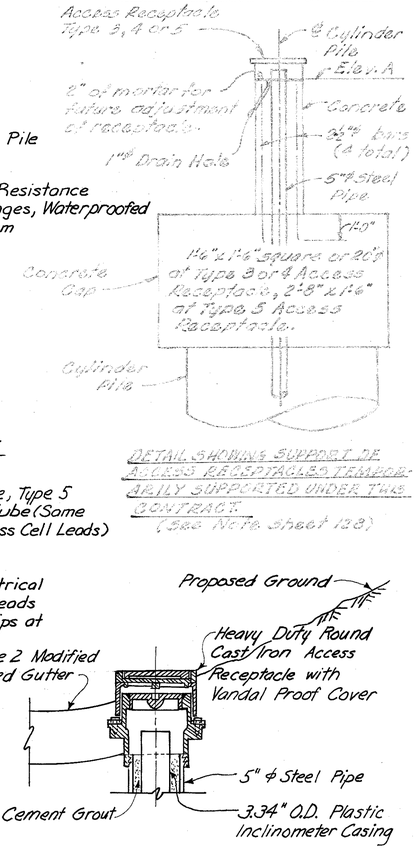


SECTION BU-BU



STRAIN GAGE INSTALLATION

(Piles 31 & 90)
(See General Notes on sheet 117)



DETAIL SHOWING SUPPORT OF ACCESS RECEPTACLES TEMPORARILY SUPPORTED UNDER THIS CONTRACT. (See Note 6 Sheet 128)

ACCESS RECEPTACLE, TYPE 6

(Piles 116, 129, 147)

Revised 8-1-80

Work with sheet 128.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CONSTRUCTION DRAWING

CYLINDER PILE WALL

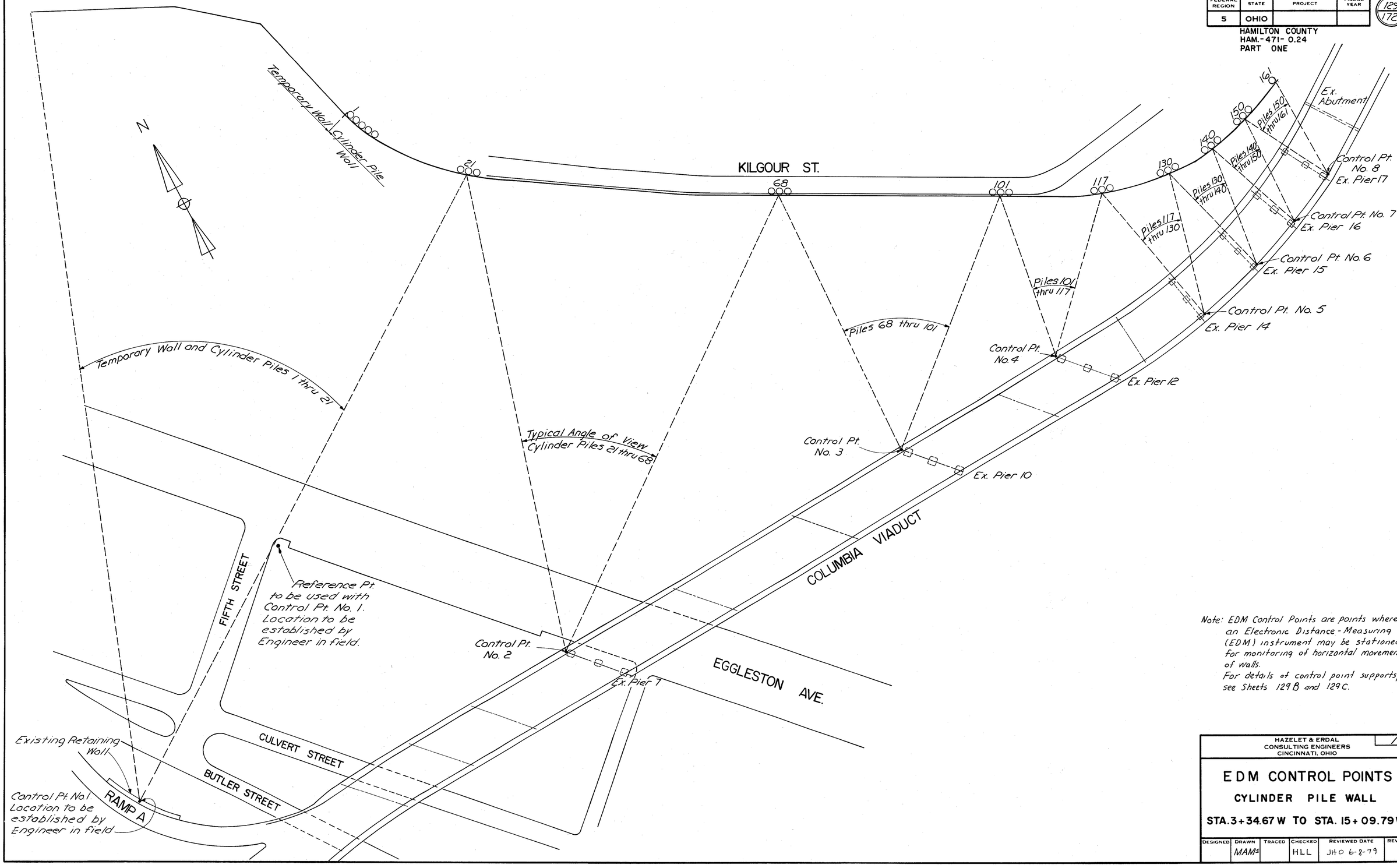
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		WL	JHO 2-27-79	7-9-80

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

129A
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE



Note: EDM Control Points are points where an Electronic Distance-Measuring (EDM) instrument may be stationed for monitoring of horizontal movements of walls.
For details of control point supports, see Sheets 129B and 129C.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

EDM CONTROL POINTS

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

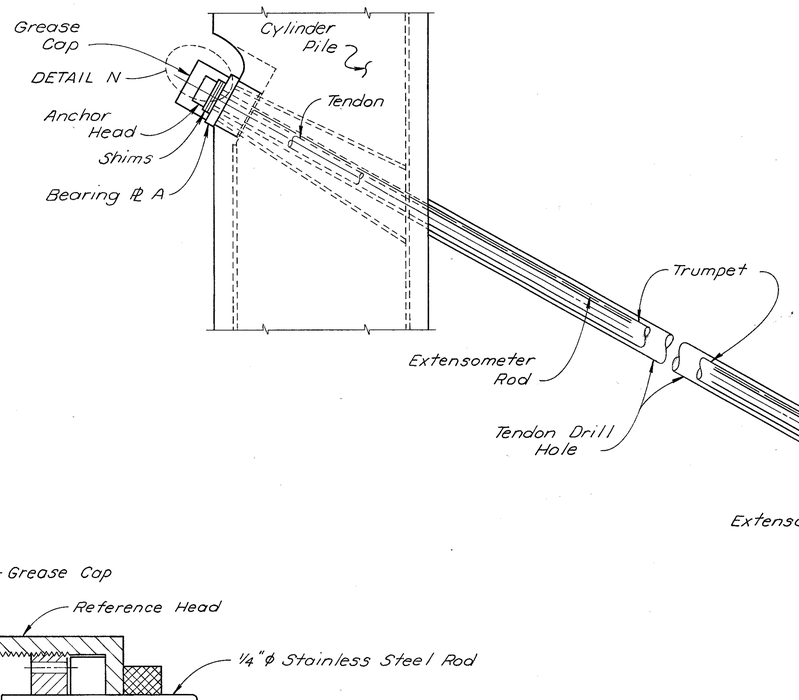
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MAMS		HLL	JHO 6-8-79	

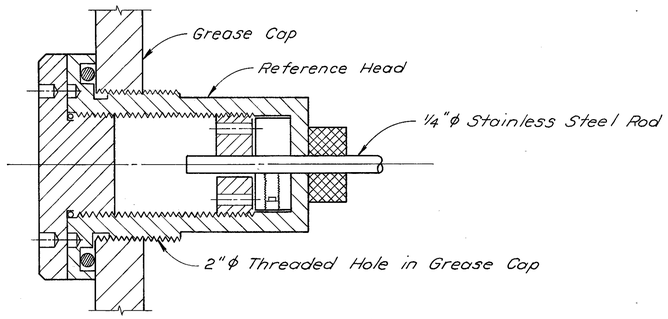
FHWA REGION	STATE	PROJECT	
5	OHIO		

129AA
172

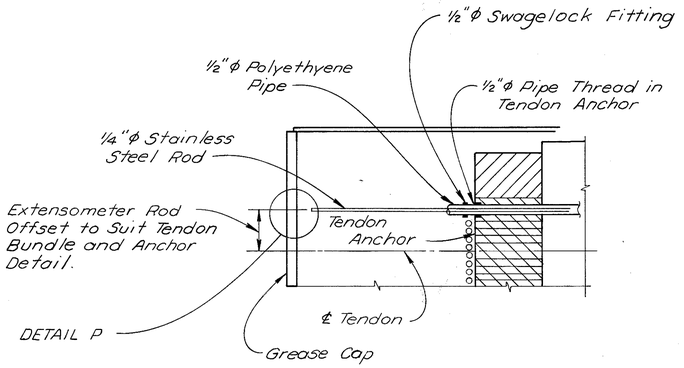
HAMILTON COUNTY
HAM-471-0.24
PART ONE

Grease cap at Extensometer Connection must be free to rotate during assembly.





DETAIL P



DETAIL N

EXTENSOMETER ROD DETAIL

(See Plan for Locations)
(See General Notes on sheet 116.)

Note: The Extensometer Rod Details shown are for tunnel anchored tendons. Grouted anchor tendons similar at Cylinder Pile but with lower end of extensometer rod grouted directly into rock beyond the end of the 20 ft. anchorage length (see sheet 143) and with bond breaker between extensometer anchor and tendon.

Sheet added 8-1-80

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
BUREAU OF BRIDGES

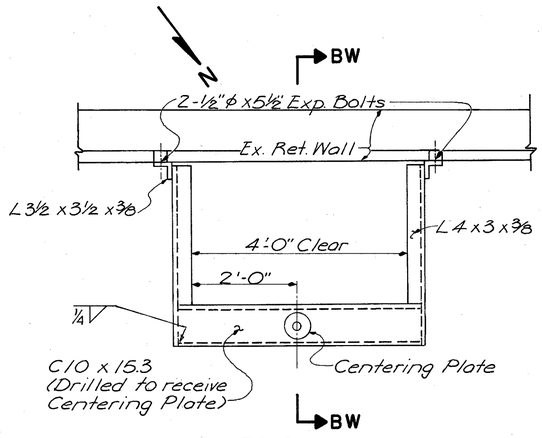
CONSTRUCTION DRAWING
CYLINDER PILE WALL
STA. 3+34.67W TO STA. 15+09.79W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED	DATE	REVISED
—	—	T.G.C.				

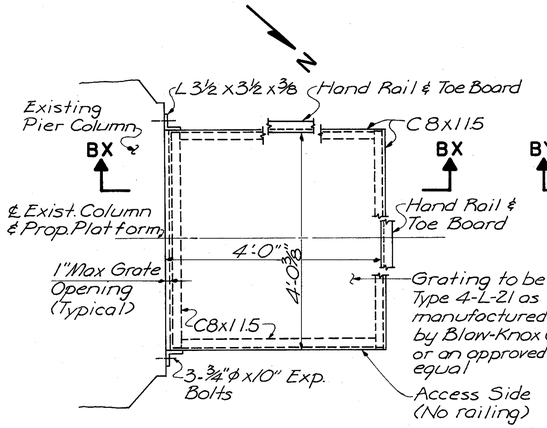
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

1298
172

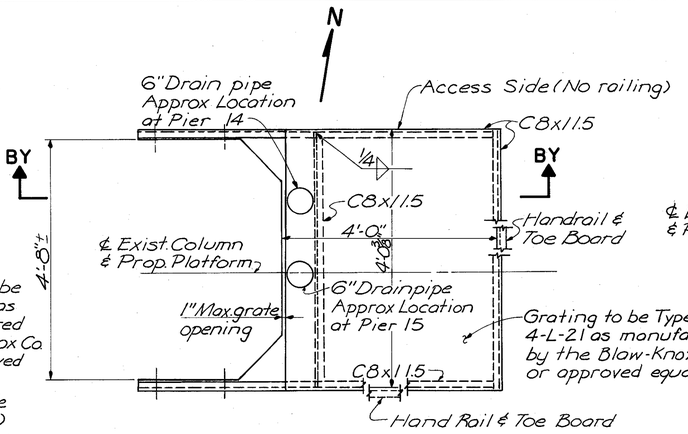
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



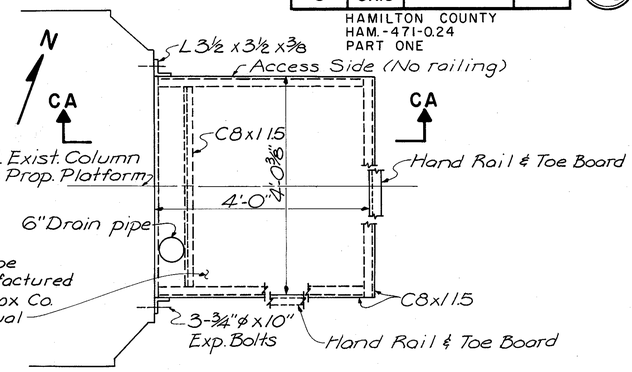
PLAN



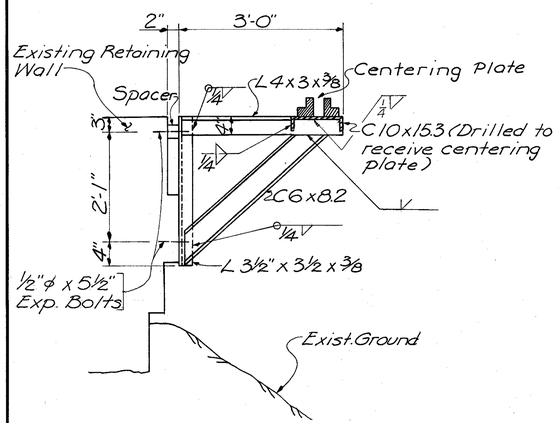
PLAN



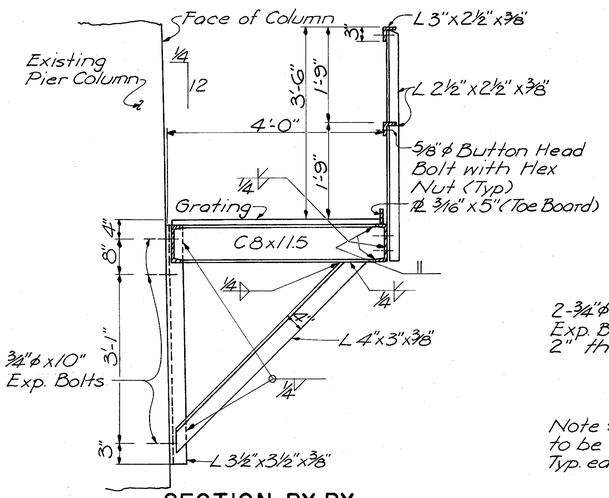
PLAN



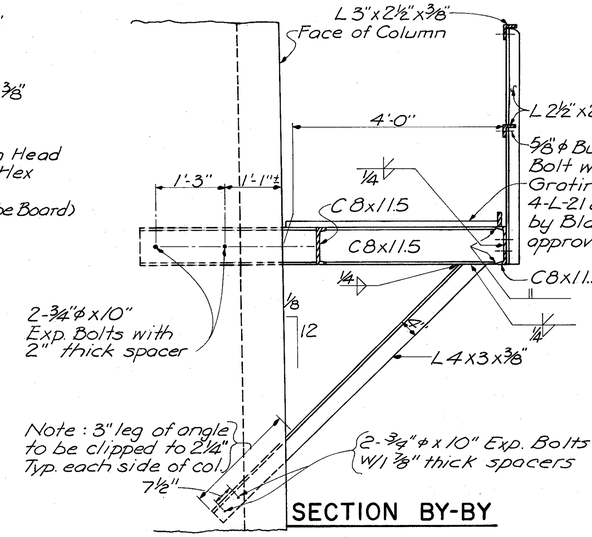
PLAN



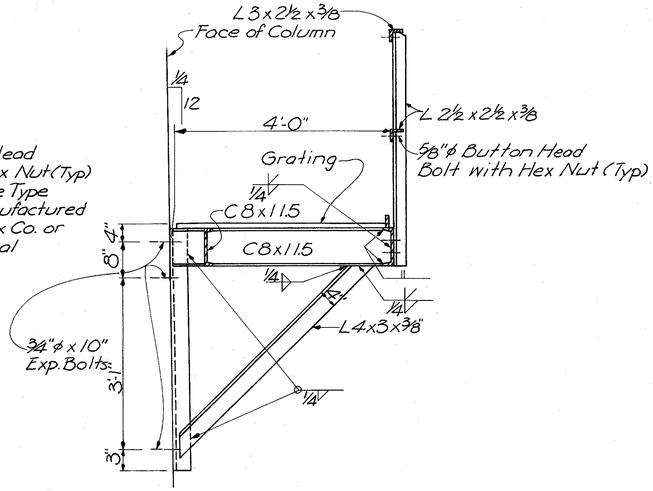
SECTION BW-BW
SUPPORT DETAIL
FOR CONTROL POINT NO 1



SECTION BX-BX
PLATFORM DETAIL
FOR CONTROL POINTS 2,3&4

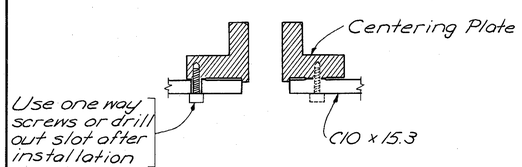


SECTION BY-BY
PLATFORM DETAIL
FOR CONTROL POINTS 5&6



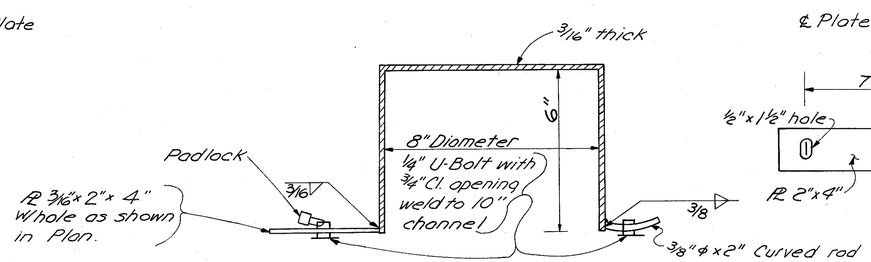
SECTION CA-CA
PLATFORM DETAIL
FOR CONTROL POINTS 7&8

Note: Expansion bolts are to be Hilti Kwik Bolt, Molly Parobolt or approved equal.
Structural steel to be pointed in accordance with 514.
Contractor shall verify all field dimensions before performing any work relating to the fabrication of structural steel.
Details shown may require modification to fit EDM equipment purchased by contractor.
All structural steel shall be A36 steel.

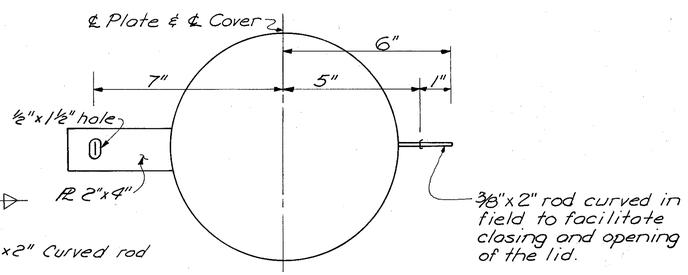


TYPICAL ATTACHMENT OF
CENTERING PLATE TO CHANNEL

Note:
One centering plate is required at each Control Point.
Once the centering plate has been secured to the channel and has been used for making measurements, it is not to be removed.



ELEVATION



PLAN

LOCKING COVER FOR CENTERING PLATE

All items shown on this sheet to be included for payment in Item Special "Observation and Monitoring".

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

EDM CONTROL POINTS
CYLINDER PILE WALL
STA. 3+34.67W TO STA. 15+09.79W

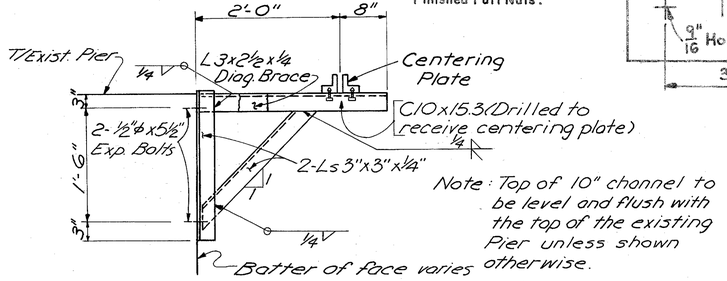
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK/MAMA		HLL	JHO 6-8-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

1290/172

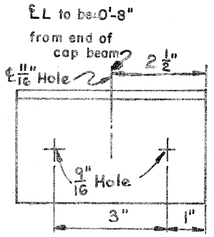
HAMILTON COUNTY
HAM 471 - 0.24
PART ONE

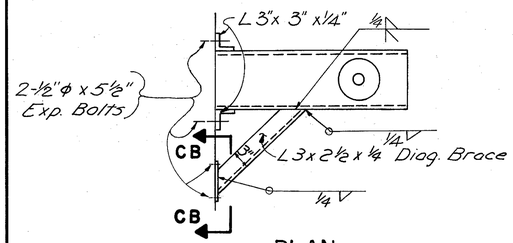
Material:
Angle to be 304 stainless steel.
Anchor Bolts or Cap Screws to be 316 Stainless steel.
Nuts to be 316 Stainless Steel
Finished Full Nuts.



Note: Top of 10" channel to be level and flush with the top of the existing Pier unless shown otherwise.

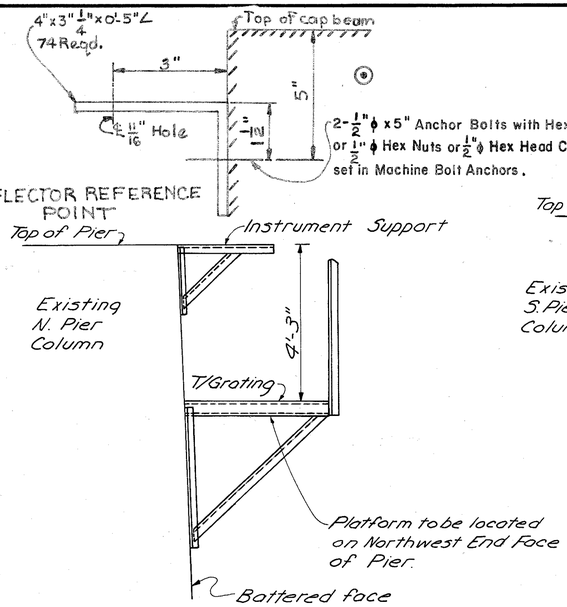
ELEVATION



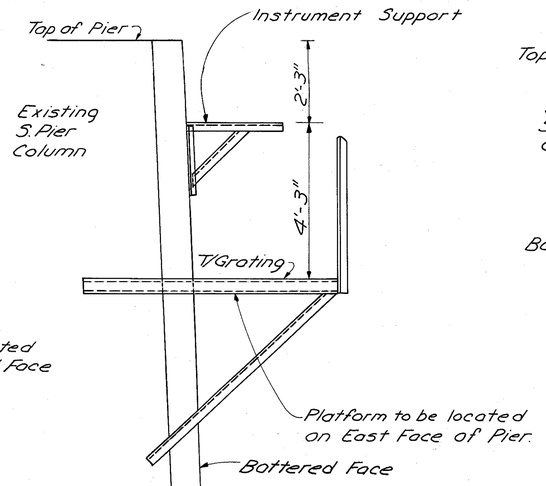


PLAN

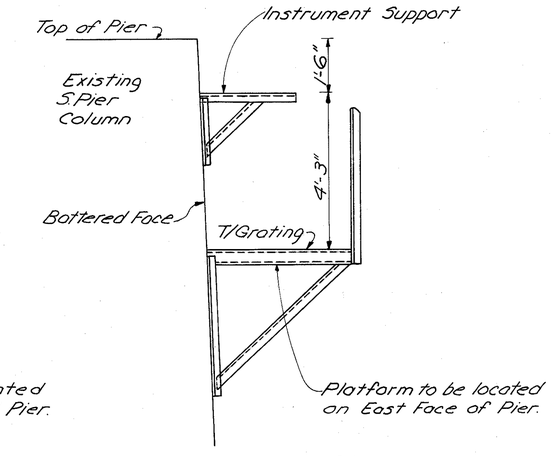
INSTRUMENT SUPPORT FOR CONTROL POINTS 2 THRU 8



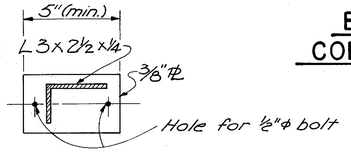
ELEVATION FOR CONTROL POINTS 2 3 & 4



ELEVATION FOR CONTROL POINTS 5 & 6



ELEVATION FOR CONTROL POINTS 7 & 8



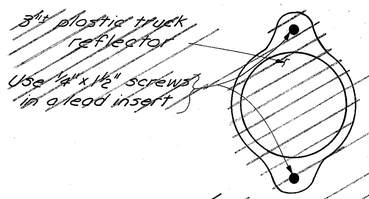
SECTION CB-CB

NOTES

Expansion bolts are to be Hilti Kwik Bolt, Molly Parabolt or approved equal
Instrument support is to be placed on ℄ column for Control Points 2, 3, 4, 5, 7 & 8
Instrument support for Control Point 6 must be located to clear existing drain pipe.
Locations for the Reference Points are to be determined in the field by the engineer after the instrument supports and the platforms are in place. Probable locations of the Reference Points are:

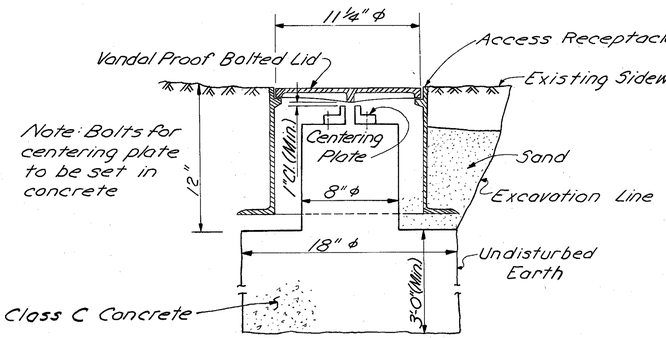
Control Point No.	Reference Point
1	As shown on sheet No. 129A.
2	Butler St. south of Columbia Viaduct.
3 & 4	N.W. corner of Eggleston Ave and Third St.
5	North of Romp J and East of I-471 bridge.
6, 7, 8	Front Street - East of I-471 bridge.

Structural Steel to be painted in accordance with 514.
All structural steel shall be A36 steel.
All items shown on this sheet, except Access Receptacle Type 3, are to be included for payment in the item Special "Observation and Monitoring."



TYPICAL PLASTIC TRUCK REFLECTOR ◎

Note: Cylinder Pile Wall: Plastic truck reflectors are to be mounted 1'-0" below bottom of cap.
Temporary Pile Wall: The plastic truck reflectors are to be mounted on alternate piles 1'-0" below top of pile, see sheet no. 85.

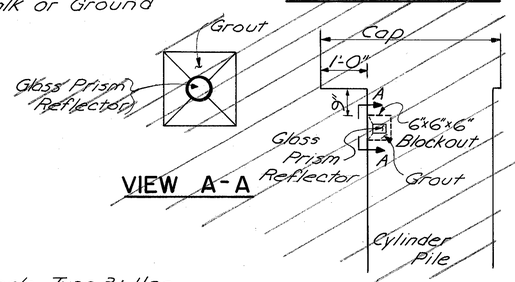


Note: Bolts for centering plate to be set in concrete

REFERENCE POINT

Note: Centering Plates shown may differ from the centering plates required to fit the EDM equipment purchased by the contractor.

* Access Receptacle Type 3: Use Neenah R-1976 Cast Iron, Heavy Duty, Round, Bolted Lid Inspection Frame or approved equal. Do not add steel floor plate on Type 3 Receptacles used for Reference Points.



VIEW A-A

Note: Cylinder Pile Wall: Glass Prism reflectors to be used on certain piles, (see sheet no. 117) and oriented toward appropriate Control Points, (see sheet no. 129A).

GLASS PRISM REFLECTOR INSTALLATION

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

EDM CONTROL POINTS

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MAMS		HLL	JHO 6-8-79	9-19-80

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

130/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

Curve No. 1 T
P.C. Sta. = 1+80.00 T
P.I. Sta. = 2+99.15 T
P.T. Sta. = 4+11.00 T
Δ = 34°39'00"
D = 15°00'00"
R = 381.97'
L = 231.00'
T = 119.15'

Curve No. 2 T
P.C. Sta. = 9+38.98 T
P.I. Sta. = 10+48.34 T
P.T. Sta. = 11+52.00 T
Δ = 31°57'10.8"
D = 15°00'00"
R = 381.97'
L = 213.02'
T = 109.36'

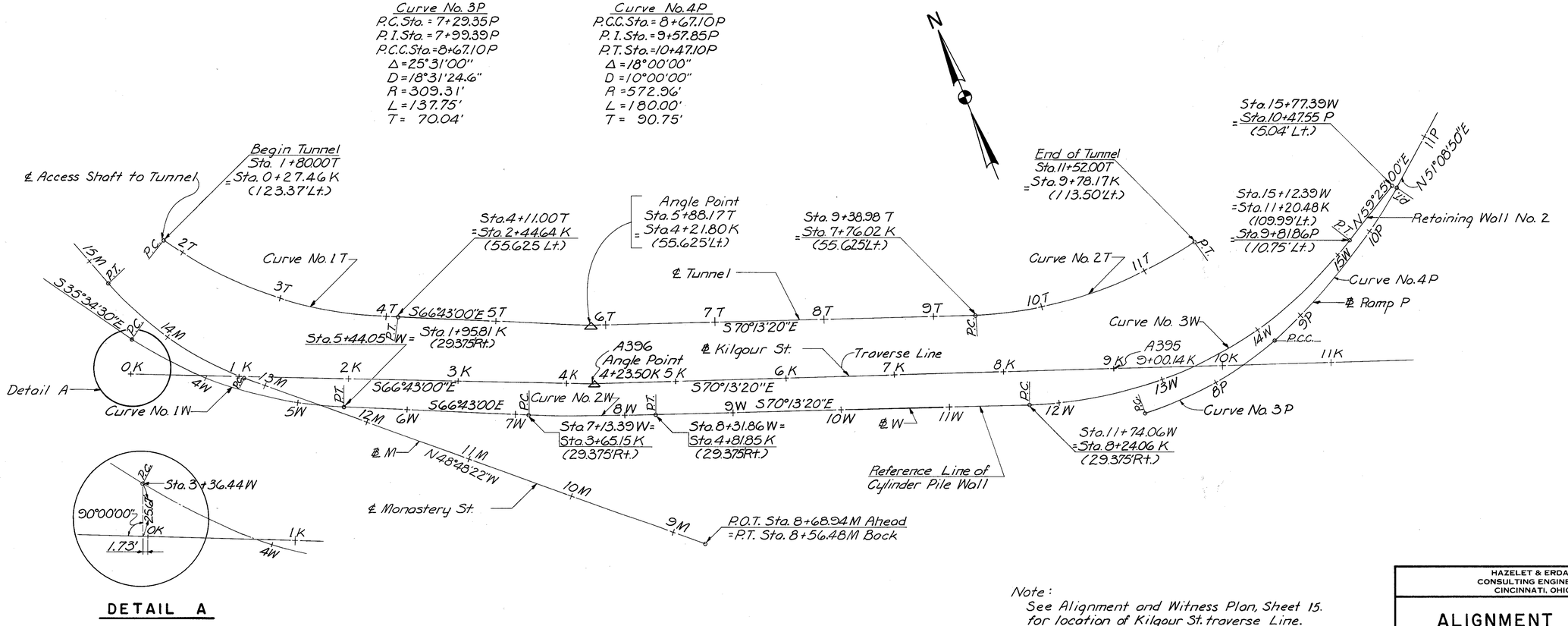
Curve No. 1 W
P.C. Sta. = 3+36.44 W
P.I. Sta. = 4+42.88 W
P.T. Sta. = 5+44.05 W
Δ = 31°08'30"
D = 15°00'00"
R = 381.97'
L = 207.61'
T = 106.44'

Curve No. 2 W
P.C. Sta. = 7+13.39 W
P.I. Sta. = 7+72.64 W
P.T. Sta. = 8+31.86 W
Δ = 3°30'20"
D = 2°57'32.89"
R = 1936.23'
L = 118.47'
T = 59.25'

Curve No. 3 W
P.C. Sta. = 11+74.06 W
P.I. Sta. = 13+55.03 W
P.T. Sta. = 15+12.39 W
Δ = 50°21'40"
D = 14°53'06.25"
R = 384.92'
L = 338.33'
T = 180.97'

Curve No. 3 P
P.C. Sta. = 7+29.35 P
P.I. Sta. = 7+99.39 P
P.C.C. Sta. = 8+67.10 P
Δ = 25°31'00"
D = 18°31'24.6"
R = 309.31'
L = 137.75'
T = 70.04'

Curve No. 4 P
P.C.C. Sta. = 8+67.10 P
P.I. Sta. = 9+57.85 P
P.T. Sta. = 10+47.10 P
Δ = 18°00'00"
D = 10°00'00"
R = 572.96'
L = 180.00'
T = 90.75'



DETAIL A

Note:
See Alignment and Witness Plan, Sheet 15. for location of Kilgour St. traverse Line.

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ALIGNMENT PLAN
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		JH	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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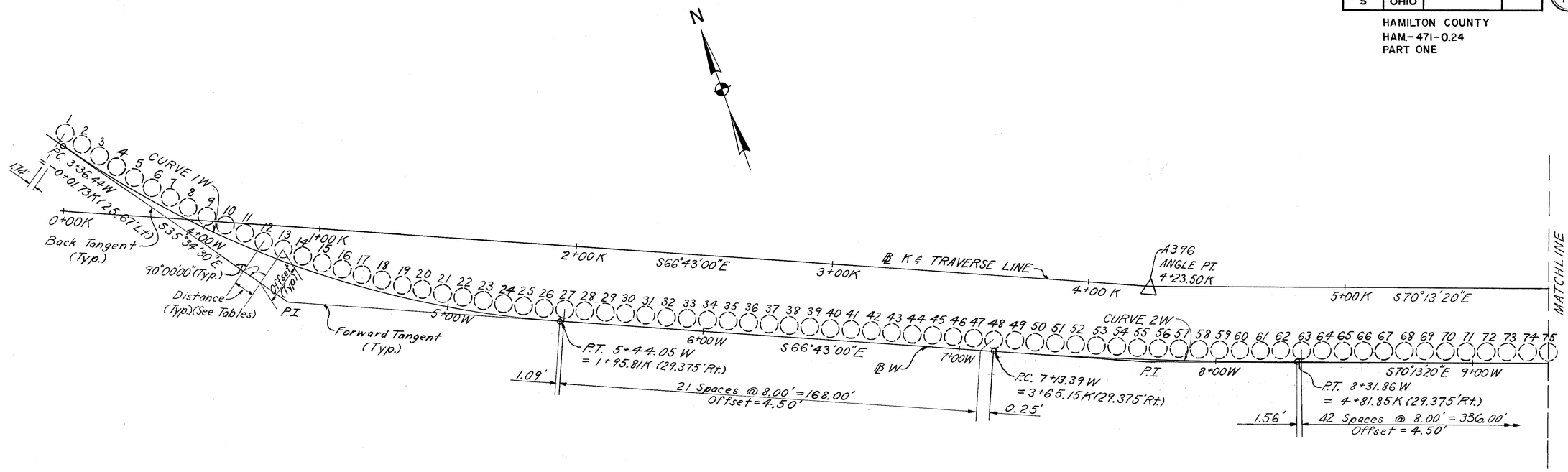
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PLAN

Notes:
For Curve Data see sheet 130.
Piles 1 thru 112 are 7.00' Diameter
Piles 113 thru 122 are 6.00' Diameter
Piles 123 thru 137 are 5.00' Diameter
Piles 138 thru 161 are 4.00' Diameter
For Alignment and Witness Plan see sheet 15.

PILES LOCATED OFF CURVE 1W BACK TANGENT		
PILE NO.	DISTANCE (ft.)	OFFSET (ft.)
1		4.50
P.C.	-1.74	
2	6.26	4.55
3	8.00	4.77
4	7.99	5.16
5	7.98	5.71
6	7.97	6.44
7	7.95	7.33
8	7.93	8.39
9	7.90	9.62
10	7.88	11.02
11	7.85	12.58
12	7.81	14.31
13	7.77	16.21
14	7.73	18.27
P.T.	5.42	

PILES LOCATED OFF CURVE 1W FORWARD TANGENT		
PILE NO.	DISTANCE (ft.)	OFFSET (ft.)
P.T.		
15	12.52	16.37
16	7.77	14.46
17	7.81	12.72
18	7.84	11.14
19	7.87	9.73
20	7.90	8.49
21	7.93	7.41
22	7.95	6.50
23	7.97	5.76
24	7.98	5.19
25	7.99	4.79
26	8.00	4.56
P.T.	6.91	

PILES LOCATED OFF CURVE 2W BACK TANGENT		
PILE NO.	DISTANCE (ft.)	OFFSET (ft.)
P.C.	7.75	
49	8.00	4.52
50	8.00	4.56
51	8.00	4.65
52	8.00	4.76
53	8.00	4.91
54	8.00	5.09
55	8.00	5.30
P.T.	3.50	

PILES LOCATED OFF CURVE 2W FORWARD TANGENT		
PILE NO.	DISTANCE (ft.)	OFFSET (ft.)
P.T.		
56	4.81	5.27
57	8.00	5.06
58	8.00	4.88
59	8.00	4.74
60	8.00	4.63
61	8.00	4.55
62	8.00	4.51
P.T.	6.44	

Work this sheet with sheet 132.

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1

STAKE OUT PLAN
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TMC		W.L.	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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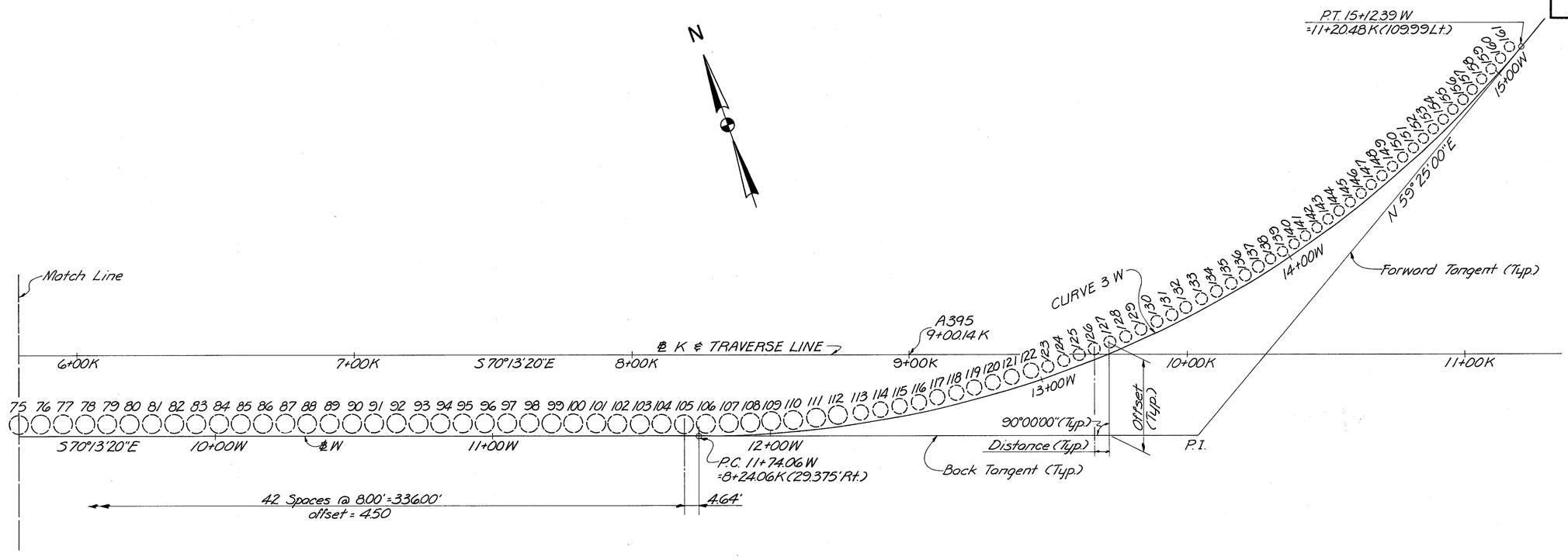
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PILES LOCATED OFF CURVE 3W BACK TANGENT		
PILE NO	DISTANCE(ft.)	OFFSET(ft.)
P.C.		
	3.36	
106		4.51
	8.00	
107		4.67
	7.99	
108		4.99
	7.98	
109		5.48
	7.97	
110		6.14
	7.96	
111		6.97
	7.94	
112		7.96
	7.41	
113		8.54
	6.91	
114		9.68
	6.88	
115		10.94
	6.86	
116		12.34
	6.83	
117		13.86
	6.80	
118		15.50
	6.77	
119		17.27
	6.74	
120		19.16
	6.70	
121		21.18
	6.66	
122		23.32
	6.27	
123		24.92
	5.65	
124		26.95
	5.61	
125		29.07
	5.58	
126		31.27
	5.55	
127		33.56
	5.51	
128		35.94
	5.47	
129		38.40
	5.43	
130		40.95
	5.39	
131		43.59
	5.35	
132		46.31
	5.40	
P.I.		

PILES LOCATED OFF CURVE 3W FORWARD TANGENT		
PILE NO	DISTANCE(ft.)	OFFSET(Ft.)
P.I.		
	37.75	
133		31.41
	5.58	
134		29.20
	5.61	
135		27.08
	5.65	
136		25.05
	5.68	
137		23.10
	4.96	
138		20.96
	4.77	
139		19.47
	4.79	
140		18.05
	4.81	
141		16.69
	4.83	
142		15.40
	4.85	
143		14.17
	4.86	
144		13.00
	4.88	
145		11.89
	4.89	
146		10.85
	4.90	
147		9.88
	4.92	
148		8.96
	4.93	
149		8.12
	4.94	
150		7.33
	4.95	
151		6.61
	4.96	
152		5.96
	4.97	
153		5.37
	4.97	
154		4.85
	4.98	
155		4.39
	4.98	
156		4.00
	4.99	
157		3.67
	4.99	
158		3.40
	5.00	
159		3.21
	5.00	
160		3.08
	5.00	
161		3.01
	2.58	
P.T.		

NOTES:
For Curve Data see sheets 130.
Piles 1 thru 112 are 7.00' Diameter
Piles 113 thru 122 are 6.00' Diameter
Piles 123 thru 137 are 5.00' Diameter
Piles 138 thru 161 are 4.00' Diameter
For Alignment and Witness Plan see sheet 15.

Work this sheet with sheet 131.

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STAKE OUT PLAN
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		JHO	2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

133
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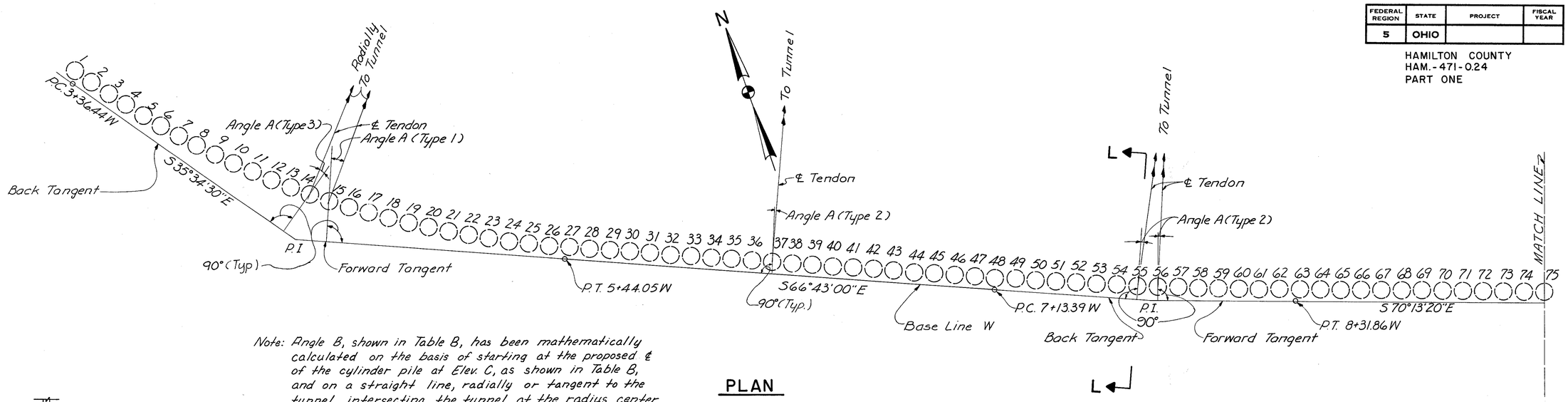
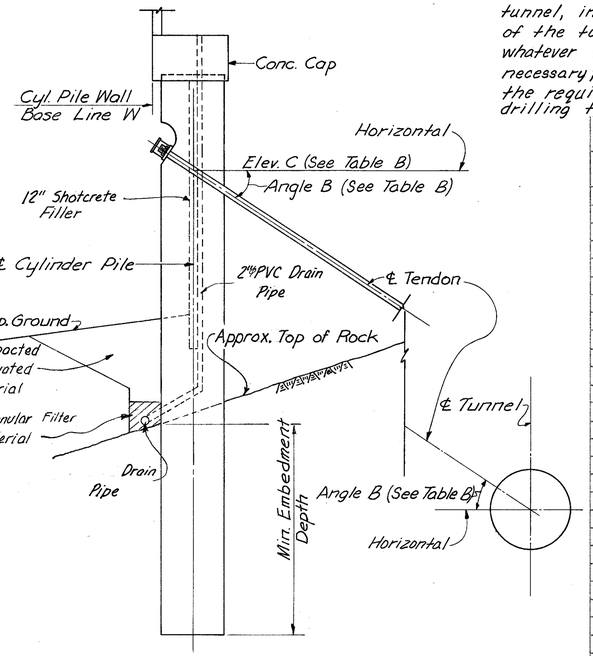
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PLAN

Note: Angle B, shown in Table B, has been mathematically calculated on the basis of starting at the proposed ℄ of the cylinder pile at Elev. C, as shown in Table B, and on a straight line, radially or tangent to the tunnel, intersecting the tunnel at the radius center of the tunnel. However, the Contractor must use whatever values of Angle A or Angle B he deems necessary, because it is his responsibility to hit the required target in the tunnel within the allowed drilling tolerances.



SECTION L-L
(Cylinder Piles 1 thru 137)

① Horizontal Angle to the tunnel
② Vertical Angle to the tunnel
③ Elevation of tendon at ℄ of pile
④ Minimum Depth of Pile Embedment in Rock

TABLE B

PILE NO.	*TYPE	ANGLE A ①	ANGLE B ②	ELEV. C ③	MIN. EMBED. DEPTH (Ft.) ④
1	3	0°03'	37°00'	564.79	20
2	3	1°01'	36°40'	563.96	↑
3	3	1°59'	36°20'	563.17	
4	3	2°57'	36°05'	562.42	
5	3	3°54'	36°00'	561.58	
6	3	4°52'	35°30'	560.83	
7	3	5°50'	35°15'	560.08	
8	3	6°48'	35°00'	559.33	
9	3	7°46'	34°50'	558.67	
10	3	8°44'	34°35'	558.00	
11	3	9°42'	34°25'	557.33	
12	3	10°40'	34°15'	556.71	
13	3	11°38'	34°10'	556.13	
14	3	12°36'	34°05'	555.58	
15	1	17°35'	34°00'	555.08	
16	1	16°36'	33°55'	554.58	
17	1	15°38'	33°50'	554.17	
18	1	14°40'	33°50'	553.71	
19	1	13°42'	33°50'	553.33	
20	1	12°44'	33°55'	552.96	
21	1	11°45'	33°55'	552.58	
22	1	10°47'	33°55'	552.17	
23	1	9°48'	33°55'	551.67	↓
24	1	8°50'	33°55'	551.08	20
25	1	7°51'	33°55'	550.54	21
26	1	6°52'	33°55'	549.92	↑
27	1	5°54'	34°00'	549.50	
28	1	4°55'	34°10'	549.33	
29	1	3°56'	34°10'	549.00	↓
30	1	2°56'	34°15'	548.75	21
31	1	1°57'	34°15'	548.50	22
32	1	0°58'	34°10'	548.17	↑
33	2	0°	34°05'	547.92	↓
34	2	0°	34°05'	547.92	22

* Type 1, Angle A, is measured clockwise from a line perpendicular to the Baseline W or Baseline tangents thru the ℄ of the pile to the ℄ tendon.
* Type 2, Angle A, is measured along a line perpendicular to the Baseline W or Baseline tangents thru the ℄ of the pile

TABLE B

PILE NO.	*TYPE	ANGLE A ①	ANGLE B ②	ELEV. C ③	MIN. EMBED. DEPTH (Ft.) ④
35	2	0°	34°05'	547.83	22
36	↑	↑	34°05'	547.83	↑
37			34°05'	547.75	
38			34°00'	547.58	
39			33°55'	547.33	
40			33°50'	547.08	
41			33°45'	546.83	
42			33°35'	546.50	
43			33°25'	546.17	
44			33°15'	545.83	
45			33°10'	545.50	
46			33°00'	545.17	↓
47			32°50'	544.83	22
48			32°45'	544.58	21
49			32°35'	544.25	↑
50			32°30'	544.08	
51			32°30'	543.83	
52			32°25'	543.67	
53			32°25'	543.50	
54			32°25'	543.33	
55			32°30'	543.25	
56			32°25'	543.17	
57			32°20'	543.08	
58			32°20'	543.08	
59			32°15'	543.08	
60			32°15'	543.08	
61			32°15'	543.17	
62			32°20'	543.25	↓
63			32°25'	543.33	21
64			32°30'	543.42	22
65			32°35'	543.58	↑
66			32°40'	543.75	
67	↓	↓	32°45'	543.92	22
68	2	0°	32°50'	544.08	23

For Continuation see Sheet 134.

* Type 3, Angle A, is measured counterclockwise from a line perpendicular to the Baseline W or Baseline tangents thru the ℄ of the pile to the ℄ tendon.

NOTES: Top of rock elevations to be determined in field by Project Engineer. Elevation B shown on sheet 135 to be lowered, if necessary, to provide minimum embedment depth shown in Table B. If depths of holes are lowered by Engineer, then beams will have to be lengthened in accordance with details shown on sheets 139 and 142. Cost to lengthen beams will be paid for under 513, "Structural Steel" and 513, "Steel Pipe Beam Splice" or "Steel Plate Beam Splice".

Elevation C must be maintained for all cylinder piles. If beams are fabricated too long or too short or if holes are excavated too deep; then, beams will have to be lengthened or bottom of holes lowered in order to provide Elevation C for cylinder piles 1 thru 137. Cost of lengthening beams or lowering of holes for these reasons will not be included in 513, "Structural Steel"; 513, "Steel Pipe Beam Splice"; 513, "Steel Plate Beam Splice"; 503, "Rock Excavation, Size Specified Cylinder Pile" or 511, "Class C Concrete, Size Specified Cylinder Piles" but will be incidental to other items of project.

EXTREME CARE MUST BE EXERCISED TO MAINTAIN BEAM IN PROPER LOCATION IN CYLINDER PILE HOLE, IN ORDER THAT ANGLE A CAN BE MAINTAINED. THIS IS NECESSARY BECAUSE CONTRACTOR MUST DRILL THRU CYLINDER PILE, OVERBURDEN AND ROCK TO HIT TARGET IN TUNNEL.

Work this sheet with sheet 134.

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CINCINNATI, OHIO

1

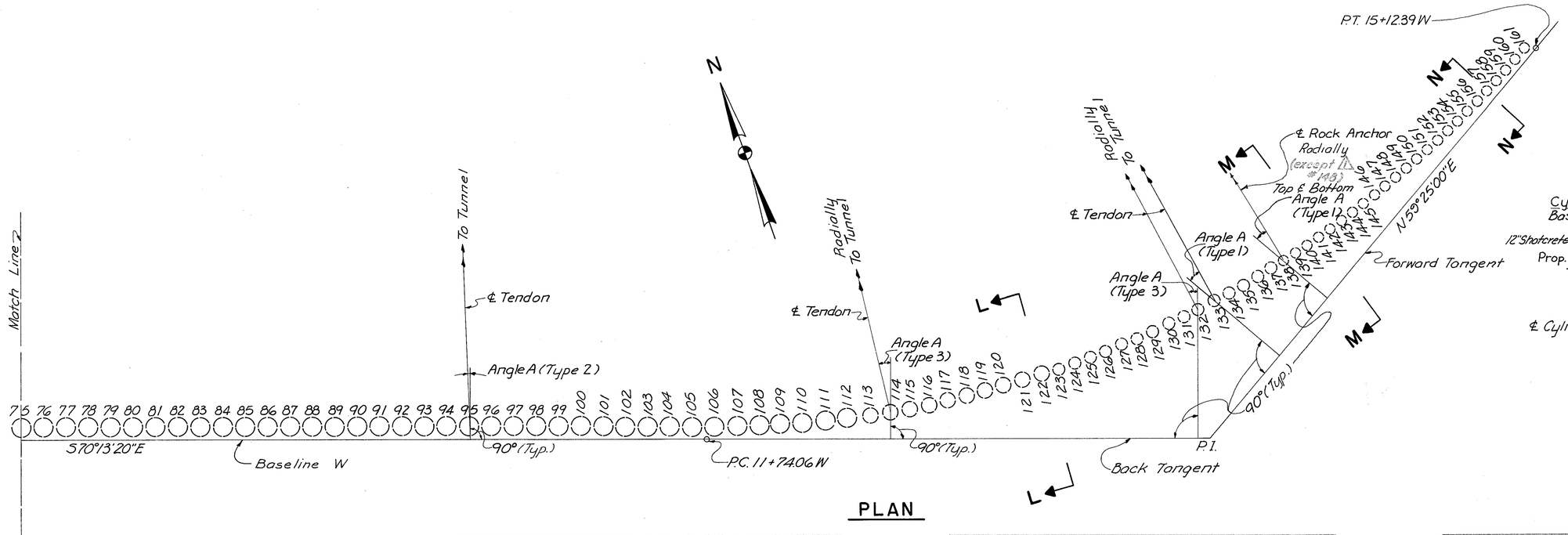
CYLINDER PILE DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		YK	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

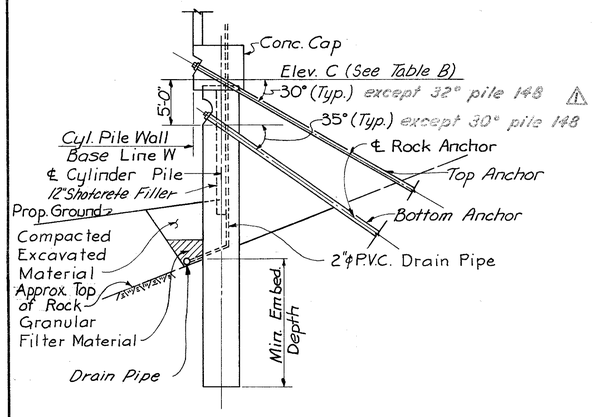
134 / 172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PLAN

SECTION N-N
(Cylinder Piles 153 thru 161)



SECTION M-M
(Cylinder Piles 138 thru 152)

① Horizontal Angle to the Tunnel
② Vertical Angle to the Tunnel
③ Elevation of tendon at ℄ of pile
④ Minimum Depth of Pile Embedment in Rock

TABLE B

PILE NO.	*TYPE	ANGLE A ①	ANGLE B ②	ELEV. C ③	MIN. EMBED. DEPTH (FF) ④
69	2	0°	33°00'	544.25	23
70	↓	↓	33°05'	544.50	23
71			33°15'	544.67	23
72			33°20'	544.92	24
73			33°30'	545.17	24
74			33°40'	545.42	24
75			33°45'	545.67	25
76			33°55'	545.92	↑
77			34°05'	546.25	
78			34°15'	546.50	
79			34°25'	546.83	
80			34°35'	547.08	
81			34°45'	547.42	
82			34°50'	547.67	
83			35°00	547.92	
84			35°10'	548.17	
85			35°20'	548.42	
86			35°25'	548.67	
87			35°35'	548.92	
88			35°40'	549.17	↓
89			35°50	549.42	25
90			36°00'	549.67	24
91			36°05'	549.83	23
92			33°50'	545.08	22
93			34°00'	545.42	22
94			34°10'	545.83	21
95			34°20'	546.08	↑
96			34°30'	546.33	↓
97			34°35'	546.58	21
98	↓	↓	34°35'	546.83	20
99	2	0°	34°40'	547.00	20
100	3	0°25'	34°40'	547.17	21
101	3	1°25'	36°25'	551.00	21
102	3	2°24'	36°15'	551.00	21

* Type 1, Angle A, is measured clockwise from a line perpendicular to the Baseline W or Baseline tangents thru the ℄ of the pile to the ℄ tendon.
* Type 2, Angle A, is measured along a line perpendicular to the Baseline W or Baseline tangents thru the ℄ of the pile.

TABLE B

PILE NO.	*TYPE	ANGLE A ①	ANGLE B ②	ELEV. C ③	MIN. EMBED. DEPTH (FF) ④
103	3	3°23'	36°05	551.08	22
104	↓	4°23'	35°55'	551.08	22
105		5°22'	35°40'	551.08	22
106		6°20'	35°20'	551.17	21
107		7°19'	35°05'	551.17	21
108		8°18'	34°45'	551.17	21
109		9°17'	34°30'	551.25	20
110		10°15'	34°15'	↓	20
111		11°14'	34°00'		20
112		12°12'	33°45'		19
113		13°06	33°25'		19
114		13°57'	33°15'		19
115		14°48'	33°05'		18
116		15°39'	32°55'		18
117		16°29'	32°45'		17
118		17°20'	32°35'		16
119		18°11'	32°25'	↓	16
120		19°02'	32°15'	551.25	16
121		19°52'	32°15'	551.50	15
122		20°43'	32°15'	551.75	15
123		21°30'	32°05'	552.00	15
124		22°13'	32°00'	552.00	14
125		22°56'	32°00'	552.00	14
126		23°40'	31°50'	552.00	14
127		24°23'	31°45'	552.00	13
128		25°06'	31°55'	552.33	13
129		25°50'	32°00'	552.83	13
130		26°33'	32°10'	553.25	12
131	↓	27°16'	32°10'	553.50	12
132	3	28°00'	32°15'	553.71	12
133	1	21°39'	32°20'	553.92	11
134	↑	20°56'	32°20'	554.17	11
135		20°12'	32°25'	554.33	11
136	↓	19°29'	32°30'	554.58	10
137	1	18°46'	32°35'	554.83	10

* Type 3, Angle A, is measured counterclockwise from a line perpendicular to the Baseline W or Baseline tangents thru the ℄ of the pile to the ℄ tendon.

TABLE B

PILE NO.	TYPE Top & Bott*	ANGLE A ①	ELEV. C ③	MIN. EMBED. DEPTH (FF) ④
138	1	17°38'	565.33	15
139	↓	16°53'	565.51	↑
140		16°08'	565.69	
141		15°23'	565.88	
142		14°38'	566.06	
143		13°53'	566.24	↓
144		13°08'	566.42	15
145		12°23'	566.60	14
146		11°38'	566.79	14
147		10°53'	566.97	13
148		⚠ (10°08' 23°09')	567.15	13
149		9°23'	567.33	12
150		8°38'	567.51	12
151		7°53'	567.69	11
152		7°08'	567.88	11
153		6°23'	568.06	10
154		5°38'	568.24	↑
155		4°53'	568.42	
156		4°08'	568.60	
157		3°23'	568.78	
158		2°38'	568.97	
159		1°53'	569.15	
160	↓	1°08'	569.33	↓
161	1	0°23'	569.51	10

⚠ Revised 11-10-80

Notes:
For Section L-L see sheet 133.
Work this sheet with sheet 133.

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CINCINNATI, OHIO

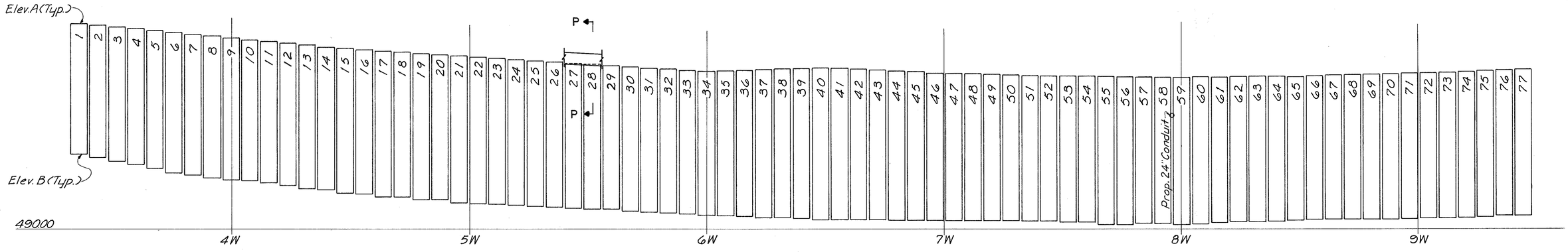
CYLINDER PILE DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		DRL	JHO 2-27-79	

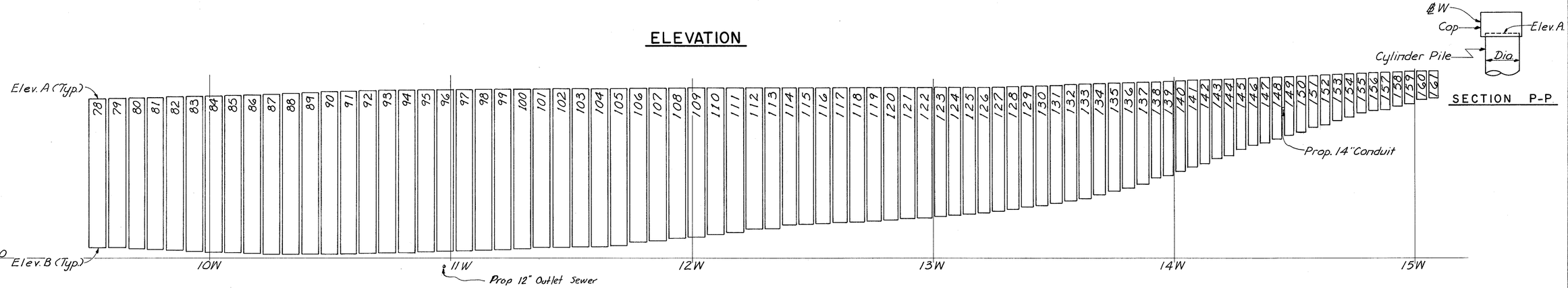
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

135/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



ELEVATION



SECTION P-P

ELEVATION

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
1	7'	577.35	522.00
2	7'	576.60	520.50
3	7'	575.80	519.50
4	7'	575.00	517.50
5	7'	574.30	516.00
6	7'	573.50	514.00
7	7'	572.75	513.00
8	7'	572.00	512.00
9	7'	571.20	511.00
10	7'	570.40	510.50
11	7'	569.60	510.00
12	7'	568.90	509.00
13	7'	568.10	507.50
14	7'	567.50	507.00
15	7'	566.90	505.50
16	7'	566.30	505.00
17	7'	565.70	504.00
18	7'	565.10	504.00
19	7'	564.50	502.50
20	7'	563.90	502.50

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
21	7'	563.30	501.50
22	7'	562.70	501.00
23	7'	562.10	500.50
24	7'	561.50	500.50
25	7'	560.90	500.00
26	7'	560.40	499.50
27	7'	559.70	499.00
28	7'	559.10	499.00
29	7'	558.50	498.50
30	7'	557.90	498.00
31	7'	557.30	497.50
32	7'	556.70	497.00
33	7'	556.00	496.50
34	7'	556.80	496.00
35	7'	557.80	495.50
36	7'	558.80	495.50
37	7'	558.80	495.00
38	7'	558.60	495.00
39	7'	558.40	494.50
40	7'	558.20	494.00

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
41	7'	557.90	494.00
42	7'	557.60	494.00
43	7'	557.25	494.00
44	7'	557.00	493.50
45	7'	556.60	493.50
46	7'	556.25	493.50
47	7'	555.95	493.50
48	7'	555.65	493.50
49	7'	555.40	493.50
50	7'	555.10	493.50
51	7'	554.90	493.50
52	7'	554.70	493.50
53	7'	554.50	493.00
54	7'	554.40	493.00
55	7'	554.25	492.00
56	7'	554.20	492.00
57	7'	554.10	492.50
58	7'	554.10	492.50
59	7'	554.10	492.00
60	7'	554.10	492.00

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
61	7'	554.20	492.50
62	7'	554.25	492.50
63	7'	554.40	493.00
64	7'	554.50	493.00
65	7'	554.60	493.50
66	7'	554.75	493.50
67	7'	554.90	493.50
68	7'	555.10	493.50
69	7'	555.30	494.00
70	7'	555.50	494.00
71	7'	555.75	494.00
72	7'	556.00	494.50
73	7'	556.20	494.50
74	7'	556.50	494.50
75	7'	556.75	495.00
76	7'	557.00	495.50
77	7'	557.30	495.50
78	7'	557.60	495.00
79	7'	557.90	495.00
80	7'	558.20	494.00

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
81	7'	558.50	493.50
82	7'	558.70	493.00
83	7'	559.00	493.00
84	7'	559.25	492.50
85	7'	559.50	492.00
86	7'	559.75	491.50
87	7'	560.00	491.50
88	7'	560.25	491.50
89	7'	560.50	491.50
90	7'	560.75	491.50
91	7'	561.00	491.50
92	7'	561.10	491.50
93	7'	561.30	492.00
94	7'	561.40	492.00
95	7'	561.55	492.50
96	7'	561.70	492.50
97	7'	561.80	493.00
98	7'	561.85	493.00
99	7'	561.90	493.50
100	7'	562.00	494.00

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
101	7'	562.00	494.50
102	7'	562.00	494.50
103	7'	562.00	495.00
104	7'	562.10	495.00
105	7'	562.10	495.50
106	7'	562.10	497.00
107	7'	562.15	497.50
108	7'	562.15	499.00
109	7'	562.06	499.50
110	7'	562.06	501.00
111	7'	562.06	502.00
112	7'	562.06	503.50
113	6'	562.06	503.50
114	6'	562.06	505.00
115	6'	562.06	505.50
116	6'	562.06	505.50
117	6'	562.06	506.00
118	6'	562.06	506.00
119	6'	562.06	506.50
120	6'	562.06	507.00

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
121	6'	562.06	507.50
122	6'	562.06	508.00
123	5'	562.06	508.50
124	5'	562.06	509.00
125	5'	562.06	509.50
126	5'	562.06	510.00
127	5'	562.06	510.50
128	5'	562.40	511.50
129	5'	562.60	512.50
130	5'	562.80	513.00
131	5'	563.05	514.00
132	5'	563.30	515.00
133	5'	563.50	516.00
134	5'	563.70	517.50
135	5'	564.00	519.00
136	5'	564.15	520.50
137	5'	564.35	522.00
138	4'	564.55	524.50
139	4'	564.70	525.50
140	4'	564.90	527.00

TABLE C

Pile No.	Dia.⑤	Elev. A⑥	Elev. B⑦
141	4'	565.10	529.00
142	4'	565.30	530.50
143	4'	565.45	532.50
144	4'	565.65	534.00
145	4'	565.80	536.50
146	4'	566.00	538.00
147	4'	566.20	539.00
148	4'	566.40	540.50
149	4'	566.60	542.00
150	4'	566.75	543.00
151	4'	566.95	545.50
152	4'	567.10	546.50
153	4'	567.30	548.00
154	4'	567.50	548.50
155	4'	567.70	550.00
156	4'	567.85	550.50
157	4'	568.05	551.00
158	4'	568.20	552.50
159	4'	568.40	553.00
160	4'	568.60	554.50
161	4'	568.80	555.00

Notes: Elevation of bottom of hole to be no higher than Elevation B, unless authorized by the Engineer.
⑤ Dia. - Diameter of Pile
⑥ Elevation A - Top of Pile
⑦ Elevation B - Bottom of Pile
Elevation B (bottom of hole) for Cylinder Pile No 96 shall not be lowered.
⑧ For Piles 1 thru 137 the bottom of the drilled shaft shall be 4" below Elev. B so that 4" of concrete may be placed below the base plate. ⑧

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CINCINNATI, OHIO

CYLINDER PILE DETAILS

CYLINDER PILE WALL

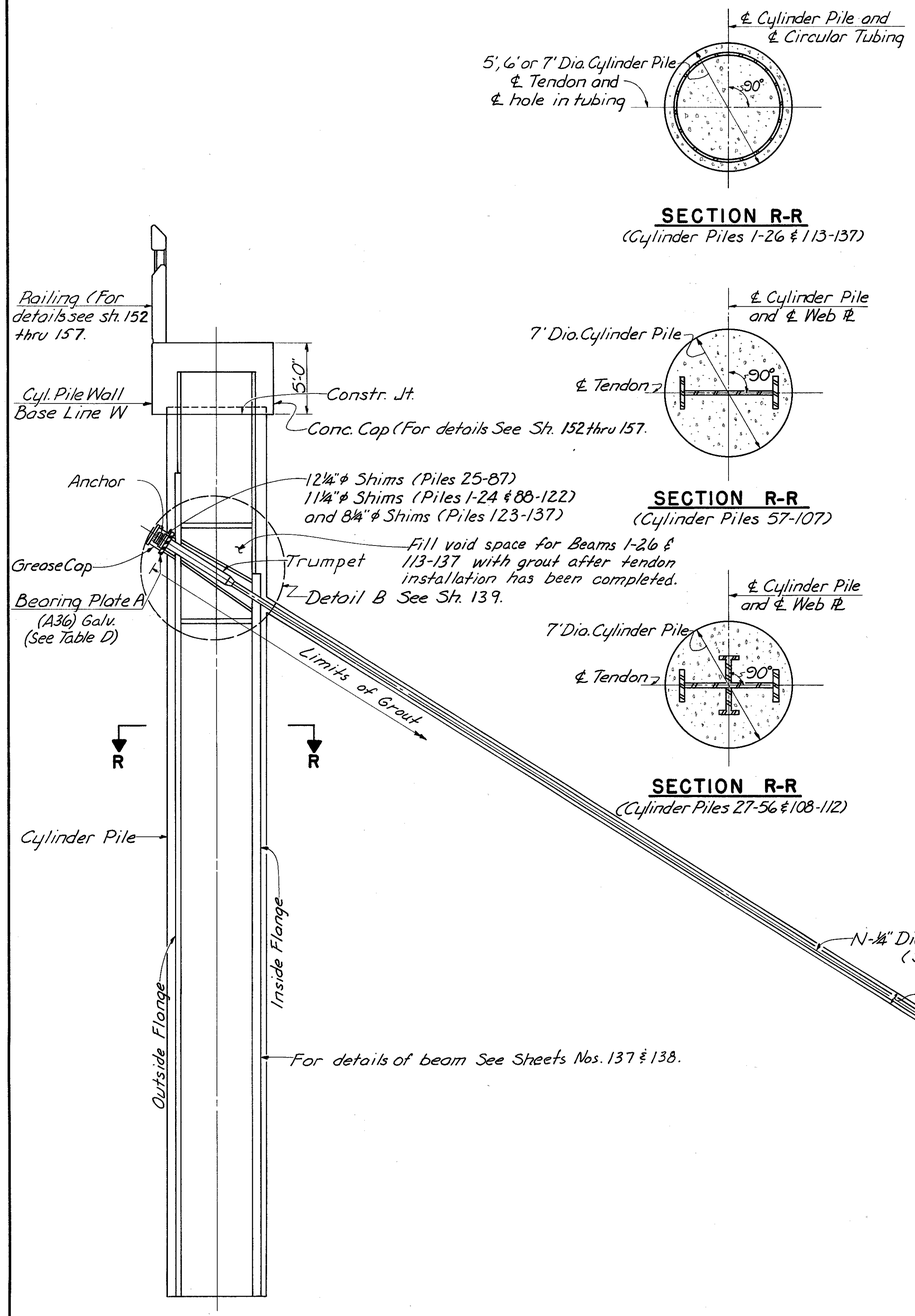
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		JH	JHO 2-27-79	9-12-80

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

136/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE



TYPICAL SECTION
(Cylinder Pile 1 thru 137)

TABLE D				
PILE NO.	BEARING ⑧ PLATE A	BEARING ⑨ PLATE B	NO. OF 1/4" ϕ WIRES N ⑩	C ⑪
1	18"ϕ x 3"	2½"x20"x20"	103	5"
2	↑	2½"x20½"x20½"	105	↑
3		2½"x20½"x20½"	106	
4		2½"x20½"x20½"	107	
5		2½"x21"x21"	111	
6		2½"x21"x21"	114	
7		2¾"x21½"x21½"	118	
8		2¾"x22"x22"	121	
9		2¾"x22"x22"	125	
10		2¾"x22½"x22½"	128	
11		3"x22½"x22½"	131	
12		3"x23"x23"	135	
13		3"x23½"x23½"	138	
14		3"x23½"x23½"	141	
15	↓	3"x24"x24"	144	
16	18"ϕ x 3"	3"x24"x24"	147	
17	18"ϕ x 3¼"	3⅜"x24"x24"	149	
18	↑	3⅜"x24½"x24½"	152	
19		3⅜"x24½"x24½"	155	
20		3⅜"x25"x25"	158	
21		3⅜"x25"x25"	162	
22		3⅜"x25½"x25½"	165	
23	↓	3⅜"x25½"x25½"	168	↓
24	18"ϕ x 3" - 3¼"	3⅜"x26"x26"	170	5"
25	19"ϕ x 3" - 3½"	3⅜"x26"x26"	172	6"
26	19"ϕ x 3½"	3⅜"x26"x26"	174	↑
27	19"ϕ x 3"	3⅜"x26½"x26½"	176	
28		3⅜"x26½"x26½"	179	
29		3⅜"x26½"x26½"	182	
30		3⅜"x27"x27"	185	
31		3⅜"x27"x27"	188	
32		3⅜"x27"x27"	189	
33		3⅜"x27½"x27½"	191	
34		3⅜"x27½"x27½"	192	
35		3⅜"x27½"x27½"	193	
36	↓	3⅜"x27½"x27½"	194	↓
37	19"ϕ x 3"	3⅝"x28"x28"	196	6"

TABLE D				
PILE NO.	BEARING ⑧ PLATE A	BEARING ⑨ PLATE B	NO. OF 1/4" ϕ WIRES N ⑩	C ⑪
38	19"ϕ x 3"	3⅝"x28"x28"	198	6"
39	↑	3¾"x28"x28"	199	↑
40		3¾"x28"x28"	201	
41		3¾"x28"x28"	203	
42		3¾"x28½"x28½"	207	
43		↑	↑	
44				
45				
46				
47				
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61				
62				
63				
64				
65				
66				
67				
68				
69				
70		↓	↓	
71			207	
72		3¾"x28½"x28½"	204	
73		3¾"x28"x28"	203	
74		3¾"x28"x28"	201	
75		3¾"x28"x28"	199	
76		3⅝"x28"x28"	197	
77		3⅜"x27½"x27½"	195	
78		3⅜"x27½"x27½"	193	
79		3⅜"x27½"x27½"	191	
80		3⅜"x27"x27"	188	
81		3⅜"x27"x27"	185	
82	↓	3⅜"x27"x27"	183	↓
83	19"ϕ x 3"	3⅜"x26½"x26½"	180	6"

TABLE D				
PILE NO.	BEARING ⑧ PLATE A	BEARING ⑨ PLATE B	NO. OF 1/4" ϕ WIRES N ⑩	C ⑪
84	19"ϕ x 3"	3⅜"x26½"x26½"	178	6"
85	↑	3⅜"x26½"x26½"	176	↑
86		3⅜"x26"x26"	174	
87	19"ϕ x 3"	3⅜"x26"x26"	172	6"
88	18"ϕ x 3"	3⅜"x26"x26"	170	5"
89	↑	3⅜"x25½"x25½"	168	↑
90		3⅜"x25½"x25½"	166	
91		3⅜"x25½"x25½"	164	
92		3⅜"x26"x26"	170	
93		3⅜"x25½"x25½"	168	
94		3⅜"x25½"x25½"	166	
95		3⅜"x25½"x25½"	164	
96		3⅜"x25"x25"	162	
97		↑	160	
98			158	
99		3⅜"x25"x25"	156	
100		3⅜"x24½"x24½"	154	
101		3⅜"x24"x24"	145	
102		3⅜"x24"x24"	144	
103		3"x23½"x23½"	142	
104		3"x23½"x23½"	140	
105		3"x23½"x23½"	138	
106		3"x23"x23"	137	
107		↑	135	
108			133	
109		3"x23"x23"	132	
110		2¾"x22½"x22½"	130	
111		2¾"x22½"x22½"	128	
112		2¾"x22½"x21½"	127	
113		2½"x21"x21"	110	
114		2½"x20½"x20½"	108	
115		2½"x20½"x20½"	107	
116		2½"x20½"x20½"	105	
117		2½"x20"x20"	104	
118		2½"x20"x20"	102	
119		2½"x20"x20"	101	
120		2½"x19½"x19½"	99	
121	↓	2½"x19½"x19½"	98	↓
122	18"ϕ x 3"	2½"x19½"x19½"	96	5"
123	15"ϕ x 3¼" - 3"	2½"x18"x18"	81	4"
124	↑	2⅛"x17½"x17½"	79	↑
125		2⅛"x17½"x17½"	78	
126		2⅛"x17½"x17½"	76	
127		2⅛"x17"x17"	74	
128		2⅛"x17"x17"	72	
129		2⅛"x16½"x16½"	71	
130		2"x16½"x16½"	69	
131		2"x16½"x16½"	68	
132		2"x16"x16"	67	
133		↓	66	
134			65	
135		2"x16"x16"	64	
136		2"x15½"x15½"	62	
137	15"ϕ x 3¼" - 3"	2"x15½"x15½"	61	4"

Notes: Bearing Plate material shall be ASTM A36 Steel Silicon-Killed fine-grain practice
⑧ Size of bearing plate A (@ caisson end)
⑨ Size of bearing plate B (@ tunnel end)
⑩ Number of ¼" diameter wires
⑪ Size of Galv. Rigid Pipe

Dimensions of square Bearing Plate B have been determined on the following basis:

SIZE OF SHIMS IN TUNNEL		
PILE NO.	SIZE OF SHIMS	DIA. OF HOLE IN BEARING PLATE
1-24 & 88-122	10" Square	7⅛" dia.
25-87	11" Square	7⅝" dia.
123-137	8¼" dia.	6" dia.

If diameter of hole is increased, size of shim decreased, or shim omitted; then dimensions of bearing plate will have to be revised by Contractor. If size of bearing plate increases, the additional metal will be at no cost to state.

Work Sheets 136 thru 139 together

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

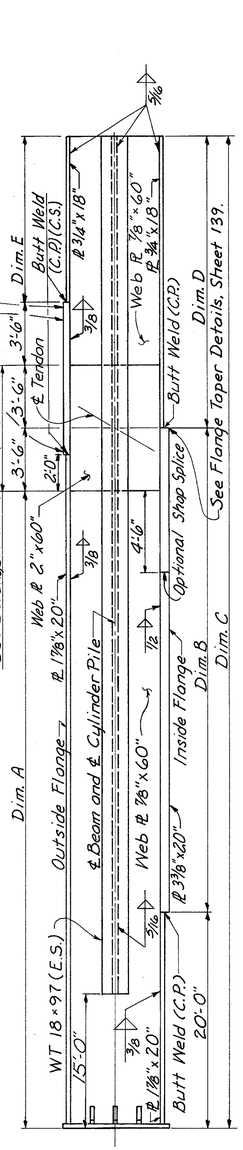
STRUCTURAL STEEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

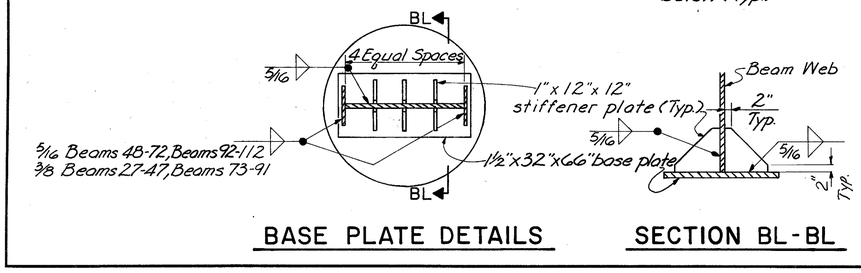
DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
JHO HLL	YK		WL	JHO 2-27-79	3-18-80

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

137/172

HAMILTON COUNTY
HAM.-471 - 0.24
PART ONE





BASE PLATE DETAILS — SECTION BL-BL

PILE NO.	DIMENSION A	B	C	D	E
27	47'-0"	30'-6"	63'-3"	12'-9"	5'-9"
28	46'-10"	30'-4"	62'-8"	12'-4"	5'-4"
29	47'-0"	30'-6"	62'-7"	12'-1"	5'-1"
30	47'-3"	30'-9"	62'-6"	11'-9"	4'-9"
31	47'-6"	31'-0"	62'-5"	11'-5"	4'-5"
32	47'-8"	31'-2"	62'-4"	11'-2"	4'-2"
33	47'-11"	31'-5"	62'-6"	11'-1"	4'-1"
34	48'-5"	31'-11"	63'-2"	11'-3"	4'-3"
35	48'-10"	32'-4"	64'-8"	12'-4"	5'-4"
36	48'-10"	32'-4"	65'-8"	13'-4"	6'-4"
37	49'-3"	32'-9	66'-7"	13'-10"	6'-10"
38	49'-1"	32'-7"	66'-4"	13'-9"	6'-9"
39	49'-4"	32'-10"	66'-8"	13'-10"	6'-10"
40	49'-7"	33'-1"	66'-11"	13'-10"	6'-10"
41	49'-4"	32'-10"	66'-8"	13'-10"	6'-10"
42	49'-0"	32'-6"	66'-4"	13'-10"	6'-10"
43	48'-8"	32'-2"	66'-0"	13'-10"	6'-10"
44	48'-10"	32'-4"	66'-2"	13'-10"	6'-10"
45	48'-6"	32'-0"	65'-10"	13'-10"	6'-10"
46	48'-2"	31'-8"	65'-6"	13'-10"	6'-10"
47	47'-10"	31'-4"	65'-2"	13'-10"	6'-10"
48	47'-7"	31'-1"	64'-1"		
49	47'-3"	30'-9"	64'-7"		
50	47'-1"	30'-7"	64'-5"		
51	46'-10"	30'-4"	64'-2"		
52	46'-8"	30'-2"	64'-0"		
53	47'-0"	30'-6"	63'-4"		
54	46'-10"	30'-4"	64'-2"		
55	47'-9"	31'-3"	65'-1"		
56	47'-8"	31'-2"	65'-0"		
108	48'-8"	35'-8"	66'-0"		
109	48'-3"	35'-3"	65'-7"		
110	46'-9"	33'-9"	64'-1"		
111	45'-9"	32'-9"	63'-1"		
112	44'-3"	31'-3"	61'-7"		

DIMENSIONS TABLE *

(Beam Number and Cylinder Pile Number are the same)

Notes:
All dimensions are based on the assumption that the bottom of the beams are at Elev. B as shown in table on sheet 135.
E.S. indicates Each Side.
C.P. indicates Complete Penetration Weld.
C.S. indicates butt weld subject to Compressive Stress only.
Flange butt weld splices do not need to be ground flush.
For Placement of Structural Steel Sections in Cylinder Piles, see sheet 140.
* Steel beam dimensions A through E (for piles 27-56 & 108-112)

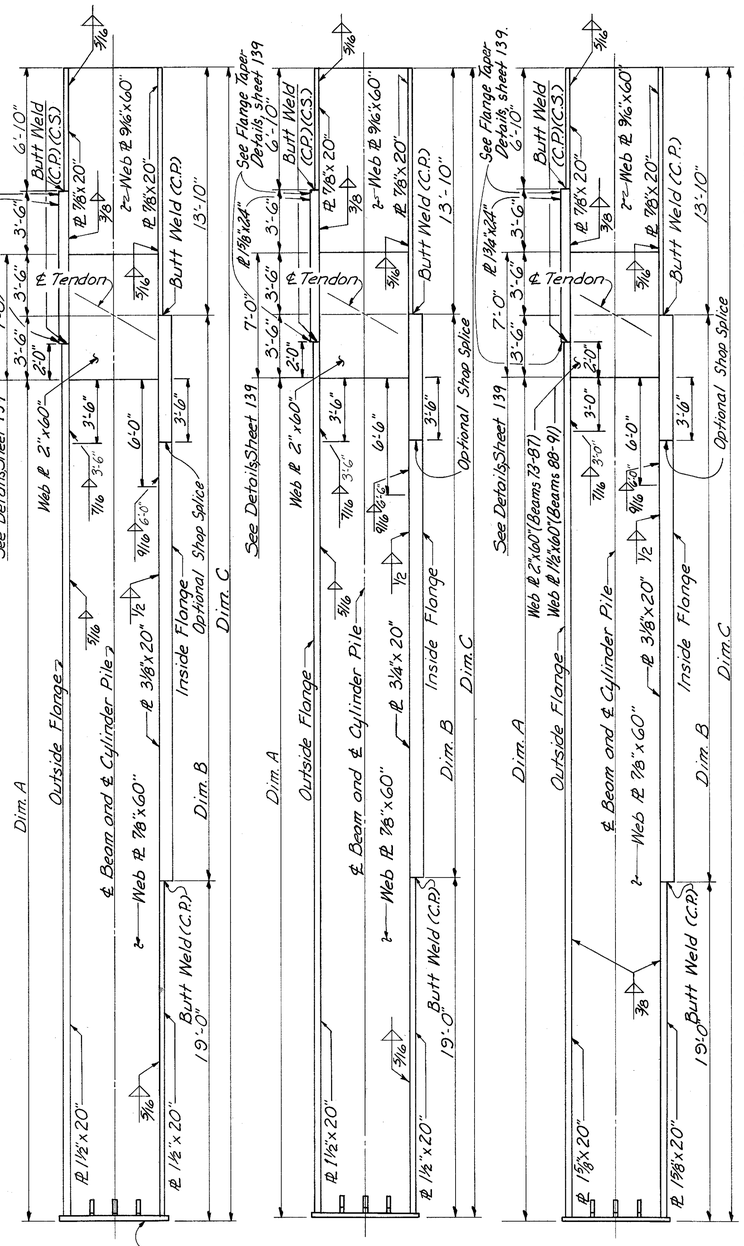
Work sheets 136 thru 139 together

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

STRUCTURAL STEEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
AYT	YK		JHO	2-27-79	

HAMILTON COUNTY
HAM. – 471-0.24
PART ONE



BEAMS 57-62 | BEAMS 63-72 | BEAMS 73-91 | BEAMS 92-96 | BEAMS 97-100 | BEAMS 101-104 | BEAMS 105-107

Notes:
For Placement of Structural Steel Sections in Cylinder Piles, see sheet 140.

C.P. indicates Complete Penetration Weld.
C.S. indicates butt weld subject to Compressive Stress only.
Flange butt weld splices do not need to be ground flush.

DIMENSIONS TABLE *

PILE NO.	DIMENSION A	B	C	D	E
57	47'-1"	31'-7"	64'-5"		
58	47'-1"	31'-7"	64'-5"		
59	47'-7"	32'-1"	64'-11"		
60	47'-7"	32'-1"	64'-11"		
61	47'-2"	31'-8"	64'-6"		
62	47'-3"	31'-9"	64'-7"		
63	46'-10"	31'-4"	64'-2"		
64	46'-11"	31'-5"	64'-3"		
65	46'-7"	31'-1"	63'-11"		
66	46'-9"	31'-3"	64'-1"		
67	46'-11"	31'-5"	64'-3"		
68	47'-1"	31'-7"	64'-5"		
69	46'-9"	31'-3"	64'-1"		
70	47'-0"	31'-6"	64'-4"		
71	47'-2"	31'-8"	64'-6"		
72	46'-11"	31'-5"	64'-3"		
73	47'-2"	31'-8"	64'-6"		
74	47'-5"	31'-11"	64'-9"		
75	47'-2"	31'-8"	64'-6"		
76	46'-11"	31'-5"	64'-3"		
77	47'-3"	31'-9"	64'-7"		
78	48'-0"	32'-6"	65'-4"		
79	48'-4"	32'-10"	65'-8"		
80	49'-7"	34'-1"	66'-11"		
81	50'-5"	34'-11"	67'-9"		
82	51'-2"	35'-8"	68'-6"		
83	51'-5"	35'-11"	68'-9"		
84	52'-2"	36'-8"	69'-6"		
85	52'-11"	37'-5"	70'-3"		
86	53'-8"	38'-2"	71'-0"		
87	53'-11"	38'-5"	71'-3"		
88	54'-2"	38'-8"	71'-6"		
89	54'-5"	38'-11"	71'-9"		
90	54'-8"	39'-2"	72'-0"		
91	54'-10"	39'-4"	72'-2"		
92	50'-1"	34'-7"	72'-5"	18'-10"	11'-10"
93	49'-11"	34'-5"	72'-0"	18'-7"	11'-7"
94	50'-4"	34'-10"	72'-3"	18'-5"	11'-5"
95	50'-1"	34'-7"	71'-10"	18'-3"	11'-3"
96	50'-4"	34'-10"	72'-0"	18'-2"	11'-2"
97	50'-1"	34'-7"	71'-7"	18'-0"	11'-0"
98	50'-4"	34'-10"	71'-8"	17'-10"	10'-10"
99	50'-0"	34'-6"	71'-2"	17'-8"	10'-8"
100	49'-8"	34'-2"	70'-9"	17'-7"	10'-7"
101	53'-0"	36'-6"	70'-4"		
102	53'-0"	36'-6"	70'-4"		
103	52'-7"	36'-1"	69'-11"		
104	52'-7"	36'-1"	69'-11"		
105	52'-1"	36'-7"	69'-5"		
106	50'-8"	35'-2"	68'-0"		
107	50'-2"	34'-8"	67'-6"		

(Beam Number and Cylinder Pile Number are the same)

Notes: *Steel beam dimensions A through E (for piles 57-107).
All dimensions are based on the assumption that the bottom of the beams are at Elev. B as shown in table on sheet 135.

Work sheets 136 thru 139 together.

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STRUCTURAL STEEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
AYT HLL	YK		H.L.	JHO 2-27-79	

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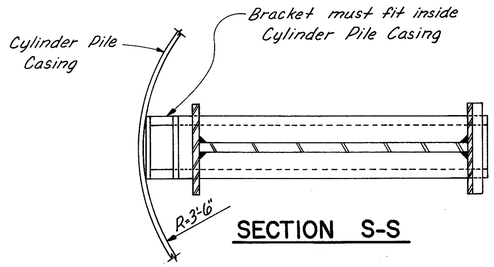
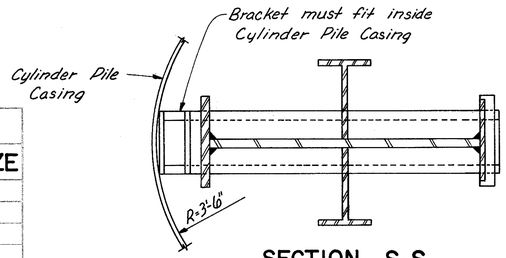
HAMILTON COUNTY
HAM.-471-0.24
PART ONE

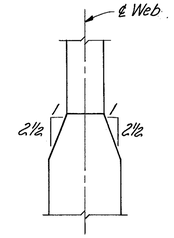


SECTION S-S

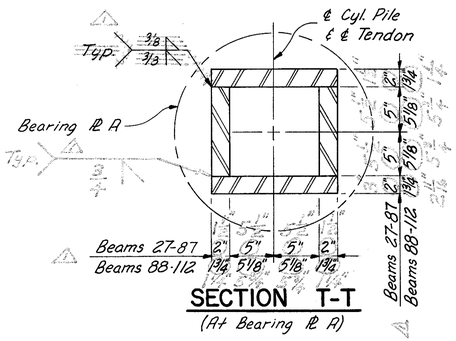
TABLE E				
TABLE OF FILLET WELD SIZE				
BEAM	A	B	C	D
57-72	3/8	5/8	9/16	3/8
73-87	3/8	5/8	1/2	7/16
88-91	5/16	9/16	1/2	3/8
92-96	5/16	9/16	1/2	9/16
97-100	5/16	9/16	3/8	9/16
101-104	5/16	1/2	1/2	5/16
105-107	5/16	3/8	3/8	5/16



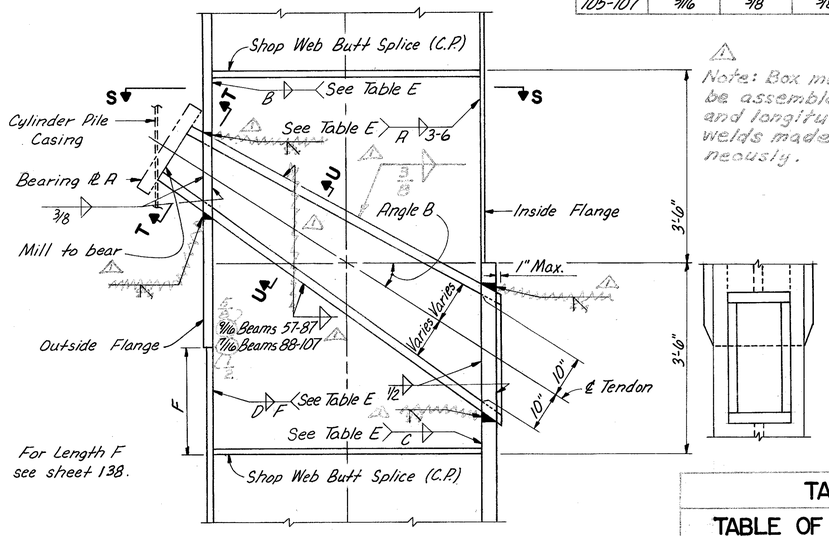
SECTION S-S



WEB SPLICE



SECTION T-T
(At Bearing ℄ A)



Note: Box members shall be assembled in a jig, and longitudinal welds made simultaneously.

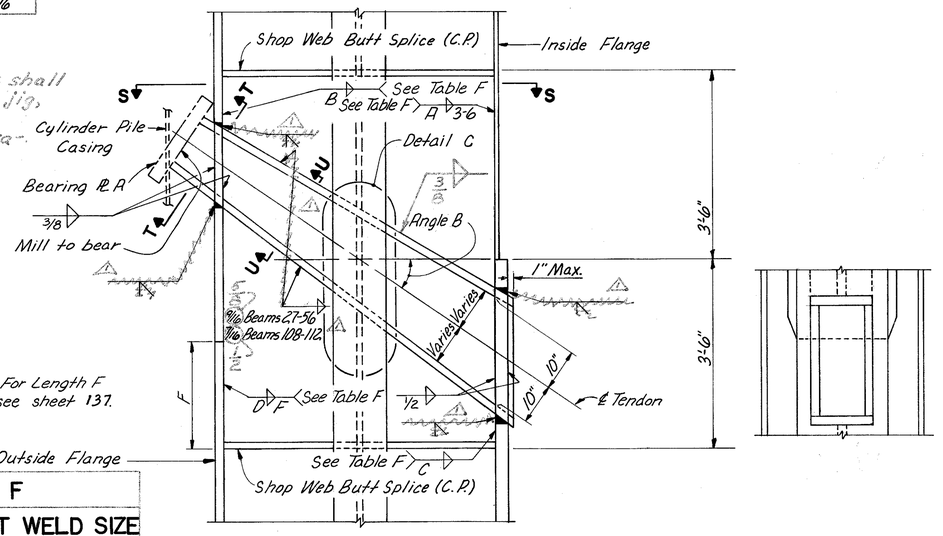
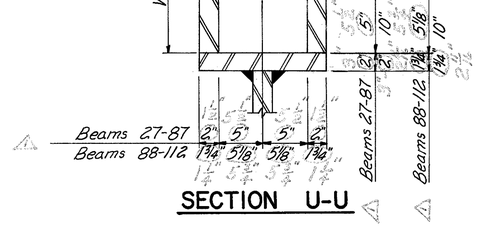


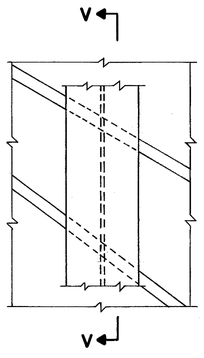
TABLE F				
TABLE OF FILLET WELD SIZE				
BEAM	A	B	C	D
27-29	3/8	9/16	1/2	3/8
30-32	3/8	5/8	1/2	3/8
33-36	3/8	5/8	9/16	3/8
37-47	3/8	11/16	5/8	7/16
48-56	3/8	5/8	5/8	3/8
108-112	5/16	7/16	1/2	5/16

DETAIL B
(BEAMS 57-107)

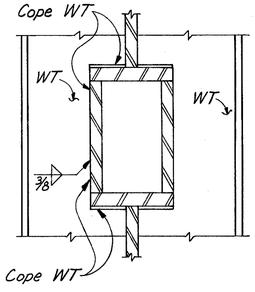
DETAIL B
(BEAMS 27-56 & 108-112)



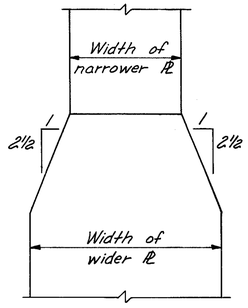
SECTION U-U



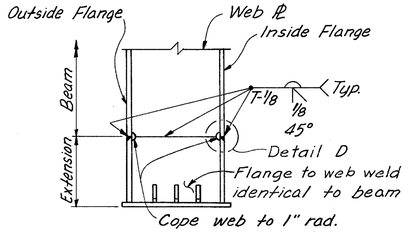
DETAIL C



SECTION V-V

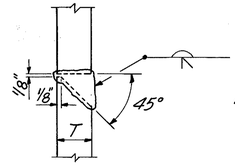


FLANGE TAPER DETAIL



STRUCTURAL STEEL SPLICE

Use where beam is to be lengthened as a result of bottom of hole being lowered from Elev. B in order to obtain minimum embedment depth of pile into rock. Cost of preparing and welding of extension paid for in Item 513, "Steel Plate Beam Splice."



DETAIL D

Size of plates of extension to be same as end of beam. Include weight of extension in Item 513, "Structural Steel" for payment.

Notes:
C.P. indicates complete penetration weld.
For Angle B see sheets 133 and 134.
For Bearing ℄ A see Table D sheet 136.
For Attachment of Brg. ℄ A to Bracket see sheet 140.
Work sheets 136 thru 139 together

Revised 2-2-81

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STRUCTURAL STEEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISION
VDG	MRT		DRL	JHO 2-27-79	

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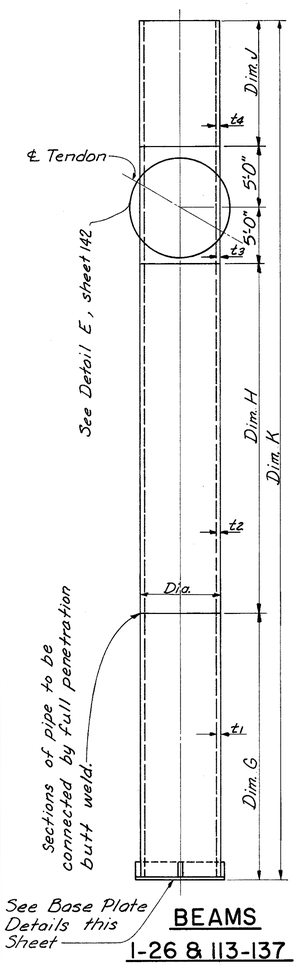
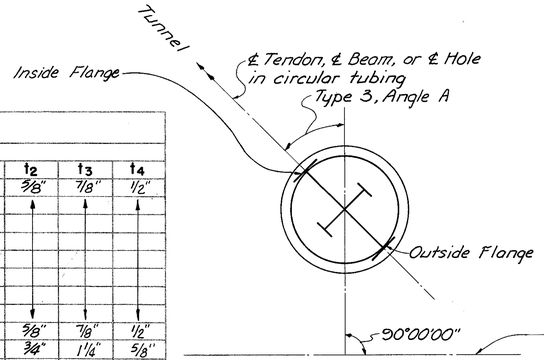


BEAMS 1-26 & 113-137

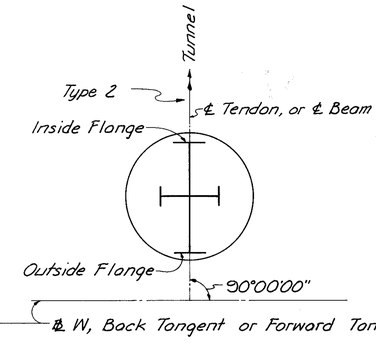
DIMENSIONS TABLE *

PILE NO.	DIMENSION								
	G	H	J	K	Dia.	t_1	t_2	t_3	t_4
1	15'-0"	22'-9½"	10'-0½"	57'-10"	6'-0"	½"	⅜"	7/8"	½"
2	↑	23'-5½"	10'-1½"	58'-7"	↑	↑	↑	↑	↑
3		23'-8"	10'-1"	58'-9"					
4		24'-11"	10'-1"	60'-0"					
5		25'-7"	10'-2"	60'-9"					
6		26'-10"	10'-1"	61'-11"					
7		27'-1"	10'-1"	62'-2"					
8		27'-4"	10'-1"	62'-5"			↓	↓	↓
9	15'-0"	27'-8"	10'-0"	62'-8"			5/8"	7/8"	½"
10	15'-0"	27'-6"	9'-11"	62'-5"			¾"	1¼"	5/8"
11	↑	27'-4"	9'-9"	62'-1"			↑	↑	↑
12		27'-8½"	9'-7½"	62'-4"					
13		28'-7½"	9'-6½"	63'-2"					
14		28'-7"	9'-6"	63'-1"					
15		29'-7"	9'-4"	63'-11"					
16		29'-7"	9'-3"	63'-10"					
17		30'-2"	9'-1"	64'-3"					
18		29'-8½"	8'-11½"	63'-8"					
19		30'-10"	8'-9"	64'-7"					
20		30'-5½"	8'-6½"	64'-0"					
21	↓	31'-1"	8'-3"	64'-4"					
22	15'-0"	31'-2"	8'-1"	64'-3"					
23	20'-0"	26'-2"	8'-0"	64'-2"					
24	↑	25'-7"	8'-0"	63'-7"					
25		25'-6½"	7'-11½"	63'-6"	↓		↓	↓	↓
26	20'-0"	25'-5"	8'-0"	63'-5"	6'-0"		¾"	1¼"	5/8"
113	15'-0"	27'-9"	8'-10"	61'-7"	5'-0"		7/8"	1⅛"	½"
114	↑	26'-3"	8'-10"	60'-1"	↑		↑	↑	↑
115		25'-9"	8'-10"	59'-7"					
116		25'-9"	8'-10"	59'-7"					
117		25'-3"	8'-10"	59'-1"					
118		25'-3"	8'-10"	59'-1"					
119		24'-9"	8'-10"	58'-7"					
120		24'-3"	8'-10"	58'-1"					
121	↓	24'-0"	8'-7"	57'-7"	↓	↓	↓	↓	↓
122	15'-0"	23'-9"	8'-4"	57'-1"	5'-0"	½"	7/8"	1⅛"	½"
123	15'-0"	23'-6"	8'-1"	56'-7"	4'-0"	5/8"	1"	1½"	¾"
124	↑	23'-0"	8'-1"	56'-1"	↑	↑	↑	↑	↑
125		22'-6"	8'-1"	55'-7"					
126		22'-0"	8'-1"	55'-1"					
127		21'-6"	8'-1"	54'-7"					
128	↓	20'-10"	7'-10"	53'-8"	↓	↓	↓	↓	↓
129	15'-0"	20'-4"	7'-7"	52'-11"		5/8"	1"	1½"	¾"
130	14'-6"	20'-9"	7'-5"	52'-8"		½"	¾"	1¼"	5/8"
131	↑	20'-0"	7'-4"	51'-10"		↑	↑	↑	↑
132		19'-2½"	7'-4½"	51'-1"					
133		18'-5"	7'-5"	50'-4"					
134		17'-2"	7'-4"	49'-0"					
135		15'-10"	7'-5"	47'-9"					
136		14'-7"	7'-4"	46'-5"					
137	14'-6"	13'-4"	7'-4"	45'-2"	4'-0"	½"	¾"	1¼"	5/8"

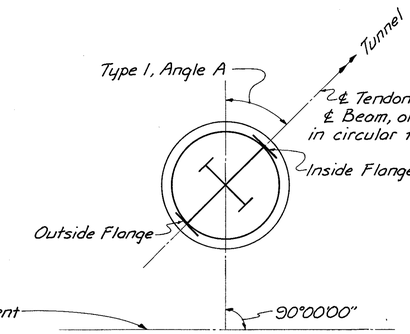
(Beam Number and Cylinder Pile Number are the same)



PILES 1-14 & 100-132



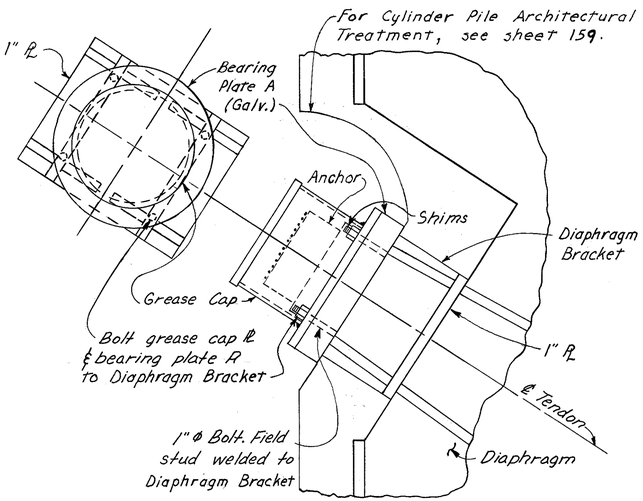
PILES 33-99



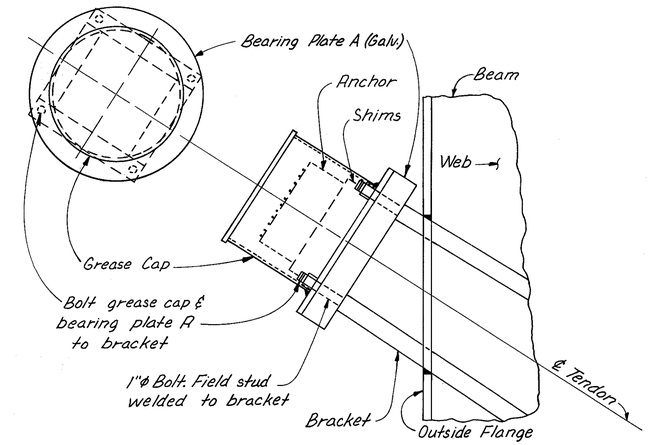
PILES 15-32 & 133-137

PLACEMENT OF STRUCTURAL STEEL SECTIONS IN CYLINDER PILES

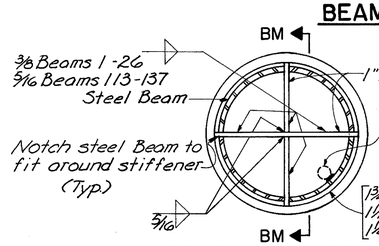
(For Angle A see sheets 133 and 134)



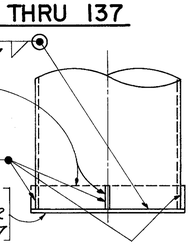
DETAIL SHOWING ATTACHMENT OF BEARING PLATE AND GREASE CAP TO DIAPHRAGM AT BEAMS 1 THRU 26 & 113 THRU 137



DETAIL SHOWING ATTACHMENT OF BEARING PLATE AND GREASE CAP TO BRACKET AT BEAMS 27 THRU 112



BASE PLATE DETAILS



SECTION BM-BM

Pipe shall comply with the requirements of ASTM Specification A252, Grade 2.
Pipe shall be included in Item 513, "Structural Steel" for payment.
All dimensions are based on the assumption that the bottom of the beams are at Elevation B as shown on sheet 135.
* Pipe column dimensions G through K (for piles 1-26 & 113-137)

Work sheets 140, 141 & 142 together

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CINCINNATI, OHIO

STRUCTURAL STEEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
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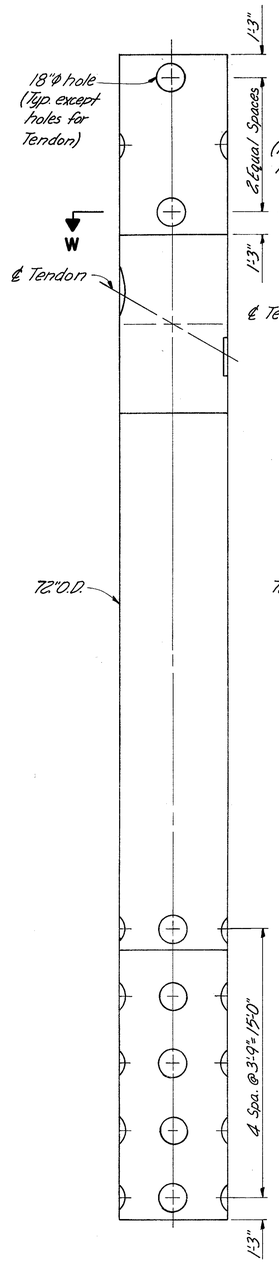
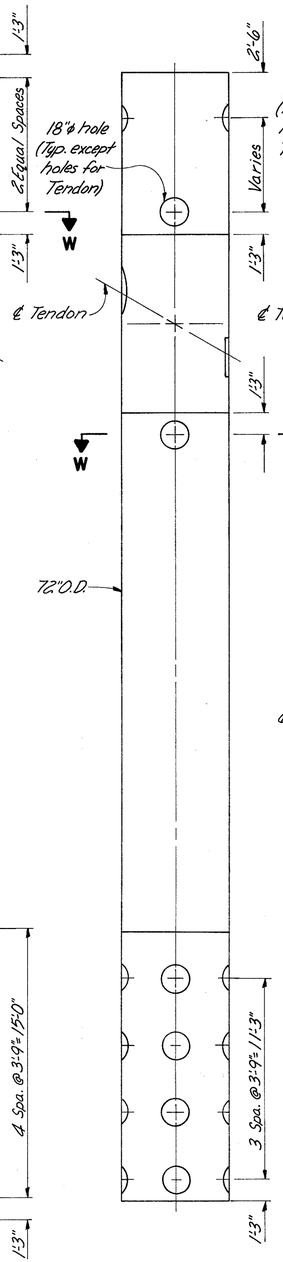
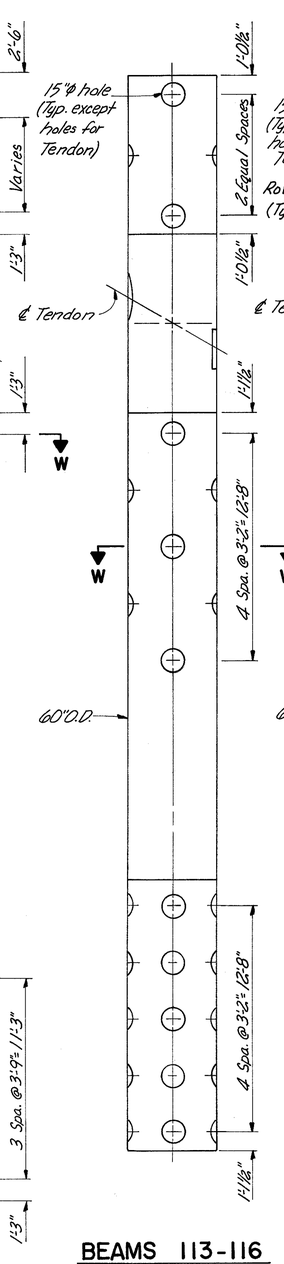
PART ONE



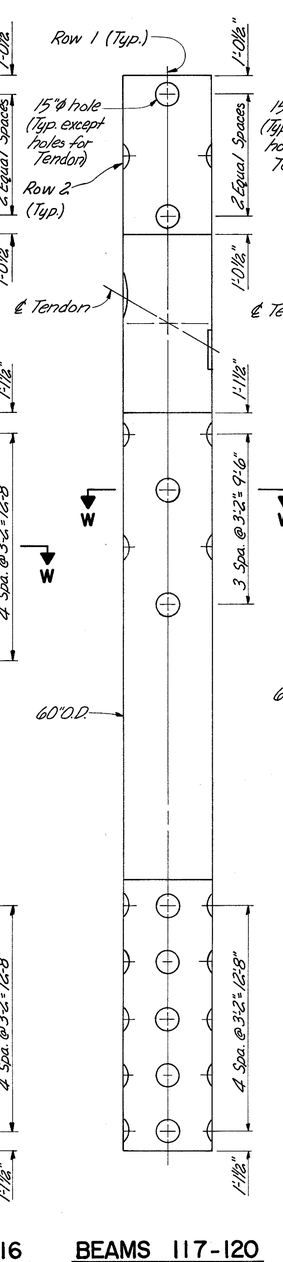
BEAMS 1-9



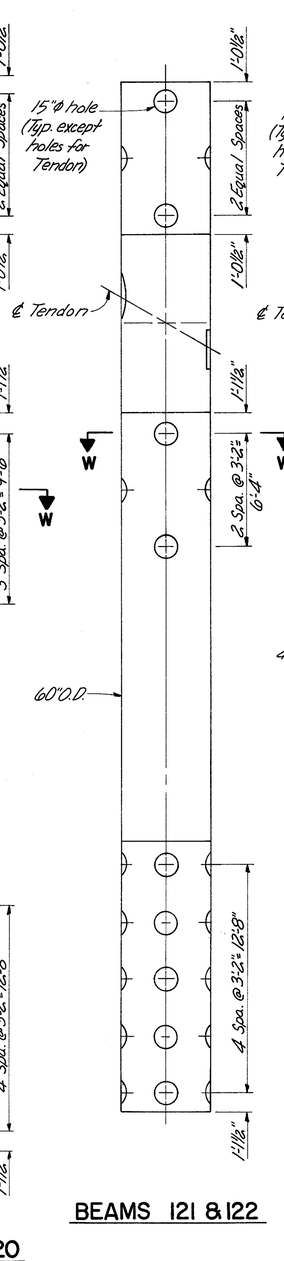
BEAMS 10-26



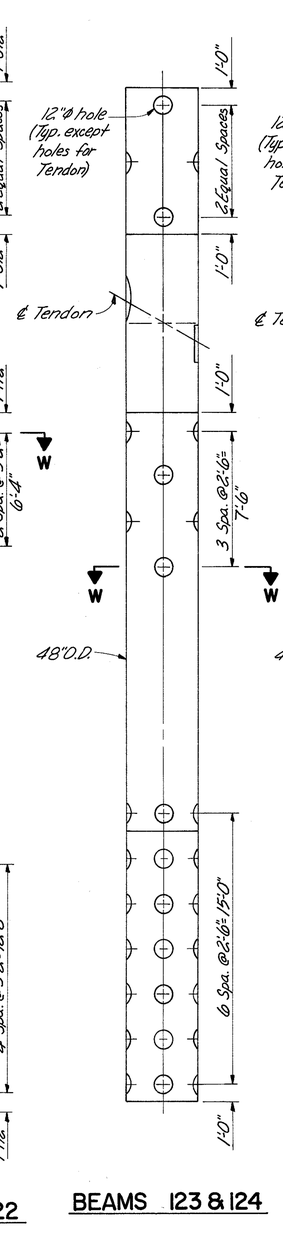
BEAMS 113-116



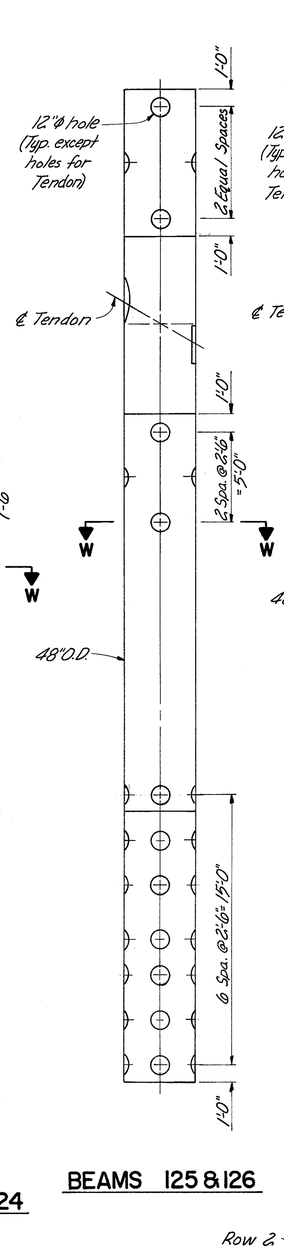
BEAMS 117-120



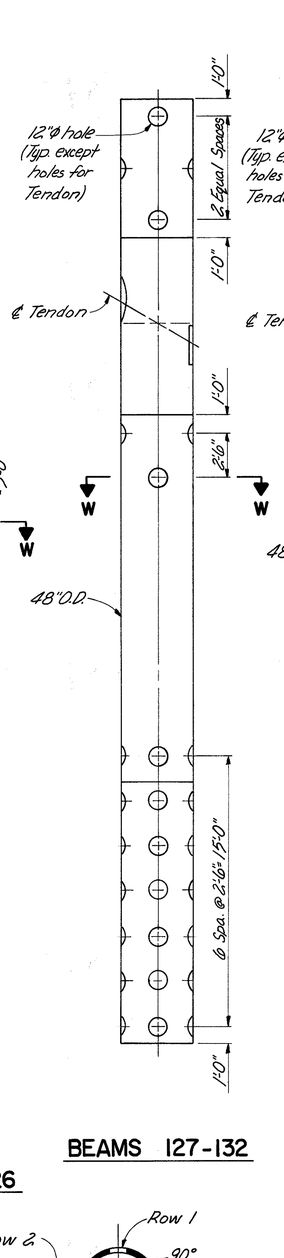
BEAMS 121 & 122



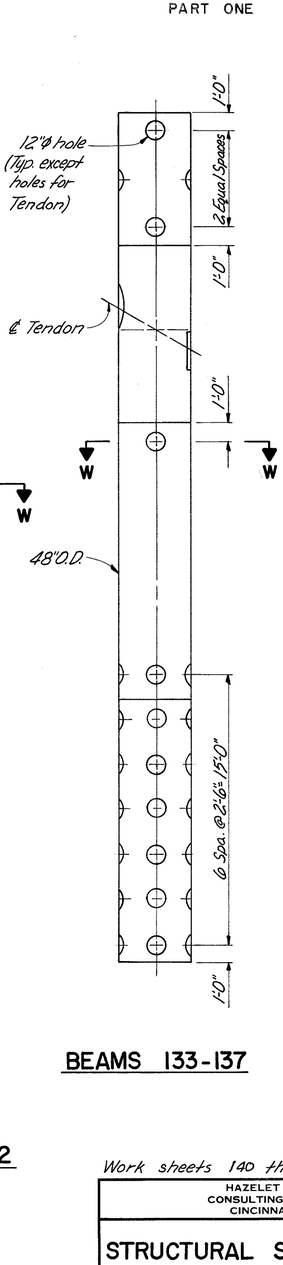
BEAMS 123 & 124



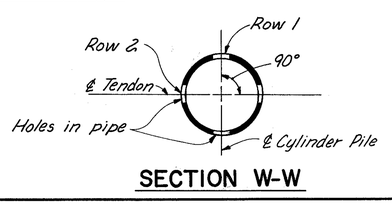
BEAMS 125 & 126



BEAMS 127-132



BEAMS 133-137



SECTION W-W

Work sheets 140 thru 142 together

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STRUCTURAL STEEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

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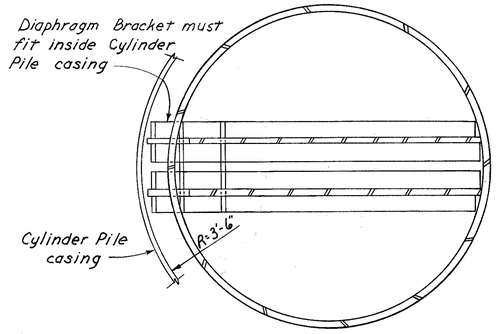
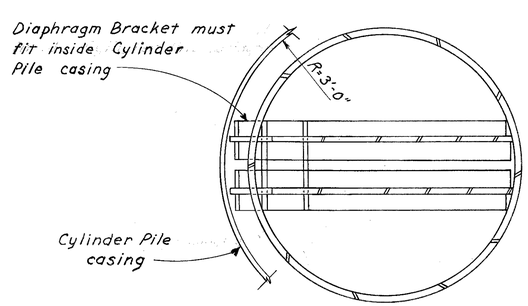
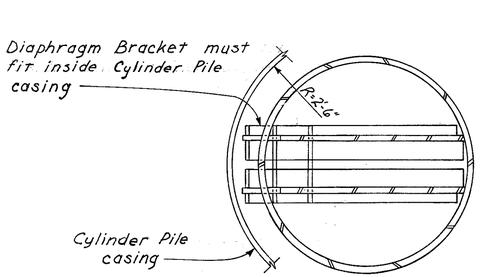


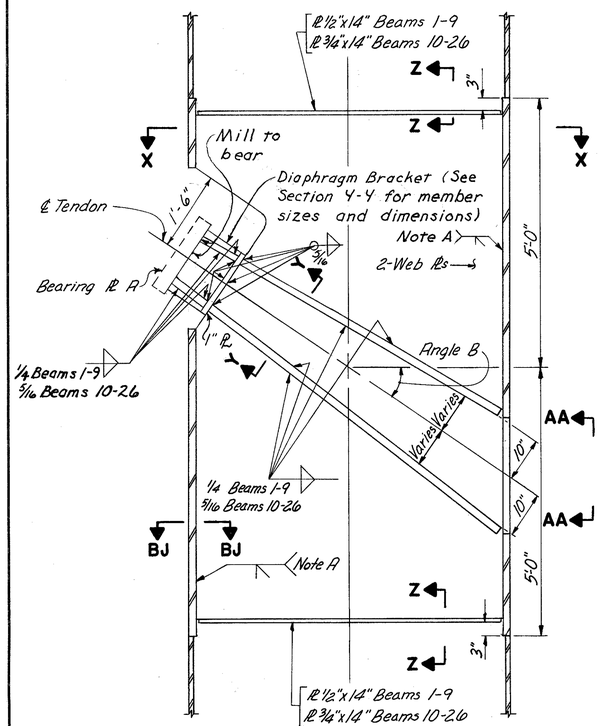
SECTION X-X



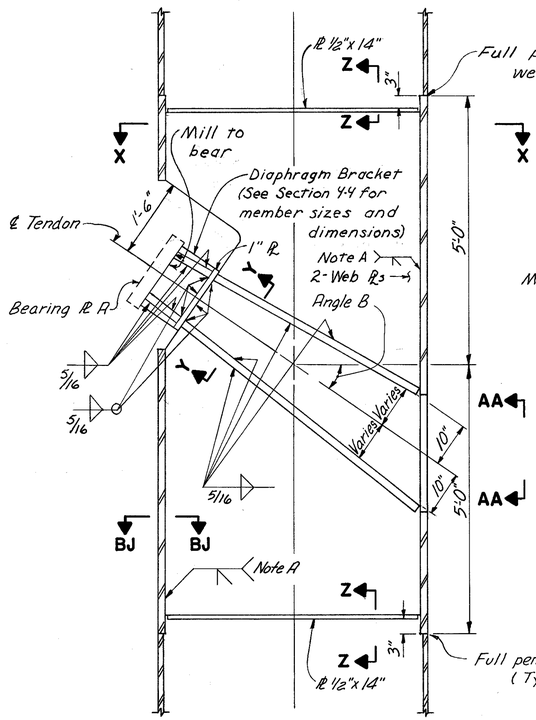
SECTION X-X



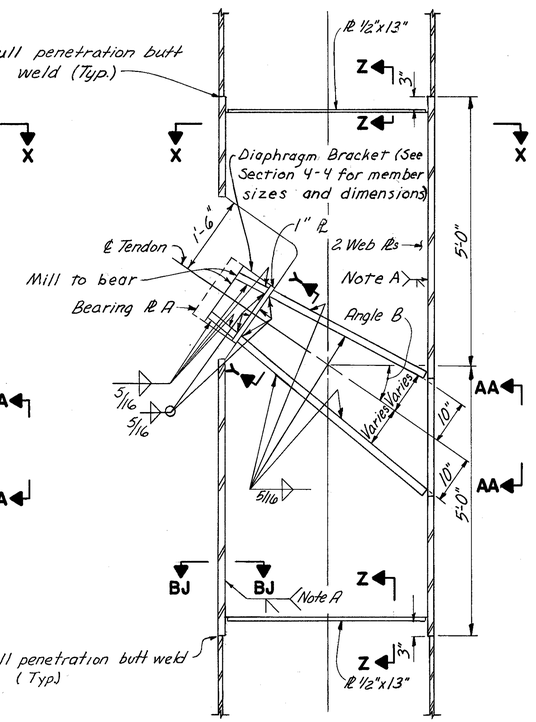
SECTION X-X



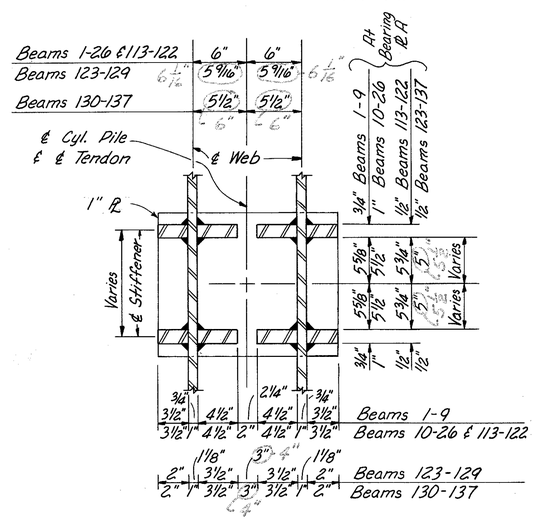
DETAIL E
(BEAMS 1-26)



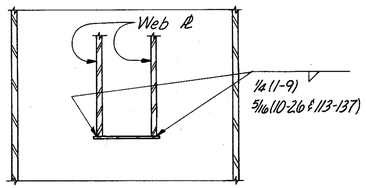
DETAIL E
(BEAMS 113-122)



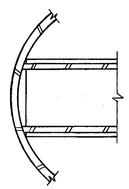
DETAIL E
(BEAMS 123-137)



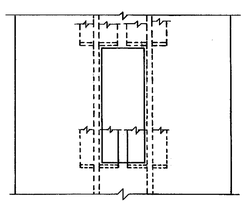
SECTION Y-Y



SECTION Z-Z



SECTION BJ-BJ

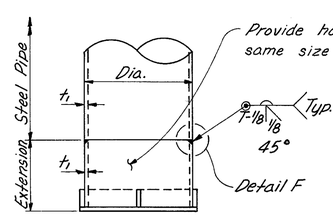


SECTION AA-AA

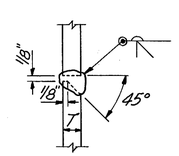
Note A: Groove weld with backing strip. Backing strip to be left in place and shall be made continuous for full length of weld. Joints in backing strip shall be full penetration butt welds.

Notes: For Angle B see sheets 133 & 134.
For Bearing Plate A see Table D sheet 136.

Use Steel Pipe Splice where beam is to be lengthened as a result of bottom of hole being lowered from Elev. B in order to obtain minimum embedment depth of pile into rock. Cost of preparing and welding of extension paid for in Item 513, "Steel Pipe Beam Splice". Include weight of extension in Item 513, "Structural Steel".



STEEL PIPE SPLICE



DETAIL F

Work sheets 140, 141 & 142 together

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

STRUCTURAL STEEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
JDC CCL	MRT		WL	JHO 2-27-79	3-13-80

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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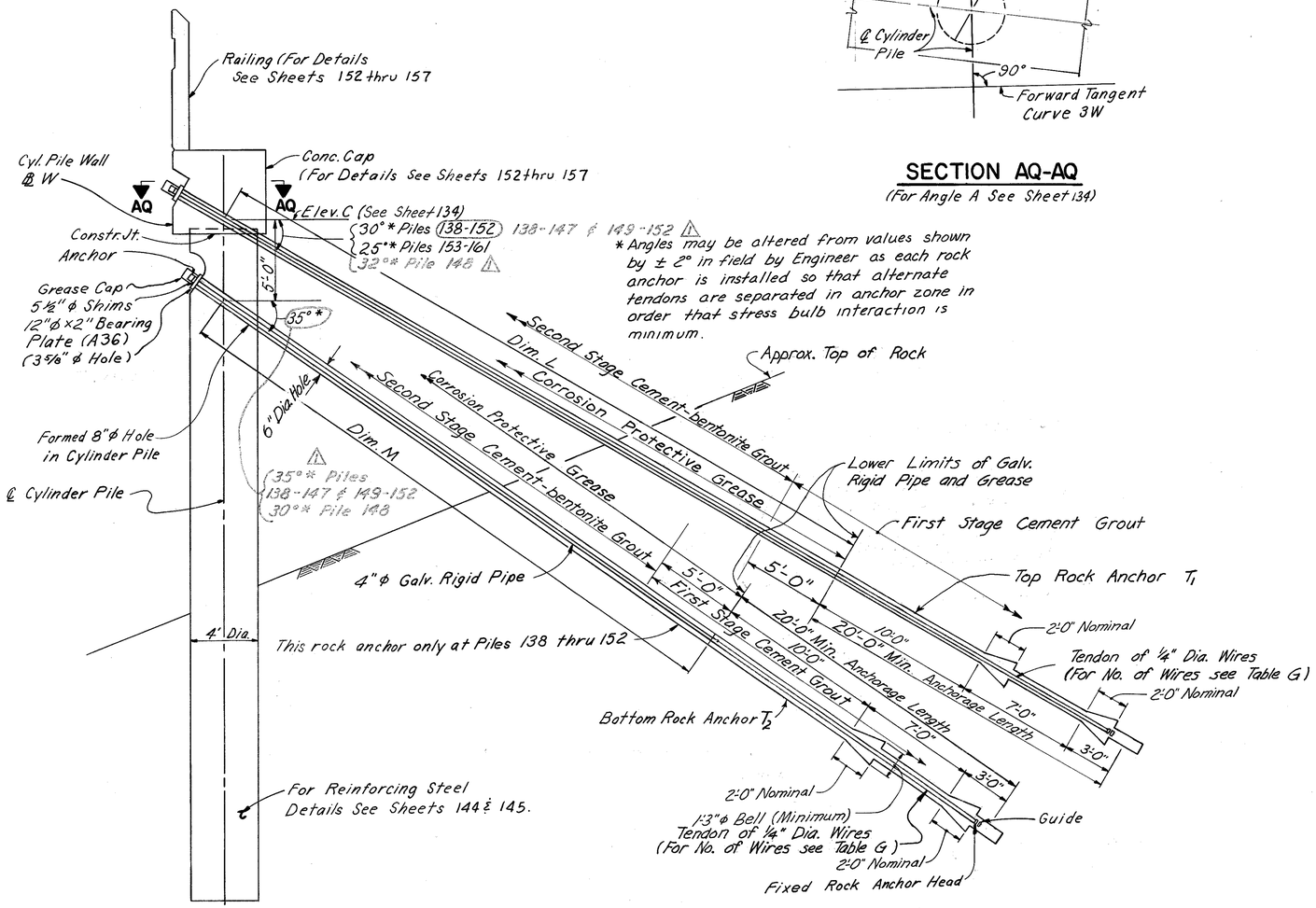
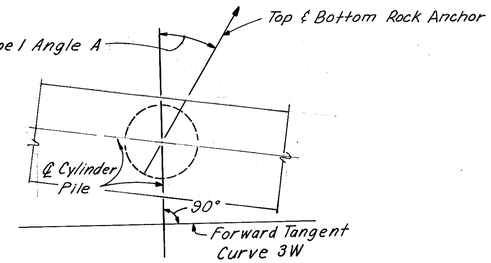
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



Note: Top and Bottom Rock Anchors identical except as noted.

TYPICAL SECTION
(Cylinder Pile 138 thru 161)



SECTION AQ-AQ
(For Angle A See Sheet 134)

* Angles may be altered from values shown by ± 2° in field by Engineer as each rock anchor is installed so that alternate tendons are separated in anchor zone in order that stress bulb interaction is minimum.

TABLE G

PILE NO.	DIMENSIONS L (FT.)	DIMENSIONS M (FT.)	NO. OF ¼" ϕ WIRES IN EACH TENDON	TENDON LOAD T_1 (KIPS)	TENDON LOAD T_2 (KIPS)
138	105	95	24	161	170
139	100	90	24	157	166
140	95	85	23	153	161
141	90	80	23	149	157
142	85	75	22	144	153
143	80	70	21	140	148
144	75	65	21	136	144
145	70	60	20	134	141
146	65	55	20	130	137
147	60	50	19	126	132
148	55	46	19	122	128
149	50	42	18	117	124
150	45	38	18	113	120
151	40	34	17	109	115
152	35	30	16	105	111
153	30		24	170	
154	30		24	170	
155	30		24	170	
156	30		24	170	
157	30		24	170	
158	30		24	170	
159	30		24	170	
160	30		24	170	
161	30		24	170	

Dimensions L & M equal minimum unbonded length.

⚠1 Revised 11-10-80
Work sheets 143 thru 145 together

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CINCINNATI, OHIO

REINF. CONCRETE CYLINDER PILE
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TMC		WL	JHo 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

144
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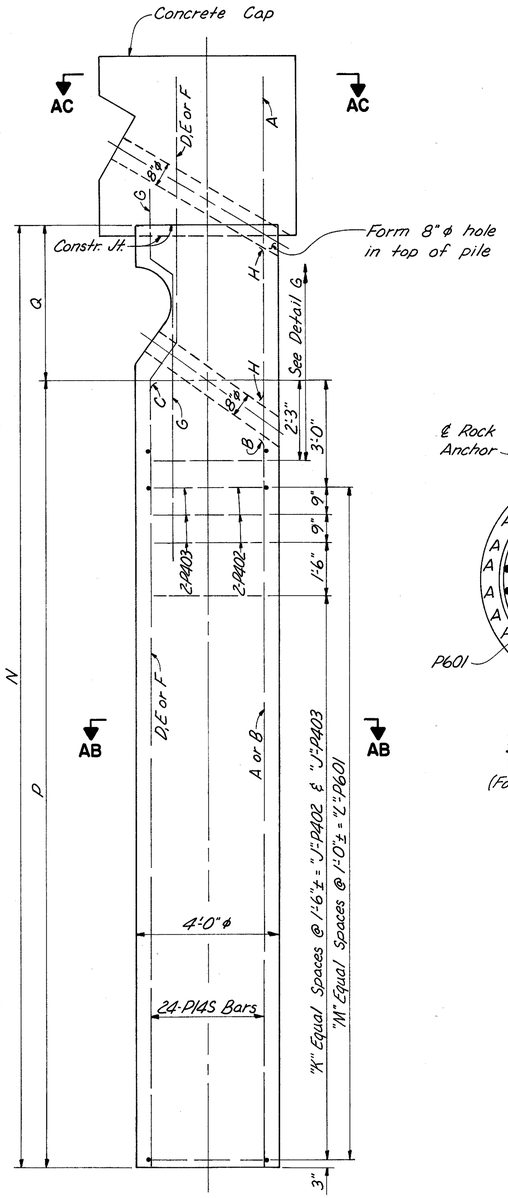
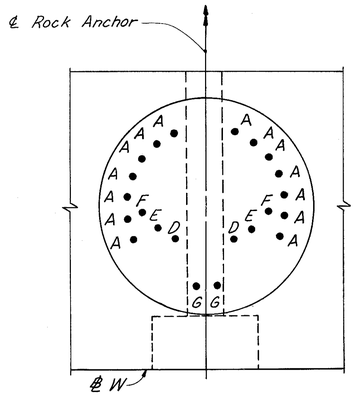
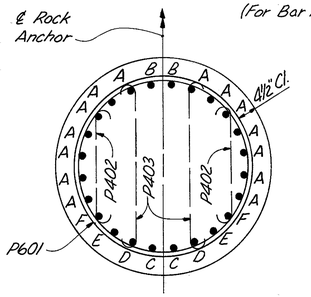
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



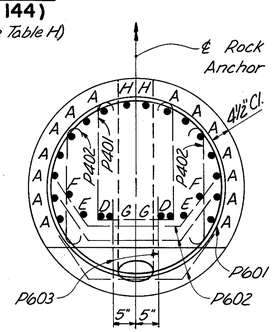
PILES 138-144
(See Table H)



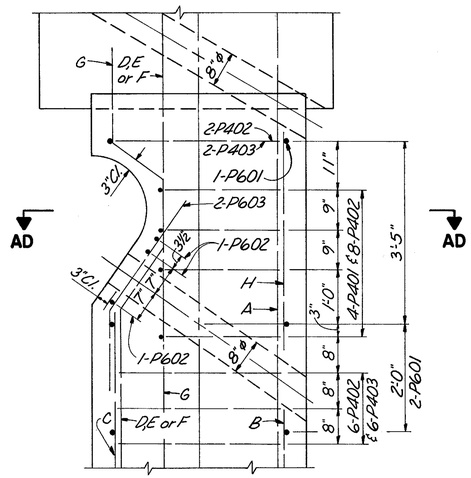
SECTION AC-AC
(PILES 138-144)
(For Bar Marks see Table H)



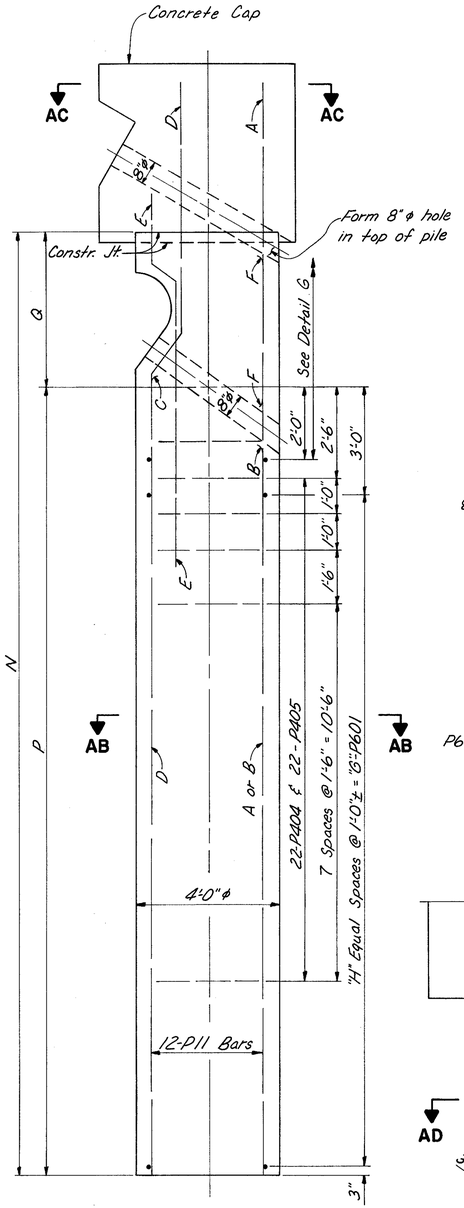
SECTION AB-AB
(PILES 138-144)
(For Bar Marks see Table H)



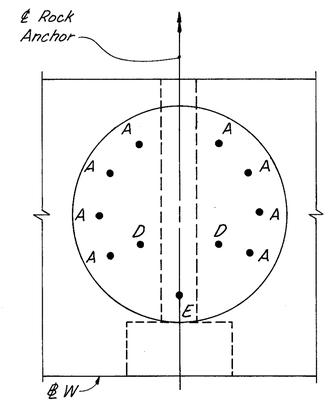
SECTION AD-AD
(PILES 138-144)
(For Bar Marks see Table H)



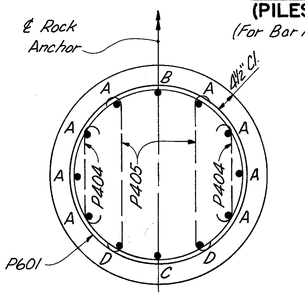
DETAIL G
(PILES 138-144)



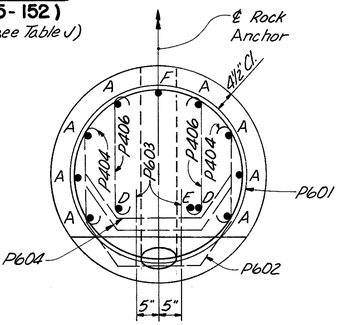
PILES 145-152
(See Table J)



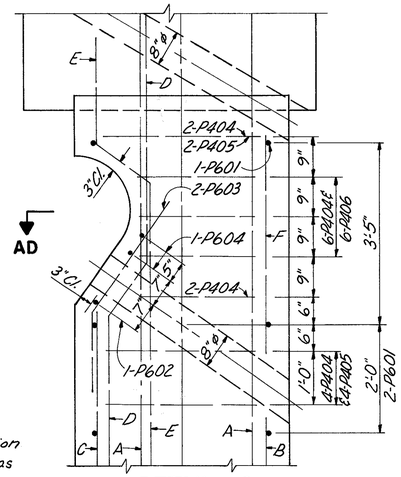
SECTION AC-AC
(PILES 145-152)
(For Bar Marks see Table J)



SECTION AB-AB
(PILES 145-152)
(For Bar Marks see Table J)



SECTION AD-AD
(PILES 145-152)
(For Bar Marks see Table J)



DETAIL G
(PILES 145-152)

Note: Reinforcing bar lengths are based on the assumption the bottom of the cylinder piles are at Elev. B as shown on sheet 135.
For details of concrete cap see sheets 152 thru 157.
For architectural treatment of cylinder pile notch see sheet 159.
For Table H and Table J see sheet 145.

Work sheets 143 thru 145 together

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

REINF. CONCRETE CYLINDER PILE

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
CCL	MRT		JH	JHO-2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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HAMILTON COUNTY
HAM. - 471 - 0.24
PART ONE

TABLE H (PILES 138-144)

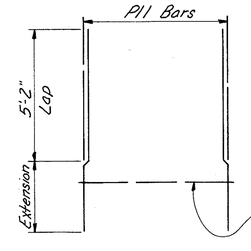
PILE NO.	DIMENSION N	DIMENSION P	DIMENSION Q	BAR MARKS A	B	C	D	E	F	G	H	NO. OF BARS 'J'	NO. OF SPA. 'K'	NO. OF BARS 'L'	NO. OF SPA. 'M'
138	40'-0 5/8"	35'-10"	4'-2 7/8"	P14S01	P14S02	P14S03	P14S04	P14S05	P14S06	P14S07	P14S44	42	20	34	33
139	39'-2 3/8"	35'-0 1/8"	4'-2 1/4"	P14S08	P14S09	P14S10	P14S11	P14S12	P14S13	↕	↕	42	20	33	32
140	37'-10 3/4"	33'-8 1/4"	4'-2 1/2"	P14S14	P14S15	P14S16	P14S17	P14S18	P14S19	↕	↕	40	19	32	31
141	36'-1 1/4"	31'-10 1/2"	4'-2 3/4"	P14S20	P14S21	P14S22	P14S23	P14S24	P14S25	↕	↕	36	17	30	29
142	34'-9 5/8"	30'-6 3/4"	4'-2 7/8"	P14S26	P14S27	P14S28	P14S29	P14S30	P14S31	↕	↕	36	17	29	28
143	32'-11 3/8"	28'-8 7/8"	4'-2 1/2"	P14S32	P14S33	P14S34	P14S35	P14S36	P14S37	↕	↕	32	15	27	26
144	31'-7 3/4"	27'-5"	4'-2 3/4"	P14S38	P14S39	P14S40	P14S41	P14S42	P14S43	P14S07	P14S44	30	14	26	25

TABLE J (PILES 145-152)

PILE NO.	DIMENSION N	DIMENSION P	DIMENSION Q	BAR MARKS A	B	C	D	E	F	NO. OF BARS 'G'	NO. OF SPA. 'H'
145	29'-3 5/8"	25'-1 1/4"	4'-2 3/8"	P1101	P1102	P1103	P1104	P1105	P1106	23	22
146	28'-0"	23'-9 1/2"	4'-2 1/2"	P1107	P1108	P1109	P1147	↕	↕	22	21
147	27'-2 3/8"	22'-11 5/8"	4'-2 3/4"	P1110	P1111	P1102	P1148	↕	↕	21	20
148	25'-10 3/4"	21'-7 3/4"	4'-3"	P1112	P1113	P1108	P1149	↕	↕	20	19
149	24'-7 1/4"	20'-4"	4'-3 1/4"	P1114	P1115	P1116	P1150	↕	↕	18	17
150	23'-9"	19'-6 1/8"	4'-2 7/8"	P1117	P1118	P1119	P1151	↕	↕	18	17
151	21'-5 3/8"	17'-2 1/4"	4'-3 1/8"	P1120	P1121	P1122	P1152	↕	↕	15	14
152	20'-7 1/4"	16'-4 1/2"	4'-2 3/4"	P1123	P1124	P1125	P1153	P1105	P1106	14	13

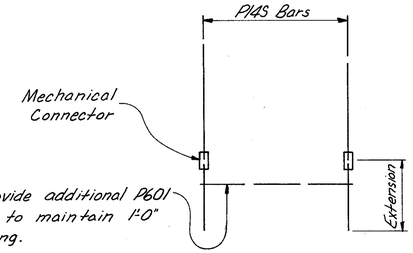
TABLE K (PILES 153-161)

PILE NO.	DIMENSION N	BAR MARKS A	B	C	NO. OF BARS 'D'	NO. OF SPA. 'E'	NO. OF BARS 'F'	NO. OF SPA. 'G'
153	19'-3 3/8"	P1126	P1127	P1128	20	19	14	6
154	19'-0"	P1119	P1129	P1102	20	19	14	6
155	17'-8 3/8"	P1129	P1130	P1108	18	17	12	5
156	17'-4 1/4"	P1131	P1132	P1133	18	17	12	5
157	17'-0 5/8"	P1134	P1135	P1136	18	17	12	5
158	15'-8 3/8"	P1137	P1138	P1139	16	15	10	4
159	15'-4 3/4"	P1140	P1141	P1142	16	15	10	4
160	14'-1 1/4"	P1141	P1143	P1144	15	14	8	3
161	13'-9 5/8"	P1124	P1145	P1146	14	13	8	3



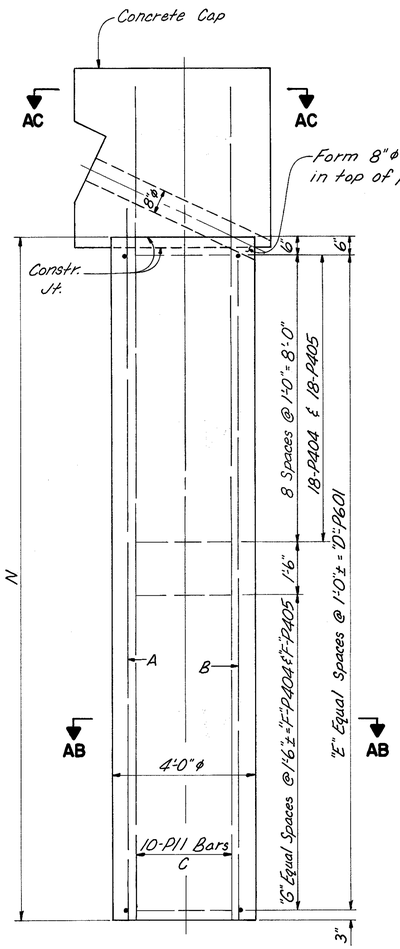
REINFORCING BAR SPLICE
(PILES 145-161)

Use Reinforcing Bar Splice where hole has been lowered from Elev. B in order to obtain minimum embedment depth of pile into rock. Include weight of splice bars in Item 509 "Reinforcing Steel, Grade 60".

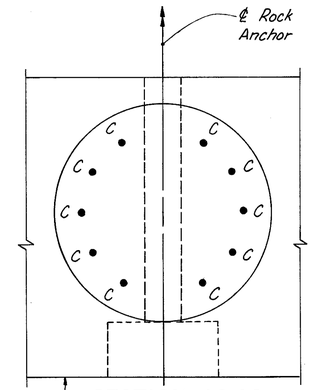


REINFORCING BAR SPLICE
(PILES 138-144)

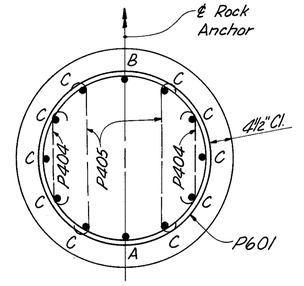
Use an approved Mechanical Connector Splice where hole has been lowered from Elev. B in order to obtain minimum embedment depth of pile into rock. Include weight of extension bars in Item 509 "Reinforcing Steel, Grade 60."



PILES 153-161
(See Table K)



SECTION AC-AC
(PILES 153-161)
(For Bar Marks see Table K)



SECTION AB-AB
(PILES 153-161)
(For Bar Marks see Table K)

Work sheets 143 thru 145 together

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

REINF. CONCRETE CYLINDER PILE

CYLINDER PILE WALL

STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
CCL	MRT		JHD	JHD 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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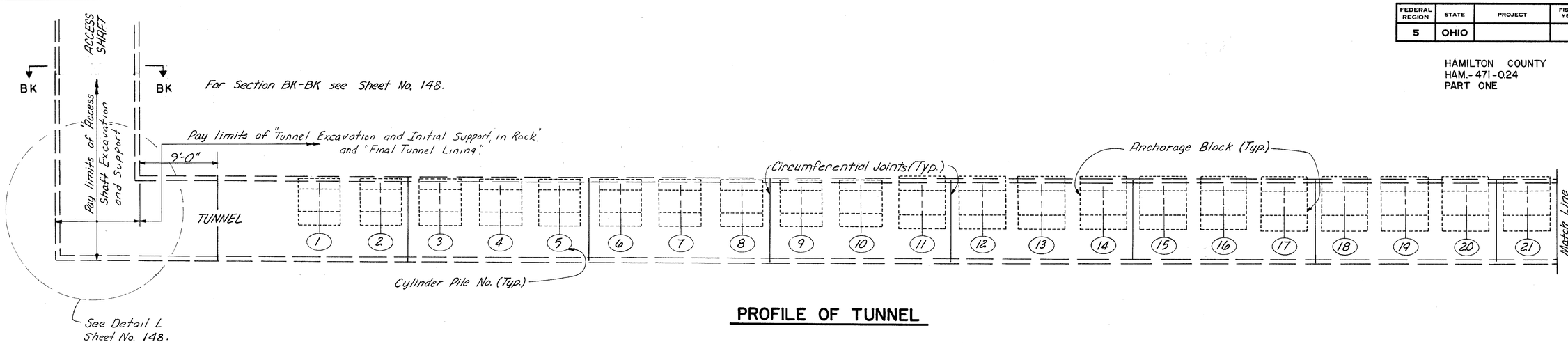
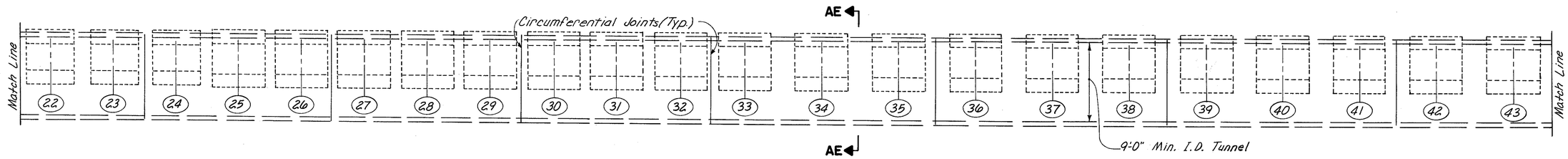
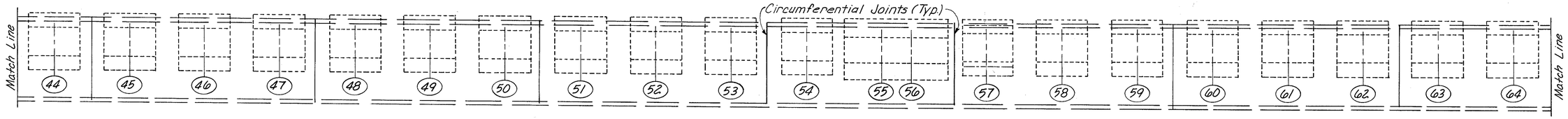
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



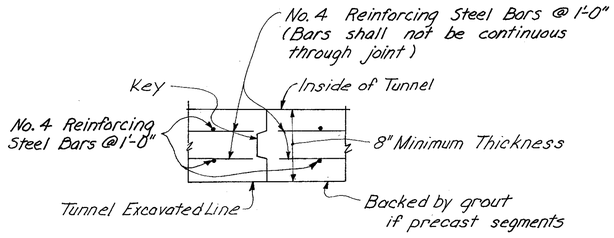
PROFILE OF TUNNEL



PROFILE OF TUNNEL



PROFILE OF TUNNEL



CIRCUMFERENTIAL JOINT DETAIL

Notes: For Site Plan Longitudinal Section Along Tunnel see sheet 97.
For Section AE-AE see sheet 149.

Work sheets 146 thru 150 together

HAZELET & ERDAL
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CINCINNATI, OHIO

PROFILE OF TUNNEL
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MRT		JH	JH 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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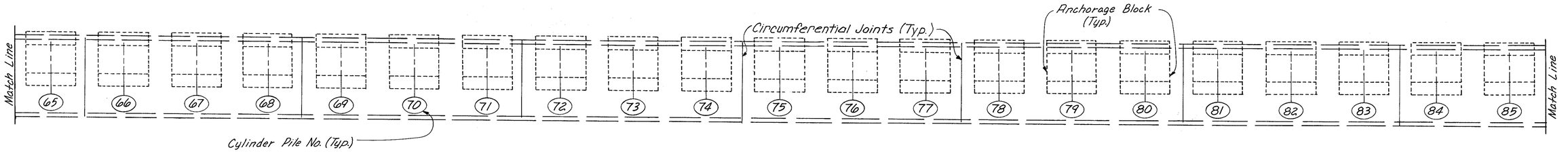
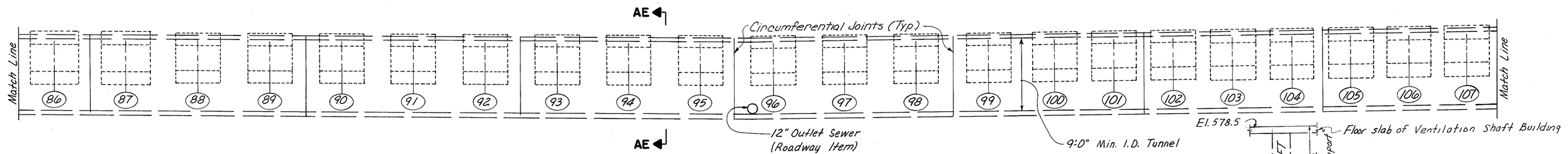
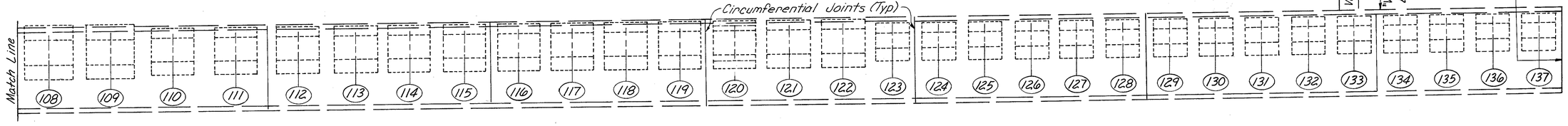
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PROFILE OF TUNNEL



PROFILE OF TUNNEL



PROFILE OF TUNNEL

Notes: For Site Plan Longitudinal Section Along Tunnel see sheet 97.
For Section AE-AE see sheet 149.

Work sheets 146 thru 150 together

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CONSULTING ENGINEERS
CINCINNATI, OHIO

PROFILE OF TUNNEL
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MRT		WL	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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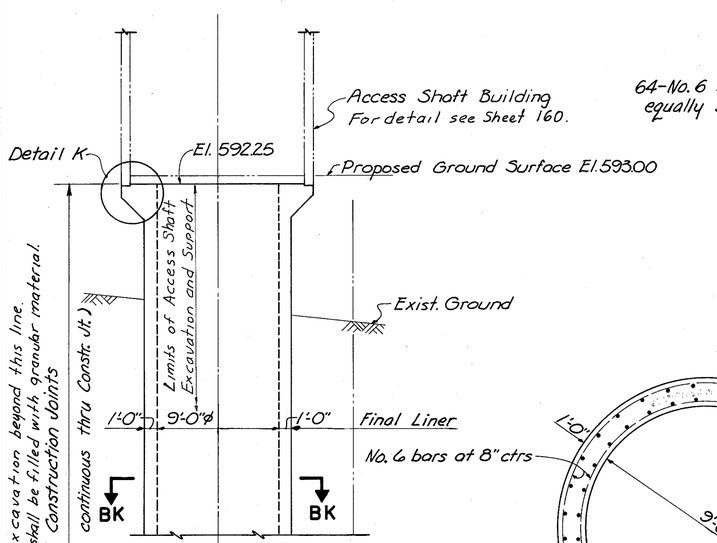
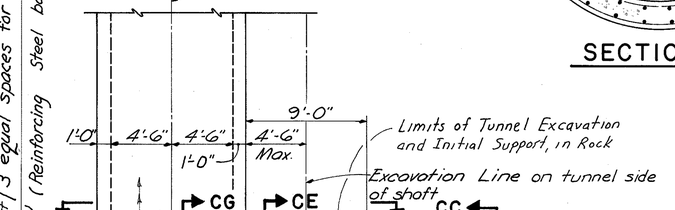
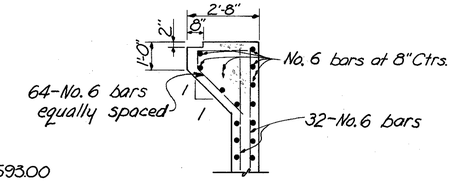
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



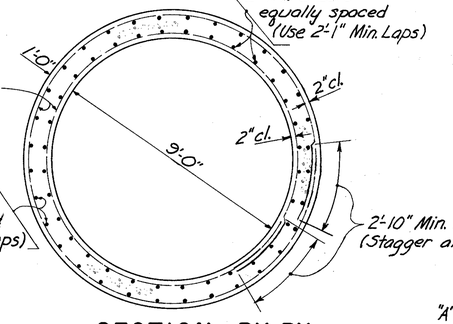
DETAIL L



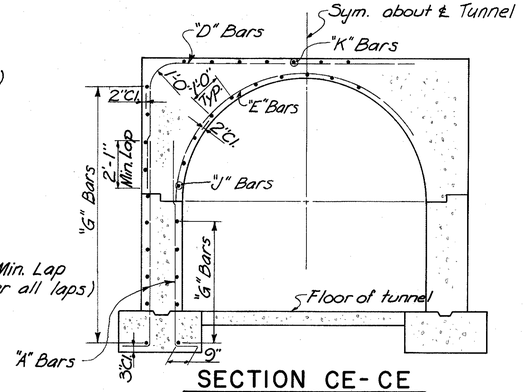
PLAN



DETAIL K

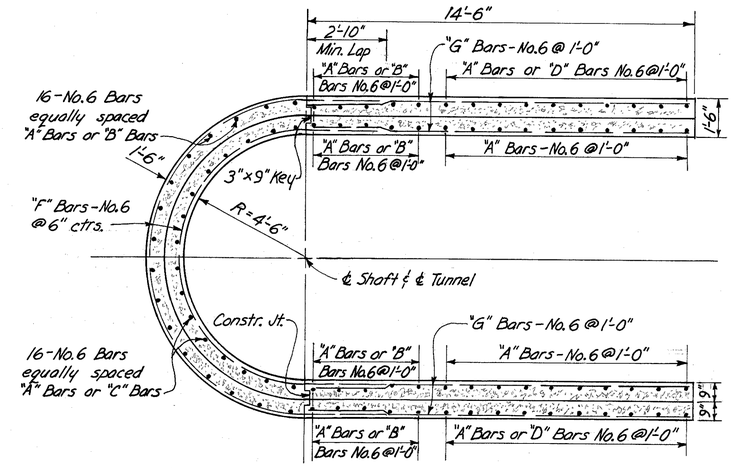


SECTION BK-BK

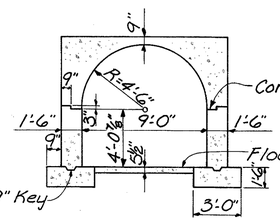


SECTION CE-CE
SHOWING REINFORCING

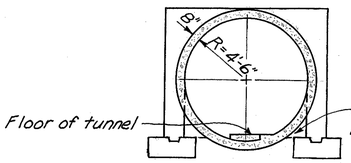
(All reinforcing bars are No. 6 bars @ 1'-0" ctrs.)



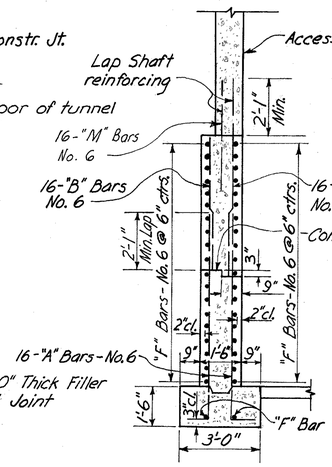
SECTION CD-CD
SHOWING REINFORCING



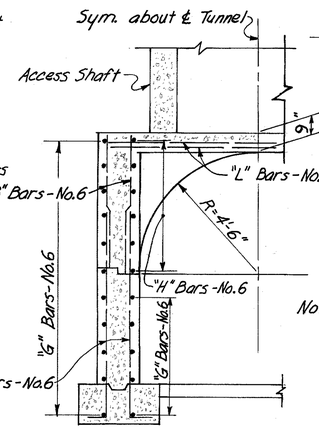
SECTION CE-CE



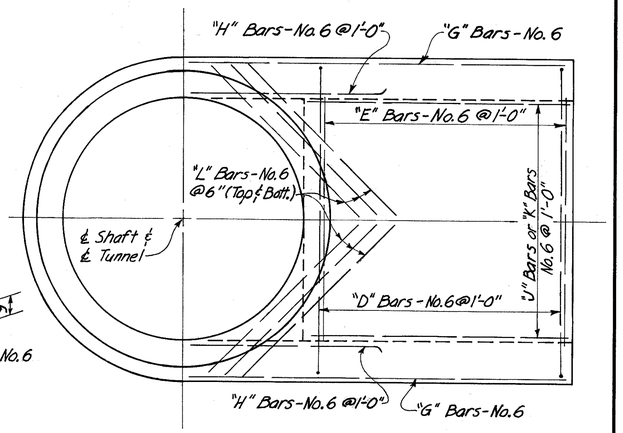
SECTION CC-CC



SECTION CF-CF



SECTION CG-CG



VIEW CH-CH

Notes:
For Manlift, Ladder and Electrical Details see sheets 160 & 161.
For location of Detail L see sheet 146.
Work sheets 146 thru 150 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

SHAFT AND TUNNEL INTERSECTION
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	YK		W.L.	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

149
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE

TABLE L
ANCHORAGE BLOCK

PILE NO.	STATION ALONG T	TYPE (12)
1	2+03.73	3
2	2+10.16	
3	2+16.58	
4	2+23.01	
5	2+29.44	
6	2+35.87	
7	2+42.29	
8	2+48.73	
9	2+55.16	
10	2+61.59	3
11	2+68.03	5
12	2+74.47	
13	2+80.92	
14	2+87.37	
15	2+93.82	
16	3+00.28	5
17	3+06.74	4
18	3+13.21	
19	3+19.68	
20	3+26.16	
21	3+32.65	
22	3+39.14	
23	3+45.64	
24	3+52.14	4
25	3+58.66	1
26	3+65.18	
27	3+71.71	
28	3+78.26	
29	3+84.83	
30	3+91.41	
31	3+98.01	
32	4+04.61	
33	4+11.26	
34	4+19.26	
35	4+27.26	
36	4+35.26	
37	4+43.26	
38	4+51.26	
39	4+59.26	
40	4+67.26	
41	4+75.26	
42	4+83.26	
43	4+91.26	
44	4+99.26	
45	5+07.26	
46	5+15.26	1

TABLE L
ANCHORAGE BLOCK

PILE NO.	STATION ALONG T	TYPE (12)
47	5+23.26	1
48	5+31.26	
49	5+39.26	
50	5+47.26	
51	5+55.26	
52	5+63.26	
53	5+71.26	
54	5+79.26	1
55	5+87.26	6
56	5+90.38	
57	5+98.38	1
58	6+06.38	
59	6+14.38	
60	6+22.37	
61	6+30.37	
62	6+38.37	
63	6+46.37	
64	6+54.37	
65	6+62.37	
66	6+70.37	
67	6+78.37	
68	6+86.37	
69	6+94.37	
70	7+02.37	
71	7+10.37	
72	7+18.37	
73	7+26.37	
74	7+34.37	
75	7+42.37	
76	7+50.37	
77	7+58.37	
78	7+66.37	
79	7+74.37	
80	7+82.37	
81	7+90.37	
82	7+98.37	
83	8+06.37	
84	8+14.37	
85	8+22.37	
86	8+30.37	
87	8+38.37	1
88	8+46.37	4
89	8+54.37	
90	8+62.37	
91	8+70.37	
92	8+78.37	4

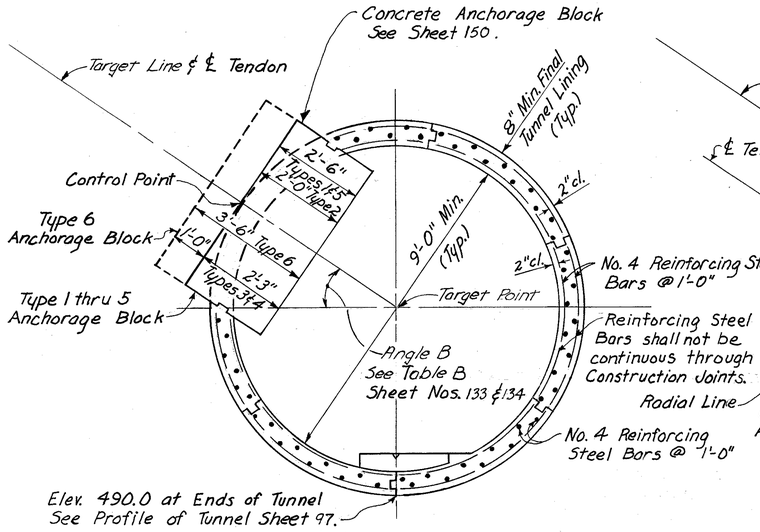
TABLE L
ANCHORAGE BLOCK

PILE NO.	STATION ALONG T	TYPE (12)
93	8+86.37	4
94	8+94.37	
95	9+02.37	
96	9+10.37	
97	9+18.37	
98	9+26.37	
99	9+34.37	
100	9+41.78	
101	9+48.39	
102	9+54.99	4
103	9+61.58	5
104	9+68.16	
105	9+74.72	
106	9+81.26	
107	9+87.79	
108	9+94.31	
109	10+00.82	5
110	10+07.32	3
111	10+13.82	
112	10+20.31	
113	10+26.29	
114	10+31.95	
115	10+37.61	
116	10+43.26	
117	10+48.91	
118	10+54.56	
119	10+60.20	
120	10+65.84	
121	10+71.48	
122	10+77.11	3
123	10+82.27	2
124	10+87.09	
125	10+91.91	
126	10+96.73	
127	11+01.54	
128	11+06.35	
129	11+11.17	
130	11+15.98	
131	11+20.79	
132	11+25.60	
133	11+30.41	
134	11+35.22	
135	11+40.03	
136	11+44.84	
137	11+49.65	2

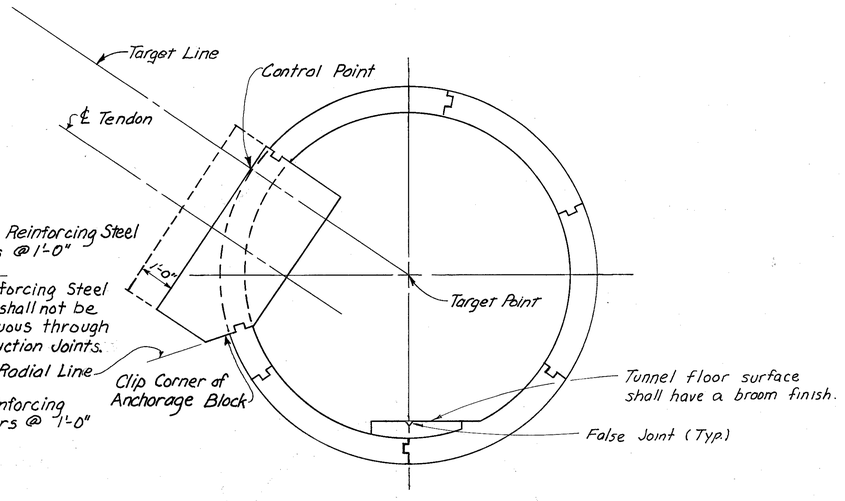
(12) Type of Concrete Anchorage Block, See Sheet 150.

Note: The locations (Sta. of radius center of 9'0" min. I.D. tunnel) of the concrete anchorage block shown in above box has been mathematically calculated on the basis of starting at the centerline of the cylinder pile at the elevations and angles shown in Table B, Sheet Nos. 133 & 134 and on a straight line intersecting the tunnel at the radius center of the tunnel. Locations of anchorage blocks may deviate from these calculated locations as noted in General Notes "Item Special Post-Tensioning System to Tunnel."

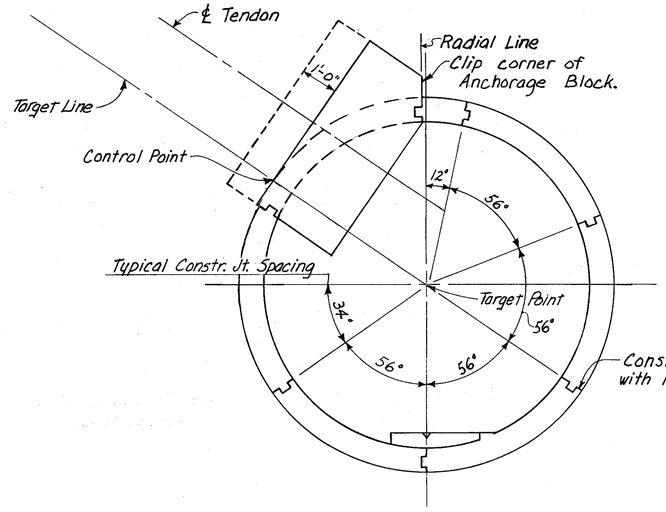
Note: The Control Point for positioning all concrete anchorage blocks, except Type 6, is at the intersection of the Target Line and excavation line of the tunnel.



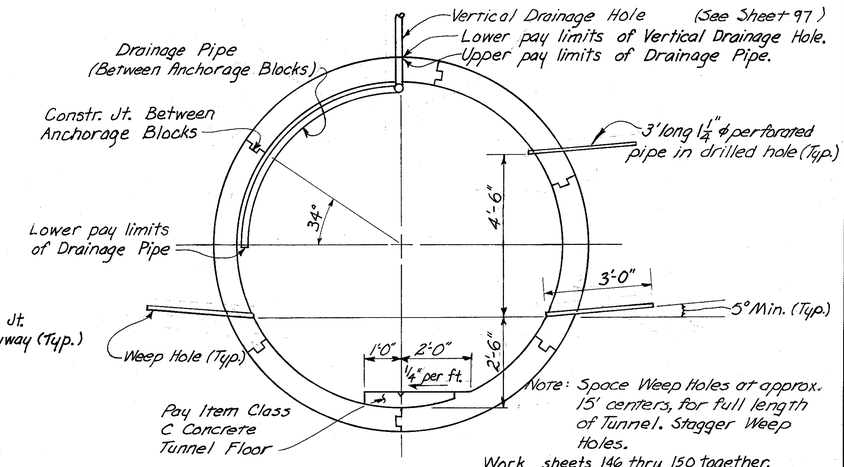
SECTION AE-AE
(SHOWING ℄ TENDON INTERSECTING TARGET POINT)



SECTION AE-AE
(SHOWING ℄ TENDON INTERSECTING 2'-0" BELOW TARGET POINT)



SECTION AE-AE
(SHOWING ℄ TENDON INTERSECTING 2'-0" ABOVE TARGET POINT)



Note: Space Weep Holes at approx. 15' centers, for full length of Tunnel. Stagger Weep Holes.

Work sheets 146 thru 150 together.

SECTION AE-AE
(SHOWING DRAINAGE)

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CINCINNATI, OHIO

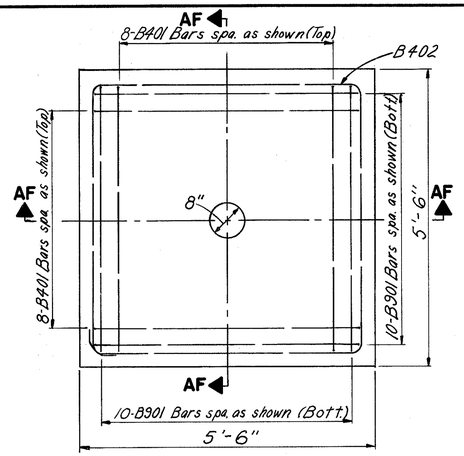
TUNNEL DETAILS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	
	FVB		WL	JHO 2-27-79	RF

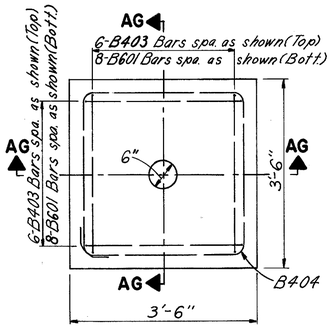
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

150
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE



TYPE 1



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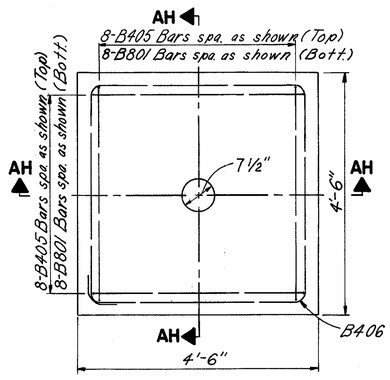
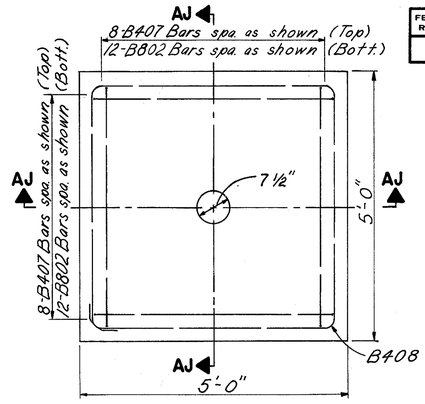
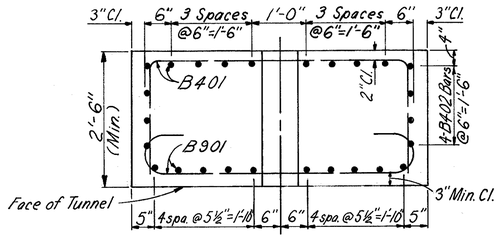


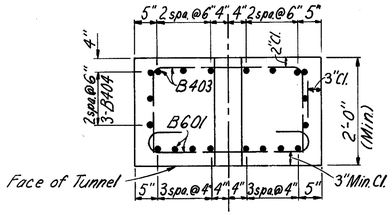
TYPE 3



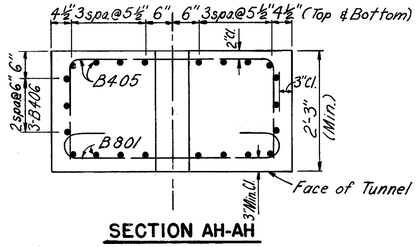
TYPE 4



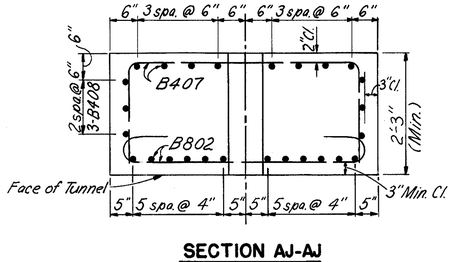
SECTION AF-AF



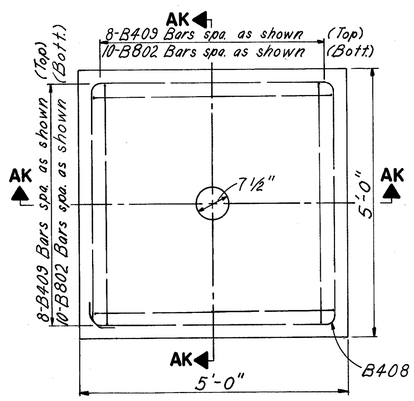
SECTION AG-AG



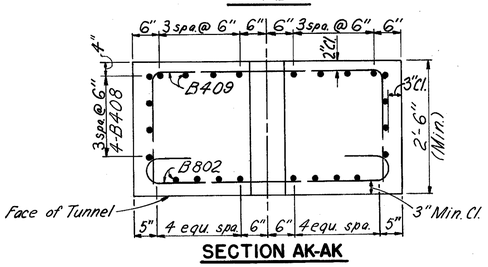
SECTION AH-AH



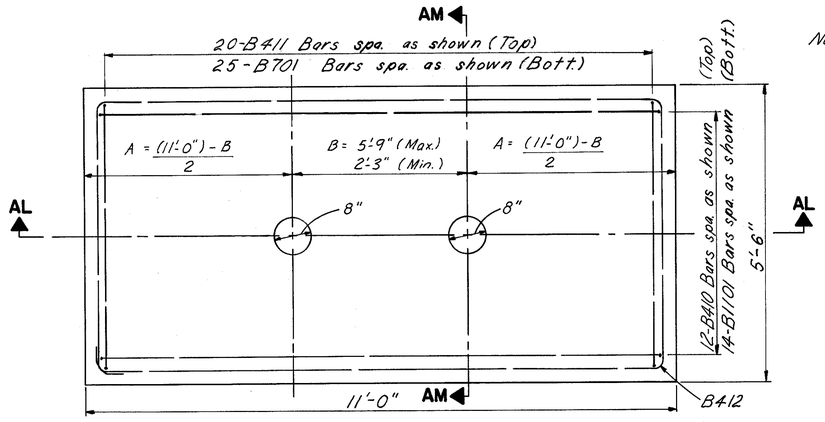
SECTION AJ-AJ



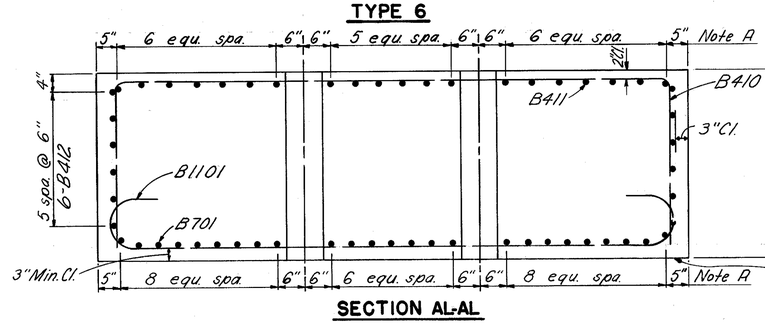
TYPE 5



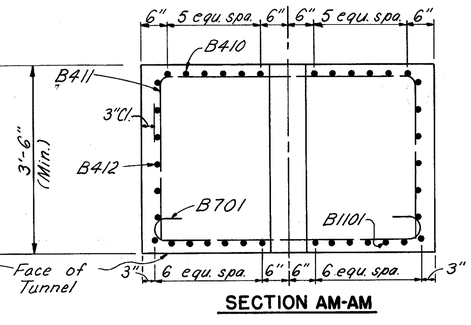
SECTION AK-AK



TYPE 6



SECTION AL-AL



SECTION AM-AM

Note A:
Final spacings will depend upon actual location of drilled tendon holes. Maintain edge distance and clearance at holes as shown. Maintain total number of bars with a final maximum spacing of 6" c/c for B411 bars and 5" c/c for B701 bars.

NOTE

The yardage of concrete for the concrete anchorage blocks shall be determined from plan dimensions with the depths being a constant and equal to 2'-6" for Types 1 & 5; 2'-0" for Type 2; 2'-3" for Types 3 & 4 and 3'-6" for Type 6. (see Section AE-AE Sheet 149.) Deductions shall be made for the volume of holes in the anchorage blocks; namely, 8" ϕ for Types 1 & 6; 6" ϕ for Type 2 and 7½" ϕ for Types 3, 4 & 5.
Reinforcing bars are designated as Top or Bottom for detailing purposes only and this does not represent final position in tunnel. For location of Anchorage Blocks in tunnel, See Sheet 149.

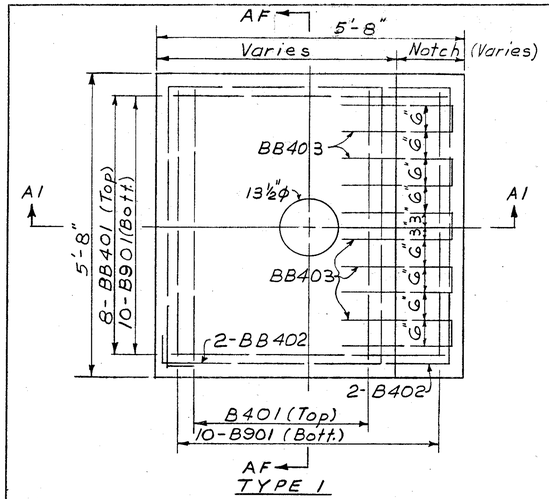
Work sheets 146 thru 150 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

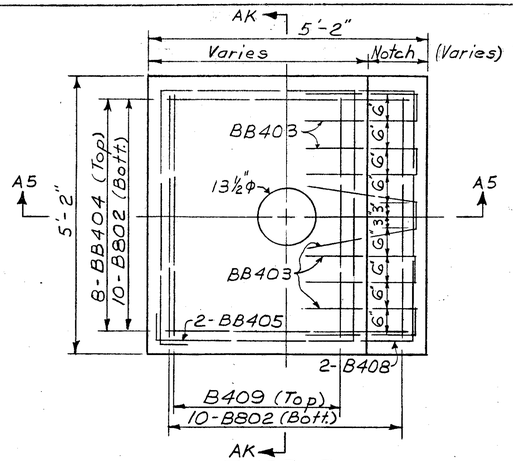
CONCRETE ANCHORAGE BLOCK
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
HLL	TMC		DHL	JHO 2-27-79	

HAMILTON COUNTY
HAM-471-0.24
PART ONE



TYPE 1



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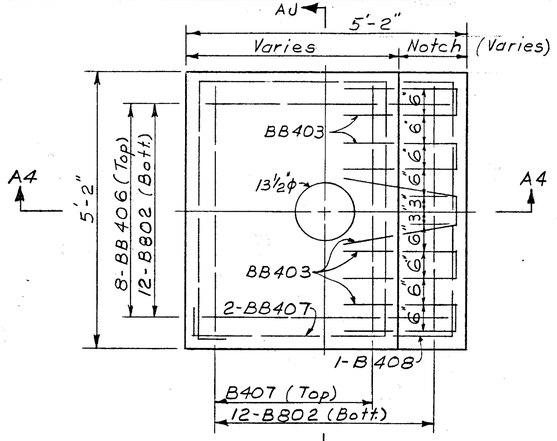
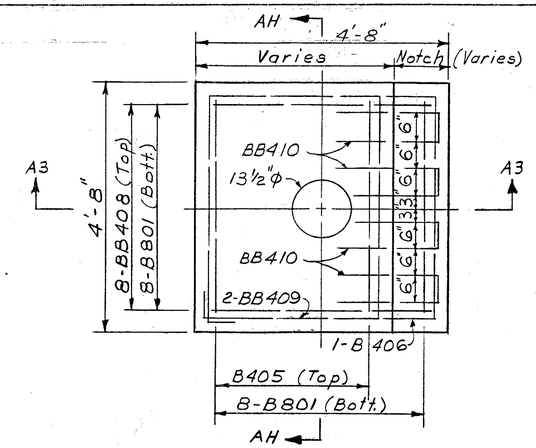
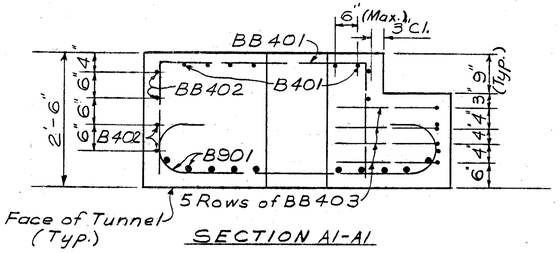


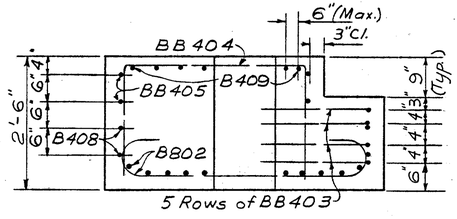
TYPE 4



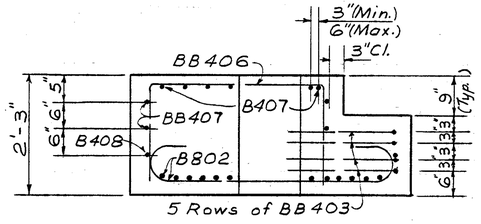
TYPE 3



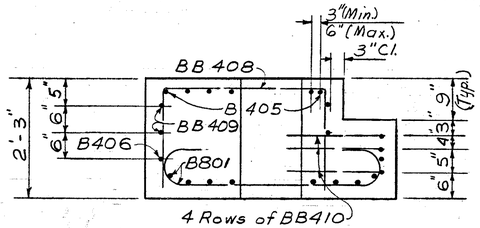
SECTION A1-A1



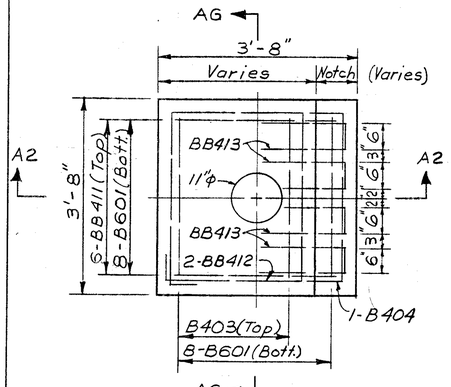
SECTION A5-A5



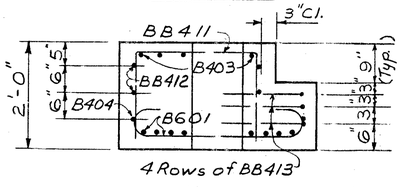
SECTION A4-A4



SECTION A3-A3



TYPE 2



SECTION A2-A2

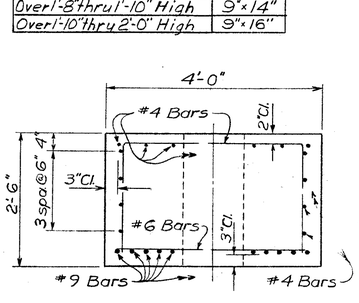
TYPE 1	
DRILL HOLE FROM TARGET LOCATION	NOTCH
0" thru 1'-0" Low	None
Over 1'-0" thru 1'-3" Low	9"x4"
Over 1'-3" thru 1'-6" Low	9"x7"
Over 1'-6" thru 1'-9" Low	9"x10"
Over 1'-9" thru 2'-0" Low	9"x13"
0" thru 8" High	None
Over 8" thru 10" High	9"x2"
Over 10" thru 1'-0" High	9"x4"
Over 1'-0" thru 1'-2" High	9"x6"
Over 1'-2" thru 1'-4 High	9"x8"
Over 1'-4" thru 1'-6" High	9"x10"
Over 1'-6" thru 1'-8" High	9"x12"
Over 1'-8" thru 1'-10" High	9"x14"
Over 1'-10" thru 2'-0" High	9"x16"

TYPE 2	
DRILL HOLE FROM TARGET LOCATION	NOTCH
0" thru 1'-3" Low	None
Over 1'-3" thru 1'-6" Low	9"x3"
Over 1'-6" thru 1'-9" Low	9"x6"
Over 1'-9" thru 2'-0" Low	9"x9"
0" thru 1'-3" High	None
Over 1'-3" thru 1'-5½" High	9"x2½"
Over 1'-5½" thru 1'-8" High	9"x5"
Over 1'-8" thru 1'-10½" High	9"x7½"
Over 1'-10½" thru 2'-0" High	9"x9"

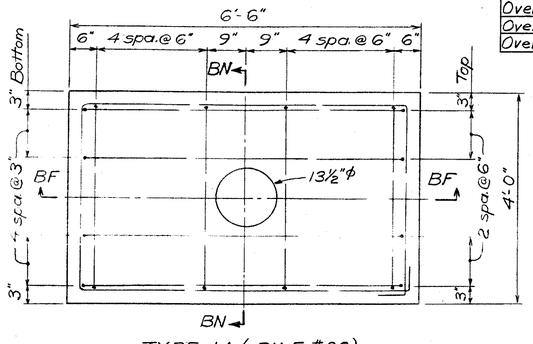
TYPE 3	
DRILL HOLE FROM TARGET LOCATION	NOTCH
0" thru 1'-2" Low	None
Over 1'-2" thru 1'-5" Low	9"x3"
Over 1'-5" thru 1'-8" Low	9"x6"
Over 1'-8" thru 1'-11" Low	9"x9"
Over 1'-11" thru 2'-0" Low	9"x10"
0" thru 1'-0" High	None
Over 1'-0" thru 1'-2½" High	9"x2½"
Over 1'-2½" thru 1'-5" High	9"x5"
Over 1'-5" thru 1'-7½" High	9"x7½"
Over 1'-7½" thru 1'-10" High	9"x10"
Over 1'-10" thru 2'-0" High	9"x12"

TYPE 4	
DRILL HOLE FROM TARGET LOCATION	NOTCH
0" thru 10" Low	None
Over 10" thru 1'-1" Low	9"x3"
Over 1'-1" thru 1'-4" Low	9"x6"
Over 1'-4" thru 1'-7" Low	9"x9"
Over 1'-7" thru 1'-10" Low	9"x12"
Over 1'-10" thru 2'-0" Low	9"x14"
0" thru 9" High	None
Over 9" thru 11" High	9"x2"
Over 11" thru 1'-1" High	9"x4"
Over 1'-1" thru 1'-3" High	9"x6"
Over 1'-3" thru 1'-5" High	9"x8"
Over 1'-5" thru 1'-7" High	9"x10"
Over 1'-7" thru 1'-9" High	9"x12"
Over 1'-9" thru 1'-11" High	9"x14"
Over 1'-11" thru 2'-0" High	9"x15"

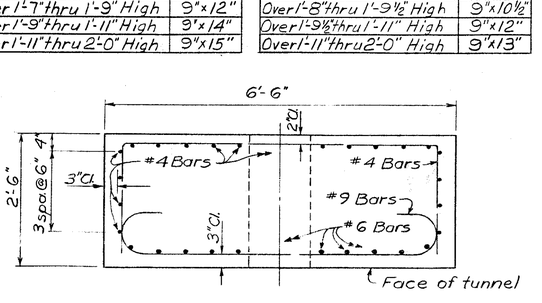
TYPE 5	
DRILL HOLE FROM TARGET LOCATION	NOTCH
0" thru 1'-2" Low	None
Over 1'-2" thru 1'-5" Low	9"x3"
Over 1'-5" thru 1'-8" Low	9"x6"
Over 1'-8" thru 1'-11" Low	9"x9"
Over 1'-11" thru 2'-0" Low	9"x10"
0" thru 11" High	None
Over 11" thru 1'-0½" High	9"x1½"
Over 1'-0½" thru 1'-2" High	9"x3"
Over 1'-2" thru 1'-3½" High	9"x4½"
Over 1'-3½" thru 1'-5" High	9"x6"
Over 1'-5" thru 1'-6½" High	9"x7½"
Over 1'-6½" thru 1'-8" High	9"x9"
Over 1'-8" thru 1'-9½" High	9"x10½"
Over 1'-9½" thru 1'-11" High	9"x12"
Over 1'-11" thru 2'-0" High	9"x13"



SECTION BN-BN

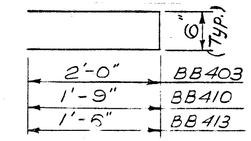


TYPE 1A (PILE #26)



SECTION BF-BF

Note:
Sections not shown are the same as contract plans.
Bars marked BB are changes to contract plans.



Note Hole for section 25 was drilled 9" (horizontally) east of target line to tunnel and hole for section 26 was drilled 11" (horizontally) west of target line to tunnel resulting in a 4'-11" horizontal distance between drilled holes 25 and 26. A Type 1 Anchor Block 5'-3" wide was placed at hole 25. The remaining horizontal distance of 2'-1" from centerline of drilled hole 26 to edge of anchor block 25 will not accommodate a Type 1 Anchor Block as planned. Type 1A Anchor Block will be needed at drilled hole 26.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CONCRETE ANCHORAGE BLOCK
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
VDG HLL			WL VDG		

This sheet added 11-5-81

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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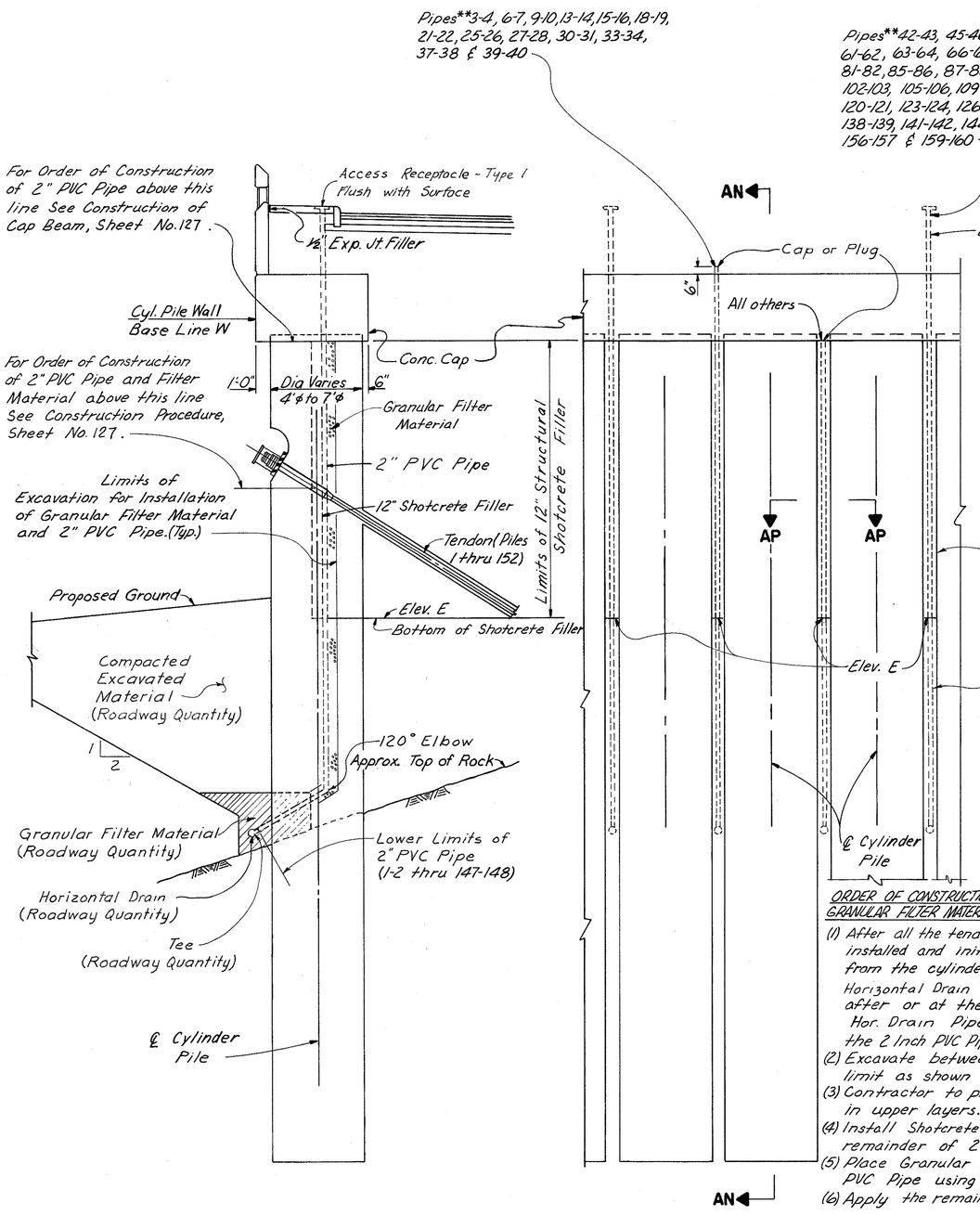
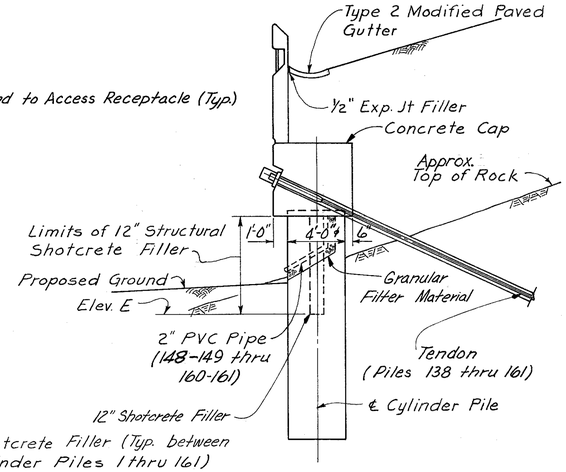
PART ONE

Note: Do not perforate the portion of the 2" PVC pipe in the concrete cap.



SECTION AN-AN

PROFILE OF WALL



SECTION AN-AN

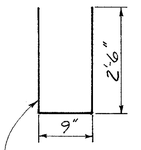
ORDER OF CONSTRUCTION OF REMAINDER OF 2 INCH PVC PIPE, GRANULAR FILTER MATERIAL AND STRUCTURAL SHOTCRETE FILLER

(1) After all the tendons for the cylinder piles have been installed and initially stressed, excavation downhill from the cylinder pile wall for construction of the Horizontal Drain Pipe can begin. Either after or at the same time of construction of Hor. Drain Pipe, construction of the remainder of the 2 Inch PVC Pipe and Filter Material can begin.
(2) Excavate between cylinder piles to limit as shown on Section AN-AN.
(3) Contractor to protect against piping of Silts in upper layers.
(4) Install Shotcrete Reinforcing Steel Cage and remainder of 2 Inch PVC Pipe.
(5) Place Granular Filter Material around 2 Inch PVC Pipe using Wire Cloth to contain material.
(6) Apply the remainder of the 12 Inch Shotcrete.

TABLE M

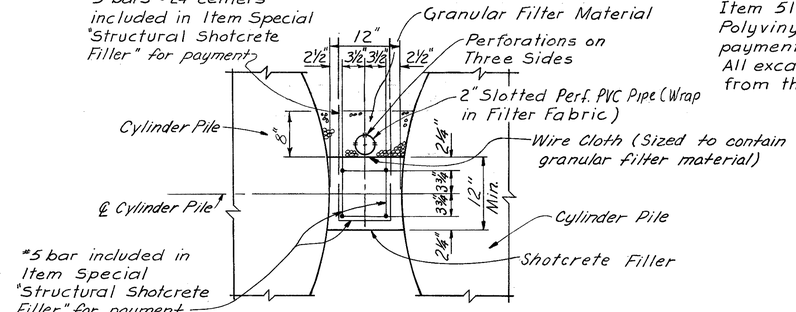
FILLER NO.**	ELEV. E (13)	FILLER NO.**	ELEV. E (13)	FILLER NO.**	ELEV. E (13)	FILLER NO.**	ELEV. E (13)	FILLER NO.**	ELEV. E (13)
1-2	562.5	33-34	543.5	65-66	533.0	97-98	524.5	129-130	544.0
2-3	561.5	34-35	543.5	66-67	534.0	98-99	524.5	130-131	545.0
3-4	561.0	35-36	544.0	67-68	533.5	99-100	524.5	131-132	545.5
4-5	560.0	36-37	544.0	68-69	532.5	100-101	524.5	132-133	546.0
5-6	559.5	37-38	544.0	69-70	532.0	101-102	524.5	133-134	546.5
6-7	558.5	38-39	544.0	70-71	531.0	102-103	524.5	134-135	547.5
7-8	557.5	39-40	544.0	71-72	530.5	103-104	524.5	135-136	548.0
8-9	555.0	40-41	544.0	72-73	530.0	104-105	525.0	136-137	540.5
9-10	550.5	41-42	544.0	73-74	529.5	105-106	525.5	137-138	542.0
10-11	549.0	42-43	544.0	74-75	529.0	106-107	525.5	138-139	543.5
11-12	548.5	43-44	544.0	75-76	528.5	107-108	526.0	139-140	544.5
12-13	548.0	44-45	543.5	76-77	528.0	108-109	526.5	140-141	545.5
13-14	547.5	45-46	543.5	77-78	527.5	109-110	527.5	141-142	547.0
14-15	547.0	46-47	543.5	78-79	527.5	110-111	528.5	142-143	548.5
15-16	546.5	47-48	543.0	79-80	527.0	111-112	529.5	143-144	549.5
16-17	546.0	48-49	543.0	80-81	526.5	112-113	530.5	144-145	551.0
17-18	545.5	49-50	542.5	81-82	526.0	113-114	531.0	145-146	552.5
18-19	545.0	50-51	542.5	82-83	525.5	114-115	532.0	146-147	553.5
19-20	544.5	51-52	542.0	83-84	525.0	115-116	532.5	147-148	555.0
20-21	544.0	52-53	541.5	84-85	524.5	116-117	533.5	148-149	556.5 *
21-22	544.0	53-54	541.0	85-86	524.5	117-118	534.0	149-150	557.0
22-23	544.0	54-55	541.0	86-87	524.5	118-119	535.0	150-151	557.5
23-24	544.0	55-56	540.5	87-88	524.5	119-120	535.5	151-152	558.0
24-25	543.5	56-57	540.0	88-89	524.5	120-121	536.0	152-153	558.5
25-26	543.5	57-58	539.5	89-90	524.5	121-122	537.0	153-154	559.0
26-27	543.5	58-59	539.0 *	90-91	524.5	122-123	538.0	154-155	560.0
27-28	543.5	59-60	538.5	91-92	524.5	123-124	539.0	155-156	560.5
28-29	543.5	60-61	538.0	92-93	524.5	124-125	540.0	156-157	561.0
29-30	543.5	61-62	537.5	93-94	524.5	125-126	541.0	157-158	561.5
30-31	543.0	62-63	537.0	94-95	524.5	126-127	541.5	158-159	562.0
31-32	543.0	63-64	536.5	95-96	524.5	127-128	542.5	159-160	562.5
32-33	543.5	64-65	535.5	96-97	524.5	128-129	543.5	160-161	563.0

Notes: (15) Elev. E - Bottom of Shotcrete.
* Shotcrete shall clear top of sewer pipe by 6"±.



#5 bars @ 24" centers included in Item Special "Structural Shotcrete Filler" for payment.

**PIPE & FILLER IDENTIFICATION



SECTION AP-AP

Note: Special Care shall be taken when placing Structural Shotcrete Filler so that the perforations of the 2" drain pipe and filter fabric do not become clogged.

NOTE: Excavation for construction of shotcrete shall be included in Item Special "Structural Shotcrete Filler" for payment. Excavation and Granular Filter Material for construction of 2" PVC Pipe shall be included in Item 518, "2" Perforated Polyvinylchloride Pipe" for payment.
All excavation shall be made from the downhill side.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

SHOTCRETE TREATMENT BETWEEN CYLINDER PILES
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
HLL	TMC		WL	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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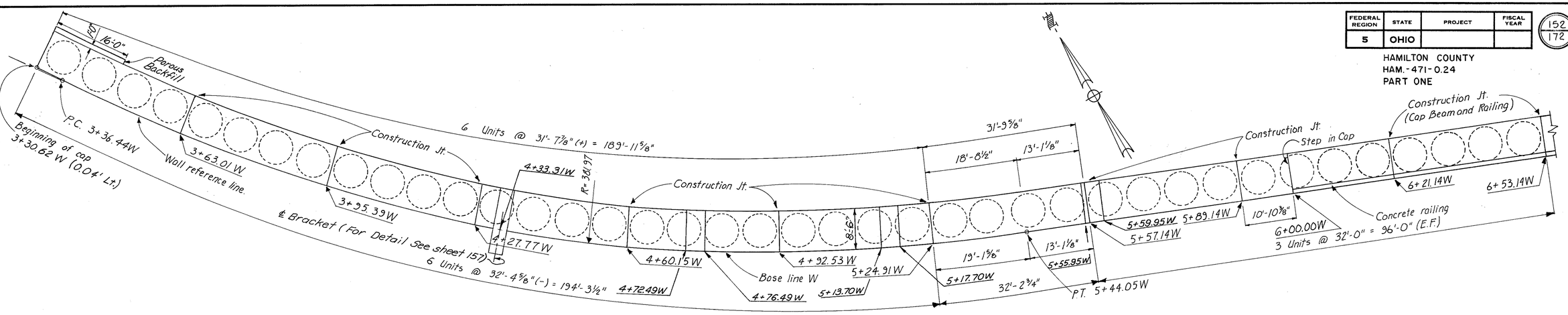
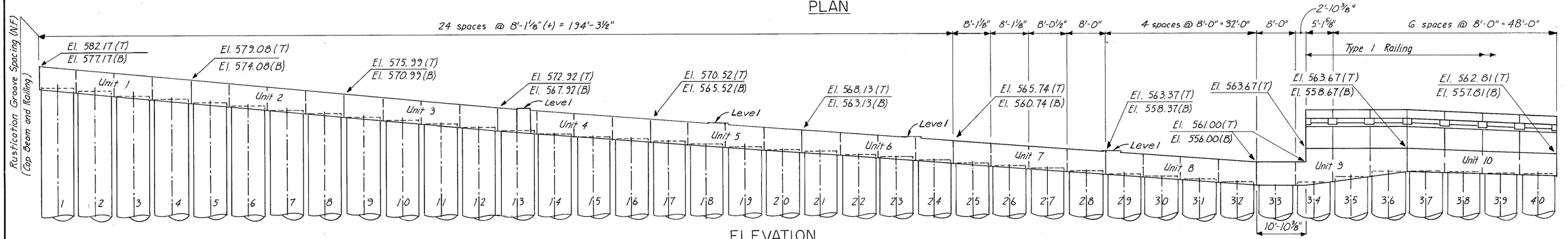
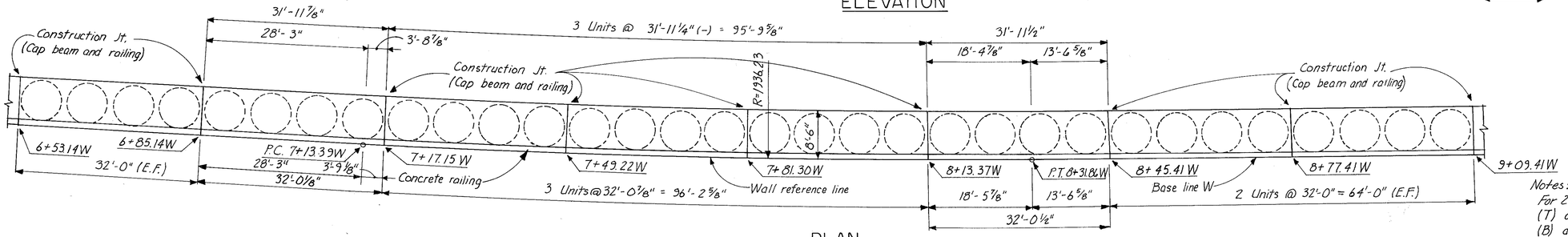
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



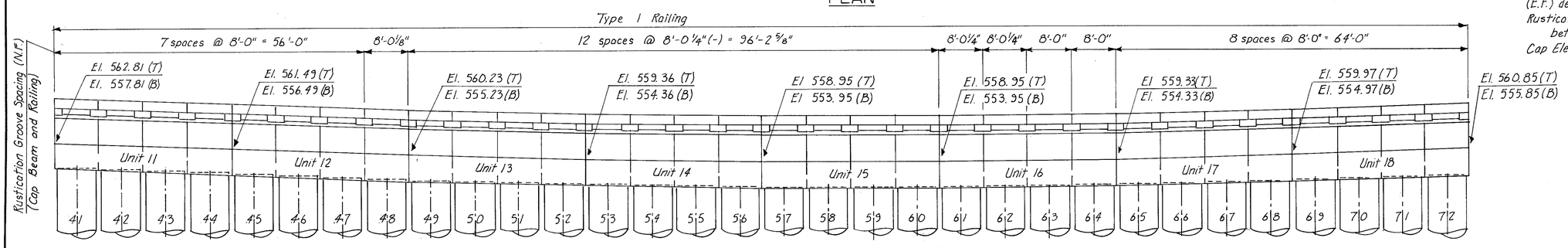
PLAN



ELEVATION



PLAN



ELEVATION

Notes:
For 2" PVC pipe in cap see sheet 151.
(T) denotes Top of Cap
(B) denotes Bottom of Cap
(E.F.) denotes Each Face
Rustication Grooves and Construction Joints between units are to be vertical.
Cap Elevations given at Wall Reference Line.

Work sheets 152 thru 157 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CAP & RAILING DETAILS
CYLINDER PILE WALL
STA. 3+30.62W TO STA. 15+12.39W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
JHO VDG	DMK		JHO	JHO 2-27-79	9-4-79

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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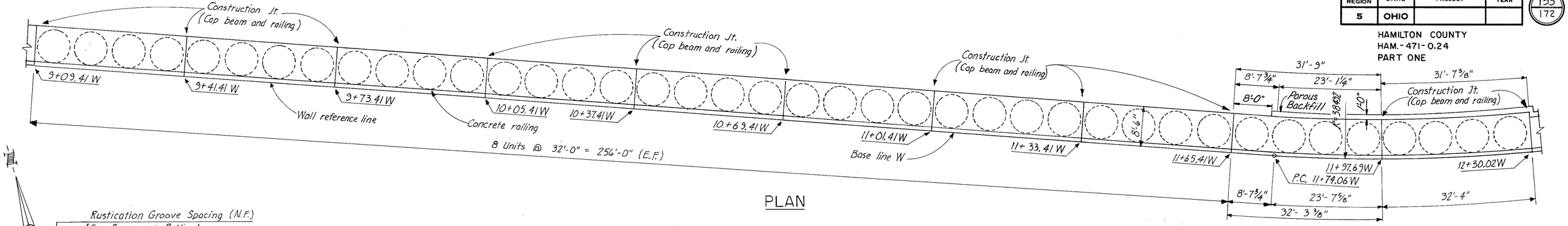
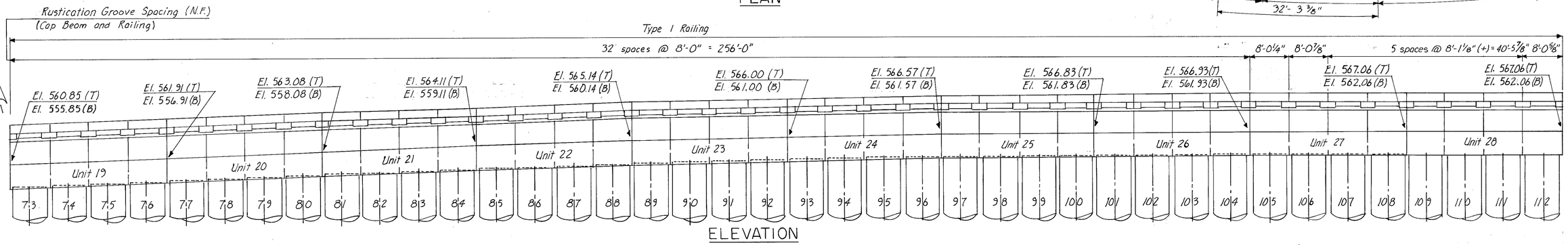
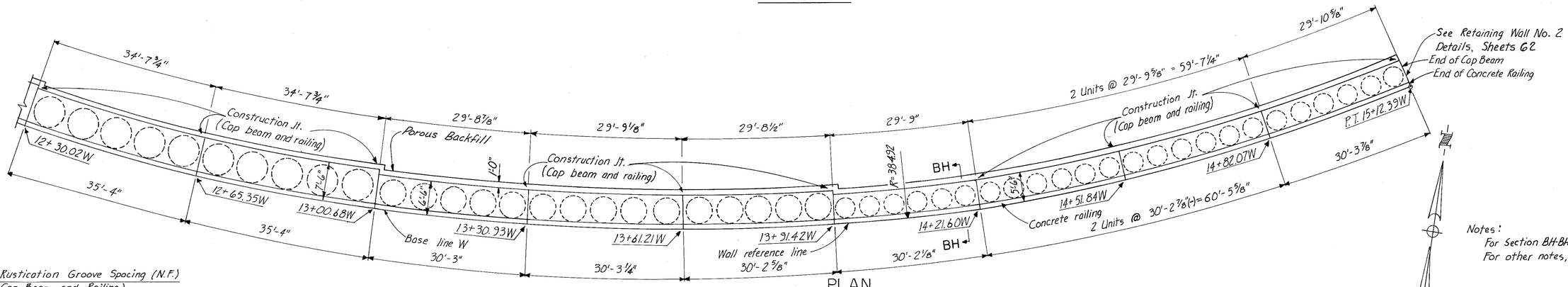
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PLAN

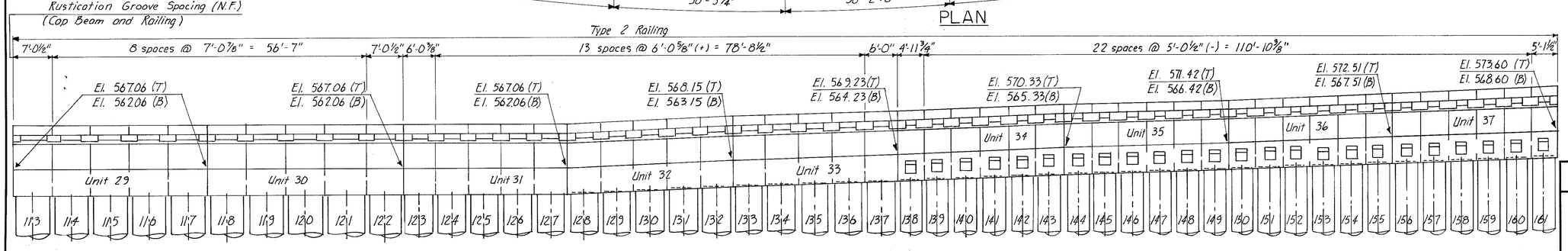


ELEVATION



PLAN

Notes:
For Section BH-BH see sheet 157.
For other notes, see sheet 152.



ELEVATION

Work sheets 152 thru 157 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CAP & RAILING DETAILS
CYLINDER PILE WALL
STA. 3+30.62W TO STA. 15+12.39W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
JHO VDG	DMK		W.L.	JHO 2-27-79	

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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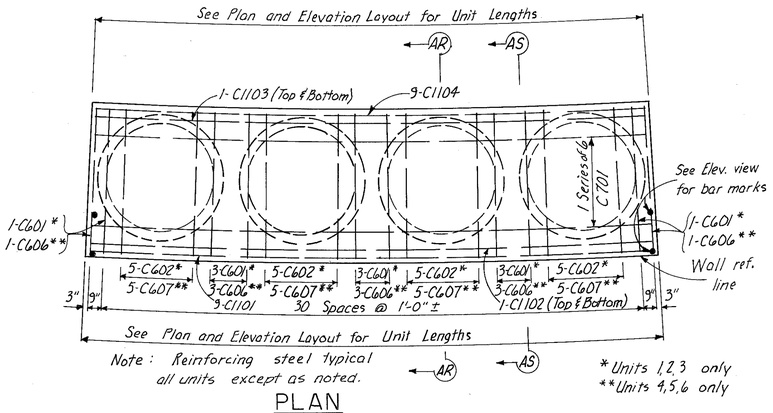
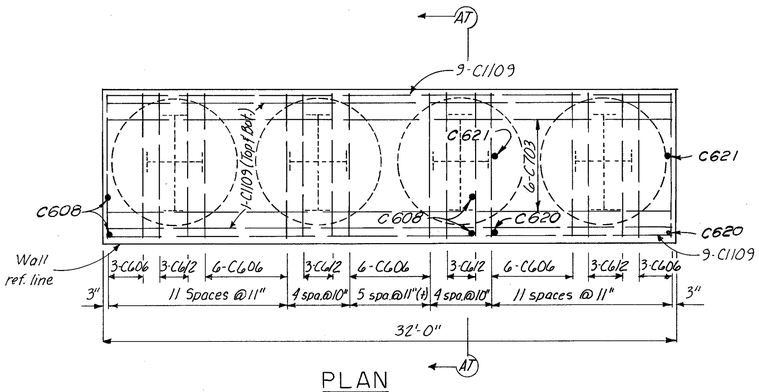
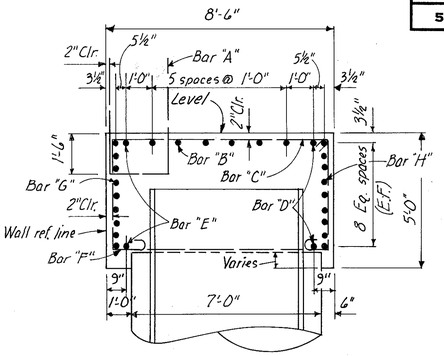
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



PLAN
(UNITS 1, 2, 3, 4, 5, 6)



PLAN
(UNIT 8)

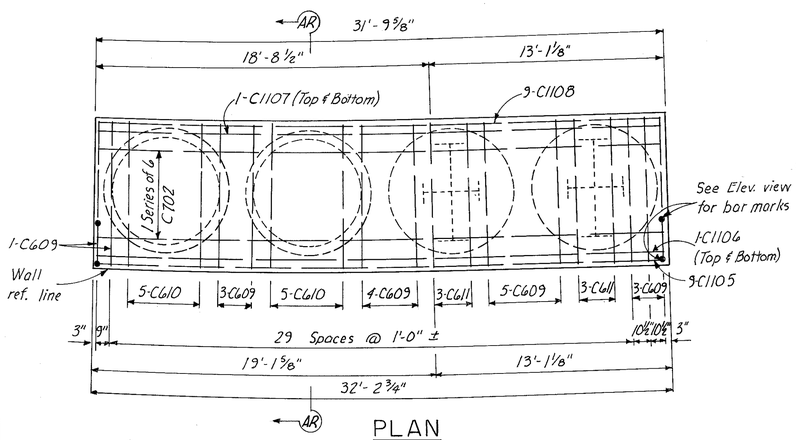


SECTION AR-AR
(UNITS 1, 2, 4, 5, 6, 7)

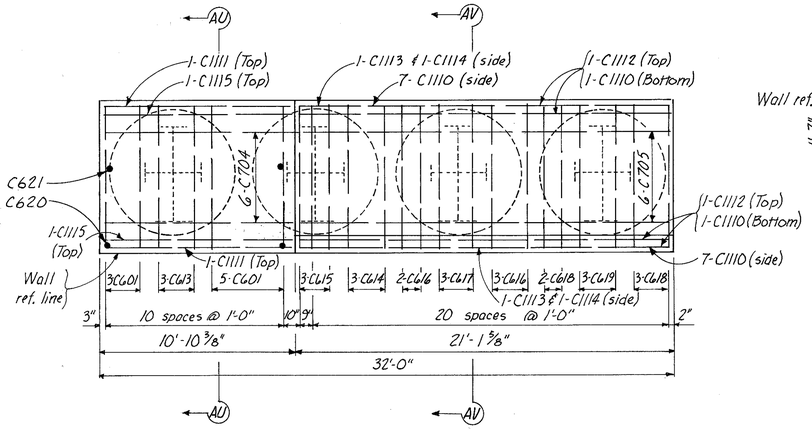
TABLE OF BAR MARKS

BAR	UNIT 1	2	4	5	6	7
A	C603	C603	C608	C608	C608	C608
B	C701	C701	C701	C701	C701	C702
C	C601	C601	C606	C606	C606	C609
D	C1103	C1103	C1103	C1103	C1103	C1107
E	C1102	C1102	C1102	C1102	C1102	C1106
F	C602	C602	C607	C607	C607	C610 C611
G	C1101	C1101	C1101	C1101	C1101	C1105
H	C1104	C1104	C1104	C1104	C1104	C1108

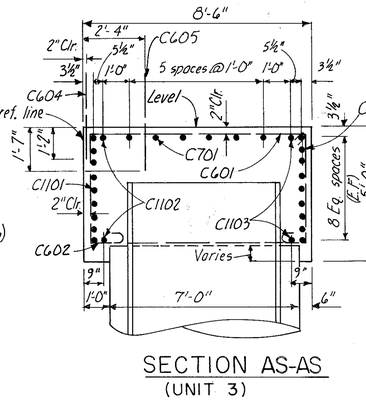
Work these sheets with sheets 128 & 129.



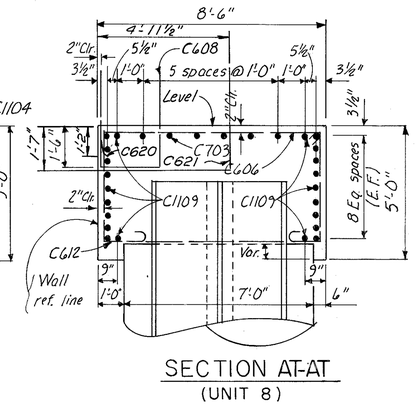
PLAN
(UNIT 7)



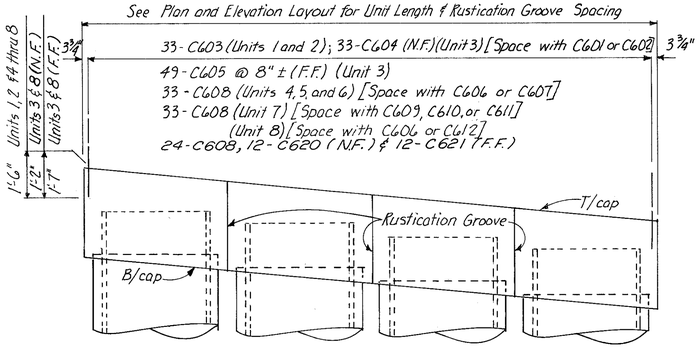
PLAN
(UNIT 9)



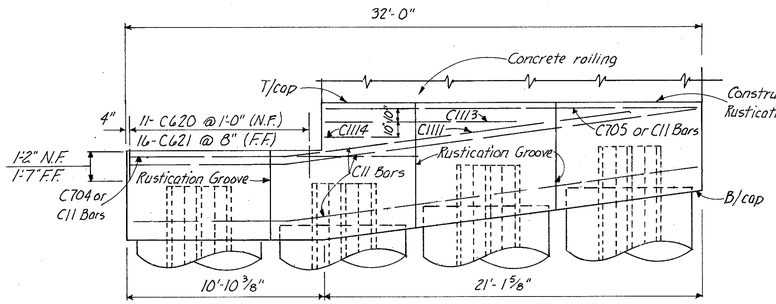
SECTION AS-AS
(UNIT 3)



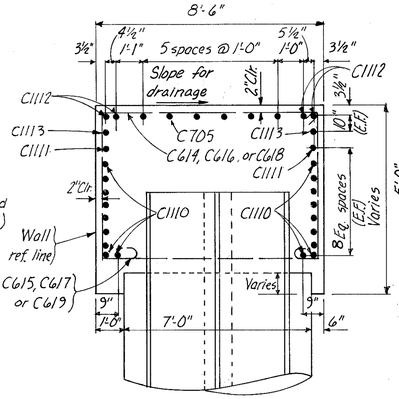
SECTION AT-AT
(UNIT 8)



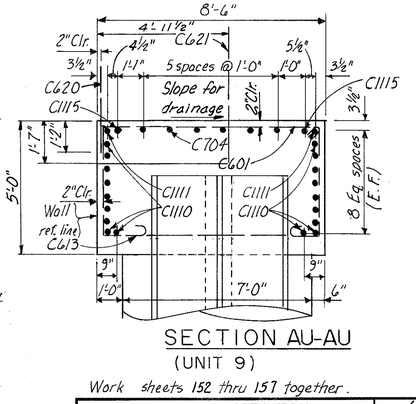
ELEVATION
(UNITS 1, 2, 3, 4, 5, 6, 7, 8)



ELEVATION
(UNIT 9)



SECTION AV-AV
(UNIT 9)
(RAILING NOT SHOWN)



SECTION AU-AU
(UNIT 9)

Work sheets 152 thru 157 together.

The exposed portion of bars C603, C604, C605, C608, C620 and C621 shall be given an asphaltic coating and wrapped with two layers of plastic film after the cap beam concrete has been poured. The plastic film shall be securely bound to the bars. This work shall be incidental to the concrete work.

Note:
For notes see sheet 152.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CAP & RAILING DETAILS
CYLINDER PILE WALL
STA. 3+30.62W TO STA. 15+12.39W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
JHO VDG	DMK		JHO	JHO 2-27-79	9-4-79

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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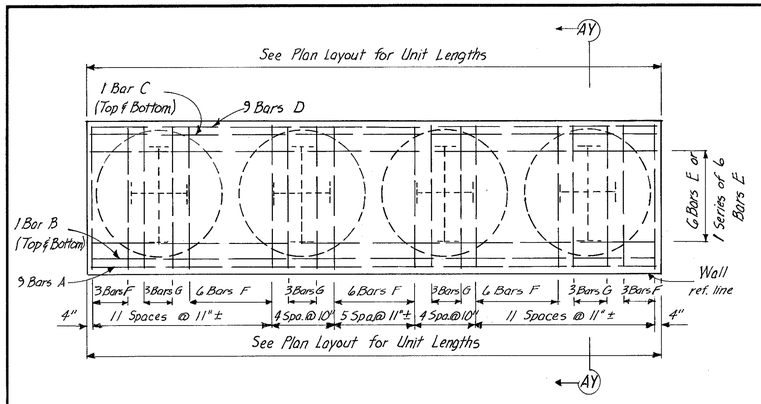
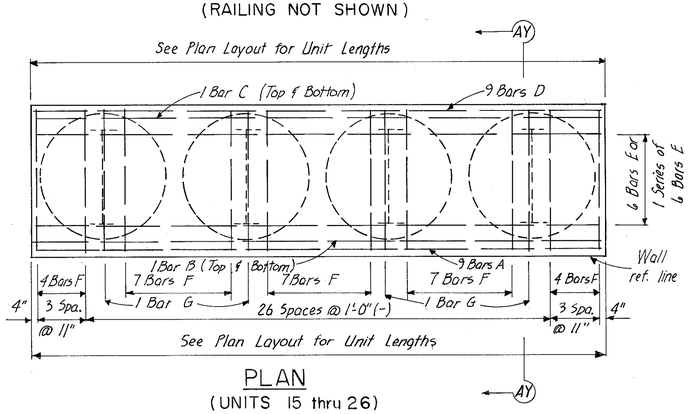
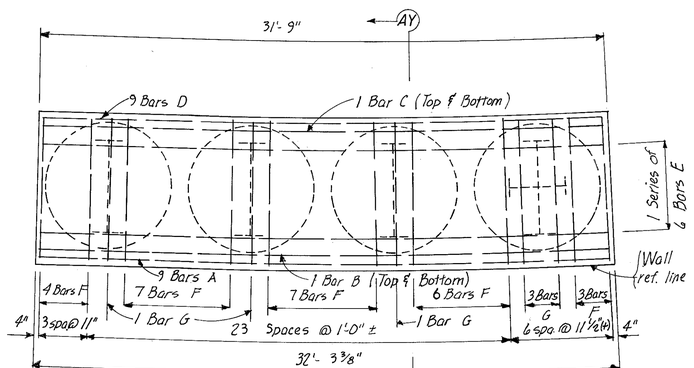
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



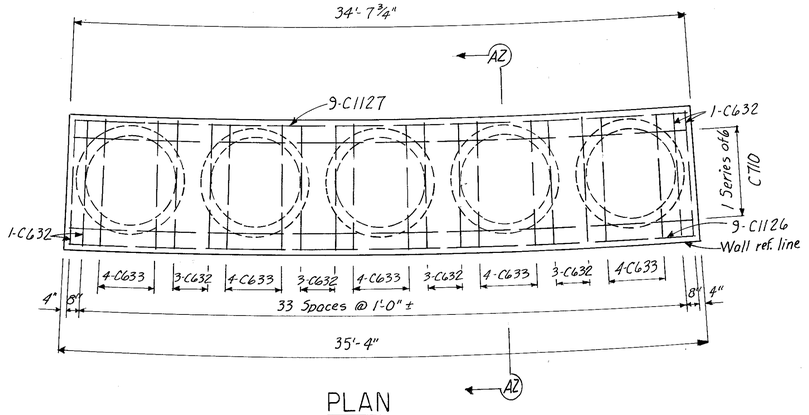
PLAN
(UNITS 10 thru 14 and 28)
(RAILING NOT SHOWN)



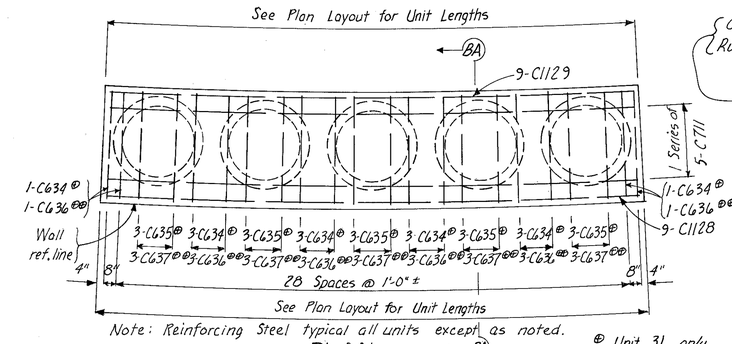
PLAN
(UNITS 15 thru 26)
(RAILING NOT SHOWN)



PLAN
(UNIT 27)
(RAILING NOT SHOWN)



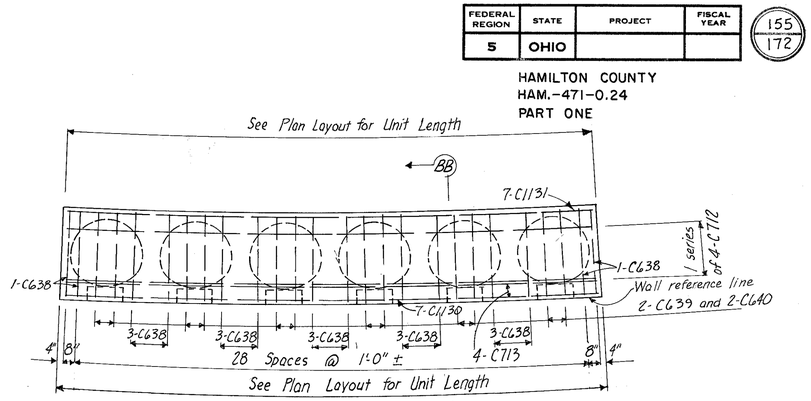
PLAN
(UNITS 29 and 30)
(RAILING NOT SHOWN)



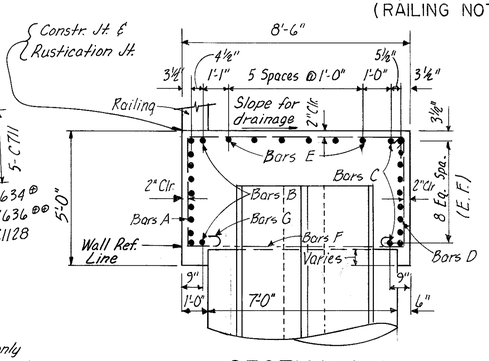
Note: Reinforcing Steel typical all units except as noted.

PLAN
(UNITS 31, 32, 33)
(RAILING NOT SHOWN)

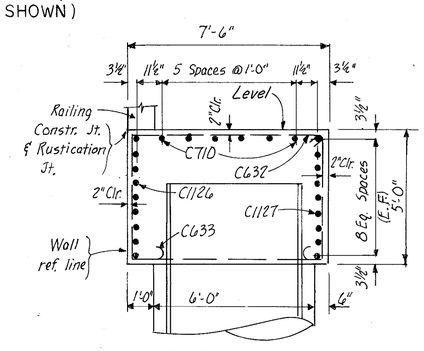
⊕ Unit 31 only
⊕⊕ Unit 32 & 33 only



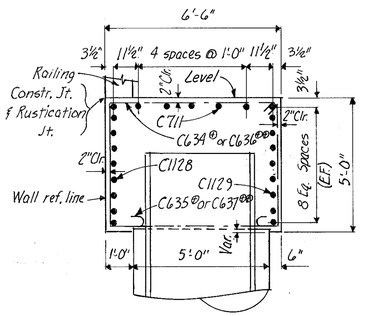
PLAN
(UNITS 34 and 35)
(RAILING NOT SHOWN)



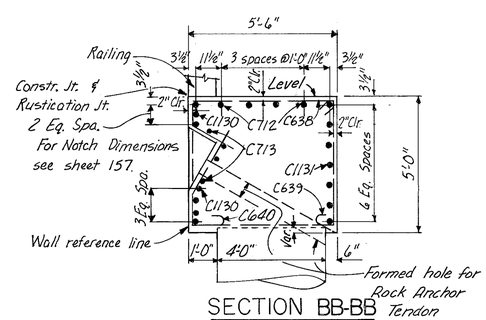
SECTION AY-AY
(RAILING NOT SHOWN)



SECTION AZ-AZ
(RAILING NOT SHOWN)



SECTION BA-BA
(RAILING NOT SHOWN)



SECTION BB-BB
(RAILING NOT SHOWN)

Note:
For notes see sheet 152.

TABLE OF BAR MARKS UNITS 10 thru 28							
UNIT	BARS A	BARS B	BARS C	BARS D	BARS E	BARS F	BARS G
10	C1116	C1116	C1116	C1116	C703	C622	C623
11	C1116	C1116	C1116	C1116	C703	C624	C625
12	C1116	C1116	C1116	C1116	C703	C622	C623
13	C1117	C1117	C1117	C1117	C708	C622	C623
14	C1117	C1117	C1117	C1117	C708	C618	C619
15	C1117	C1117	C1117	C1117	C708	C626	C627
16	C1117	C1117	C1117	C1117	C708	C618	C619
17	C1116	C1116	C1116	C1116	C703	C628	C629
18	C1116	C1116	C1116	C1116	C703	C622	C623
19	C1116	C1116	C1116	C1116	C703	C622	C623
20	C1116	C1116	C1116	C1116	C703	C622	C623
21	C1116	C1116	C1116	C1116	C703	C622	C623
22	C1116	C1116	C1116	C1116	C703	C622	C623
23	C1116	C1116	C1116	C1116	C703	C622	C623
24	C1116	C1116	C1116	C1116	C703	C628	C629
25	C1116	C1116	C1116	C1116	C703	C618	C619
26	C1116	C1116	C1116	C1116	C703	C618	C619
27	C1118	C1119	C1120	C1121	C702	C626	C627
28	C1122	C1123	C1124	C1125	C709	C630	C631

Work sheets 152 thru 157 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

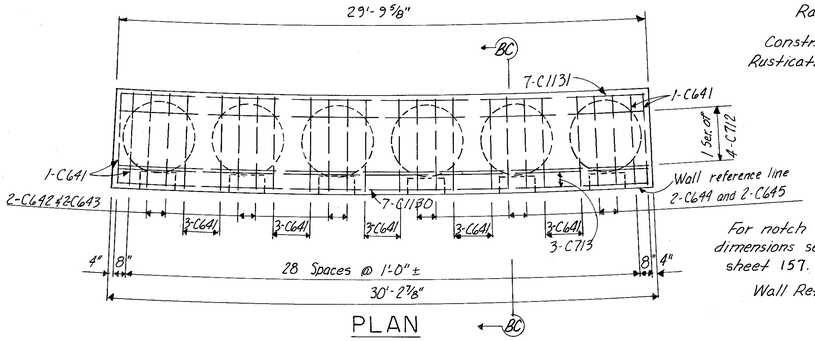
CAP & RAILING DETAILS
CYLINDER PILE WALL
STA. 3+30.62W TO STA. 15+12.39W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
VHO VDG	DMK		M.L.	JHO 2-27-79	

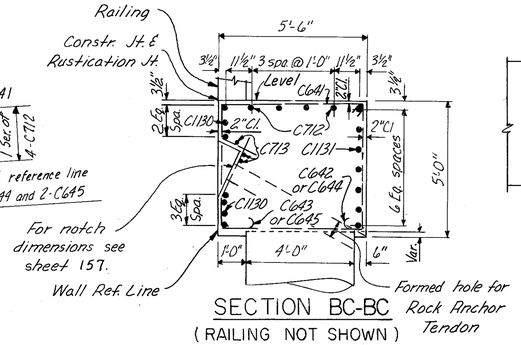
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

156/172

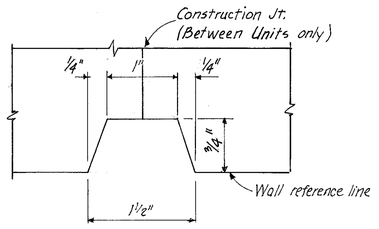
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



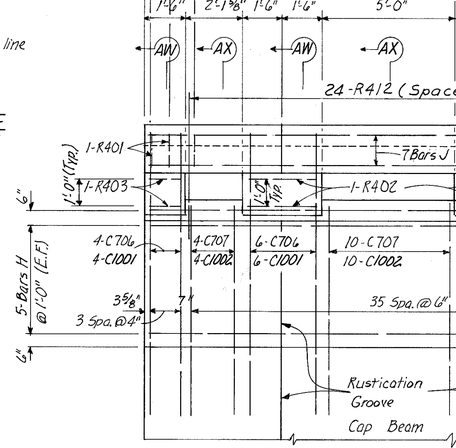
PLAN
(UNIT 36)
(RAILING NOT SHOWN)



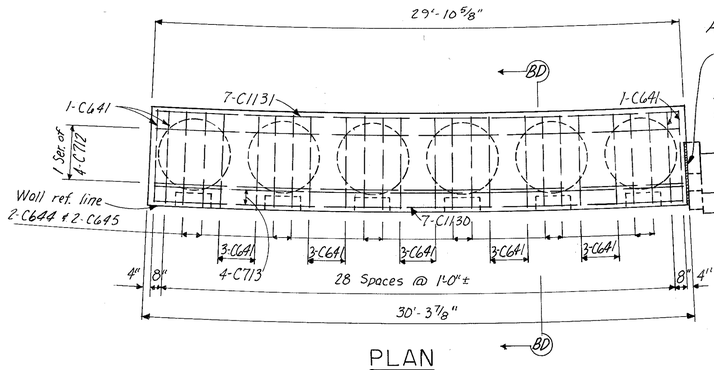
SECTION BC-BC
(RAILING NOT SHOWN)



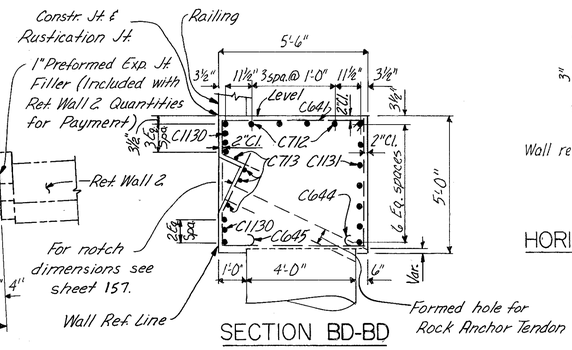
VERT. RUSTICATION GROOVE



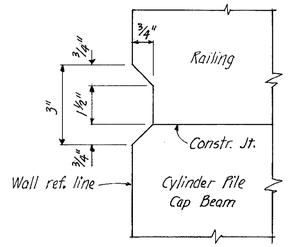
TYPE I RAILING
(UNIT 9)



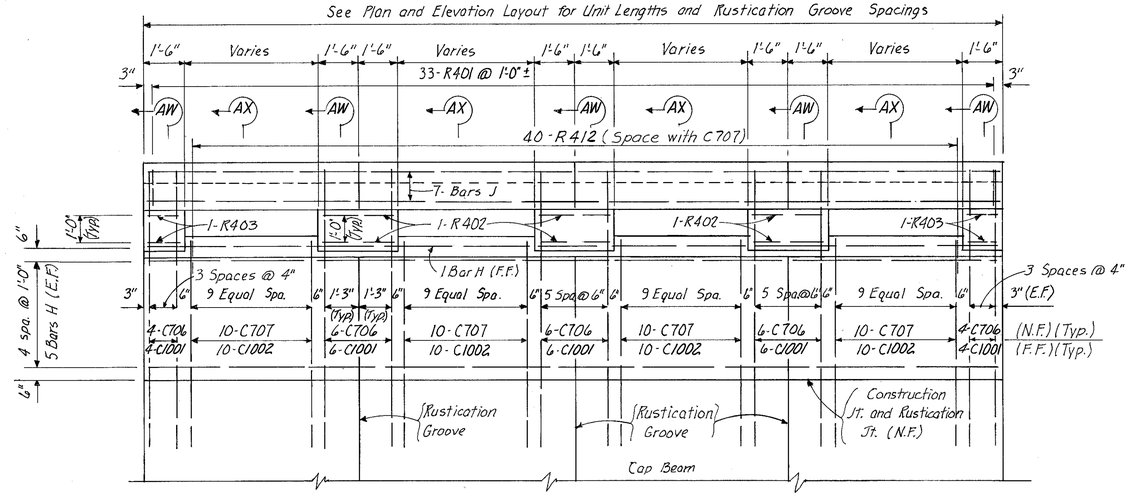
PLAN
(UNIT 37)
(RAILING NOT SHOWN)



SECTION BD-BD
(RAILING NOT SHOWN)

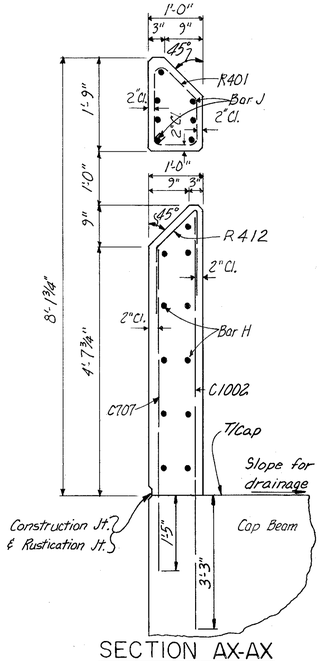


HORIZ. RUSTICATION JOINT

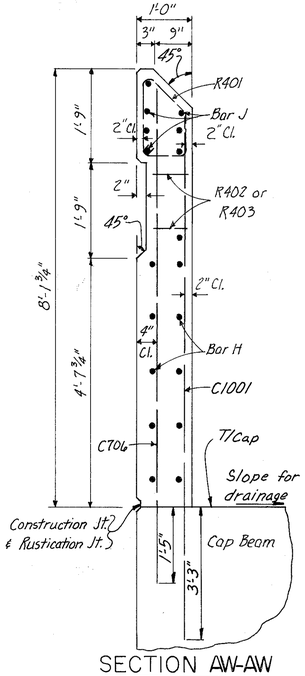


TYPE I RAILING
(UNITS 10 thru 28)

TYPE I RAILING BAR MARKS		
UNIT	BAR H	BAR J
9	R404	R501
10	R405	R502
11	R405	R502
12	R405	R502
13	R405	R502
14	R405	R502
15	R405	R502
16	R405	R502
17	R405	R502
18	R405	R502
19	R405	R502
20	R405	R502
21	R405	R502
22	R405	R502
23	R405	R502
24	R405	R502
25	R405	R502
26	R405	R502
27	R406	R503
28	R407	R504



SECTION AX-AX
(UNITS 9 thru 28)



SECTION AW-AW
(UNITS 9 thru 28)

Note:
Yardage of concrete for Item 511, "Class C Concrete, Cap" shall be determined on the basis of deductions for notch for tendon attachment, embedment of cylinder pile and encasement of structural steel.
For notes see sheet 152.

Work sheets 152 thru 157 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

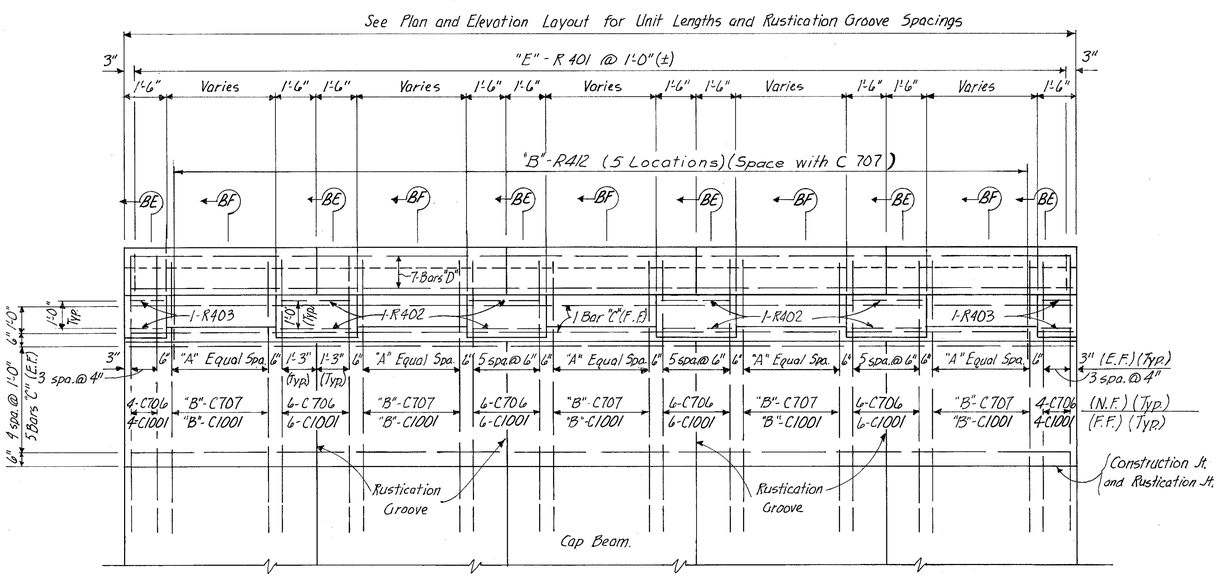
CAP & RAILING DETAILS
CYLINDER PILE WALL
STA. 3+30.62 W TO STA. 15+12.39W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
JHO VDG	DMK		JHO	JHO 2-27-79	

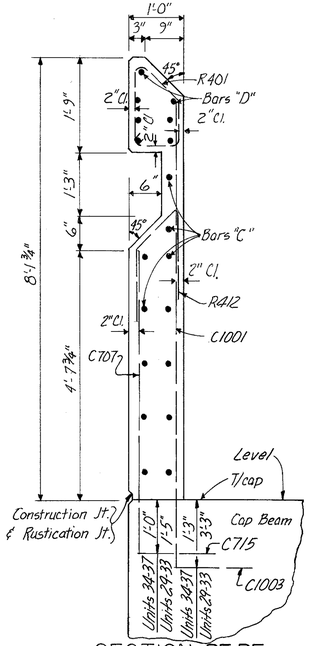
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

157
172

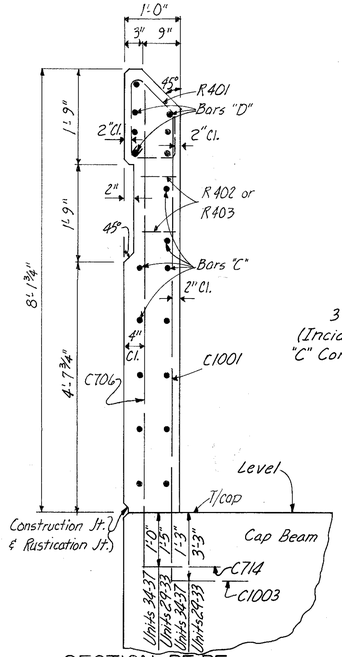
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



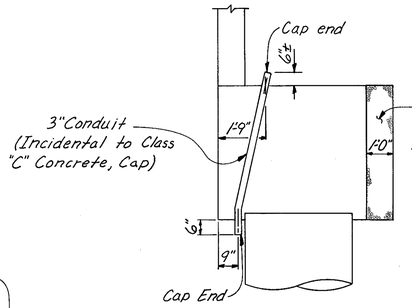
TYPE 2 RAILING
(UNITS 29 thru 33)



SECTION BF-BF
(UNITS 29 thru 37)

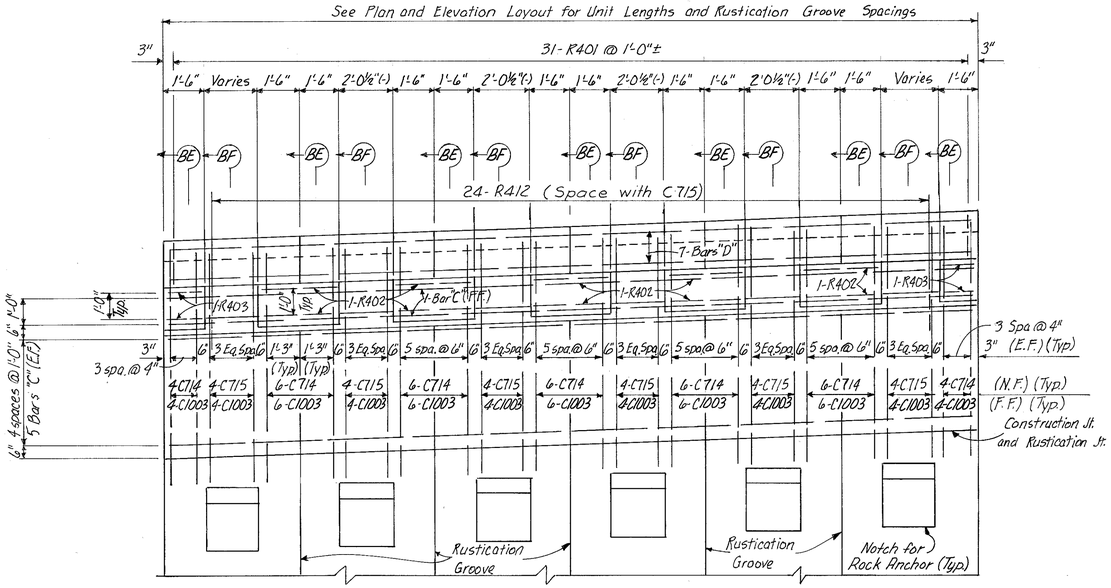


SECTION BE-BE
(UNITS 29 thru 37)



SECTION BH-BH
Sta. 14+19.08 W

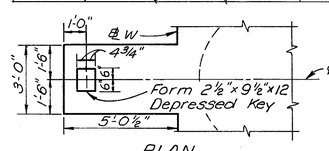
Notes:
For notes see sheet 152.
For Rustication Joint Detail see sheet 156.



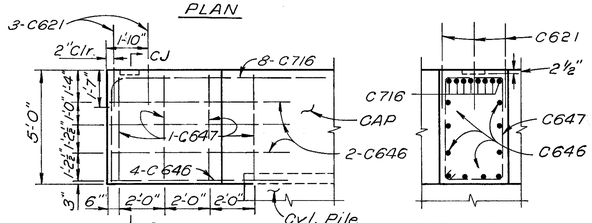
TYPE 2 RAILING
(UNITS 34 thru 37)

TYPE 2 RAILING BAR MARKS & SPACES

UNIT	No. of Spa. A	No. of Bars B	Bars "C"	Bars "D"	No. of Bars E
29	7	8	R408	R505	36
30	7	8	R408	R505	36
31	5	6	R409	R506	31
32	5	6	R409	R506	31
33	5	6	R409	R506	31
34			R410	R507	
35			R409	R506	
36			R409	R506	
37			R411	R508	

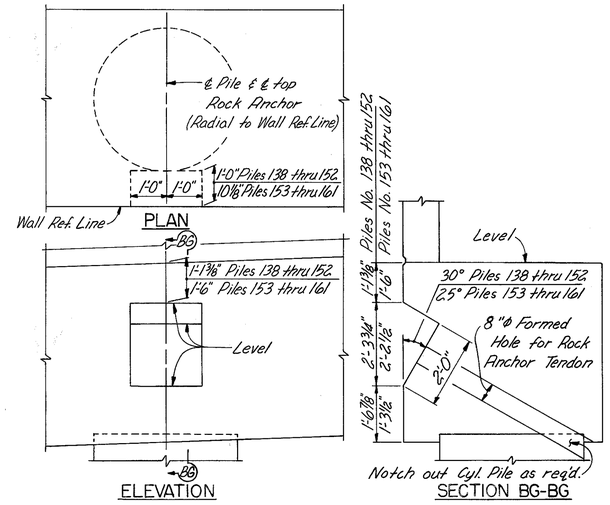


PLAN



ELEVATION
BRACKET DETAIL

SECTION CJ-CJ



CAP BEAM NOTCH DETAILS

Work sheets 152 thru 157 together.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CAP & RAILING DETAILS
CYLINDER PILE WALL
STA. 3+30.62 W TO STA. 15+12.39W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
JHO VDG	DMK		D.K.	JHO 2-27-79	9-4-79

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

158
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE

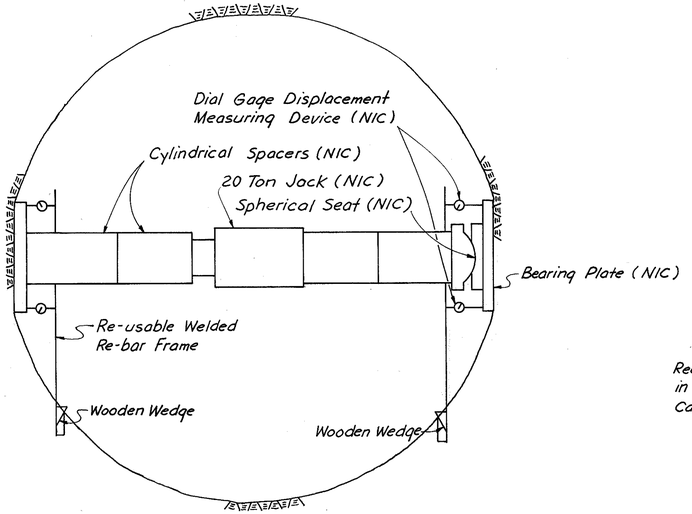
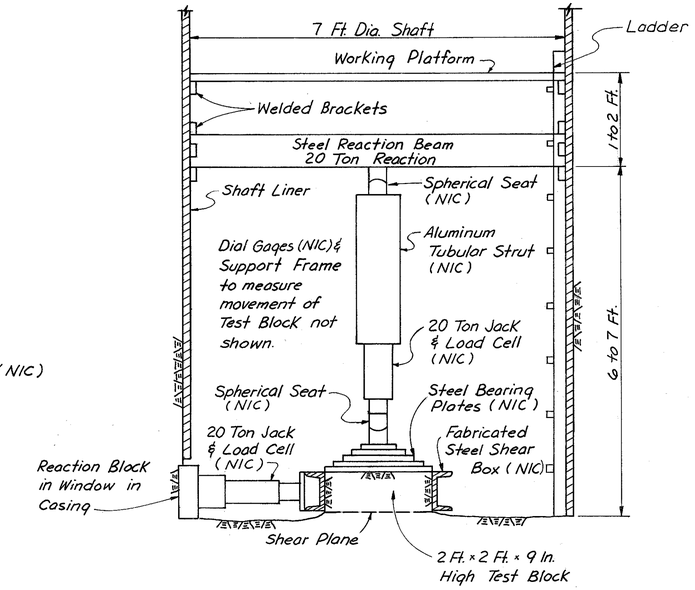


PLATE BEARING TEST APPARATUS FOR TUNNEL AND CYLINDER PILES

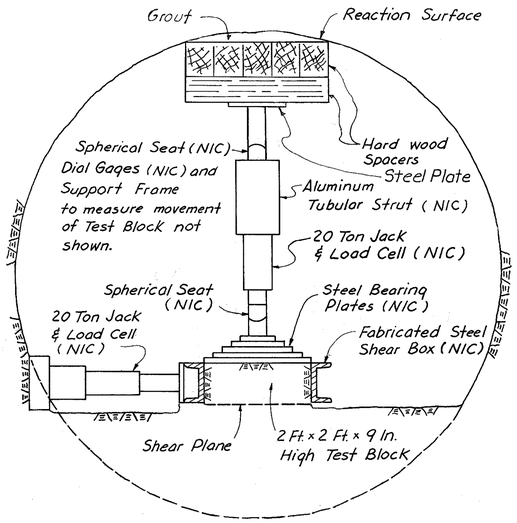
Note: All Jacking Equipment, Plates, Cylindrical Spacers, and Measuring Devices marked (NIC) will be furnished by Engineer.



DIRECT SHEAR TEST APPARATUS FOR CYLINDER PILES

(Re-usable Welded Re-bar Frame, for support of dial gages during testing, not shown)

Note: Steel Plates, Jacks, Bearings, Cylindrical Spacer, and Spherical Seats marked (NIC) will be furnished by Engineer.



DIRECT SHEAR TEST APPARATUS FOR TUNNEL

(Re-usable Welded Re-bar Frame, for support of dial gages during testing, not shown)

Note: Steel Plates, Bearings, Jacks, Cylindrical Spacers, and Spherical Seats marked (NIC) will be furnished by Engineer.

GENERAL NOTES

Schematic layouts shown on these diagroms are intended to show general principles only and are subject to modification.

NIC denotes Not In Contract

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

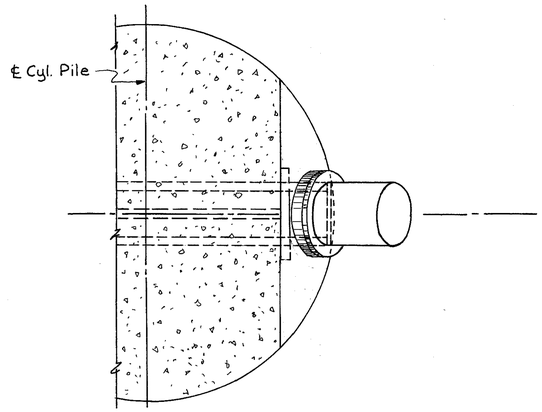
TEST APPARATUS
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	CCL		JDC	JHO 2-27-79	

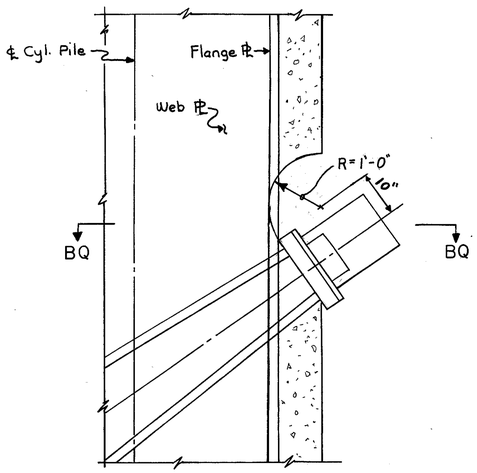
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

159
172

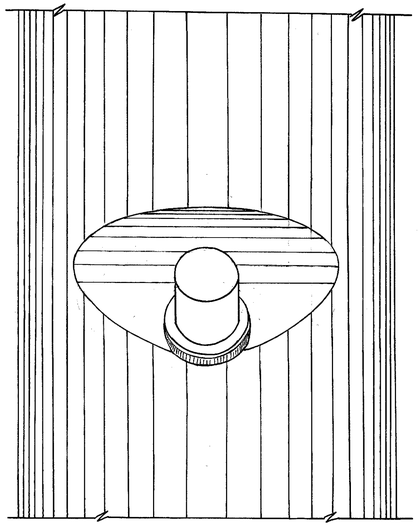
HAMILTON COUNTY
HAM.-471-0.24
PART ONE



SECTION BQ-BQ

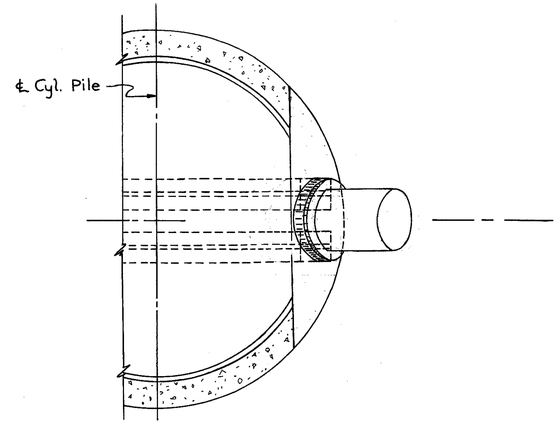


CENTER SECTION

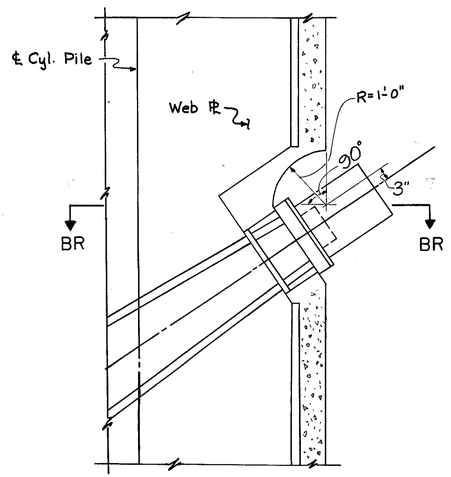


FRONT ELEVATION

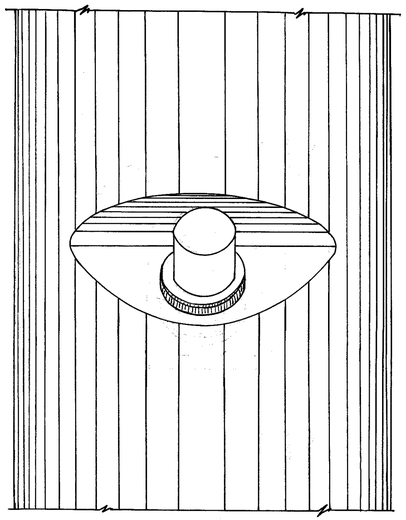
STRUCTURAL STEEL REINFORCED PILE



SECTION BR-BR

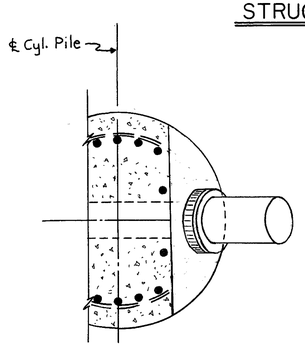


CENTER SECTION

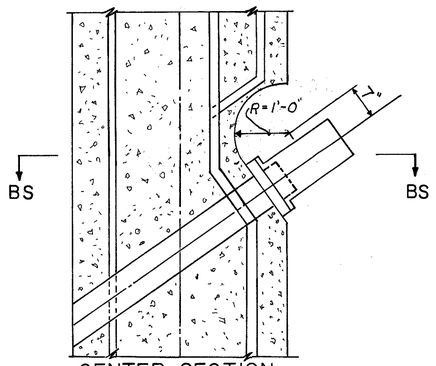


FRONT ELEVATION

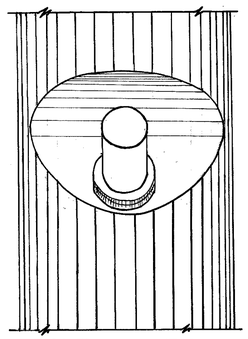
CIRCULAR TUBE REINFORCED PILE



SECTION BS-BS



CENTER SECTION



FRONT ELEVATION

REINFORCING STEEL REINFORCED PILE

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

CYLINDER PILE ARCHITECTURAL TREATMENT

CYLINDER PILE WALL

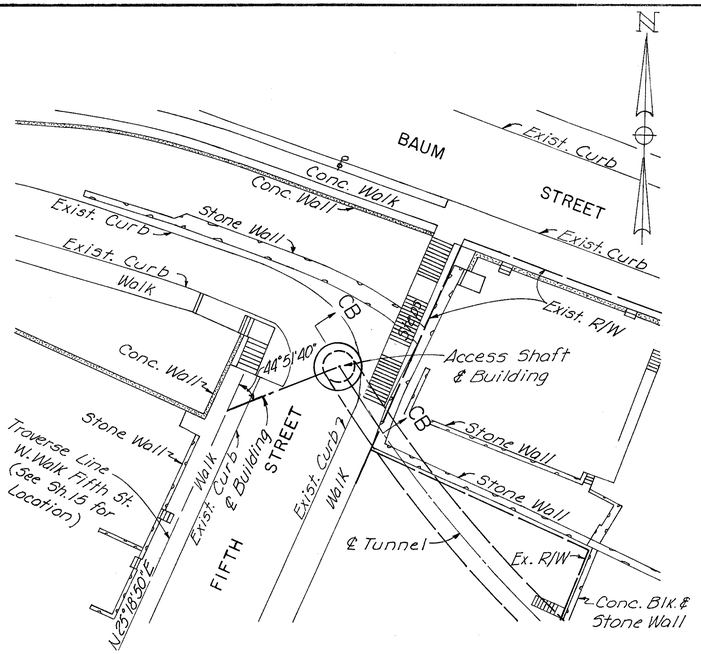
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	MAM'C		H.L.L.	JHO 2-27-79	

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

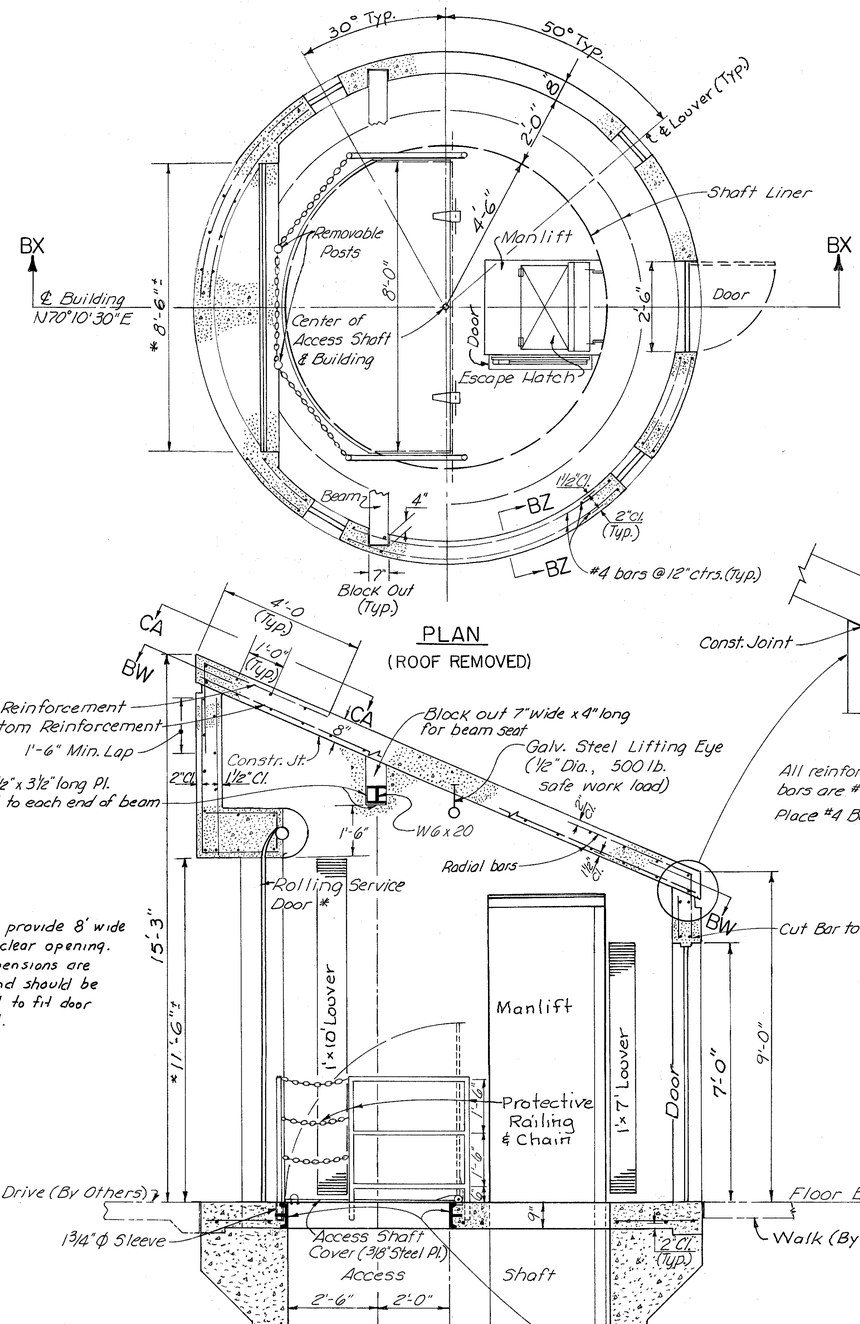
160/172

HAMILTON COUNTY
HAM-471-0.24
PART ONE

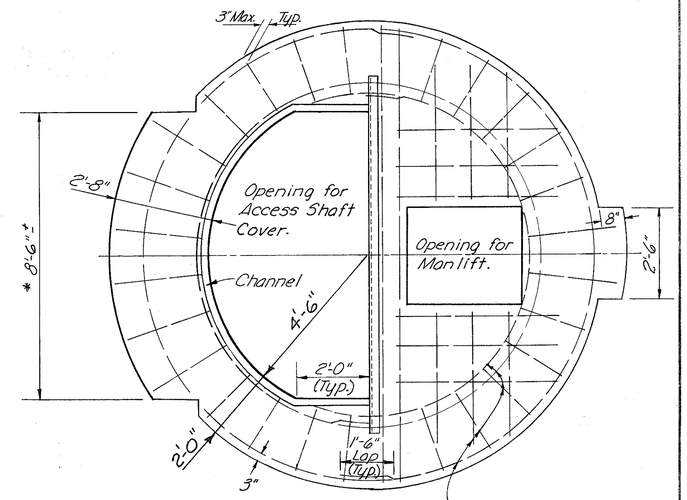


LOCATION PLAN

Note:
Location of building to be determined by location of the shaft. Centerline of building to be set at bearing shown.

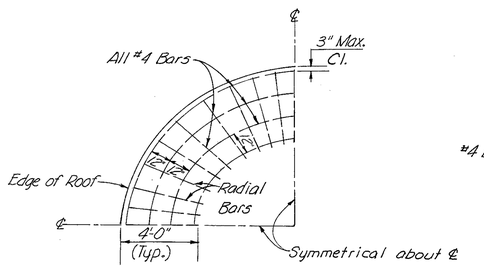


PLAN

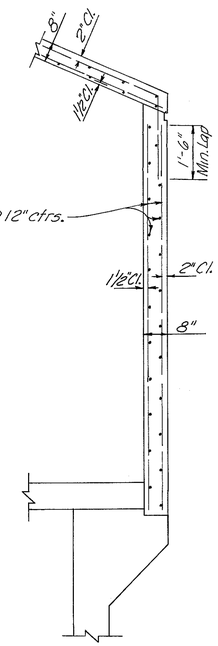


FLOOR PLAN

All reinforcement bars are #4.



SECTION CA-CA
(Top Reinforcement)

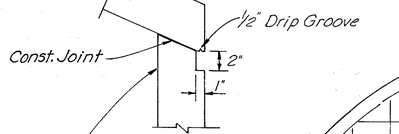


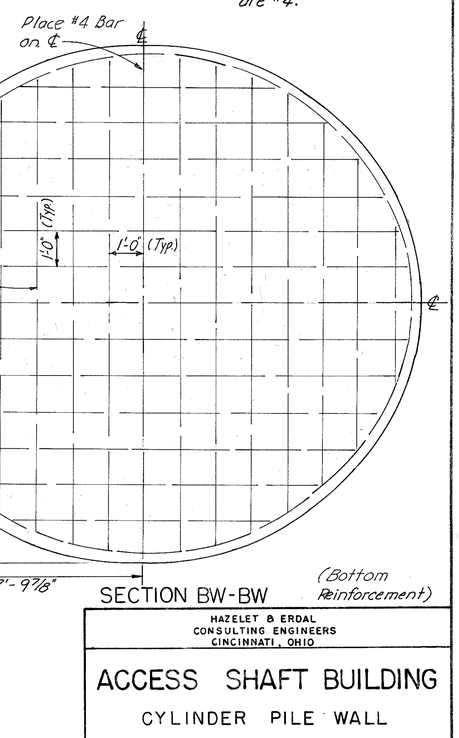
SECTION BZ-BZ

ESTIMATED QUANTITIES				
Access Shaft Building	Roof	Wall	Floor	Totals
Cu. Yds. Concrete	4.35	10.00	2.81	17.2
Lbs. Reinf. Steel	421	1053	135	1609

PLAN
(ROOF REMOVED)

SECTION BX-BX





SECTION BW-BW
(Bottom Reinforcement)

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CINCINNATI, OHIO

ACCESS SHAFT BUILDING

CYLINDER PILE WALL

STA. 3+34.67 W. TO STA. 15+09.79 W.

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	C.N.B.		W.W.C.	JHO 2-28-79	

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

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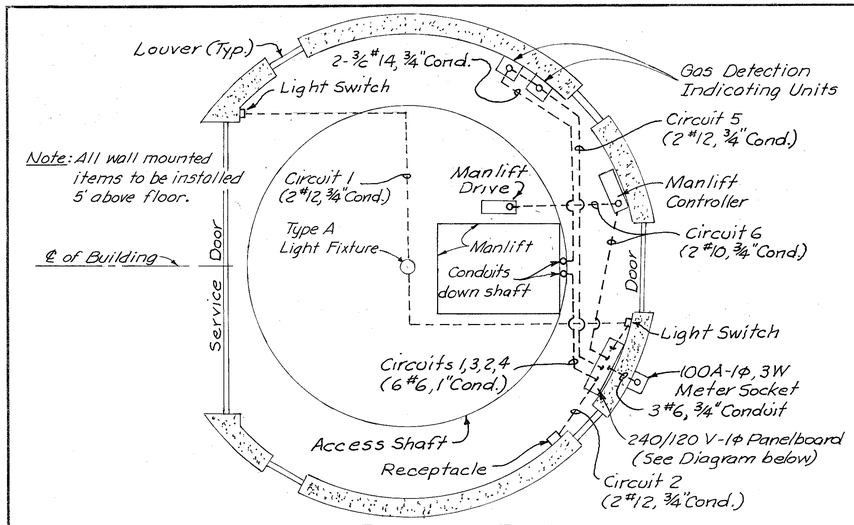
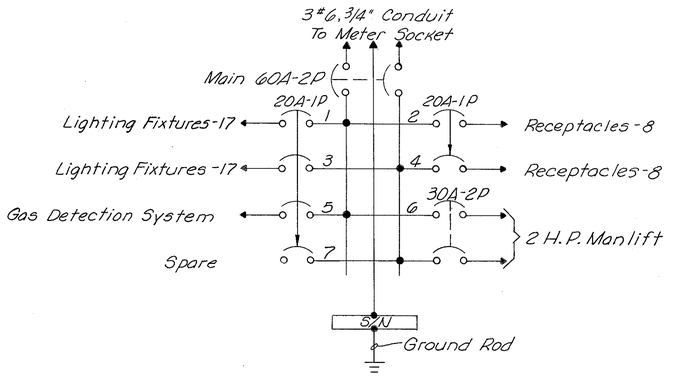
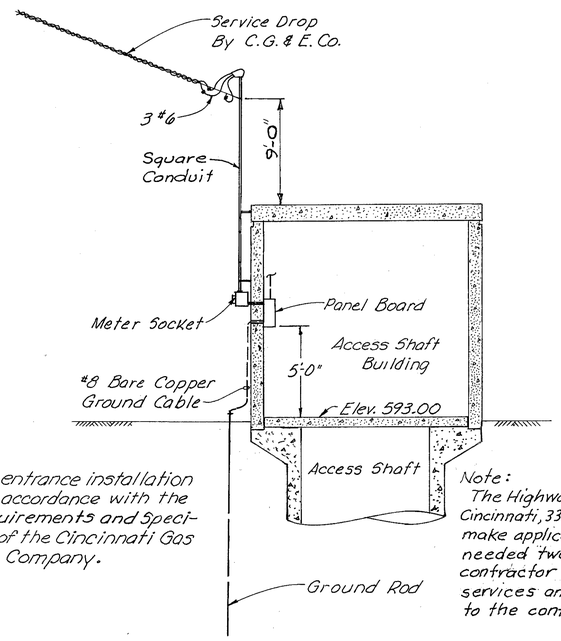
HAMILTON COUNTY
HAM-471-0.24
PART ONE



ELECTRICAL DETAILS



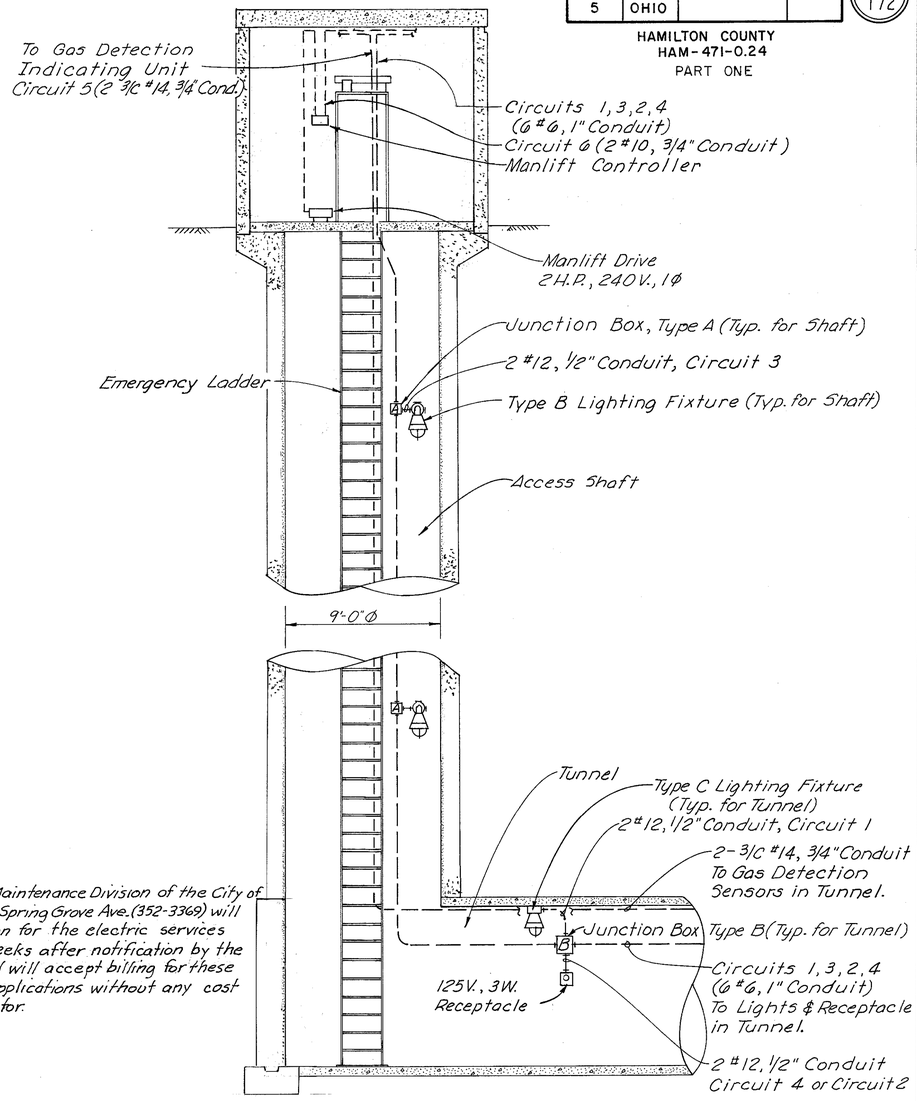
SCHEMATIC
240/120 V-1Φ, 3W. PANELBOARD
SERVICE NO. 1



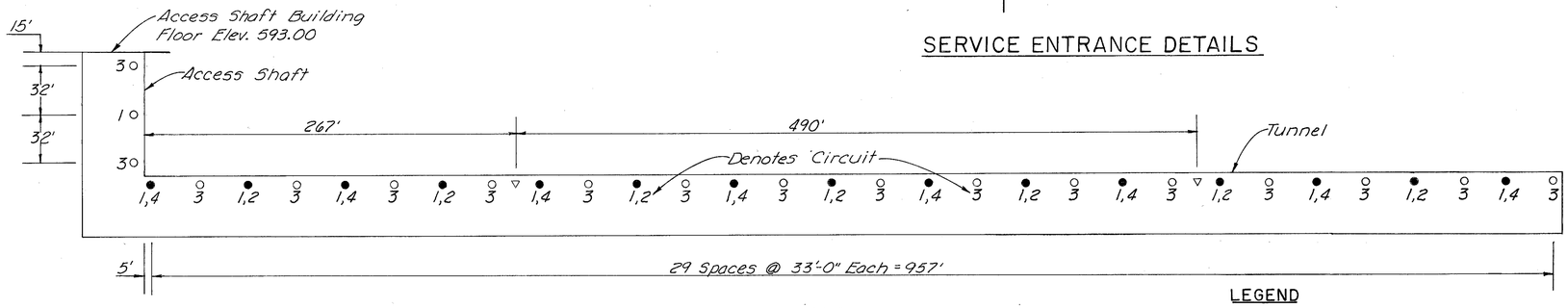
Note:
Service entrance installation must be in accordance with the latest requirements and Specifications of the Cincinnati Gas & Electric Company.

Note:
The Highway Maintenance Division of the City of Cincinnati, 3300 Spring Grove Ave. (352-3369) will make application for the electric services needed two weeks after notification by the contractor and will accept billing for these services and applications without any cost to the contractor.

SERVICE ENTRANCE DETAILS



SECTION CB-CB



NORTH ELEVATION

LEGEND
o - Location of Lighting Fixture Type B in Shaft and Type C in Tunnel.
● - Location of Lighting Fixture Type C and 125V, 3W Receptacle.
▽ - Location of Gas Detection Sensing Head.
Connect Lighting Fixtures and Receptacles to Alternate Circuits 1, 3, 2 or 4 as shown.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

ACCESS SHAFT & TUNNEL ELECTRICAL DETAILS

CYLINDER PILE WALL
STA. 3+34.87 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	C.N.B.		W.W.C.	JHO 2-28-79	

FED. RD. DIV.	STATE	PROJECT	FISCAL YEAR
5	OHIO		

162
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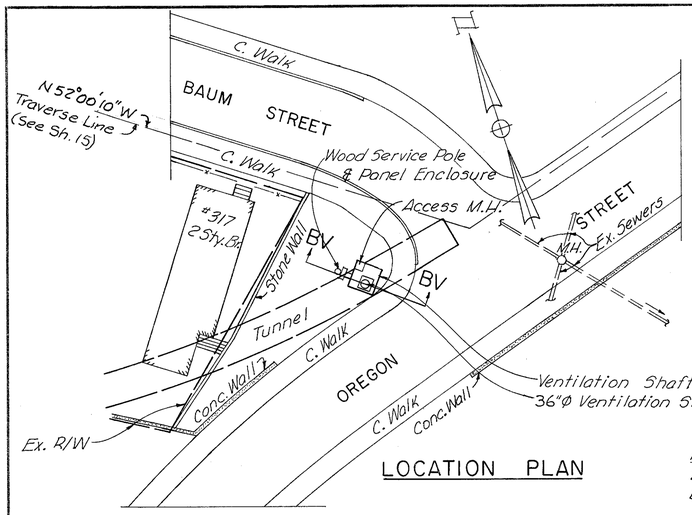
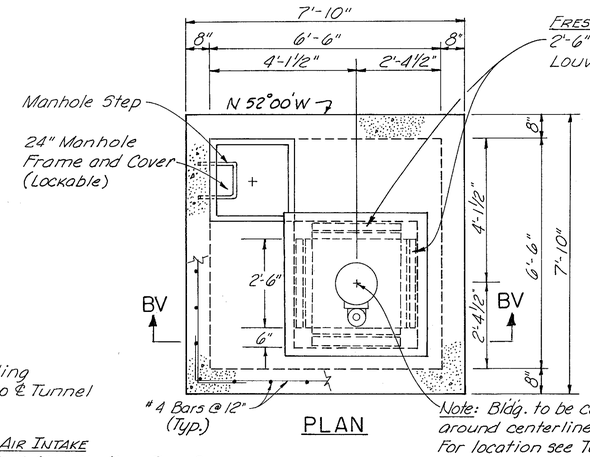
HAMILTON COUNTY
HAM-471-0.24
PART ONE

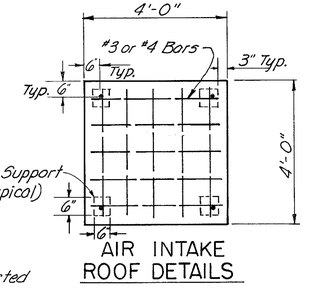


LOCATION PLAN

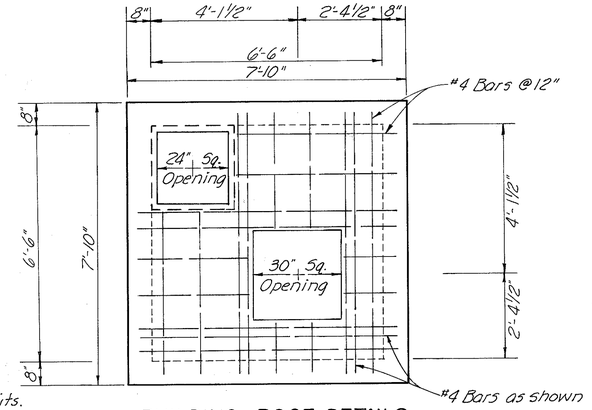
Note: See Sheet 161 for notes pertaining to electric service.



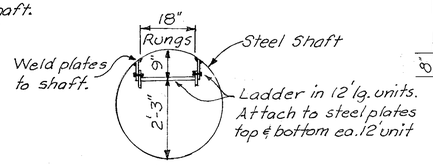
PLAN



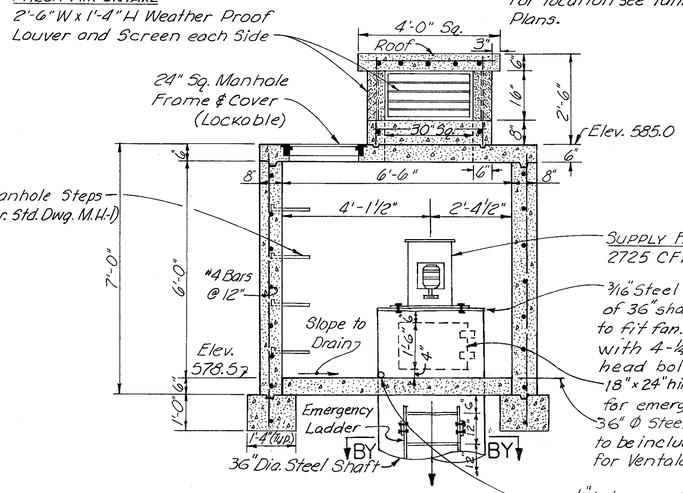
AIR INTAKE
ROOF DETAILS



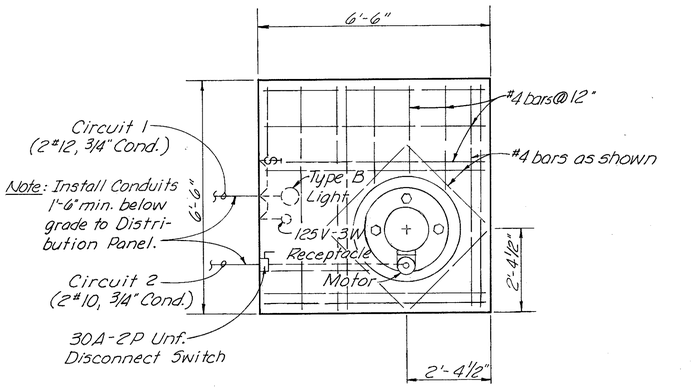
BUILDING ROOF DETAILS



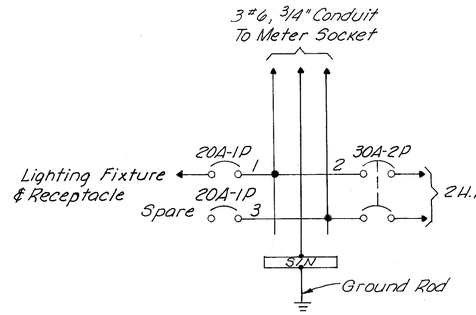
SECTION BY-BY



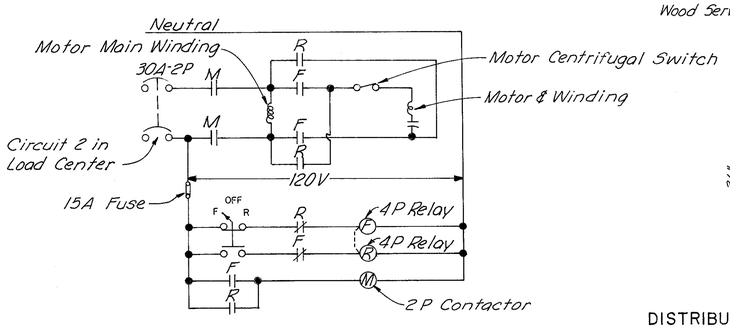
SECTION BV-BV



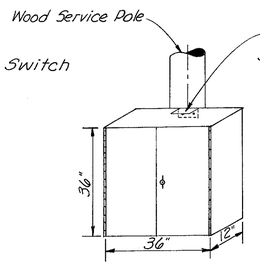
FLOOR & ELECTRICAL DETAILS



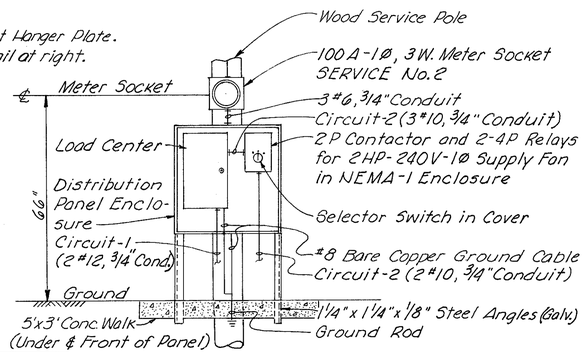
SCHEMATIC
240/120V-1Ø, 3W. LOAD CENTER
SERVICE NO.2



SUPPLY FAN POWER AND CONTROL DIAGRAM



DETAIL
DISTRIBUTION PANEL ENCLOSURE

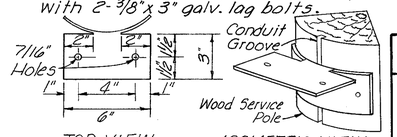


ELEVATION
DISTRIBUTION PANEL INTERIOR & SERVICE POLE

ESTIMATED QUANTITIES

Ventilation Shaft Building	Roof	Walls	Floor & Fdn.	Totals
Cu. Yds. Concrete	1.45	5.75	2.06	9.3
Lbs. Reinf. Steel	116	282	90	488

Hanger Plate made from 1/8" x 3" x 3" x 6" galv. steel angle cut 2" back at each end at fillet, then formed to fit control cabinet & pole on top. Anchor to pole with 2-3/8" x 3" galv. lag bolts.



CABINET HANGER PLATE
DETAIL

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

VENTILATION SHAFT BUILDING & ELECT. DET.

CYLINDER PILE WALL

STA. 3+34.67 W. TO STA. 15+09.79 W.

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	C.N.B.		W.W.C.	JHO 2-28-79	

CYLINDER PILES 138 THRU 161

MARK	TYPE	LENGTH	TOTAL NO. OF BARS	WEIGHT	DIMENSIONS A	B	C	D	E	F	R
P401	15	6'-8"	28	125	2'-3"	1'-5"					
P402	26	3'-2"	412	872	2'-2"						
P403	26	4'-1"	356	971	3'-1"						
P404	26	2'-10"	550	1,041	1'-10"						
P405	26	3'-11"	486	1,272	2'-11"						
P406	26	3'-3"	48	104	2'-3"						
P601	57	12'-0"	562	10,129	10'-0"	2'-0"					1'-6 3/4"
P602	10	3'-2"	29	138	8"	10"	1'-0"	1'-1"			
P603	16	4'-0"	30	180	1'-5 1/4"	1'-6"	2'-6"	2'-0 1/2"			
P604	10	3'-9"	16	90	9 3/4"	7"	1'-9"	1'-0"			
P1101	Str.	33'-7"	8	1,427							
P1102	Str.	23'-3"	12	1,482							
P1103	Str.	25'-4"	1	135							
P1104	30	33'-9"	2	359	7'-3"	1'-0"	25'-3"	1'-3"	8 1/2"		
P1105	30	11'-1"	8	471	1'-9"	9 1/4"	8'-0"	1'-4"	1'-1 1/2"		
P1106	Str.	3'-9"	8	159							
P1107	Str.	32'-3"	8	1,371							
P1108	Str.	21'-11"	12	1,397							
P1109	Str.	24'-0"	1	128							
P1110	Str.	31'-6"	8	1,339							
P1111	Str.	21'-2"	1	112							
P1112	Str.	30'-2"	8	1,282							
P1113	Str.	19'-10"	1	105							
P1114	Str.	28'-10"	8	1,226							
P1115	Str.	18'-6"	1	98							
P1116	Str.	20'-7"	1	109							
P1117	Str.	28'-0"	8	1,190							
P1118	Str.	17'-8"	1	94							
P1119	Str.	19'-9"	2	210							
P1120	Str.	25'-8"	8	1,091							
P1121	Str.	15'-4"	1	81							
P1122	Str.	17'-5"	1	93							
P1123	Str.	24'-10"	8	1,056							
P1124	Str.	14'-6"	2	154							
P1125	Str.	16'-7"	1	88							
P1126	Str.	20'-1"	1	107							
P1127	Str.	18'-9"	1	100							
P1128	Str.	23'-7"	10	1,253							
P1129	Str.	18'-5"	2	196							
P1130	Str.	17'-1"	1	91							
P1131	Str.	18'-1"	1	96							
P1132	Str.	16'-9"	1	89							
P1133	Str.	21'-7"	10	1,147							
P1134	Str.	17'-9"	1	94							
P1135	Str.	16'-5"	1	87							
P1136	Str.	21'-3"	10	1,129							
P1137	Str.	16'-6"	1	88							
P1138	Str.	15'-2"	1	81							
P1139	Str.	20'-0"	10	1,063							
P1140	Str.	16'-2"	1	86							
P1141	Str.	14'-10"	2	158							
P1142	Str.	19'-8"	10	1,045							
P1143	Str.	13'-6"	1	72							
P1144	Str.	18'-4"	10	974							
P1145	Str.	13'-2"	1	70							
P1146	Str.	18'-0"	10	956							
P1147	30	32'-5"	2	344	7'-3"	1'-0"	23'-11"	1'-3"	8 1/2"		
P1148	30	31'-8"	2	336	7'-3"	1'-0"	23'-2"	1'-3"	8 1/2"		
P1149	30	30'-4"	2	322	7'-3"	1'-0"	21'-10"	1'-3"	8 1/2"		
P1150	30	29'-0"	2	308	7'-3"	1'-0"	20'-6"	1'-3"	8 1/2"		
P1151	30	28'-2"	2	299	7'-3"	1'-0"	19'-8"	1'-3"	8 1/2"		
P1152	30	25'-10"	2	275	7'-3"	1'-0"	17'-4"	1'-3"	8 1/2"		
P1153	30	25'-0"	2	266	7'-3"	1'-0"	16'-6"	1'-3"	8 1/2"		

CYLINDER PILES 138 THRU 161

MARK	TYPE	LENGTH	TOTAL NO. OF BARS	WEIGHT	DIMENSIONS A	B	C	D	E	F	R
P14S01	Str.	44'-4"	14	4,748							
P14S02	Str.	34'-0"	2	520							
P14S03	Str.	36'-1"	2	552							
P14S04	30	44'-7"	2	682	7'-1"	1'-2"	36'-1"	1'-5"	9 3/4"		
P14S05	30	44'-7"	2	682	6'-10"	1'-2"	36'-4"	1'-5"	9 3/4"		
P14S06	30	44'-7"	2	682	6'-5"	1'-2"	36'-9"	1'-5"	9 3/4"		
P14S07	30	10'-11"	14	1,169	1'-9"	7 3/4"	8'-0"	1'-1 1/2"	11"		
P14S08	Str.	43'-6"	14	4,659							
P14S09	Str.	33'-2"	2	507							
P14S10	Str.	35'-3"	2	539							
P14S11	30	43'-9"	2	669	7'-1"	1'-2"	35'-3"	1'-5"	9 3/4"		
P14S12	30	43'-9"	2	669	6'-10"	1'-2"	35'-6"	1'-5"	9 3/4"		
P14S13	30	43'-9"	2	669	6'-5"	1'-2"	35'-11"	1'-5"	9 3/4"		
P14S14	Str.	42'-2"	14	4,516							
P14S15	Str.	31'-10"	2	487							
P14S16	Str.	33'-11"	2	519							
P14S17	30	42'-5"	2	649	7'-1"	1'-2"	33'-11"	1'-5"	9 3/4"		
P14S18	30	42'-5"	2	649	6'-10"	1'-2"	34'-2"	1'-5"	9 3/4"		
P14S19	30	42'-5"	2	649	6'-5"	1'-2"	34'-7"	1'-5"	9 3/4"		
P14S20	Str.	40'-4"	14	4,320							
P14S21	Str.	30'-0"	2	459							
P14S22	Str.	32'-1"	2	491							
P14S23	30	40'-7"	2	621	7'-1"	1'-2"	32'-1"	1'-5"	9 3/4"		
P14S24	30	40'-7"	2	621	6'-10"	1'-2"	32'-4"	1'-5"	9 3/4"		
P14S25	30	40'-7"	2	621	6'-5"	1'-2"	32'-9"	1'-5"	9 3/4"		
P14S26	Str.	39'-1"	14	4,186							
P14S27	Str.	28'-9"	2	440							
P14S28	Str.	30'-10"	2	472							
P14S29	30	39'-4"	2	602	7'-1"	1'-2"	30'-10"	1'-5"	9 3/4"		
P14S30	30	39'-4"	2	602	6'-10"	1'-2"	31'-1"	1'-5"	9 3/4"		
P14S31	30	39'-4"	2	602	6'-5"	1'-2"	31'-6"	1'-5"	9 3/4"		
P14S32	Str.	37'-3"	14	3,989							
P14S33	Str.	26'-11"	2	412							
P14S34	Str.	29'-0"	2	444							
P14S35	30	37'-6"	2	574	7'-1"	1'-2"	29'-0"	1'-5"	9 3/4"		
P14S36	30	37'-6"	2	574	6'-10"	1'-2"	29'-3"	1'-5"	9 3/4"		
P14S37	30	37'-6"	2	574	6'-5"	1'-2"	29'-8"	1'-5"	9 3/4"		
P14S38	Str.	35'-11"	14	3,847							
P14S39	Str.	25'-7"	2	391							
P14S40	Str.	27'-8"	2	423							
P14S41	30	36'-2"	2	553	7'-1"	1'-2"	27'-8"	1'-5"	9 3/4"		
P14S42	30	36'-2"	2	553	6'-10"	1'-2"	27'-11"	1'-5"	9 3/4"		
P14S43	30	36'-2"	2	553	6'-5"	1'-2"	28'-4"	1'-5"	9 3/4"		
P14S44	Str.	3'-9"	14	402							

Total Weight of Reinforcing Steel (Cylinder Piles 138 thru 161) = 92,853 Lbs.

NOTES:
Refer to CMS Sections 106.03, 700, 709.01 through 709.05 and 709.08. Sufficient additional reinforcing steel shall be provided for sampling. Random samples shall be replaced in the structures by the additional steel, spliced in accordance with 509.08.

For Bar Bending Schedule see Sheet No. 70 .

All reinforcing bars shall be Grade 60 Steel.

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
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HAMILTON COUNTY
HAM-471-0.24
PART ONE

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

REINFORCING STEEL LIST
CYLINDER PILE WALL
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		MRT	JHO 2-27-79	

CYLINDER PILE CAP & RAILING

MARK	TYPE	LENGTH	TOTAL NO. OF BARS	WEIGHT	DIMENSIONS A	B	C	D	E	F	G	R
C601	37	24'-3"	47	1,712	3'-9 1/2"	8'-2"						
C602	53	18'-5"	60	1,660	3'-9 1/2"	8'-2"	1'-3"	9"				
C603	1	10'-4"	66	1,024	4'-3"	2'-2"						
C604	Str.	4'-2"	33	207								
C605	Str.	4'-7"	49	337								
C606	37	24'-8"	63	2,334	4'-0"	8'-2"						
C607	53	18'-10"	60	1,697	4'-0"	8'-2"	1'-3"	9"				
C608	1	8'-10"	156	2070	3'-6"	2'-2"						
C609	37	24'-6"	17	626	3'-11"	8'-2"						
C610	53	18'-8"	10	280	3'-11"	8'-2"	1'-3"	9"				
C611	53	19'-4"	6	174	3'-11"	8'-2"	1'-7"	1'-1"				
C612	53	19'-6"	12	351	4'-0"	8'-2"	1'-7"	1'-1"				
C613	53	19'-1"	3	86	3'-9 1/2"	8'-2"	1'-7"	1'-1"				
C614	37	29'-2"	3	131	6'-3"	8'-2"						
C615	53	24'-0"	3	108	6'-3"	8'-2"	1'-7"	1'-1"				
C616	37	27'-8"	5	208	5'-6"	8'-2"						
C617	53	22'-6"	3	101	5'-6"	8'-2"	1'-7"	1'-1"				
C618	37	25'-8"	116	4,472	4'-6"	8'-2"						
C619	53	20'-6"	27	831	4'-6"	8'-2"	1'-7"	1'-1"				
C620	Str.	3'-2"	23	109								
C621	Str.	3'-7"	34	183								
C622	37	25'-4"	246	9,360	4'-4"	8'-2"						
C623	53	20'-2"	60	1,817	4'-4"	8'-2"	1'-7"	1'-1"				
C624	37	25'-2"	24	907	4'-3"	8'-2"						
C625	53	20'-0"	12	360	4'-3"	8'-2"	1'-7"	1'-1"				
C626	37	25'-10"	56	2,173	4'-7"	8'-2"						
C627	53	20'-8"	10	310	4'-7"	8'-2"	1'-7"	1'-1"				
C628	37	25'-6"	58	2,221	4'-5"	8'-2"						
C629	53	20'-4"	8	244	4'-5"	8'-2"	1'-7"	1'-1"				
C630	37	26'-0"	24	937	4'-8"	8'-2"						
C631	53	20'-10"	12	375	4'-8"	8'-2"	1'-7"	1'-1"				
C632	37	24'-0"	32	1,154	4'-8"	7'-2"						
C633	53	19'-2"	40	1,152	4'-8"	7'-2"	1'-3"	9"				
C634	37	22'-0"	16	529	4'-8"	6'-2"						
C635	53	18'-2"	15	409	4'-8"	6'-2"	1'-3"	9"				
C636	37	21'-4"	32	1,025	4'-4"	6'-2"						
C637	53	17'-6"	30	789	4'-4"	6'-2"	1'-3"	9"				
C638	37	19'-6"	38	1,113	4'-5"	5'-2"						
C639	55	13'-2"	24	475	4'-5"	5'-2"	9"	1'-0"	1'-8 3/4"	2'-0"	8"	
C640	56	5'-8"	24	204	1'-2"	1'-0"	2'-7"	1'-6"	3'-0"			
C641	37	19'-4"	38	1,103	4'-4"	5'-2"						
C642	55	13'-1"	6	118	4'-4"	5'-2"	9"	1'-0"	1'-8 3/4"	2'-0"	8"	
C643	56	5'-7"	6	50	1'-2"	11"	2'-7"	1'-6"	3'-0"			
C644	55	13'-6"	18	365	4'-4"	5'-2"	1'-2"	10"	1'-9 3/4"	2'-0"	8"	
C645	56	5'-4"	18	144	1'-2"	8"	2'-8 1/2"	1'-3 1/4"	3'-0"			
C646	Str.	8'-4"	10	125								
C647	37	14'-8"	4	88	4'-6"	2'-8"						
C701	Str.	31'-6" to 31'-11"	6 Series of 6	2,333								
C702	Str.	31'-6" to 31'-10"	2 Series of 6	777								
C703	Str.	31'-8"	84	5,437								
C704	Str.	13'-0"	6	159								
C705	Str.	20'-9"	6	254								
C706	Str.	9'-1"	674	12,514								
C707	Str.	6'-0"	954	11,700								
C708	Str.	31'-7"	24	1,549								
C709	Str.	31'-4" to 31'-10"	1 Series of 6	387								
C710	Str.	34'-5" to 34'-10"	2 Series of 6	849								
C711	Str.	29'-5" to 29'-9"	3 Series of 5	907								
C712	Str.	29'-6" to 29'-9"	4 Series of 4	969								
C713	Str.	29'-9"	15	912								
C714	17	9'-11"	152	3,081	1'-5"	8'-8"						
C715	17	6'-10"	96	1,341	1'-5"	5'-7"						
C716	17	13'-8"	8	223	4'-5"	9'-5"						
C1001	Str.	10'-6"	844	38,133								
C1002	Str.	8'-5"	784	28,394								
C1003	17	10'-7"	248	11,294	2'-4 1/2"	8'-6"						
C1101	22	32'-0"	54	9,181	32'-0"							381'-7 1/2"
C1102	22	32'-0"	12	2,040	32'-0"							381'-2"
C1103	22	31'-4"	12	1,998	31'-4"							374'-2"
C1104	22	31'-4"	54	8,990	31'-4"							373'-8 1/2"
C1105	23	31'-10"	9	1,522	12'-11"	18'-11"	5 1/2"					381'-7 1/2"
C1106	23	31'-10"	2	338	12'-11"	18'-11"	5 1/2"					381'-2"
C1107	23	30'-11"	2	329	12'-11"	18'-0"	5 1/4"					374'-2"
C1108	23	30'-11"	9	1,478	12'-11"	18'-0"	5 1/4"					373'-8 1/2"
C1109	Str.	31'-8"	22	3,701								

CYLINDER PILE CAP & RAILING

MARK	TYPE	LENGTH	TOTAL NO. OF BARS	WEIGHT	DIMENSIONS A	B	C	D	E	F	R
C1110	16	31'-9"	18	3,036	2'-10"	9'-3"	22'-6"	22'-4"			
C1111	16	27'-9"	2	295	2'-4"	9'-3"	18'-6"	18'-4"			
C1112	Str.	20'-9"	4	441							
C1113	Str.	10'-9"	2	114							
C1114	Str.	4'-0"	2	43							
C1115	Str.	16'-2"	2	172							
C1116	Str.	31'-8"	286	48,118							
C1117	Str.	31'-7"	88	14,767							
C1118	23	31'-10"	9	1,522	8'-5"	23'-5"	8 1/2"				384'-7"
C1119	23	31'-10"	2	338	8'-5"	23'-5"	8 1/2"				384'-2"
C1120	23	31'-4"	2	333	8'-5"	22'-11"	8 1/2"				377'-1 1/2"
C1121	23	31'-4"	9	1,498	8'-5"	22'-11"	8 1/2"				376'-8"
C1122	22	31'-11"	9	1,526	31'-11"						384'-7"
C1123	22	31'-11"	2	339	31'-11"						384'-2"
C1124	22	31'-3"	2	332	31'-3"						377'-1 1/2"
C1125	22	31'-3"	9	1,494	31'-3"						376'-8"
C1126	22	34'-11"	18	3,339	34'-11"						384'-7"
C1127	22	34'-4"	18	3,283	34'-4"						377'-8"
C1128	22	29'-10"	27	4,280	29'-10"						384'-7"
C1129	22	29'-4"	27	4,208	29'-4"						378'-8"
C1130	22	29'-9"	28	4,426	29'-9"						384'-7"
C1131	22	29'-5"	28	4,376	29'-5"						379'-8"
R401	54	4'-0"	938	*	8"	1'-2 1/2"	9 1/4"	5 1/4"			
R402	37	7'-1"	198	*	2'-9"	7"					
R403	37	4'-1"	116	*	1'-3"	7"					
R404	Str.	20'-9"	11	*							
R405	Str.	31'-8"	187	*							
R406	Str.	31'-10"	11	*							
R407	Str.	31'-11"	11	*							
R408	Str.	34'-11"	24	*							
R409	Str.	29'-10"	60	*							
R410	Str.	29'-9"	12	*							
R411	Str.	29'-11"	12	*							
R412	7	3'-5"	1,050	*	1'-6"	8"	8 1/2"	5 1/4"	1'-3"		
R501	Str.	20'-9"	7	*							
R502	Str.	31'-8"	119	*							
R503	Str.	31'-10"	7	*							
R504	Str.	31'-11"	7	*							
R505	Str.	34'-11"	14	*							
R506	Str.	29'-10"	35	*							
R507	Str.	29'-9"	7	*							
R508	Str.	29'-11"	7	*							

Total Weight of Reinforcing Steel (CAP & RAILING) = 295,318 Lbs.

TUNNEL CONCRETE ANCHOR BLOCK

MARK	TYPE	LENGTH	TOTAL NO. OF BARS	WEIGHT	DIMENSIONS A	B	C	D	E	F	R
B401	1	8'-10"	976	5,759	2'-1"	4'-11"					
B402	58	20'-5"	244	3,328	5'-0"	5'-0"	6"				
B403	1	5'-10"	180	701	1'-7"	2'-11"					
B404	58	12'-5"	45	373	3'-0"	3'-0"	6"				
B405	1	7'-4"	368	1,803	1'-10"	3'-11"					
B406	58	16'-5"	69	757	4'-0"	4'-0"	6"				
B407	1	7'-10"	368	1,926	1'-10"	4'-5"					
B408	58	18'-5"	121	1,489	4'-6"	4'-6"	6"				
B409	1	8'-4"	208	1,158	2'-1"	4'-5"					
B410	1	16'-4"	12	131	3'-1"	10'-5"					
B411	1	10'-10"	20	145	3'-1"	4'-11"					
B412	58	31'-5"	6	126	5'-0"	10'-6"	6"				
B601	26	4'-4"	240	1,562	3'-0"						
B701	26	6'-8"	25	341	5'-0"						
B801	26	5'-10"	368	5,732	4'-0"						
B802	26	6'-4"	812	13,731	4'-6"						
B901	26	7'-6"	1,220	31,110	5'-0"						
B1101	26	13'-8"	14	1,017	10'-6"						

Total Weight of Reinforcing Steel (Tunnel Concrete Anchor Block) = 71,189 Lbs.

FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

164
172

HAMILTON COUNTY
HAM.-471-0.24
PART ONE

For Notes see Sheet No. 163.

* Reinforcing bars marked "R" are included in Type 1 or Type 2 Railing for payment

Total weight of reinforcing steel, Grade 60 = 459,360 Lbs.

All reinforcing bars except bars marked R shall be Grade 60 Steel.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

REINFORCING STEEL LIST

CYLINDER PILE WALL

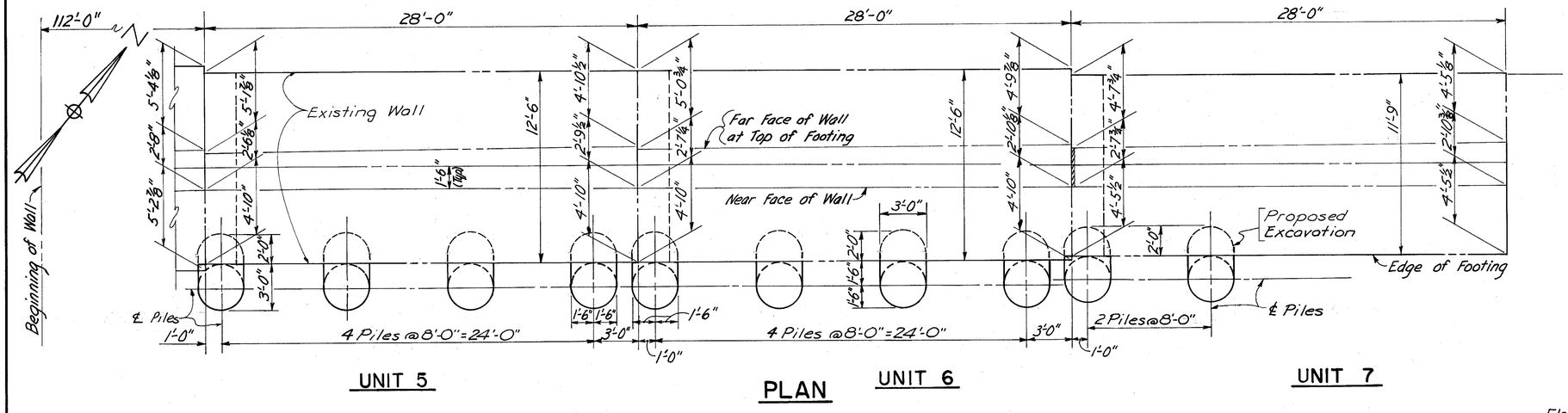
STA. 3+34.67 W TO STA. 15+09.79 W

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	TLB		WL	JHO 2-27-79	9-4-79

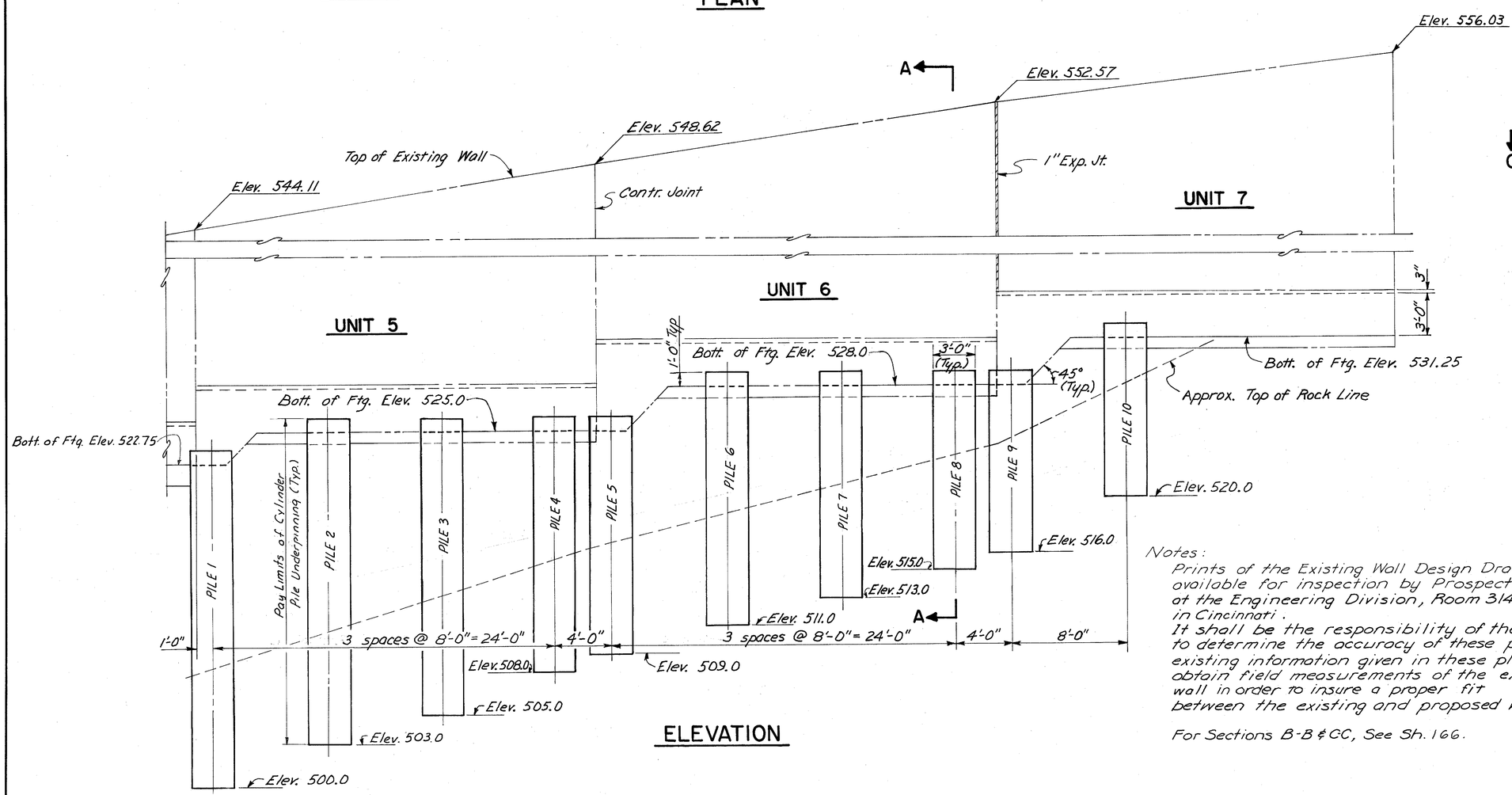
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

165
172

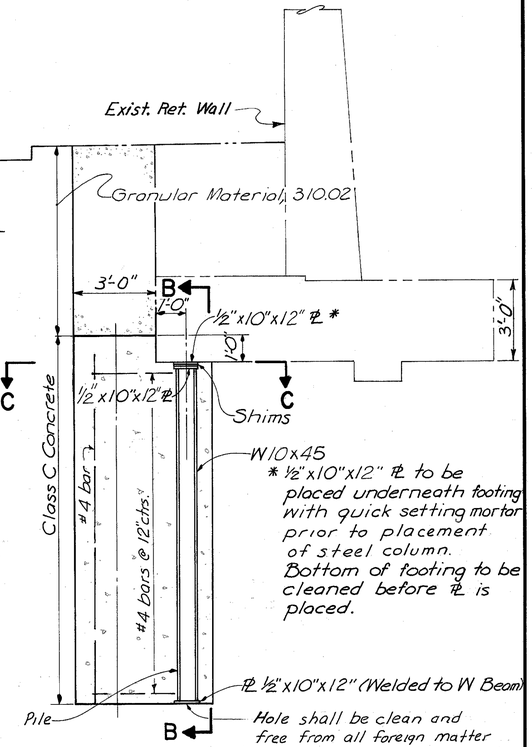
HAMILTON COUNTY
HAM. - 471 - 0.24
PART ONE



PLAN



ELEVATION



SECTION A—A

Notes:

Prints of the Existing Wall Design Drawings are available for inspection by Prospective Bidders at the Engineering Division, Room 314, City Hall in Cincinnati.

It shall be the responsibility of the Contractor to determine the accuracy of these plans and the existing information given in these plans and to obtain field measurements of the existing wall in order to insure a proper fit between the existing and proposed work.

For Sections B-B & CC, See Sh. 166.

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

PILE DETAILS

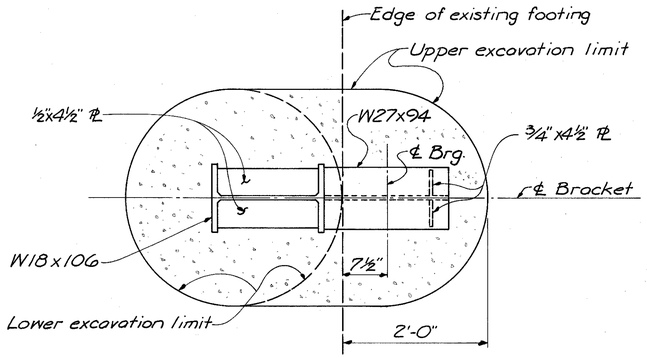
EXISTING RETAINING WALL NO. 1

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
	DES		HLL	JHO 5-9-79	

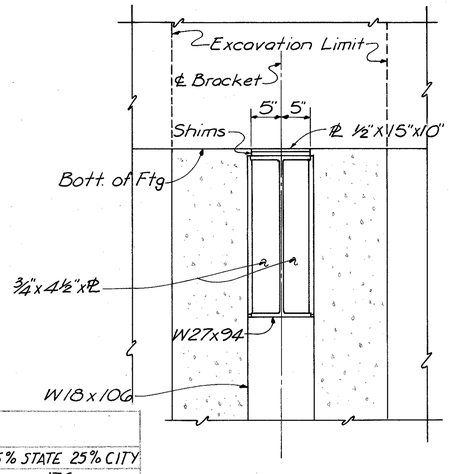
FEDERAL REGION	STATE	PROJECT	FISCAL YEAR
5	OHIO		

166
172

HAMILTON COUNTY
HAM. 471-0.24
PART ONE

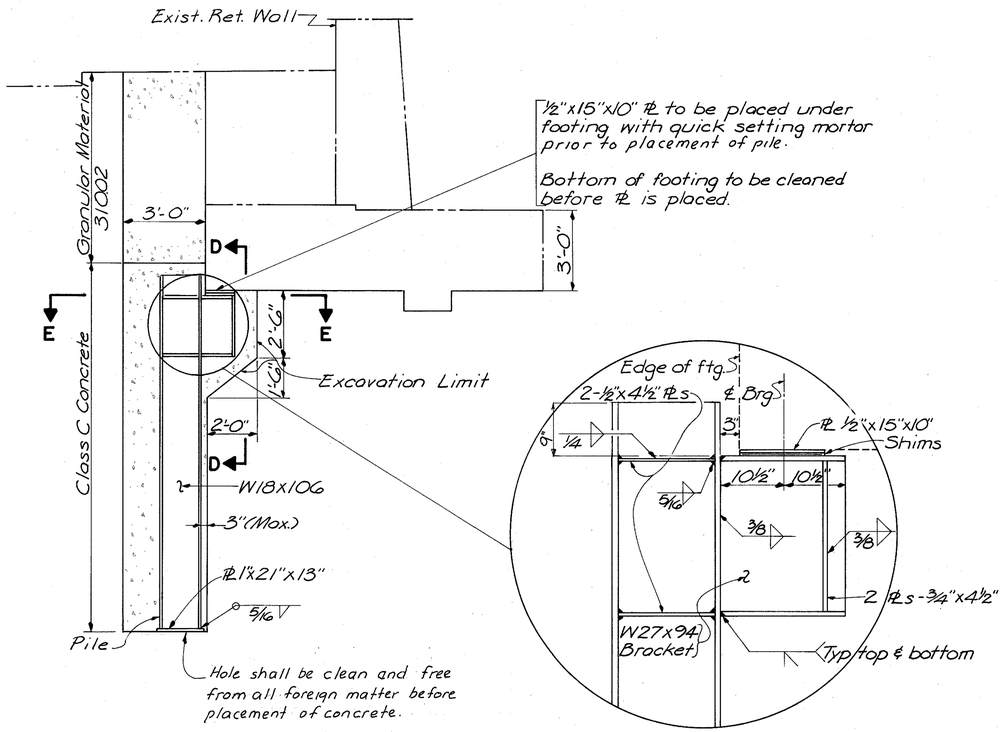


SECTION E-E



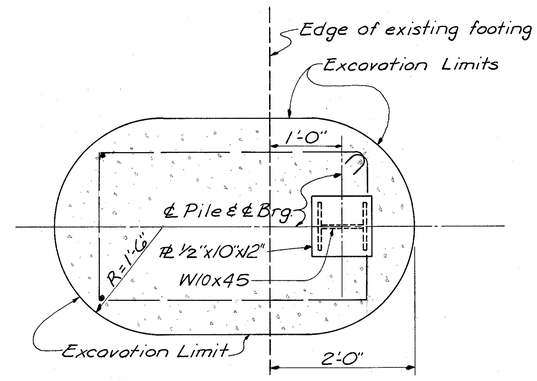
SECTION D-D

ESTIMATED QUANTITIES				
ITEM	TOTAL	UNIT	DESCRIPTION	75% STATE 25% CITY
Special	176	Lin. Ft.	Cylinder Pile Underpinning	176

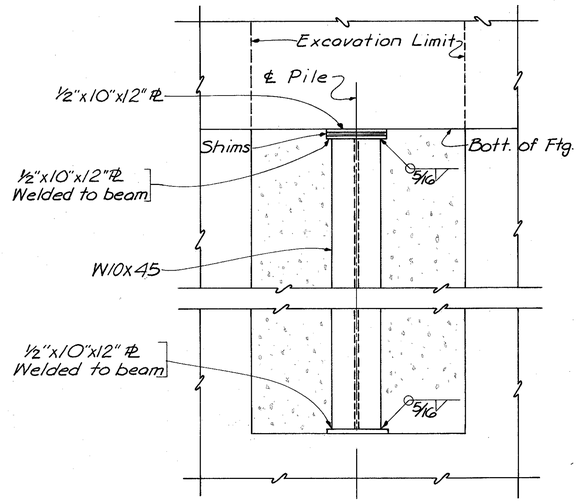


SECTION A-A
(Alternate Construction)

Contractor has option of using either Section A-A as shown on Sheet 165 or Alternate Section A-A as shown above.



SECTION C-C



SECTION B-B

Cylinder Pile Underpinning

Description. This item shall consist of excavating a shaft through the fill and overburden and into bedrock; hand excavating, where necessary, for installation of steel columns, installing a temporary casing through the soils and weathered rock, if necessary in order to prevent caving; removing the spoil, scaling loose rock, disposing of excavated material; furnishing and placing structural steel, reinforcing steel and Portland cement concrete; filling remainder of open hole with granular material; and furnishing all labor, materials and equipment necessary to construct the cylinder piles as shown in the plans and in accordance with 503, 509, 511 and 513 of the Construction and Material Specifications, except as modified and augmented herein.

General. All shafts shall be 36 inches minimum in diameter and shall be constructed at the locations shown on the plans. It shall be the contractor's responsibility to perform the work so as to prevent movement of the wall units.

Cylinder Pile Underpinning Continued

Material. Materials shown shall conform to the following:

A) Portland cement concrete shall be in accordance with 511.02 of the Construction and Material Specifications. For the purpose of identification in the Construction and Material Specifications, concrete for the cylinder piles shall be considered structural concrete (excluding superstructure concrete).

B) Granular material shall be in accordance with 310.02 of the Construction and Material Specifications.

C) Structural steel shall be in accordance with 513.03 of the Construction and Material Specifications.

D) Reinforcing steel shall be in accordance with 509.02 of the Construction and Material Specifications.

Monitoring. During all work on the underpinning, the contractor shall install, maintain and monitor reference points on the wall units to detect any movement of a unit. If any movements are detected, construction procedures shall be modified subject to the approval of the Engineer.

During the construction period the existing retaining wall will be periodically surveyed by the Engineer at selected locations for vertical and horizontal movements.

Excavation. Excavation for the cylinder piles may be performed using any practical method and machinery acceptable to the Engineer.

Work on not more than one cylinder pile under each unit of the retaining wall may be performed concurrently; and work on two adjacent cylinder piles may not be performed concurrently.

The Contractor shall not allow a completed or partially completed cylinder pile excavation to remain open longer than forty-eight hours without prior approval of the Engineer.

Disposal of Excavated Material, Protective Casing, Material for Protective Casing, Water in the Excavation, Safety Provisions, Observations and Placement of Steel. All these sections shall be as described in the note, "Drilled Cylinder Piles Excavation and Support", Sheet No. 106.

Construction. The volume of all the concrete placed in the hole shall be carefully monitored by the Engineer. The Engineer shall be present throughout the concrete placement operation for each and every cylinder pile. The level and volume of the concrete in the shaft excavation as filling proceeds shall be carefully controlled to prevent ingress of water or soil into the shaft. The cylinder pile shall be completely backfilled with concrete in one continuous pour.

A nominal seating load (approximately 25 kips), or greater load if approved by the Engineer, shall be jacked into the steel column before concreting operations are begun.

Method of Measurement. The length of each cylinder pile to be paid for shall be the completed and accepted length, measured along the axis of the cylinder pile within the limits shown on Sheet No. 165.

Excavation, structural steel, reinforcing steel, granular material and concrete will not be paid for separately but shall be included in this item for payment.

Basis for Payment. Payment will be made at the contract price, which price shall be payment in full for all work and material hereinbefore described.

Payment will be made under:

Item	Unit	Description
Special	Linear Foot	Cylinder Pile Underpinning

HAZELET & ERDAL
CONSULTING ENGINEERS
CINCINNATI, OHIO

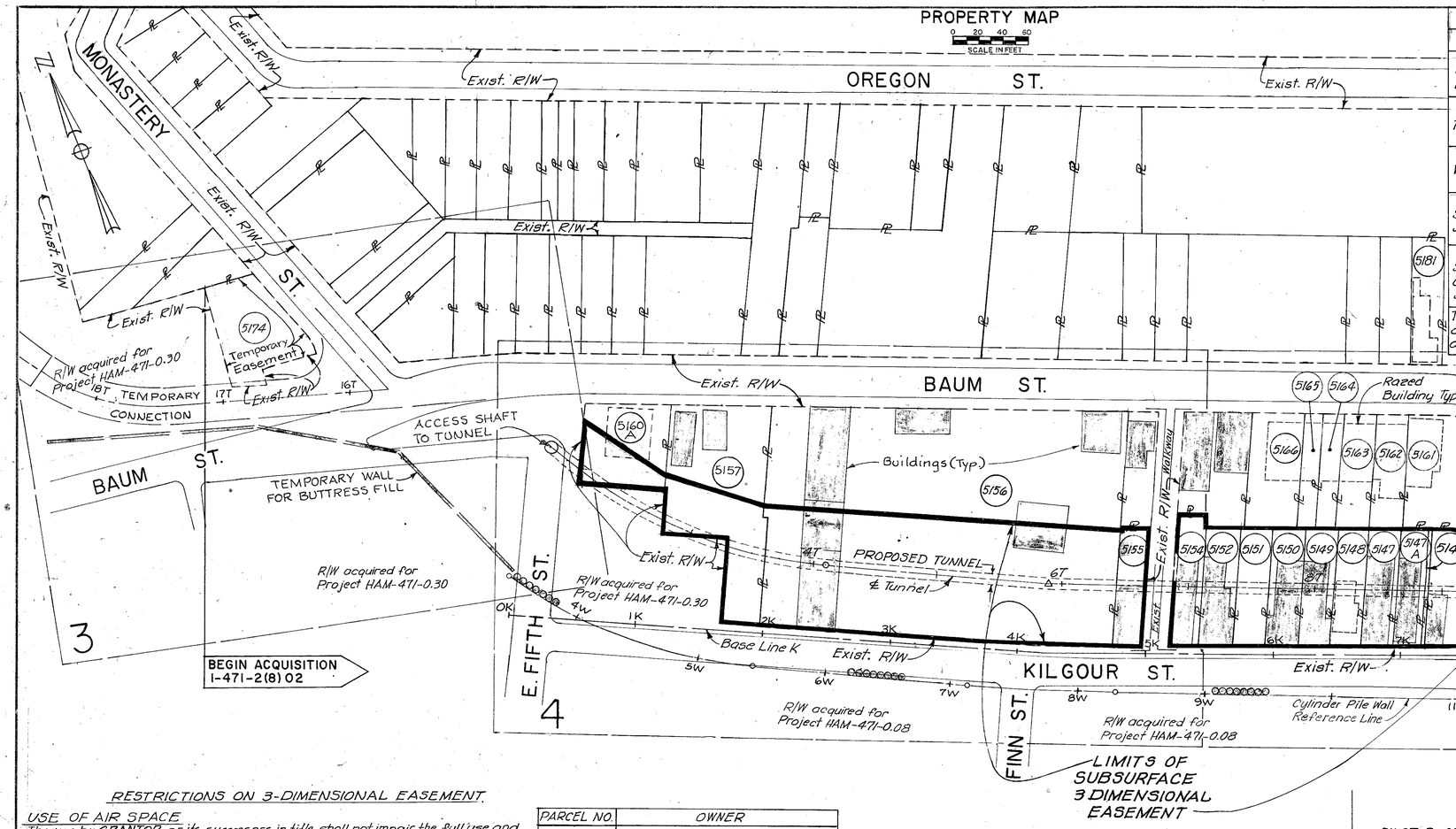
PILE DETAILS

EXISTING RETAINING WALL NO. 1

DESIGNED	DRAWN	TRACED	CHECKED	REVIEWED DATE	REVISED
J.D.C.	Y.K.		H.L.L.	J.H.O. 5-9-79	

PROPERTY MAP

0 20 40 60 SCALE IN FEET



UTILITY OWNERS

TYPE	NAME & ADDRESS
Gas & Electric	Cincinnati Gas & Electric Co. Fourth & Main Streets, Cincinnati, Ohio, 45202
Telephone	Cincinnati Bell 225 E. 4th Street Cincinnati, Ohio 45202
Water	Cincinnati Water Works 4747 Spring Grove Ave. Cincinnati, Ohio 45232
Storm Sewers	Division of Engineering City Hall Cincinnati, Ohio 45202
Sanitary & Combined Sewers	The Metropolitan Sewer District of Greater Cincinnati 1600 Gest Street Cincinnati, Ohio 45204

The utilities shown throughout the plan are based on information supplied by the utility companies as to type, size and location of the utilities.

CALC. BY DATE
CHKD. BY DATE

HAM-471-0.24 PART I
FEDERAL PROJ. I-471-2(8)02

OHIO
FHWA - 5 REGION

167 / 172

1 / 6

HAMILTON COUNTY
STATE PROJECT 08666(2)

RECEIVED FOR TRANSFER _____
TRANSFERRED _____

AUDITOR, HAMILTON COUNTY, OHIO
BY _____ DEPUTY
FILED FOR RECORD _____ AT _____
RECORDED _____ , _____

RECORDER, HAMILTON COUNTY, OHIO
BY _____ DEPUTY
FILE _____ FEE _____
PLAT BOOK _____ PAGE _____

RESTRICTIONS ON 3-DIMENSIONAL EASEMENT

USE OF AIR SPACE

The use by GRANTOR or its successors in title shall not impair the full use and safety of the cylinder pile wall hillside stabilization system.

DESIGN, CONSTRUCTION & MAINTENANCE

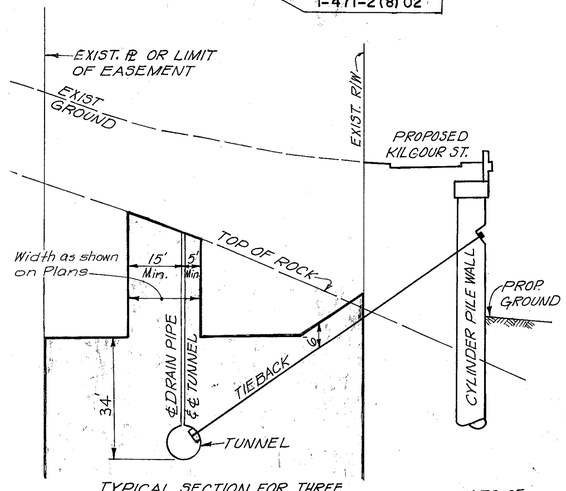
The design of any new structure occupying the space above the cylinder pile wall tie-back system must be reviewed and approved by the City of Cincinnati and the State of Ohio prior to granting authorization to begin construction. The GRANTOR will be permitted to modify the existing structure provided the additional weight of this modification is held to a minimum. New structures with footings above the rock line will be permitted as long as the weight of the earth removed shall not be less than the total weight of the structure being added. Where the weight of the structure being added is to exceed the weight of the ground being removed, then the load of the new structure must be carried to footings below the rock line. Such footings founded in rock shall not be closer than 35 feet from the top of the tunnel and shall not penetrate any portion of the three-dimensional EASEMENT.

Structures, utilities or installations of any nature which, in the opinion of the City of Cincinnati and the State of Ohio will contribute to the deterioration of the cylinder pile wall and its tie-back system shall not be permitted.

LEGEND

- ——— ——— ... Existing Right of Way
- ——— ℄ ——— ... Property Line
- WD ..... Warranty Deed
- R ..... Standard Highway Easement with Special Reservation (A Three Dimensional Easement)
- T ..... Temporary Right of Way Agreement
- ——— ——— ..... Proposed Easement Line
- (5156) ..... Typical Parcel Number

PARCEL NO.	OWNER
5117 R	Donald G. Hall
5118 R	Brent Hall
5119 R	Patricia M. Hall
5144 WD, R℄T	City of Cincinnati
5145 WD, R℄T	City of Cincinnati
5146 R	City of Cincinnati
5147A R	City of Cincinnati
5147 R	Fred & Margaret Tirey
5148 R	City of Cincinnati
5149 R	Jerry Lee
5150 R	Mt. Adams Apt. Co.
5151 R	City of Cincinnati
5152 R	City of Cincinnati
5154 R	Inland Investment Co. & H.R. Duval
5155 R	Laota E. Simpson et. al.
5156 R	Mt. Adams Apt. Co.
5157 R℄T	Calvin Williams
5160A R	Wm. S. Van Horneff
5161 WD	City of Cinti. (T.C. & H.K. DeBord)
5162 WD	City of Cinti. (Troy M. DeBord)
5163 WD	City of Cinti. (H.B. Hagner)
5164 WD	City of Cinti. (Albert Smith)
5165 WD	City of Cinti. (Robert D. Pogue)
5166 WD	City of Cinti. (Alvin Gould)
5174 T3	Josephine F. Imbus
5181 WD	City of Cinti. (Morington Inc.)



TYPICAL SECTION FOR THREE DIMENSIONAL EASEMENT

0 10 20 30 40 SCALE IN FEET HORZ. & VERTICAL

LIMITS OF EASEMENT
For typical section only

I hereby certify that this plat is a true delineation of a survey made for the Ohio Department of Transportation in 1977.

Thomas H. Schwiers
Thomas H. Schwiers
Reg. Surv. No. 6376
Date 2-27-79

APPROVED William W. Brayshaw
DATE 6-11-79 DISTRICT DEPUTY DIRECTOR

NOTES

1. All elevations are based on U.S.C.&G.S. Datum
2. Reference point information is contained in the construction plans.

HAMILTON COUNTY, CITY OF CINCINNATI
SECTION 12, T4, F.R.1, CINCINNATI TWP.

REV.	DATE	DESCRIPTION

1 / 6

PROPERTY MAP

TOTAL NUMBER OF
26 OWNERSHIPS
7 TOTAL TAKES
7 OWNERSHIPS WITH STRUCTURES INVOLVED
0 OWNERSHIPS WITH "P" ITEMS

SUMMARY OF ADDITIONAL RIGHT OF WAY

CALC. BY / DATE	HAM-471-0.24 PART I	OHIO	168 / 172
CHKD. BY / DATE	FEDERAL PROJ. I-471-2(8)02	FHWA REGION 5	
FEDERAL PROJECT	I-471-2(8)02	STATE PROJECT	08666(2)

2/6

NOTES
1. All areas shown are given in square feet unless otherwise noted.
2. Areas of "R" parcels are not deducted from Record Area

NOTE 3
RESTRICTIONS ON 3-DIMENSIONAL EASEMENT

USE OF AIR SPACE
The use by GRANTOR or its successors in title shall not impair the full use and safety of the cylinder pile wall hillside stabilization system.

DESIGN, CONSTRUCTION & MAINTENANCE
The design of any new structure occupying the space above the cylinder pile wall tie-back system must be reviewed and approved by the City of Cincinnati and the State of Ohio prior to granting authorization to begin construction. The GRANTOR will be permitted to modify the existing structure provided the additional weight of this modification is held to a minimum. New Structures with footings above the rock line will be permitted as long as the weight of the earth removed shall not be less than the total weight of the structure being added. Where the weight of the structure being added is to exceed the weight of the ground being removed, then the load of the new structure must be carried to footings below the rockline. Such footings founded in rock shall not be closer than 35 feet from the top of the tunnel and shall not penetrate any portion of the three-dimensional EASEMENT.
Structures, utilities or installations of any nature which, in the opinion of the City of Cincinnati and the State of Ohio will contribute to the deterioration of the cylinder pile wall and its tie-back system shall not be permitted.

	PARCEL	OWNER	SHEET NO.	OWNERS RECORD BOOK	OWNERS RECORD PAGE	RECORD AREA	TOTAL P.R.O.	GROSS TAKE	P.R.O. IN TAKE	NET TAKE	STRUCT.	NET RESIDUE LEFT	NET RESIDUE RIGHT	TYPE FUND	REMARKS AND PERSONALTY	AS ACQUIRED BOOK	AS ACQUIRED PAGE
	5117 R	Donald G. Hall	5	R.L. 213	77686	1,620	0	770	0	770	No	1620	0	I	Registered Land See Note 3		
	5118 R	Brent Hall	5	3847	936	1,836	0	572	0	572	No	1836	0	I	See Note 3		
	5119 R	Patricia M. Hall	5	3847	962	1,878	0	186	0	186	No	1878	0	I	See Note 3		
	5144 WD	City of Cincinnati	5	4040	726	4,123	0	103	0	103	No	4,020	0	I			
	5144 T		5					1,667	0	1,667				I	Grading		
	5144 R		5					4020	0	4020		4020		I	See Note 3		
	5145 WD	City Of Cincinnati	5	4053	1486	5,575	0	44	0	44	No	5531	0	I			
	5145 T		5					2,541	0	2,541				I	Grading		
	5145 R		5					5531	0	5,531		5,531		I	See Note 3		
	5146 R	City of Cincinnati	5	4050	1043	272	0	272	0	272	No	272	0	I	See Note 3		
	5147A R	City of Cincinnati	5	4053	1490	2,268	0	2,268	0	2,268	No	2268	0	I	See Note 3		
	5147 R	Fred & Margaret Tirey	5	3119	50	2,271	0	2,271	0	2,271	No	2271	0	I	See Note 3		
	5148 R	City of Cincinnati	5	4053	1488	2,274	0	2,274	0	2,274	No	2274	0	I	See Note 3		
	5149 R	Jerry Lee	5	3927	974	2,277	0	2,277	0	2,277	No	2277	0	I	See Note 3		
	5150 R	Mt. Adams Apt. Co.	5	3844	463	2,292	0	2,292	0	2,292	No	2292	0	I	See Note 3		
	5151 R	City of Cincinnati	5	4037	1899	2,375	0	2,375	0	2,375	No	2375	0	I	See Note 3		
	5152 R	City of Cincinnati	5	4074	308	2,378	0	2,378	0	2,378	No	2378	0	I	See Note 3		
	5154 R	Inland Investment Co. & H.R. Duvoll	4	3980	474	2,650	0	2,650	0	2,650	No	2650	0	I	See Note 3		
	5155 R	Laota E. Simpson et. al.	4	3591	484	2,090	0	2090	0	2,090	No	2,090	0	I	See Note 3		
	5156 R	Mt. Adams Apt. Co.	4	3844	463	50,463	0	26,377	0	26,377	No	50463	0	I	See Note 3		
	5157 R	Calvin Williams	4	2541	585	10,365	0	5,233	0	5,233	No	10,365	0	I	See Note 3		
	5157 T		4					964	0	964				I	Grading - Previously acquired for Project HAM-471-0.30		
	5160A R	Wm. S. Van Horneff II	4	3744	824	4,330	0	2195	0	2,195	No	4,330	0	I	See Note 3		
	5161 WD	City of Cincinnati (T.C. & H.K. DeBord)	5	3907	407	4508	0	4,508	0	4,508	Yes	0	0	I			
	5162 WD	City of Cincinnati (Troy M. DeBord)	5	3828	874	2256	0	2,256	0	2,256	Yes	0	0	I			
	5163 WD	City of Cincinnati (H.B. Hagner)	5	4045	1334	2,645	0	2,645	0	2,645	Yes	0	0	I			
	5164 WD	City of Cincinnati (Albert Smith)	5	4050	1045	1,287	0	1,287	0	1,287	Yes	0	0	I			
	5165 WD	City of Cincinnati (Robert D. Pogue)	5	4045	1336	1,285	0	1,285	0	1,285	Yes	0	0	I			
	5166 WD	City of Cincinnati (Alvin Gould)	5	4045	1338	3,945	0	3945	0	3,945	Yes	0	0	I			
①	5174 T3	Josephine F. Imbus	3	3736	529	4598	0	4598	0	4,598	No	4,598	0	I	Temporary Connection & Grading		
				3774	141												
	5181 WD	City of Cincinnati (Morington Inc.)	5	4046	1586	2,500	0	2,500	0	2,500	Yes	0	0	I			

① 5174 T-1 (2127 S.F.) and 5174 T-2 (103 S.F.) are overlapped by 5174 T-3

REV.	DATE	DESCRIPTION

CINCINNATI TWP.
SEC. 12 T. 4, F.R.I.
CITY OF CINCINNATI

0 10 20 30 40 50
SCALE IN FEET

CALC. BY DATE	HAM-471-0.24 PART I	OHIO	169 / 172
CHKD. BY DATE	FEDERAL PROJ. I-471-2(8)02	FHWA REGION 5	3 / 6
	HAMILTON COUNTY		

BEGIN ACQUISITION
I-471-2(8)02

ALEX H. EWING'S SUBDIVISION
D.B. 94 P. 319

P.C.C. 18+50 Van Meter
= 18+50T

40' Exist. R/W

Ch. Brg. N 00°29'02"E
Ch. = 15.27' Arc = 15.60'
R = 22.00'

Existing R/W

℄ R = 150'
Δ = 39°57'21"
T = 54.53'
L = 104.60'

Ex. St. Wall

Existing R/W

39.62'
N83°56'50"W

Const. Limit

S19°49'30"E 66.47'

R/W acquired for
Project HAM-471-0.30

Grading Limit

81.56'
N06°25'50"E

5174 T-3

46

47

+93.58

+46.36

MONASTERY STREET

Ex. 8" W.M.

Ex. 12" P.S.

#902
3 St. Br.

#512
2 St. Br.

#506-8
2 St. Br.

#504
2 St. Br.

Existing R/W

Ex. 6" G.M.

Ex. 18" P.S.

15"

18T

Ex. 15" P.S.

P.C. 17+45.40T

17T

TEMPORARY CONNECTION

5174 T-1

5174 T-2

43.41'
N83°56'50"W

N06°25'50"E

Existing R/W

8'

18T

Subdivision Line

M.H.

FUTURE VAN METER STREET

Conc. Walk

Ex. 4" W.M.

Ex. 3" G.M.

Ex. 12" P.S.

Ex. 6" G.M.

M.H.

W.V. & Ex. 6" W.M.

Ex. 15" P.S.

M.H.

18T

Ex. 4" G.M.

C.B.

F.H.

+Sign

+Sign

+Sign

Conc. Walk

Conc. Wall

Ex. 24" P.S.

St. Wall

Ex. 6" W.M.

Ex. 3" G.M.

M.H.

C.W.

BAUM ST.

LINE

AUD. BK. 73 P. 2

Ch. Brg. = S 70°11'34"E
Ch. = 27.96' Arc = 27.97'
R = 277.00'

TEMPORARY WALL
FOR BUTTRESS FILL

FUTURE MONASTERY STREET

MATCH 24"

For Continuation of R/W
See Sheet No. 4

5174 T-3 Josephine F. Imbus
T.B.A. = 4598 S.F.

Note:
1. Construction limit shown is for surface work only.

REV.	DATE	DESCRIPTION

3/6

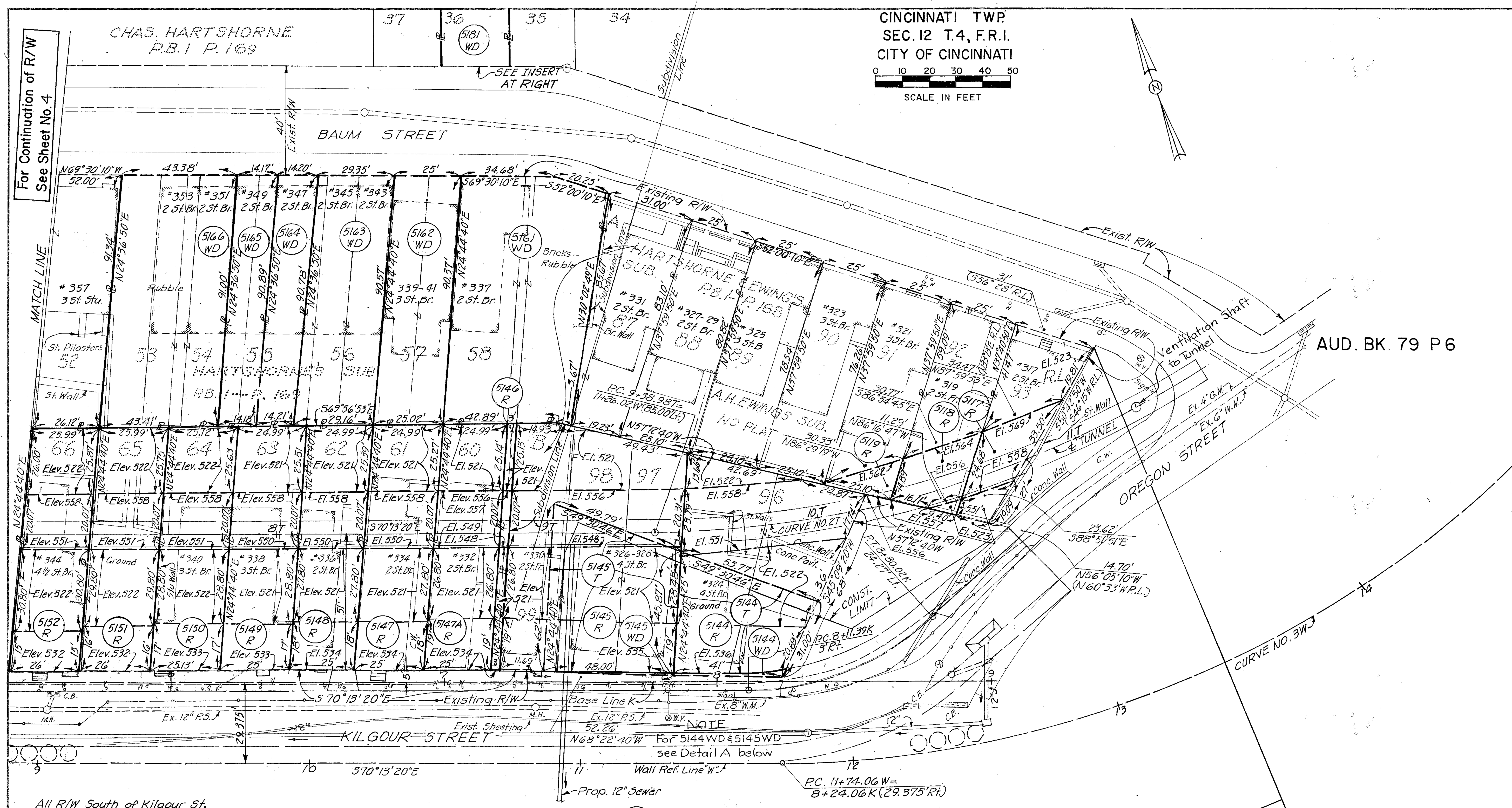
R/W PLAN TEMPORARY CONNECTION

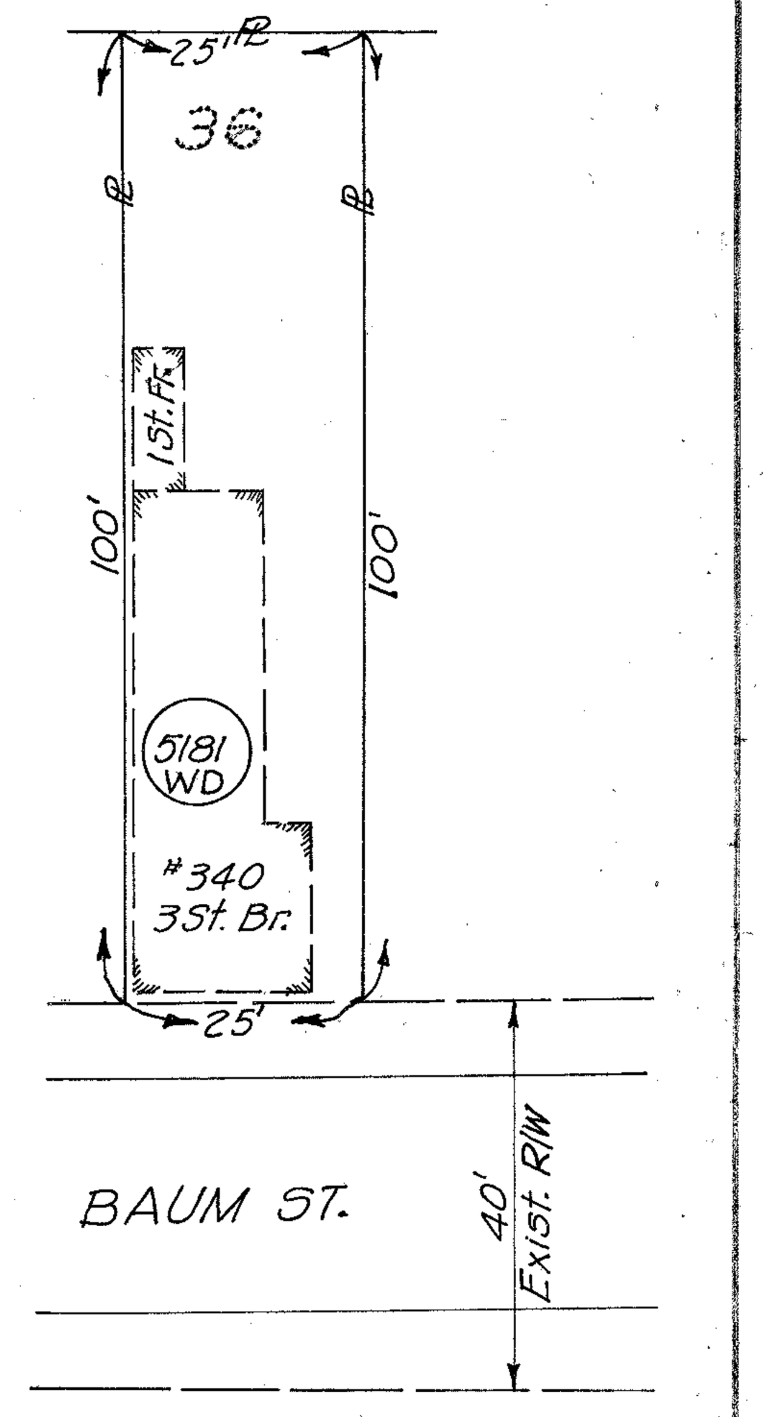
HAM-471-0.24 PART I
FEDERAL PROJ. I-471-2(8)02
HAMILTON COUNTY
OHIO
FHWA REGION 5
170/172
4/6
CINCINNATI TWP.
SEC. 12 T.4, F.R.1
CITY OF CINCINNATI
SCALE IN FEET
BAUM STREET
FIFTH STREET
KILGOUR STREET
FINN ST.
Access Shaft to Tunnel
For Continuation of R/W See Sheet No. 3
For Continuation of R/W See Sheet No. 5
All R/W East of Fifth St. and South of Baum St. acquired for Project HAM-471-0.30
R/W acquired for Project HAM-471-0.30
All R/W South of Kilgour St. acquired for Project HAM-471-0.08 & 0.30
AUD. BK. 79 P6
A.H. EWING'S SUB. D.B. 94-P. 319
CHAS. HARTSHORNE SUB. D.B. 94-P. 599
M. BAUM'S HEIRS' SUB. D.B. 76-P. 99
CHAS. HARTSHORNE SUB. P.B. 1-P. 169
MATCH LINE
Base Line K
PROP. TUNNEL
Angle Point 5+88.17T
P.T. 4+11.00T = 5+92.87W (85.00'Lt.)
P.T. 5+44.05 W = 1+95.81K (29.375'Rt.)
P.C. 7+13.39W = 3+65.15K (29.375'Rt.)
P.T. 8+31.86 W = 4+81.85K (29.375'Rt.)
P.T. 4+81.85K 3'R
Cylinder Pile Wall
CURVE NO. 1T
CURVE NO. 1W
CURVE NO. 2W
5154 R Inland Investment Co. & H.R. Duval T.B.A. = 2650 S.F.
5155 R Laota E. Simpson et.al. T.B.A. = 2090 S.F.
5156 R Mt. Adams Apt. Co. T.B.A. = 26,377 S.F.
5157 R Calvin Williams T.B.A. = 5233 S.F.
5157 T Calvin Williams T.B.A. = 964 S.F.
5160A R Wm. S. VanHorneff II T.B.A. = 2195 S.F.
CURVE DATA
CURVE NO. 1T Δ=31°39'00" R=381.97' T=108.27' L=211.00' D=15°00'
CURVE NO. 1W Δ=31°08'30" R=381.97' T=106.44' L=207.61' D=15°00'
CURVE NO. 2W Δ=3°30'20" R=1936.23' T=59.25' L=118.47' D=2°57'33"
KILGOUR ST. NORTH CURB Δ=3°30'20" R=1909.86 T=58.44' L=116.85' D=3°00'
NOTES
1. Construction Limit shown is for surface work only.
REV. DATE DESCRIPTION
R/W PLAN KILGOUR ST.

CALC. BY / DATE	HAM-471-0.24 PART I	OHIO	171/172
CHKD. BY / DATE	FEDERAL PROJ. I-471-2(8)02	FHWA REGION 5	

HAMILTON COUNTY

5/6





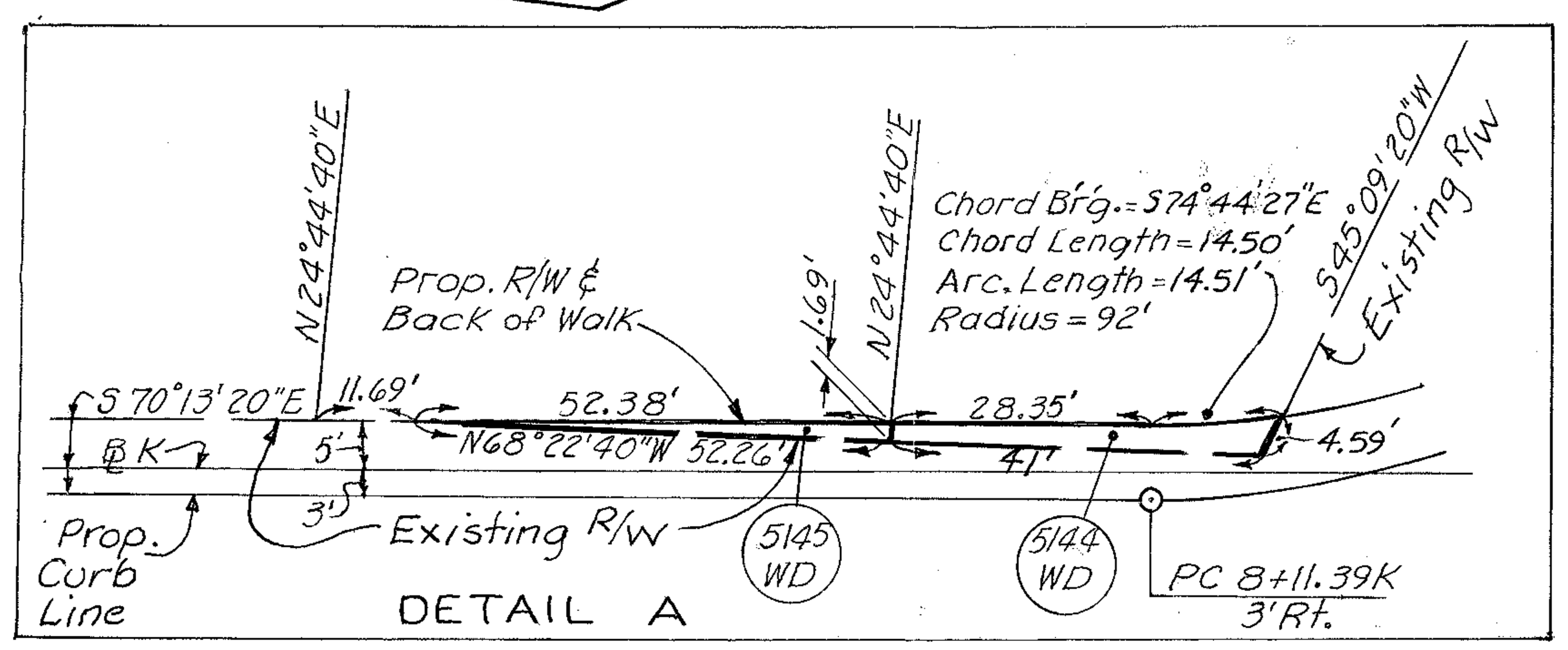
INSERT

All R/W South of Kilgour St. acquired for Project HAM-471-0.08

CURVE DATA

CURVE NO. 2T	CURVE NO. 3W	KILGOUR ST.
Δ = 31°57'01"	Δ = 50°21'40"	Δ = 43°20'14"
R = 381.97'	R = 384.92'	R = 100'
T = 109.35'	T = 180.97'	T = 39.73'
L = 213.00'	L = 338.33'	L = 75.64'
D = 15°00'	D = 14°53'06"	D = 57°17'45"

Parcel	Owner	Area
5117 R	Donald G. Hall	T.B.A. = 770 S.F.
5118 R	Brent Hall	T.B.A. = 572 S.F.
5119 R	Patricia M. Hall	T.B.A. = 180 S.F.
5144 R	City of Cincinnati	T.B.A. = 4020 S.F.
5144 T	City of Cincinnati	T.B.A. = 1667 S.F.
5144 WD	City of Cincinnati	T.B.A. = 103 S.F.
5145 R	City of Cincinnati	T.B.A = 5531 S.F.
5145 WD	City of Cincinnati	T.B.A. = 44 S.F.
5145 T	City of Cincinnati	T.B.A. = 2541 S.F.
5146 R	City of Cincinnati	T.B.A. = 272 S.F.
5147A R	City of Cincinnati	T.B.A. = 2268 S.F.
5147 R	Fred & Margaret Tirey	T.B.A. = 2271 S.F.
5148 R	City of Cincinnati	T.B.A. = 2274 S.F.
5149 R	Jerry Lee	T.B.A. = 2277 S.F.
5150 R	Mt. Adams Apt. Co.	T.B.A. 2292 S.F.
5151 R	City of Cincinnati	T.B.A. = 2375 S.F.
5152 R	City of Cincinnati	T.B.A. = 2378 S.F.
5161 WD	City of Cincinnati (T.C. & H.K. DeBord)	T.B.A. = 4508 S.F.
5162 WD	City of Cincinnati (Troy M. DeBord)	T.B.A. = 2256 S.F.
5163 WD	City of Cincinnati (H.B. Hagner)	T.B.A. = 2645 S.F.
5164 WD	City of Cincinnati (Albert Smith)	T.B.A. = 1287 S.F.
5165 WD	City of Cincinnati (Robert D. Pogue)	T.B.A. = 1285 S.F.
5166 WD	City of Cincinnati (Alvin Gould)	T.B.A. = 3945 S.F.
5181 WD	City of Cincinnati Morington Inc.	T.B.A. = 2500 S.F.



DETAIL A

NOTES

Construction Limit shown is for Surface Work only.

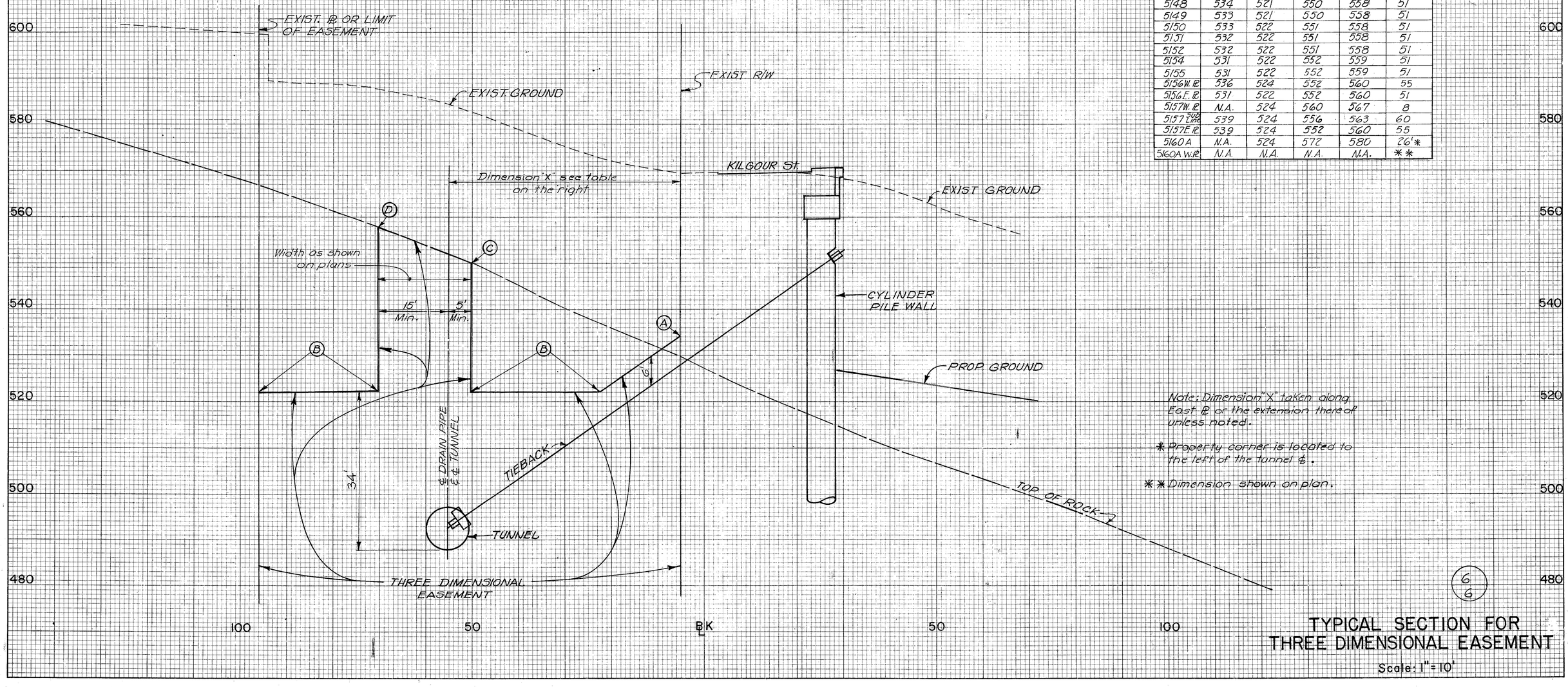
Building shown thus has been razed.

REV.	DATE	DESCRIPTION

5/6 R/W PLAN KILGOUR ST.

CALC. BY DATE	HAM-471-0.24 PART I	OHIO	172
CHKD. BY DATE	FEDERAL PROJ. I-471-2(8)02	FHWA REGION 5	172
	HAMILTON COUNTY		6 / 6

PARCEL NO.	ELEVATIONS A	B	C	D	Dim. "X"
5117	N.A.	523	558	569	**
5118	N.A.	523	556	564	13
5119	N.A.	N.A.	557	562	2*
5144	536	522	551	558	**
5145	535	521	548	556	53
5146	534	521	548	556	51
5147A	534	521	549	557	51
5147	534	521	550	558	51
5148	534	521	550	558	51
5149	533	521	550	558	51
5150	533	522	551	558	51
5151	532	522	551	558	51
5152	532	522	551	558	51
5154	531	522	552	559	51
5155	531	522	552	559	51
5156W. R	536	524	552	560	55
5156E. R	531	522	552	560	51
5157W. R	N.A.	524	560	567	8
5157 Tunnel	539	524	556	563	60
5157E R	539	524	552	560	55
5160A	N.A.	524	572	580	26'*
5160A W.R	N.A.	N.A.	N.A.	N.A.	**



Note: Dimension "X" taken along East ℄ or the extension thereof unless noted.

* Property corner is located to the left of the tunnel ℄.

** Dimension shown on plan.

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TYPICAL SECTION FOR THREE DIMENSIONAL EASEMENT

Scale: 1" = 10'