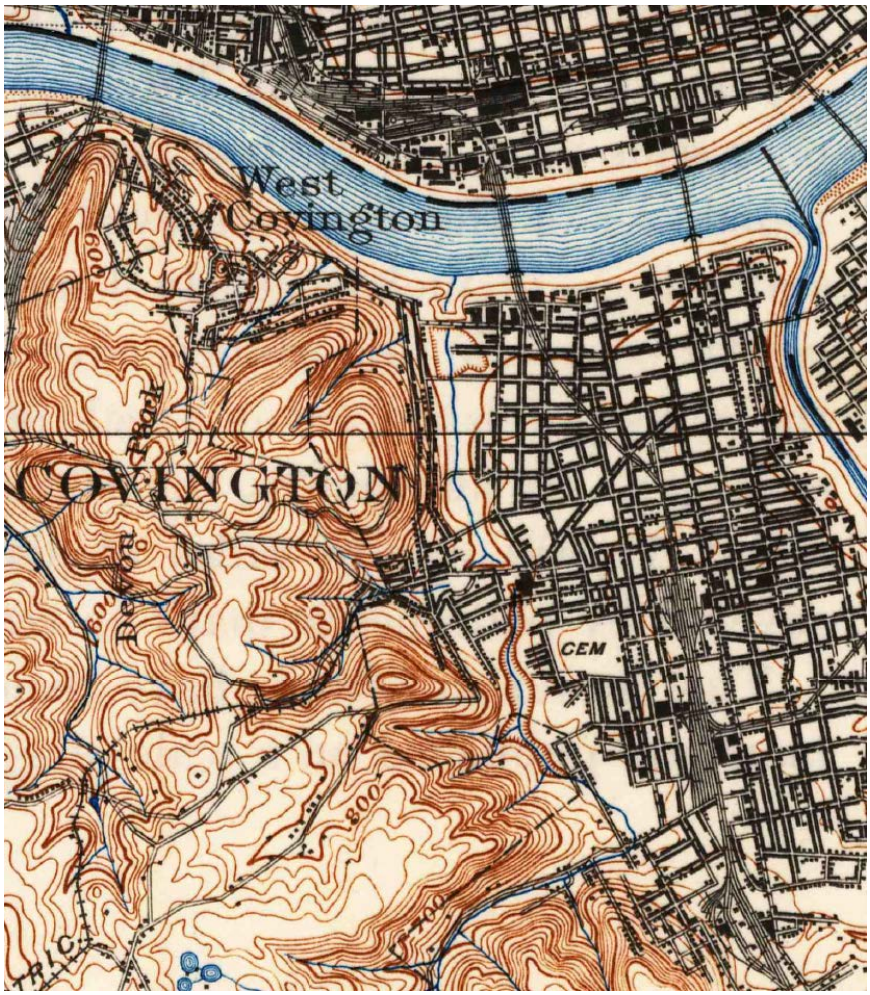
Willow Run Storm Water Separation Feasibility Study Report

I-71/I-75 (BRENT SPENCE BRIDGE PROJECT)

Kenton County, KY
MP 188.6 to MP 191.4
Item No. 6-17.00



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MARCH, 2022

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Project Scope and Background

The Willow Run watershed is the largest watershed in Sanitation District 1's (SD1) system. It drains 1,871 acres, discharges into the Ohio River, and the combined sewer system accounts for 33% of SD1's total system flow. During times of wet weather, it overflows and discharges untreated sewerage into the river and into neighborhood parks, streams and creeks. The EPA, through a consent decree, has mandated that the overflows be reduced or eliminated in the watershed.

According to SD1, there are 7 low-flow diversions in the Willow Run combined sewer. During dry weather, these divert combined flow into a parallel sanitary interceptor sewer. Flows are then carried, via gravity, to the treatment plant. During wet weather, when the flow exceeds the capacity of the diversions, a portion of the flow overtops the diversions and overflows directly into the Ohio River. Generally it takes about a ½" rain in the Willow Run watershed to trigger an overflow event.

During normal Ohio River levels, the Willow Run combined sewer outfall drains into the river by gravity. During high Ohio River levels (exceeding a gage height of 38 feet) the following occurs:

1. The Ohio River water backs up into the combined system, flows over the diversions and gets into the interceptor sewer.
2. A gage height of 40 feet is considered "action stage" according to the USGS National Water Dashboard.
3. At a gage height of 43.5 feet, the flow backs out of the Willow Run combined sewer into Goebel Park.
4. At a gage height of 45.9', the pumps are turned on to pump the combined system over the levee and back into the river. A 12'X12' sluice gate is lowered at this point.
5. A gage height of 52 feet is considered "minor flood stage" according to the USGS National Water Dashboard.

The boundary of the Willow Run watershed is located along Kyles Lane at its interchange with I-71/I-75. Therefore, all runoff from the I-71/I-75 corridor, between the Kyles Lane interchange and the Ohio River currently drains into the Willow Run combined sewer system at various points. The proposed widening of the corridor will increase runoff by increasing the impervious area in the watershed. The existing combined sewer system appears to already be experiencing problems with capacity according the City of Covington.

In a letter dated January 5, 2022 from the Covington's Mayor Meyer to Kentucky Transportation Cabinet (KYTC) Secretary Jim Gray, the City requested that KYTC resolve the storm water runoff capacity issues. It should be noted that the City has reassumed storm water responsibility from SD1. They are responsible for storm water runoff until it reaches the combined sewer system, at which point it becomes the responsibility of SD1. In that letter, the City mentioned the following specific problem areas with the existing system:

- Excessive runoff from the interstate corridor to Highland Avenue

- Flooding in Lewisburg at the end of Laurel Street
- Street and basement flooding along Euclid Avenue.

The City requested the following measures in their letter:

- Ensure the City is engaged and a part of storm water and water quality planning
- Separate the storm water from the Willow Run combined sewer system north of 16th Street
- Expand storm water removal capacity to eliminate backups on Euclid Avenue
- Improve maintenance of all storm water drains and detention areas along the interstate corridor to prevent clogging from debris.

To address the City's concerns, KYTC tasked Palmer Engineering with studying options for separating storm water runoff in the I-71/I-75 corridor within the Willow Run watershed.

Goals

Palmer's goal was to develop a feasibility study for separating interstate corridor storm water flow within the Willow Run watershed from the combined sewer system. During scoping discussions with KYTC, the project team decided to study two proposed alternatives – one which specifically addressed the City's request to separate storm water flow from the combined sewer system from 16th Street to the Ohio River, and another which went beyond their request and provided a separate storm water system from Kyles Lane to the Ohio River.

Palmer was provided files from the original preliminary drainage layout done by others, completed in approximately 2010 during the environmental assessment. These files included PDFs of the drainage layout, CADD files for the corridor, and InRoads data files. At that time, the designers did not have a goal of separating all of the corridor's storm water flow from the combined system. Their goal was to evaluate options that could achieve a net-zero effect, or better, for the storm water runoff that reached the combined system. After reviewing all of the files, Palmer determined that it would be best to start from scratch with the proposed drainage layouts to achieve the goals of this study.

Proposed Alternatives

See Appendix A and B for plan views of each proposed alternative discussed below. The following should be noted about the layout of the proposed alternatives:

- Inlets were placed using the proposed DTMs and cross sections that were provided. They account for crest and sag locations, superelevation transitions, barrier wall and retaining wall locations, and bridge locations.
- Spread calculations were not performed for each inlet location. But, some general spread calculations were used to determine if pipe length would control inlet spacing or if spread would control
- Bridge deck drains were not laid out, but bridge deck runoff was accounted for in the storm sewer system at ground level below the bridges.

- Bridge pier locations are not known at this time. They could impact the location of the proposed storm sewer or relocated existing sewers during final design.

Alternative 1

The goal of Alternative 1 was to separate the corridor's storm water runoff from the combined system from 16th Street to the Ohio River. The proposed storm sewer trunk line begins at Lt. Sta. 526+00, crosses the interstate at a sag point near Sta. 530+50, and then continues northward generally under the proposed Jillians Way pavement. Branch connections at each side road attempt to separate as much storm water runoff from the side streets as possible within the footprint of the side road reconstruction.

There are a couple of areas where the depth of the proposed Alt 1 trunk line was critical. At 9th Street, the proposed storm sewer trunk line crosses the existing 96" combined sewer just upstream from where the existing sewer joins with the 120" Willow Run trunk line. SD1's GIS data was used to check the elevations of the existing line versus the proposed. The elevation of this crossing prevented the proposed Alt 1 system from being able intercept a low area approximately 1 acre is size in the vicinity of the 12th Street and Bullock Street intersection. Intercepting the storm water runoff in this area would have pushed the proposed Alt 1 system too low and created a conflict at the crossing.

Goebel Park is also a low area where the existing combined system backs up and floods during high water events on the Ohio River. The proposed Alt 1 system was able to be raised by taking advantage of the higher Jillians Way grade, where it is being built up with a retaining wall.

There are segments of the existing Willow Run system that will require relocation due to the proposed roadway construction. These are also shown schematically in the proposed exhibits. One area is from Rt. Sta. 530+00 to Rt. Sta. 546+00, where the existing Willow Run trunk line is proposed to be relocated adjacent to the proposed Alt 1 storm sewer trunk line. Another is from Lt. Sta. 524+00 to Lt. Sta. 544+00, where a significant existing branch line to the Willow Run system is proposed to be relocated along Bullock Street. And, as the project nears the Ohio River, the existing Willow Run trunk line and the low-flow diversion sanitary sewer is proposed to be relocated north of Rt. Sta. 561+00.

The proposed Alt 1 trunk line and the relocated Willow Run system are proposed to tie back into the existing system at, or just upstream from, the existing pump station. Alt 1 does not propose a new pump station or new outfall to the Ohio River. Rather, it would utilize the existing system from the existing outfall/pump station to the river. Modifications to the pump station itself may be needed.

Alternative 2

The goal of Alternative 2 was to separate the corridor's storm water runoff from the combined system from Kyles Lane to the Ohio River. The proposed storm sewer trunk line begins at Lt. Sta. 449+00, crosses to the right side of the interstate at Rt. Sta. 453+00, continues along the right side of the interstate until crossing to the left side at Sta. 466+00, and then remains on the left side until joining with the beginning of the proposed layout of Alternative 1.

There is an existing 42" pipe that crosses the interstate near Sta. 456+50. This pipe conveys offsite drainage which eventually ends up in a detention basin near Rt. Sta. 470+00. This pipe is proposed to remain in service and the offset drainage is not proposed to be intercepted. The proposed Alt 2 trunk line avoided impacting this pipe by going around it to the right side.

There are 5 existing detention basins along the corridor for Alt 2.

- Rt. Sta. 470+00 – The outlet for this basin drains away from the interstate. Alt 2 reduces the flow that reaches the basin by intercepting some storm runoff that currently reaches it.
- Lt. Sta. 477+00 – The outlet for this basin drains into the left roadside ditch for the interstate. There is an existing pipe crossing the interstate that currently conveys the left roadside ditch across the interstate just upstream from where the basin outlets into the left roadside ditch. Alt 2 captures the outlet flow from the basin, and captures the upstream roadside ditch flow described above. This eliminates the existing pipe crossing, and thus reduces the flow that reaches the problematic Highland Avenue area.
- Lt. Sta. 490+00 – The outlet for this basin drains into the left roadside ditch for the interstate. Alt 2 captures the outlet flow from the basin.
- Lt. Sta. 518+00 – The outlet for this basin is a junction where existing sanitary and storm flow join, beginning a combined sewer line. Alt 2 proposes to separate the storm water flow, and create a new storm-only outlet structure for the basin. This will reduce the flow that enters into the combined sewer system.
- Rt. Sta. 520+00 – This basin captures runoff from the right interstate roadside ditch and cut area, along with runoff from St. Elizabeth Covington Hospital. The outlet for this basin drains away from the interstate and toward the problematic Euclid Avenue area. Alt 2 proposes to capture the interstate roadside ditch before it reaches the basin, thereby reducing flows that eventually reach the Euclid Avenue area.

The details of the detention basin outlet flows are not known at this time, and proposed outlet flows were assumed for this study. Detailed design of the basins during final design could affect downstream pipe sizes. Each basin that is impacted by the roadway widening is being modified by the roadway team to replace any lost volume. The proposed outflow from the basins along the left side of the interstate will not be as critical to control, since they will all flow into the proposed separate storm sewer. The proposed outflow from the basins on the right side of the interstate will each be reduced by the proposed storm sewer system intercepting some of the runoff that currently reaches the existing basins.

Downstream from the detention basin at Lt. Sta. 518+00, the layout of Alt 2 is the same as Alt 1 except for pipe sizes along the trunk line.

At the Project Team's Alternative Review Meeting on February 21, 2022, KYTC decided that Alternative 2 was the preferred option. Alt 2 would be advanced with a cost estimate, a summary of drainage areas separated from the Willow Run combined sewer, and presented to the City of Covington and SD1. The project team presented Alt 2 to local officials including the City of Covington and SD1 on March 3, 2022. See Appendix D for documentation of all pertinent meetings.

Alternative 2 separates a total of 467 acres (25% of the total Willow Run watershed area) from the existing Willow Run combined sewer system. This area is comprised of 170 acres of impervious area and 297 acres of pervious area.

The preliminary cost of Alternate 2 is estimated to be $15.1 million. This includes the estimated cost for relocated portions of the existing Willow Run combined sewer and its low-flow diversion line, along with some connections to each. The preliminary estimate does not include a cost for potential modifications to the existing pump station.

Pump Station

The existing pump station is planned to remain in service with the proposed Alternative 2. See Appendix C for record plans for the pump station. The relocated Willow Run combined sewer and the proposed separated Alt 2 storm sewer are proposed to connect to the existing outfall/pump station system just upstream from the pump station. The general operation of the pump station is not proposed to change, but the pumps will need to be evaluated to determine if modifications are needed in the proposed condition. The total area of watershed that drains to the pump station will not change in the proposed condition versus the existing condition. However, the flow rate could change due to increased impervious area, changes to the operation of the detention ponds, or the timing of runoff reaching the pump station.

This was discussed with SD1 at the project team's Local Officials Meeting (See Appendix D), and SD1 requested the proposed Alt 2 layout for the purpose of evaluating its impact in their system's hydrologic and hydraulic model. The project team will continue to coordinate with SD1 to determine if the changes to their model indicate a need to modify the pumps at the pump station. An addendum to this report will be submitted upon the conclusion of that coordination.

The project team also met with the U.S. Army Corps of Engineers and the City of Covington on March 17, 2022 to discuss the Section 408 permitting process. The Corps advised the project team about what items would be required for the Section 408 permit and the review time to expect. It was also recommended that the selected design-build team should continue to coordinate with the City of Covington and SD1 regarding the flood control system. The levee, floodwall, and pump station system are owned by the City of Covington, and they are operated and maintained by SD1.

APPENDIX A

Alternative 1 Plan

BRENT SPENCE BRIDGE
REPLACEMENT STUDY

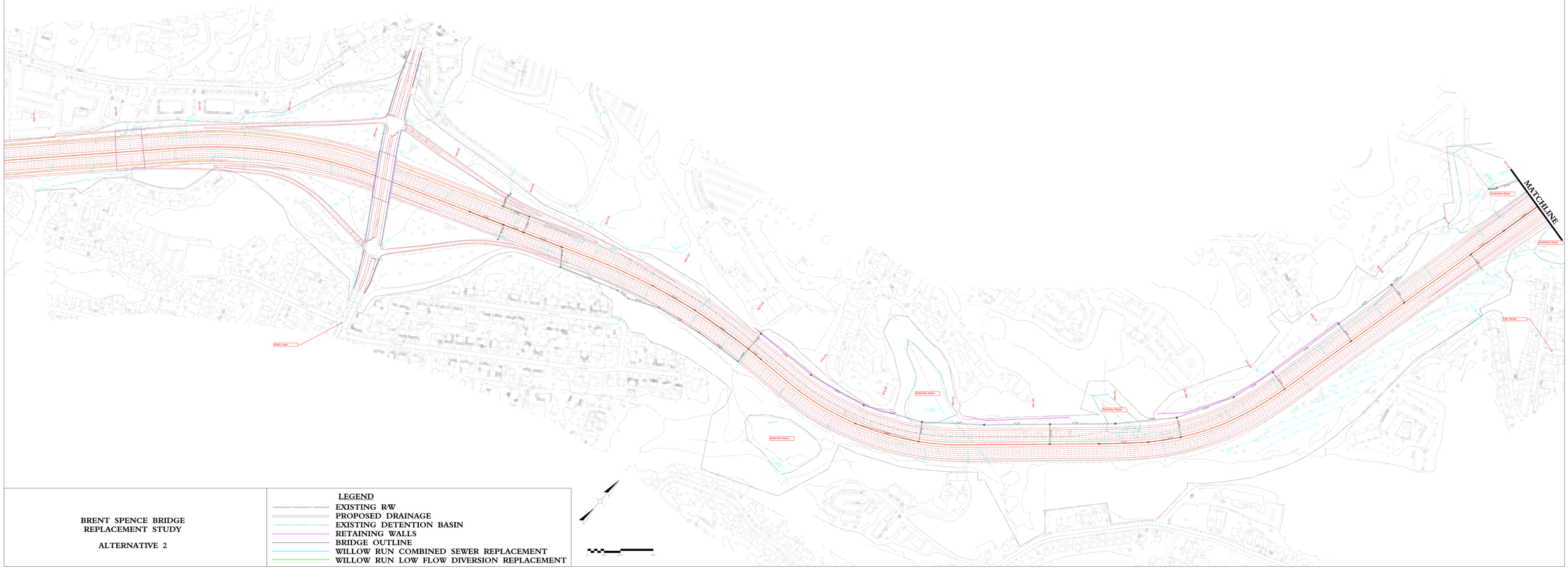
ALTERNATIVE I

LEGEND

- EXISTING R/W
- PROPOSED DRAINAGE
- EXISTING DETENTION BASIN
- RETAINING WALLS
- BRIDGE OUTLINE
- WILLOW RUN COMBINED SEWER REPLACEMENT
- WILLOW RUN LOW FLOW DIVERSION REPLACEMENT

APPENDIX B

Alternative 2 Plan, Cost, and Drainage Area Summary



BRENT SPENCE BRIDGE
REPLACEMENT STUDY

ALTERNATIVE 2

LEGEND

- EXISTING R/W
- PROPOSED DRAINAGE
- EXISTING DETENTION BASIN
- RETAINING WALLS
- BRIDGE OUTLINE
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- WILLOW RUN LOW FLOW DIVERSION REPLACEMENT

BRENT SPENCE BRIDGE
REPLACEMENT STUDY

ALTERNATIVE 2

LEGEND

- EXISTING R/W
- PROPOSED DRAINAGE
- EXISTING DETENTION BASIN
- RETAINING WALLS
- BRIDGE OUTLINE
- WILLOW RUN COMBINED SEWER REPLACEMENT
- WILLOW RUN LOW FLOW DIVERSION REPLACEMENT

PRELIMINARY COST ESTIMATE

CONSTRUCTION

Road Name:	**I-71/I-75**
From:	16th Street
To:	Ohio River

Willow Run Storm Water Separation - ALT 2

ITEM NO.	ITEM	QUANTITIES	UNIT	UNIT PRICE	COST
	DRAINAGE				
522	18" STORM SEWER PIPE	15100	LF	$54	$815,400
524	24" STORM SEWER PIPE	2788	LF	$85	$236,980
526	30" STORM SEWER PIPE	1138	LF	$98	$111,524
528	36" STORM SEWER PIPE		LF	$122	$0
529	42" STORM SEWER PIPE		LF	$135	$0
530	48" STORM SEWER PIPE	947	LF	$163	$154,361
531	54" STORM SEWER PIPE	4370	LF	$175	$764,750
532	60" STORM SEWER PIPE	1263	LF	$215	$271,545
533	66" STORM SEWER PIPE	2055	LF	$230	$472,650
534	72" STORM SEWER PIPE	3425	LF	$375	$1,284,375
1456	CURB BOX INLET TYPE A	90	EACH	$5,200	$468,000
1480	CURB BOX INLET TYPE B	3	EACH	$4,800	$14,400
1490	DROP BOX INLET TYPE 1	18	EACH	$4,600	$82,800
1490	DROP BOX INLET TYPE 2	2	EACH	$4,100	$8,200
1490	DROP BOX INLET TYPE 7	12	EACH	$9,500	$114,000
1559	DROP BOXINLET TYPE 13G	22	EACH	$4,100	$90,200
1568	DROP BOXINLET TYPE 13S	6	EACH	$4,500	$27,000
1614	CMBBI TY 14	55	EACH	$3,700	$203,500
1761	MANHOLE TY B	2	EACH	$4,500	$9,000
1767	MANHOLE TY C	28	EACH	$6,100	$170,800
RELOCATED WILLOW RUN SEWER					
528	36" STORM SEWER PIPE	356	LF	$122	$43,432
531	54" STORM SEWER PIPE	289	LF	$175	$50,575
532	60" STORM SEWER PIPE	380	LF	$215	$81,700
	108" STORM SEWER PIPE	1736	LF	$1,100	$1,909,600
	120" STORM SEWER PIPE	2380	LF	$1,300	$3,094,000
	36" EQUIV. STORM SEWER PIPE	2670	LF	$150	$400,500
1767	MANHOLE TY C	27	EACH	$6,100	$164,700
	DETENTION BASIN RECONSTR	3	EACH	$100,000	$300,000
---	PUMP STATION	1	LS		$0
				SUBTOTAL	**$11,343,992**
2568	Mobillization (5%)	1	5.0%		**$567,200**
2569	Demobillization (1.5%)	1	1.5%		**$170,160**
				PROJECT SUBTOTAL	**$12,081,351**
			25%	**Contingency**	**$3,020,338**
				CONSTRUCTION TOTAL	**$15,101,689**

Drainage Reports

Drainage Data File: BSB Willow Run - ALT 2

ID (cfs)	AttachTo	Total Area (Ac)	% impervious	% pervious	Area impervious (Ac)	Area pervious (Ac)
A1	IN42	0.5	100%	0%	0.5	0.0
A2	IN40	0.8	100%	0%	0.8	0.0
A3	IN41	0.3	100%	0%	0.3	0.0
A4	IN39	0.4	100%	0%	0.4	0.0
A7	IN38	0.5	100%	0%	0.5	0.0
A5	IN30	3.6	29%	71%	1.0	2.6
A6	IN46	1.9	27%	73%	0.5	1.4
A8	IN23	1.8	100%	0%	1.8	0.0
A9	IN31	0.5	100%	0%	0.5	0.0
A10	IN20	0.4	100%	0%	0.4	0.0
A11	IN151	0.9	100%	0%	0.9	0.0
A12	IN36	0.2	100%	0%	0.2	0.0
A13	IN21	0.1	100%	0%	0.1	0.0
A14	IN34	0.1	100%	0%	0.1	0.0
A15	IN22	0.0	100%	0%	0.0	0.0
A16	IN35	0.1	100%	0%	0.1	0.0
A17	IN37	0.5	100%	0%	0.5	0.0
A18	IN161	0.0	100%	0%	0.0	0.0
A19	IN160	0.0	100%	0%	0.0	0.0
A20	IN48	0.4	100%	0%	0.4	0.0
A21	IN162	0.1	100%	0%	0.1	0.0
A22	IN163	0.3	100%	0%	0.3	0.0
A23	IN32	0.4	100%	0%	0.4	0.0
A24	IN26	0.1	100%	0%	0.1	0.0
A25	IN29	0.2	100%	0%	0.2	0.0
A26	IN28	0.6	100%	0%	0.6	0.0
A27	IN24	0.2	100%	0%	0.2	0.0
A28	IN33	0.4	100%	0%	0.4	0.0
A29	IN49	0.3	100%	0%	0.3	0.0
A30	IN50	0.3	100%	0%	0.3	0.0
A31	IN84	0.1	100%	0%	0.1	0.0
A32	P164	0.1	100%	0%	0.1	0.0
A33	P164	0.2	100%	0%	0.2	0.0
A34	P164	1.7	100%	0%	1.7	0.0
A35	IN52	0.2	100%	0%	0.2	0.0
A36	IN53	0.2	100%	0%	0.2	0.0
A37	IN51	0.1	100%	0%	0.1	0.0
A38	IN51	0.2	100%	0%	0.2	0.0
A39	IN54	0.3	100%	0%	0.3	0.0

ID (cfs)	AttachTo	Total Area (Ac)	% impervious	% pervious	Area impervious (Ac)	Area pervious (Ac)
A40	IN54	0.2	100%	0%	0.2	0.0
A41	IN97	0.0	100%	0%	0.0	0.0
A42	IN98	0.0	100%	0%	0.0	0.0
A43	IN97	0.1	100%	0%	0.1	0.0
A44	IN100	0.1	100%	0%	0.1	0.0
A45	IN104	0.1	100%	0%	0.1	0.0
A46	IN102	0.1	100%	0%	0.1	0.0
A47	IN105	0.2	100%	0%	0.2	0.0
A48	IN55	0.3	100%	0%	0.3	0.0
A49	IN51	1.3	100%	0%	1.3	0.0
A50	IN166	0.2	100%	0%	0.2	0.0
A51	IN96	0.3	100%	0%	0.3	0.0
A52	IN87	0.0	100%	0%	0.0	0.0
A53	IN88	0.1	100%	0%	0.1	0.0
A54	IN89	0.1	100%	0%	0.1	0.0
A55	IN90	0.1	100%	0%	0.1	0.0
A56	IN92	0.1	100%	0%	0.1	0.0
A57	IN91	0.1	100%	0%	0.1	0.0
A58	IN95	0.1	100%	0%	0.1	0.0
A59	IN94	0.9	100%	0%	0.9	0.0
A60	IN14	0.5	100%	0%	0.5	0.0
A61	IN15	0.5	100%	0%	0.5	0.0
A62	IN13	0.5	100%	0%	0.5	0.0
A63	IN19	0.4	100%	0%	0.4	0.0
A64	IN18	0.2	100%	0%	0.2	0.0
A65	IN143	0.5	100%	0%	0.5	0.0
A66	IN18	0.2	100%	0%	0.2	0.0
A67	IN142	0.3	100%	0%	0.3	0.0
A68	IN142	0.2	100%	0%	0.2	0.0
A69	IN142	0.1	100%	0%	0.1	0.0
A70	IN55	0.3	100%	0%	0.3	0.0
A71	IN98	0.1	100%	0%	0.1	0.0
A72	IN56	0.9	100%	0%	0.9	0.0
A73	IN56	0.1	100%	0%	0.1	0.0
A74	IN57	0.1	100%	0%	0.1	0.0
A75	IN58	0.1	100%	0%	0.1	0.0
A76	IN61	0.2	100%	0%	0.2	0.0
A77	IN61	0.2	100%	0%	0.2	0.0
A78	IN59	0.1	100%	0%	0.1	0.0
A79	IN61	0.1	100%	0%	0.1	0.0
A80	IN60	0.2	100%	0%	0.2	0.0
A81	IN148	0.1	100%	0%	0.1	0.0
A82	IN149	0.1	100%	0%	0.1	0.0
A83	IN62	0.1	100%	0%	0.1	0.0

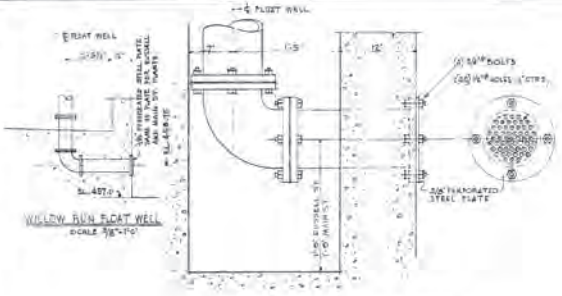
ID (cfs)	AttachTo	Total Area (Ac)	% impervious	% pervious	Area impervious (Ac)	Area pervious (Ac)
A84	IN106	0.2	100%	0%	0.2	0.0
A85	IN107	0.2	100%	0%	0.2	0.0
A86	IN108	0.2	100%	0%	0.2	0.0
A87	IN109	0.1	100%	0%	0.1	0.0
A88	IN110	0.1	100%	0%	0.1	0.0
A89	IN144	0.1	100%	0%	0.1	0.0
A90	IN145	0.0	100%	0%	0.0	0.0
A91	IN111	0.1	100%	0%	0.1	0.0
A92	IN112	0.2	100%	0%	0.2	0.0
A93	IN12	1.1	0%	100%	0.0	1.1
A94	IN167	2.8	0%	100%	0.0	2.8
A95	IN113	0.1	100%	0%	0.1	0.0
A96	IN114	0.3	100%	0%	0.3	0.0
A97	IN10	0.0	100%	0%	0.0	0.0
A98	IN11	0.1	100%	0%	0.1	0.0
A99	IN115	0.2	100%	0%	0.2	0.0
A100	IN116	0.4	100%	0%	0.4	0.0
A101	IN5	0.5	100%	0%	0.5	0.0
A102	IN9	0.8	100%	0%	0.8	0.0
A103	IN8	0.7	100%	0%	0.7	0.0
A104	IN1	0.3	100%	0%	0.3	0.0
A105	IN3	0.4	100%	0%	0.4	0.0
A106	IN45	0.5	100%	0%	0.5	0.0
A107	IN16	0.4	100%	0%	0.4	0.0
A108	IN7	0.4	100%	0%	0.4	0.0
A109	IN2	0.2	100%	0%	0.2	0.0
A110	IN43	0.1	100%	0%	0.1	0.0
A111	IN152	0.1	100%	0%	0.1	0.0
A112	IN153	0.1	100%	0%	0.1	0.0
A113	IN64	0.1	100%	0%	0.1	0.0
A114	IN64	0.3	100%	0%	0.3	0.0
A115	IN63	0.1	100%	0%	0.1	0.0
A116	IN64	0.1	100%	0%	0.1	0.0
A117	IN155	0.2	100%	0%	0.2	0.0
A118	IN157	0.1	100%	0%	0.1	0.0
A119	IN155	0.2	100%	0%	0.2	0.0
A120	IN156	0.1	100%	0%	0.1	0.0
A121	IN65	0.1	100%	0%	0.1	0.0
A122	IN66	0.2	100%	0%	0.2	0.0
A123	IN66	0.0	100%	0%	0.0	0.0
A124	IN66	0.0	100%	0%	0.0	0.0
A125	IN67	0.0	100%	0%	0.0	0.0
A126	IN67	0.0	100%	0%	0.0	0.0
A127	IN69	0.7	100%	0%	0.7	0.0

ID (cfs)	AttachTo	Total Area (Ac)	% impervious	% pervious	Area impervious (Ac)	Area pervious (Ac)
A128	IN71	0.6	100%	0%	0.6	0.0
A129	IN70	0.9	100%	0%	0.9	0.0
A130	IN72	0.5	100%	0%	0.5	0.0
A131	IN159	0.7	100%	0%	0.7	0.0
A132	IN159	0.5	100%	0%	0.5	0.0
A133	IN154	2.1	100%	0%	2.1	0.0
A134	IN158	1.6	100%	0%	1.6	0.0
A135	IN127	0.1	100%	0%	0.1	0.0
A136	IN117	0.3	100%	0%	0.3	0.0
A137	IN118	0.4	100%	0%	0.4	0.0
A138	IN126	0.3	100%	0%	0.3	0.0
A139	IN125	0.2	100%	0%	0.2	0.0
A140	IN119	0.3	100%	0%	0.3	0.0
A141	IN120	0.1	100%	0%	0.1	0.0
A142	IN121	0.1	100%	0%	0.1	0.0
A143	IN122	0.1	100%	0%	0.1	0.0
A144	IN124	0.7	30%	70%	0.2	0.5
A145	IN123	0.3	100%	0%	0.3	0.0
A146	IN122	1.2	29%	71%	0.3	0.8
A147	IN130	0.4	100%	0%	0.4	0.0
A148	IN78	0.5	100%	0%	0.5	0.0
A149	IN79	0.4	100%	0%	0.4	0.0
A150	IN132	0.0	100%	0%	0.0	0.0
A151	IN133	0.1	100%	0%	0.1	0.0
A152	IN168	2.1	100%	0%	2.1	0.0
A153	IN124	0.3	100%	0%	0.3	0.0
A154	IN134	0.2	100%	0%	0.2	0.0
A155	IN169	3.0	100%	0%	3.0	0.0
A156	IN135	0.1	100%	0%	0.1	0.0
A157	IN136	0.0	100%	0%	0.0	0.0
A158	IN137	0.3	31%	69%	0.1	0.2
A159	IN138	0.3	52%	48%	0.2	0.1
A160	IN140	0.1	100%	0%	0.1	0.0
A161	IN141	0.0	100%	0%	0.0	0.0
A162	IN189	0.6	69%	31%	0.4	0.2
A163	IN189	0.4	46%	54%	0.2	0.2
A164	IN190	2.4	35%	65%	0.8	1.6
A165	IN195	0.8	100%	0%	0.8	0.0
A166	IN186	1.8	100%	0%	1.8	0.0
A167	IN196	0.5	100%	0%	0.5	0.0
A168	IN187	0.2	100%	0%	0.2	0.0
A169	IN194	0.3	100%	0%	0.3	0.0
A170	IN191	3.7	32%	68%	1.2	2.5
A171	IN188	0.6	100%	0%	0.6	0.0

ID (cfs)	AttachTo	Total Area (Ac)	% impervious	% pervious	Area impervious (Ac)	Area pervious (Ac)
A172	IN182	1.7	100%	0%	1.7	0.0
A173	IN183	0.7	100%	0%	0.7	0.0
A174	IN193	4.0	55%	45%	2.2	1.8
A175	IN192	5.3	22%	78%	1.2	4.1
A176	IN192	4.2	43%	57%	1.8	2.4
A177	IN181	0.7	100%	0%	0.7	0.0
A178	IN184	0.7	100%	0%	0.7	0.0
A179	IN180	0.9	100%	0%	0.9	0.0
A180	IN185	0.7	100%	0%	0.7	0.0
A181	IN179	0.2	100%	0%	0.2	0.0
A182	IN177	1.4	100%	0%	1.4	0.0
A183	IN178	2.6	52%	48%	1.3	1.2
A184	IN197	3.3	44%	56%	1.4	1.8
A185	IN198	37.9	38%	62%	14.4	23.5
A186	IN176	0.9	100%	0%	0.9	0.0
A187	IN174	1.4	100%	0%	1.4	0.0
A188	IN174	0.4	100%	0%	0.4	0.0
A189	IN199	2.5	37%	63%	0.9	1.6
A190	IN201	2.1	28%	72%	0.6	1.5
A191	IN173	0.3	100%	0%	0.3	0.0
A192	IN173	0.4	100%	0%	0.4	0.0
A193	IN25	0.7	100%	0%	0.7	0.0
A194	IN44	0.5	100%	0%	0.5	0.0
A195	IN170	1.5	100%	0%	1.5	0.0
A196	IN202	28.6	21%	79%	6.0	22.6
A197	IN203	0.9	41%	59%	0.4	0.6
A198	IN204	2.6	46%	54%	1.2	1.4
A199	IN205	29.2	19%	81%	5.5	23.6
A200	IN171	0.7	100%	0%	0.7	0.0
A201	IN171	0.5	100%	0%	0.5	0.0
A202	IN172	0.5	100%	0%	0.5	0.0
A203	IN172	0.5	100%	0%	0.5	0.0
A204	IN200	0.6	100%	0%	0.6	0.0
A205	IN200	0.6	100%	0%	0.6	0.0
A206	IN206	3.6	29%	71%	1.0	2.5
A207	IN207	3.8	21%	79%	0.8	3.0
A208	P232	21.7	21%	79%	4.5	17.1
A209	IN175	4.9	61%	39%	3.0	1.9
A210	IN6	221.0	22%	78%	48.6	172.4
		466.6			169.5	297.1

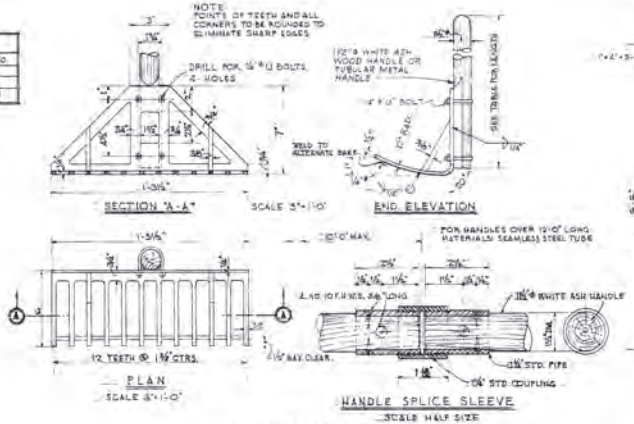
APPENDIX C

Pump Station Record Plans

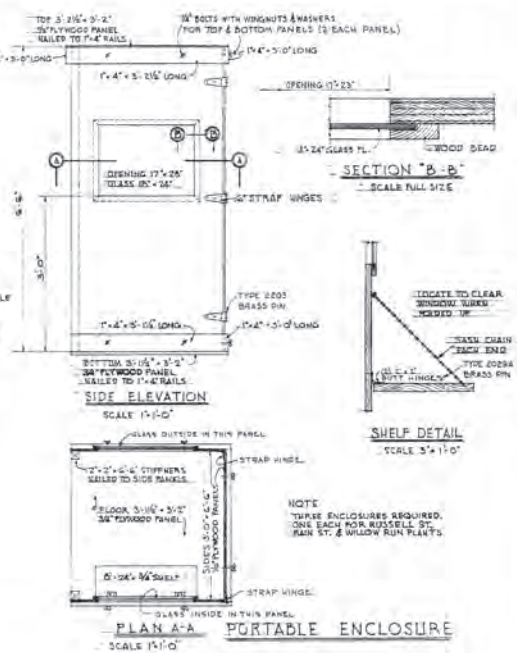


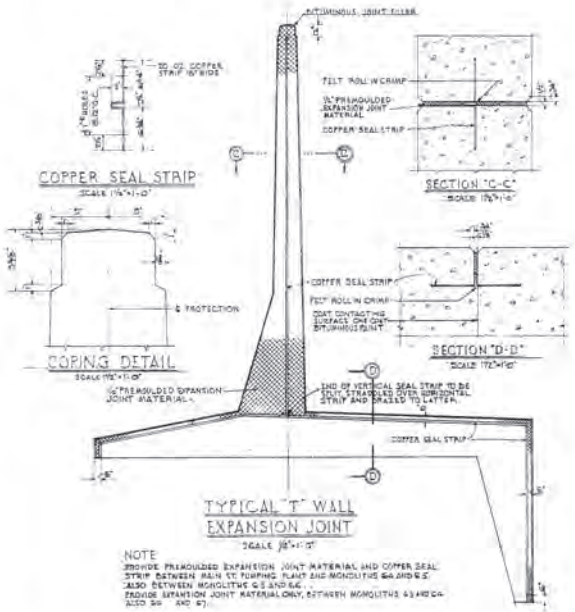
FLOAT WELL BAFFLE DETAIL
SCALE 1/2"=1'-0"

RAKE SCHEDULE		
PLANT	HANDLE LENGTH	NO.
RUSSELL ST.	21'-0"	1
MAIN ST.	19'-6"	1
WILLOW RUN	23'-0"	1

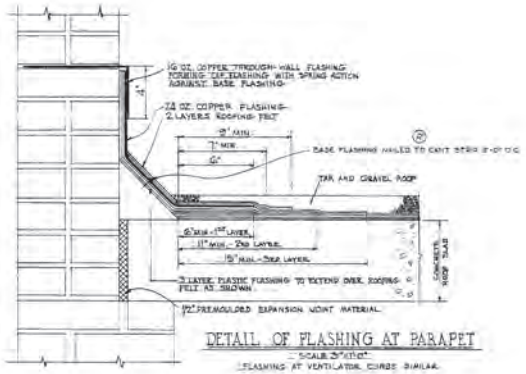


HAND RAKE DETAIL





NOTE
PROVIDE PREMOLDED EXPANSION JOINT MATERIAL AND COPPER SEAL STRIP BETWEEN MAIN ST. PUMPING PLANT AND MONOLITHS 64 AND 65. ALSO BETWEEN MONOLITHS 65 AND 66.
PROVIDE EXPANSION JOINT MATERIAL ONLY, BETWEEN MONOLITHS 63 AND 64 ALSO 66 AND 67.



(P) Note added "Field"

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
1	10/20/50	Rake handle material note revised	WAN

A. M. KINNEY, INC
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

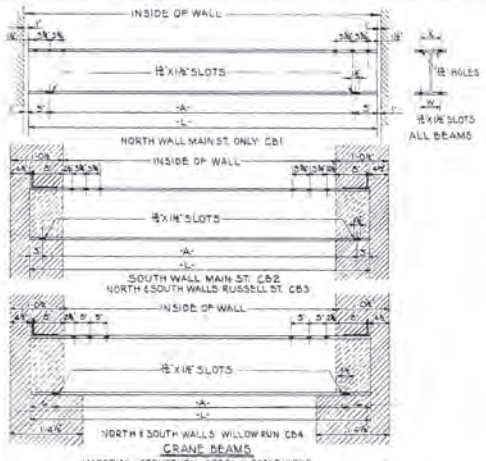
OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
MISCELLANEOUS DETAILS

DRAWN: B.A.K.
TRACED: E.O.B.
CHECKED: R.C.
SUBMITTED: A.M. KINNEY, INC.
APPROVED: DATE: SEPT. 1949
U.S. CORPS OF ENGINEERS, LOUISVILLE DISTRICT
APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT
SCALE: AS NOTED | SHEET 12 OF 48 SHEETS
DRAWING NUMBER 471-122/12

AS BUILT

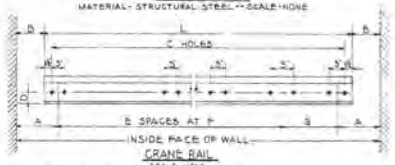
CORPS OF ENGINEERS

U.S. ARMY



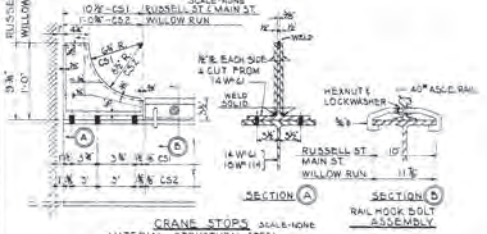
CRANE BEAMS

MATERIAL- STRUCTURAL STEEL -- SCALE-NONE



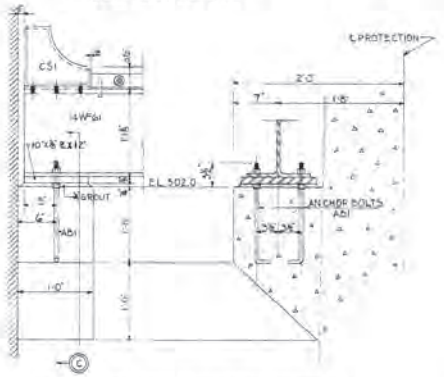
CRANE RAIL

SCALE-NONE



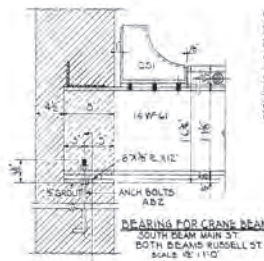
CRANE STOPS SCALE-NONE

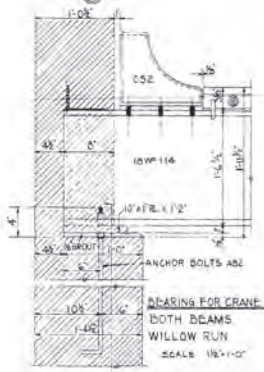
MATERIAL-- STRUCTURAL STEEL

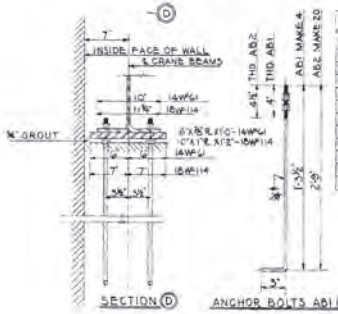


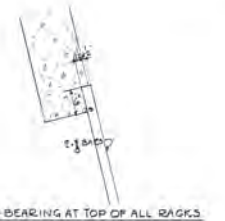
BEARING FOR CRANE BEAM-NORTH BEAM, MAIN ST.

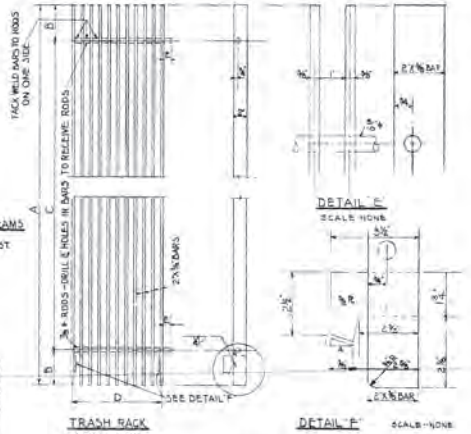
SCALE 1½"=1'-0"





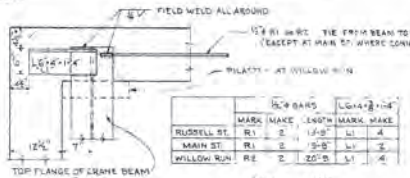






TRASH RACK

SCALE-NONE



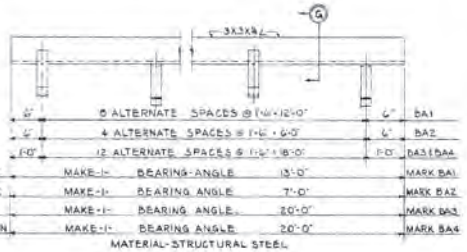
	¾"ø BARS			L.G.14+2-1'-6"	
	MARK	MAKE	LENGTH	MARK	MAKE
RUSSELL ST.	R1	2	19'-9"	L1	4
MAIN ST.	R1	2	19'-8"	L1	3
WILLOW RUN	R2	2	20'-8"	L1	6

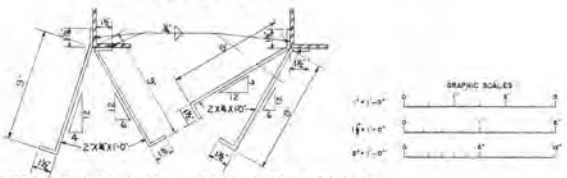
RACK LIST

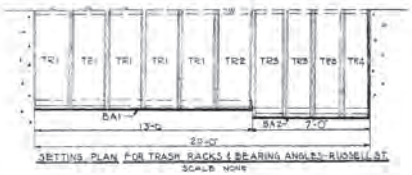
TRASH RACK DETAILS -- MATERIAL -- STRUCTURAL STEEL

TRASH RACK GRATING

PUMP PLANT	MAKE	MARK	A	B	C	D	E	SIZE OF BAR	WT. EA.
RUSSELL ST.	5	TR1	8'-10⅝"	5⅞"	4 SPCS @ 2'-0"	18 SPCS @ 1⅞"-0"	½"	2"X⅜"	442
RUSSELL ST.	1	TR2	8'-10⅝"	5⅞"	4 SPCS @ 2'-0"	17 SPCS @ 1⅞"-11⅛"	1"	2"X⅜"	418
RUSSELL ST.	5	TR3	9'-10⅝"	5¼"	4 SPCS @ 2'-3"	14 SPCS @ 1⅞"-11⅛"	1½"	2"X⅜"	388
RUSSELL ST.	1	TR4	9'-10⅝"	5¼"	4 SPCS @ 2'-3"	15 SPCS @ 1⅞"-11⅛"	1½"	2"X⅜"	413
MAIN ST.	6	TR5	10'-8⅝"	4½"	4 SPCS @ 2'-6"	16 SPCS @ 1⅞"-11⅛"	1½"	2"X⅜"	474
MAIN ST.	3	TR6	10'-8⅝"	4½"	4 SPCS @ 2'-6"	17 SPCS @ 1⅞"-11⅛"	1"	2"X⅜"	502
MAIN ST.	1	TR7	10'-8⅝"	4½"	4 SPCS @ 2'-6"	17 SPCS @ 1⅞"-11⅛"	1"	2"X⅜"	502
WILLOW RUN	16	TR8	11'-11⅛"	3⅝"	5 SPCS @ 2'-5"	8 SPCS @ 1⅞"-11⅛"	½"	2"X⅜"	447
WILLOW RUN	2	TR9	12'-11⅛"	3⅝"	5 SPCS @ 2'-5"	9 SPCS @ 1⅞"-11⅛"	½"	2"X⅜"	496
WILLOW RUN	1	TR10	13'-11⅛"	3⅝"	5 SPCS @ 2'-5"	9 SPCS @ 1⅞"-11⅛"	½"	2"X⅜"	496





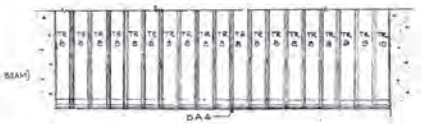


SETTING PLAN FOR TRASH RACKS & BEARING ANGLES-RUSSELL ST.

SCALE NONE

SETTING PLAN FOR TRASH RACKS & BEARING ANGLE-MAIN STREET

SCALE NONE



SETTING PLAN FOR TRASH RACKS & BEARING ANGLE-WILLOW RUN

SCALE-NONE

CRANE BEAMS

PLANT	SIZE OF BEAM	DIMENSIONS A	L	W	X	MARK	MAKE
MAIN STREET NORTH BEAM	14WF61	21'-6"	22'-2"	7"	7"	CB1	1
MAIN STREET SOUTH BEAM	14WF61	23'-2"	23'-8"	7"	7"	CB2	1
RUSSELL STREET	14WF61	22'-8"	23'-2"	7"	7"	CB3	2
WILLOW RUN	18WF114	30'-0"	30'-0"	7"	7"	CB4	2

CRANE RAILS

PLANT	WEIGHT A.S.C.E. RAIL	DIMENSIONS A	B	C	E	F	G	L	MARK	MAKE	RAIL HOOKS SIZE	RAIL HOOKS MAKE
MAIN STREET	40#	1'-2⅝	11⅜	1¾	1⅜	3	2'-0"	1'-10⅞	20-4½	CR1	2	¾ø	44
RUSSELL STREET	40#	1'-2⅝	11⅜	1¾	1⅜	3	2'-0"	1'-4⅞	15'-6½	CR2	2	¾ø	44
WILLOW RUN	40#	1'-4⅜	11⅛	1¾	1⅜	3	2'-0"	1'-10⅞	27'-4½	CR3	2	¾ø	60

CRANE STOPS

PLANT	SIZE OF L	HEIGHT OF L	LENTH OF L	REINFORCING RATES	MARK	MAKE
MAIN STREET	CUT FROM 14 WF 61	9⅜	10⅛"	2#S 0'-8½"X 0'-9⅜"	CS1	4
RUSSELL STREET	CUT FROM 14WF61	9⅜	10⅛"	2#S 0'-8½"X 0'-9⅜"	CS1	4
WILLOW RUN	CUT FROM 14WF61	11⅜	1'-0⅛"	2#S 10⅜"X 1'-0"	CS2	4

REVISION	DATE	DESCRIPTION	BY
1	4/26/50	Plate sizes revised Section D	W.R.K.

A.M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN A.E.B.
TRACED K.W.
CHECKED E.S.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS-OHIO RIVER SECTION

MISCELLANEOUS METAL DETAILS

SUBMITTED: A.M. KINNEY, INC. — APPROVED: [signature] — DATE: SEPT. 1948

APPROVAL RECOMMENDED: [signature] CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

U.S. CORPS OF ENGINEERS, ACTING DISTRICT ENGINEER, LOUISVILLE DISTRICT

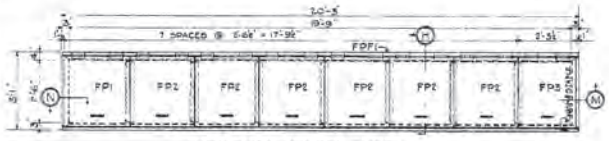
SCALE: AS NOTED | SHEET 15 OF 46 SHEETS

DRAWING NUMBER 471-12.2/13

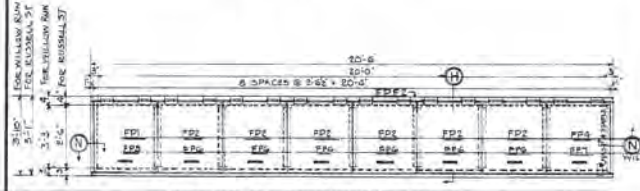
AS BUILT

CORPS OF ENGINEERS

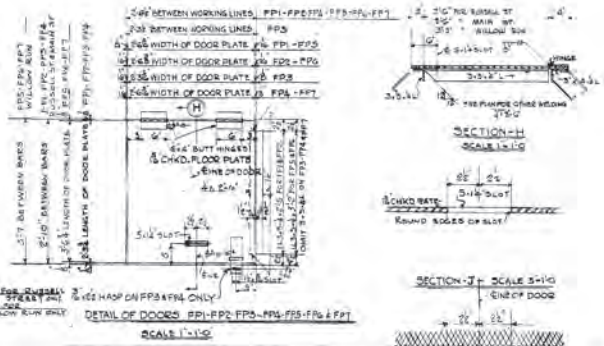
U.S. ARMY

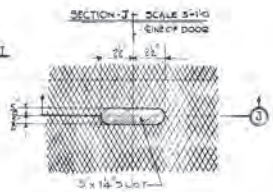


FLOOR PLATES FOR MAIN STREET
SCALE 1"=1'-0"

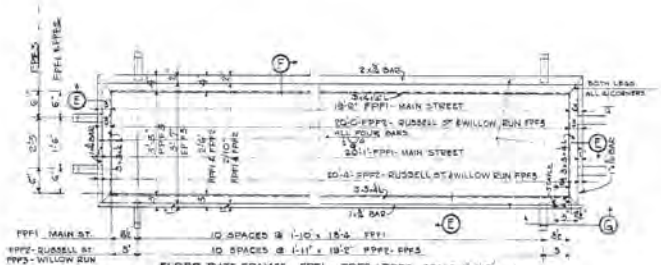


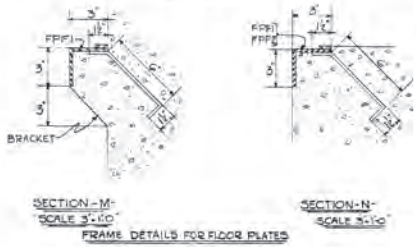
FLOOR PLATES FOR RUSSELL STREET & WILLOW RUN
SCALE 1"=1'-0"



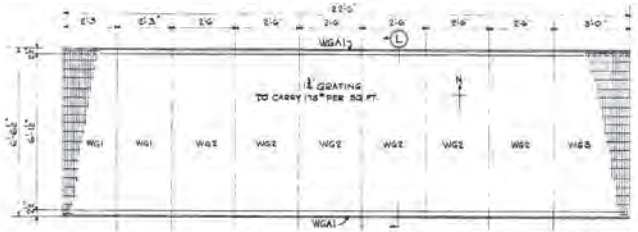


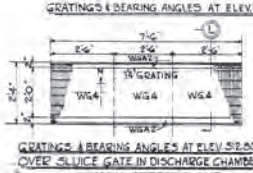
FLOOR PLATES & ANGLE FRAMES						
PLANT	FLOOR PLATES			ANGLE FRAMES		
	MARK	MAKE	MATERIAL	MARK	MAKE	MATERIAL
MAIN STREET	FP1	1	½" CONCRETE	FPF1	1	3-3-9 L 4-3-14 L
	FP2	G	DO.	—	—	—
	FP3	1	DO.	—	—	—
RUSSELL STREET	FP1	1	DO.	FPF2	1	3-3-9 L 4-3-14 L
	FP2	G	DO.	—	—	—
	FP4	1	DO.	—	—	—
WILLOW RUN	FP5	1	DO.	FPF3	1	3-3-9 L 4-3-14 L
	FP6	G	DO.	—	—	—
	FP7	1	DO.	—	—	—





WALKWAY GRATINGS AND WALKWAY GRATING BEARING ANGLES									
GRATINGS			WALKWAY GRATING BEARING ANGLES						
PLANT	MARK	MAKE	MARK	MAKE	DIMENSIONS				
					A	B	C	D	L
MAIN STREET	WG1	2	WGA1	2	7½"	13"	22½"	1'-8"	22'-8"
	WG2	G							
	WG3	1							
	WG4	3	WGA2	2	8"	3"	2"	1'-6"	7'-6"





REVISION	DATE	DESCRIPTION	BY

A.M. KINNEY, INC
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN E.E.S.
TRACED E.E.S.
CHECKED E.E.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION

MISCELLANEOUS METAL DETAILS

SUBMITTED: A.M. KINNEY, INC.
APPROVED: [illegible] DATE: SEPT 1949
APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT
[illegible] CORPS OF ENGINEERS, OHIO RIVER DISTRICT ENGINEER, LOUISVILLE DISTRICT

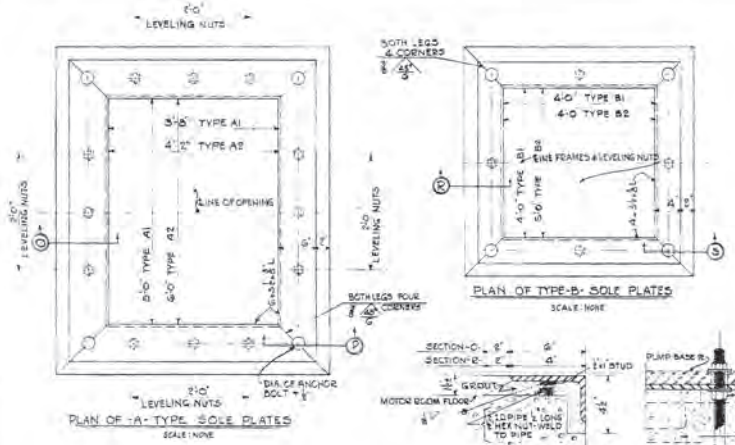
SCALE AS NOTED SHEET 14 OF 48 SHEETS
DRAWING NUMBER
471-122/14

AS BUILT

073

CORPS OF ENGINEERS

U.S. ARMY



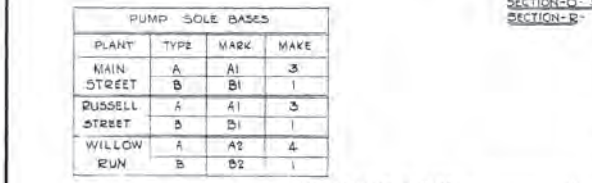
PLAN OF -A- TYPE SOLE PLATES

SCALE: NONE

PLAN OF TYPE-B- SOLE PLATES

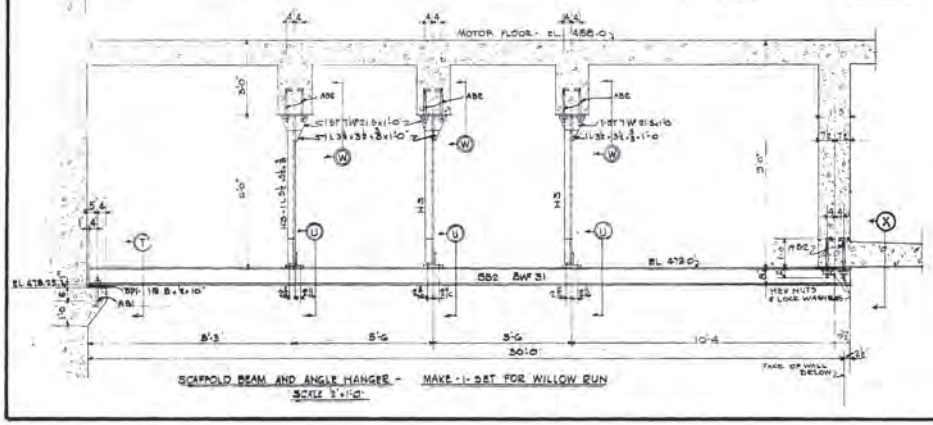
SCALE: NONE

PUMP SOLE BASES			
PLANT	TYPE	MARK	MAKE
MAIN STREET	A	A1	3
	B	B1	1
RUSSELL STREET	A	A1	3
	B	B1	1
WILLOW RUN	A	A2	4
	B	B2	1



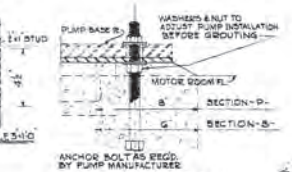
SCAFFOLD BEAMS AND L HANGERS { MAKE-1-SET FOR RUSSELL ST / MAKE-1-SET FOR MAIN ST

SCALE 1/2"=1'-0"



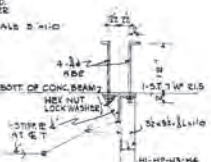
SCAFFOLD BEAM AND ANGLE HANGER - MAKE-1-SET FOR WILLOW RUN

SCALE 1/2"=1'-0"



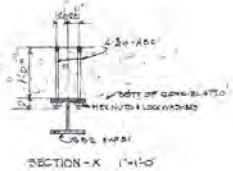
SECTION-P- SCALE 3"=1'-0"

SECTION-S-

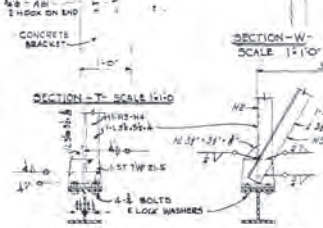


SECTION-W-

SCALE 1"=1'-0"



SECTION-X 1"=1'-0"

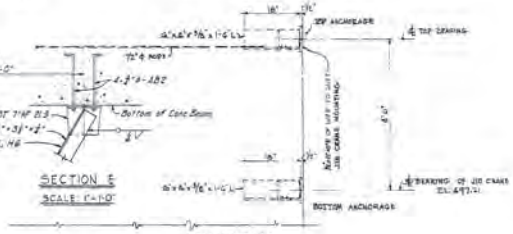


SECTION-U

SCALE 1"=1'-0"

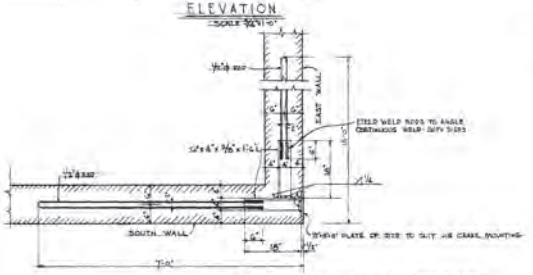
SECTION-D

SCALE 1"=1'-0"



SECTION E

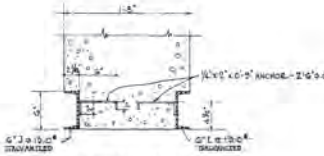
SCALE 1"=1'-0"



PLAN - TOP ANCHORAGE SCALE 3/8"=1'-0"

BOTTOM ANCHORAGE SAME AS ABOVE EXCEPT RODS IN SOUTH WALL ARE OMITTED.

ANCHORAGE FOR 1/2 TON JIB CRANE - WILLOW RUN PLANT



CHANNEL GUIDES

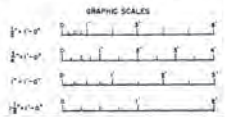
FOR BULKHEADS IN DISCHARGE CHAMBER - MAIN ST. PLANT

SEE SHEETS NO. 21 AND 22 FOR LOCATION.

ARE NUMERICAL REQUIRED.

SCALE: 1/2"=1'-0"

GRAPHIC SCALES



REVISION	DATE	DESCRIPTION	W.A.M.
1	14 Feb 50	Sections D-D and E-E added.	

A.M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION

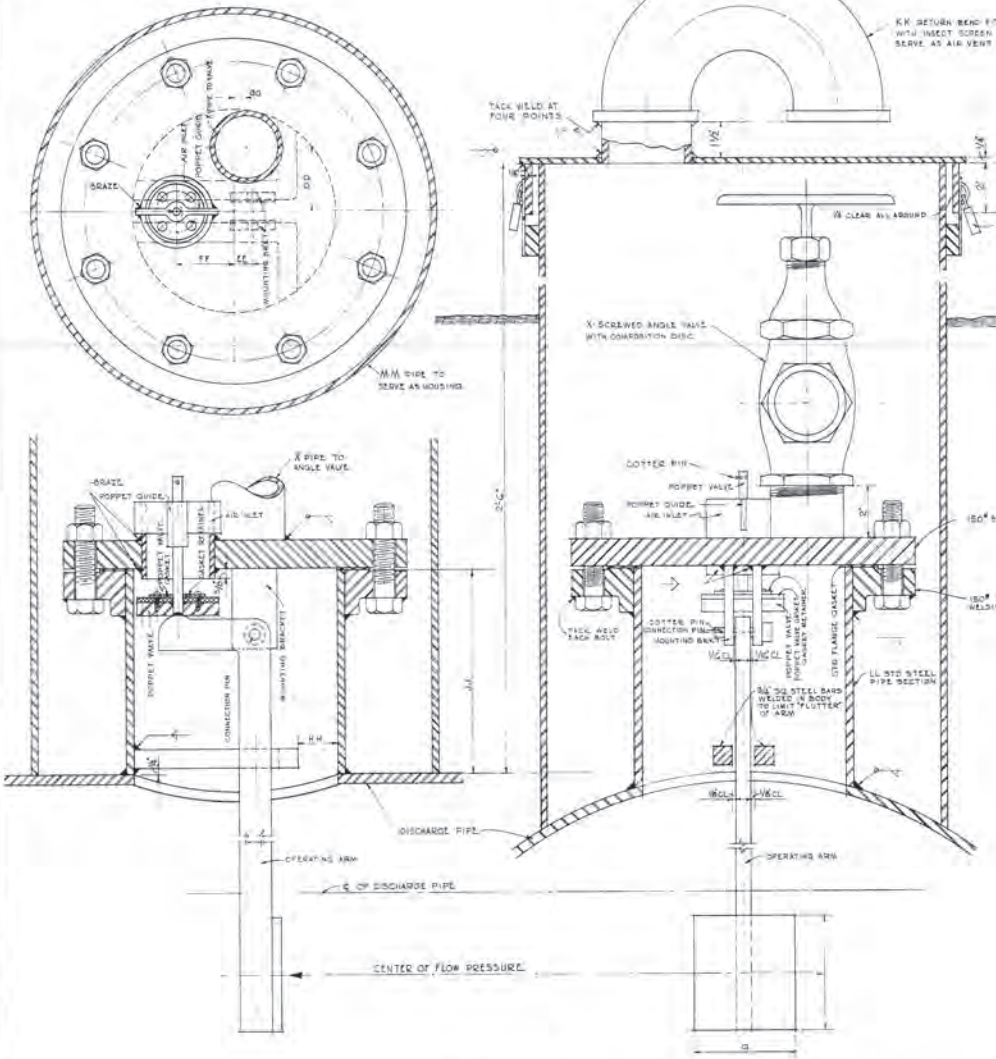
MISCELLANEOUS METAL DETAILS

DRAWN: R.E.B.
TRACED: R.E.B.
CHECKED: R.C.
SUBMITTED: A.M. KINNEY, INC.
APPROVED: Col. [illegible] Corps of Engineers, Acting District Engineer, Louisville District
DATE: SEPT 1948
APPROVAL RECOMMENDED: Chief, Engineering Division, Corps of Engineers, Louisville District
SCALE: AS NOTED
SHEET 15 OF 46 SHEETS
DRAWING NUMBER
471-12.2/15

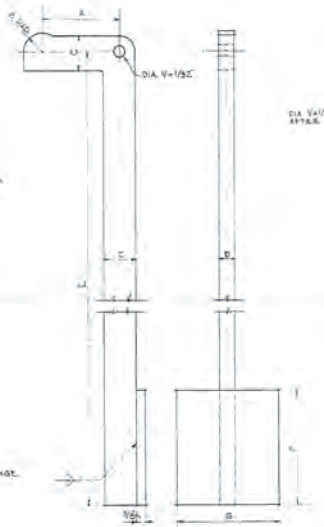
AS BUILT

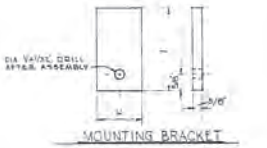
CORPS OF ENGINEERS

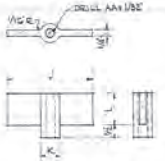
U.S. ARMY

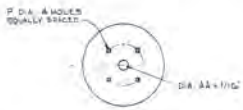


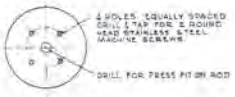
SIPHON BREAKER

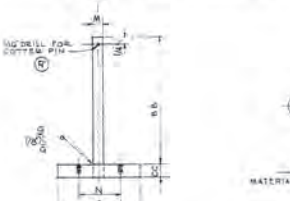


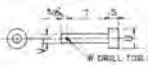






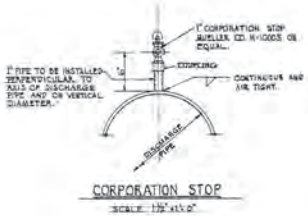






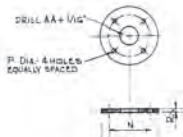
NOTES:
1. ALL FILLET WELDS 1/8" UNLESS OTHERWISE NOTED.
2. ALL WELDS SEALING BREAKER ASSEMBLY MUST BE CONTINUOUS AND AIR TIGHT.
3. QUANTITIES SHOWN ARE FOR ONE ASSEMBLY.

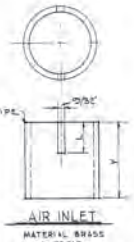
(R) COTTER KEY REPLACED WITH WASHER WELDED ON STEM (WILLOW RUN RP ONLY)



CORPORATION STOP

SCALE: 1½" = 1'-0"





DIMENSION SCHEDULE

LETTERING DESIGNATION	BREAKER ASSEMBLY FOR DISCHARGE PIPE SIZE 12"	14"	30"	36"
A	1 3/4"	1 3/4"	5"	5"
B	15 1/2"	9 1/16"	7 1/4"	7 1/16"
C	7/16"	3/4"	1 1/4"	1 1/2"
D	5/16"	3/16"	5/16"	9/16"
E	13 1/2"	15 1/2"	27 1/2"	34"
F	5"	3"	4 1/2"	12"
G	23 1/2"	27 1/2"	4"	41 1/2"
H	1"	1"	1 3/16"	1 3/16"
I	2 5/16"	2 9/16"	3 1/4"	3 5/16"
J	2 1/16"	2 1/16"	3 3/16"	3 3/16"
K	1/2"	1/2"	3/16"	3/16"
L	1/2"	1/2"	1 1/4"	1 1/4"
M	1/16"	1/16"	3/16"	3/16"
N	7/16"	7/16"	1 5/16"	1 7/16"
O	2 1/4"	2 1/4"	3 1/16"	3 3/16"
P	9 1/32"	5 1/32"	5 11/32"	1/16"
Q	1 1/16"	1 1/16"	2 1/4"	2 1/2"
R	1 7/32"	1 1/16"	1 1/16"	1 1/8"
S	1/8"	1/8"	3/16"	3/16"
T	1 7/16"	1 7/16"	1 5/16"	1 5/16"
U	1/2"	1/2"	3/16"	3/16"
V	1/16"	1/16"	3/16"	1/2"
W	3/32"	3/32"	1/16"	5/32"
X	1 1/2"	1 1/2"	2 1/2"	5"
Y	2 1/16"	2 1/16"	3 11/16"	3 11/16"
Z	*5	*5	*8	*10
AA	3/16"	3/16"	3/16"	3/16"
BB	3 1/2"	3 1/2"	5"	5 1/2"
CC	1/4"	1/2"	1 1/2"	1 1/2"
DD	3 1/2"	1 3/16"	2 1/16"	2"
EE	1/16"	1/16"	3/16"	1/16"
FF	1 1/2"	1 1/2"	2 1/4"	2 7/16"
GG	1"	1"	1 1/2"	1"
HH	1 1/16"	1 1/4"	1 7/16"	1 1/2"
JJ	7 1/2"	5 1/16"	6"	7"
KK	1 1/2"	1 1/2"	5"	5"
LL	12"	14"	30"	10"
MM	13 5/8"	15 3/8"	32 1/2"	38 1/2"

REVISION	DATE	DESCRIPTION	BY

A.M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN E.A.K. B.D.
TRACED E.A.K.
CHECKED B.D.
SUBMITTED: A.M. KINNEY, INC.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION

SIPHON BREAKER

APPROVED: LT. COL. CORPS OF ENGINEERS, ACTING DISTRICT ENGINEER, LOUISVILLE DISTRICT
DATE: SEPT. 1948

APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

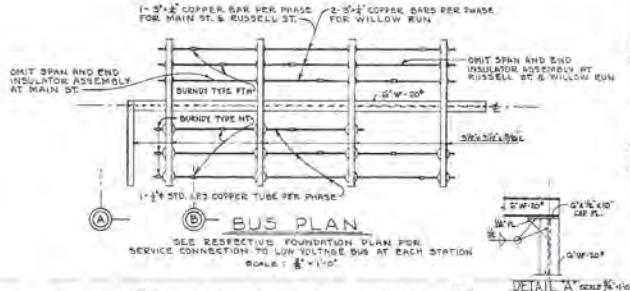
SCALE: AS NOTED | SHEET 18 OF 46 SHEETS

DRAWING NUMBER
471 - 12.2/18

AS BUILT

CORPS OF ENGINEERS

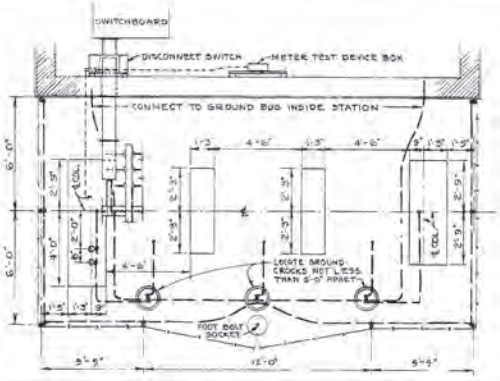
U.S. ARMY



BUS PLAN

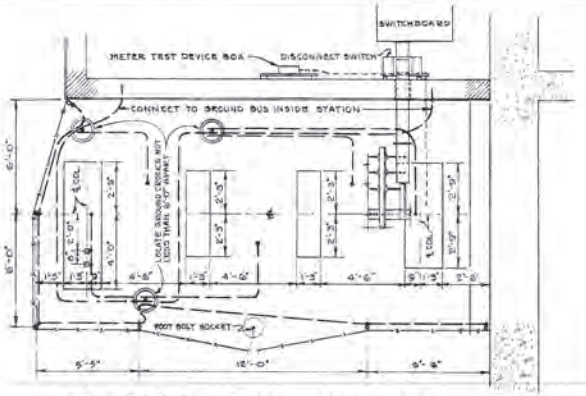
SEE RESPECTIVE FOUNDATION PLAN FOR SERVICE CONNECTION TO LOW VOLTAGE BUS AT EACH STATION

SCALE: ⅜"=1'-0"



FOUNDATION PLAN - RUSSELL ST.

SCALE: ⅜"=1'-0"

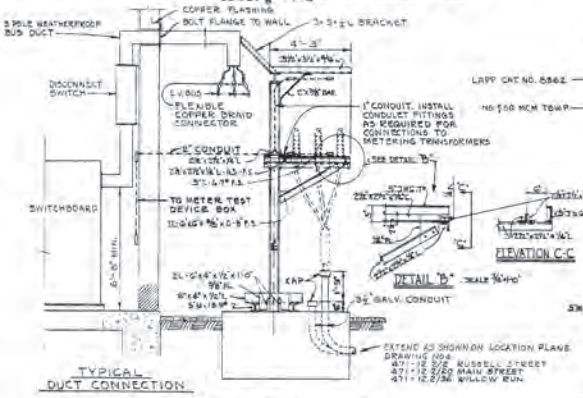


FOUNDATION PLAN - MAIN ST.

SCALE: ⅜"=1'-0"

ELEVATION - H.V. SIDE

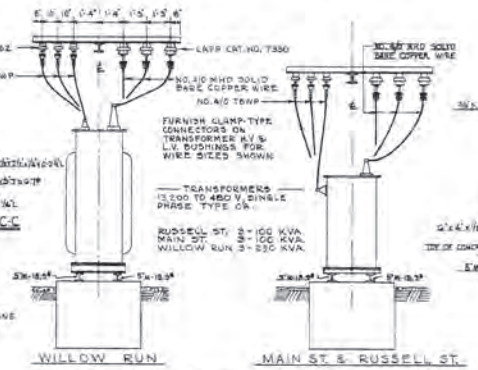
SCALE: ⅜"=1'-0"



TYPICAL DUCT CONNECTION

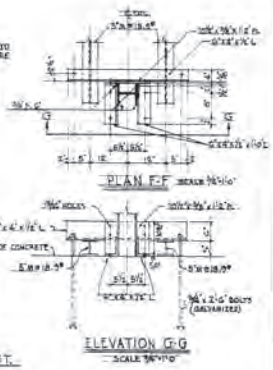
SECTION A-A

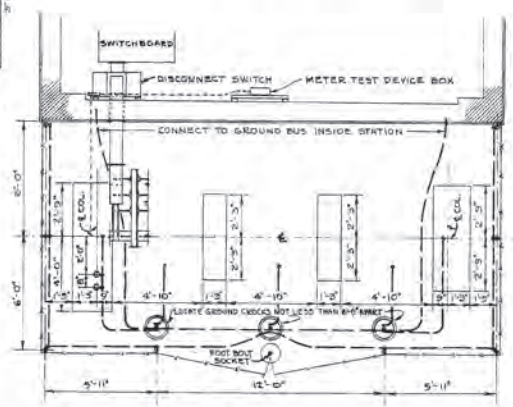
SCALE: ⅜"=1'-0"



SECTION B-B

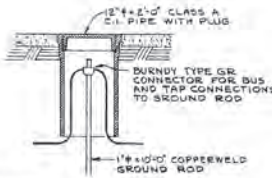
SCALE: ⅜"=1'-0"





FOUNDATION PLAN - WILLOW RUN

SCALE: ⅜"=1'-0"



GROUND CROCK DETAIL

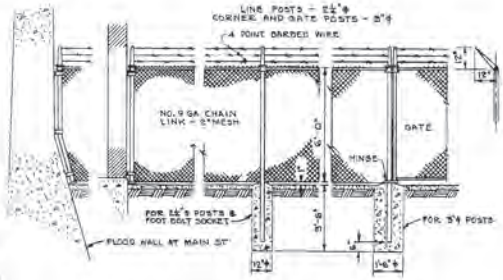
SCALE: 1"=1'-0"

GROUNDING NOTES

ALL GROUNDING CONDUCTORS, SOFT DRAWN STRANDED COPPER, MAIN BUS, NO. 4/0; TAPS TO TRANSFORMER CASES AND STRUCTURAL STEEL, NO. 2/0; FENCE GROUND, NO. 2.

GROUND CONNECTIONS INDICATED THUS ⊕ TO BE MADE WITH BURNDY, OR EQUAL, APPROVED CONNECTORS.

BOND GATE FRAMES TO ADJACENT POSTS WITH BURNDY TYPE BB FLEXIBLE COPPER BRAID AND TYPE GG CONNECTORS.



FENCE DETAIL

SCALE: ⅜"=1'-0"

GENERAL NOTES

PROVIDE 3-INCH THICK CRUSHED LIMESTONE BLANKET OVER AREA WITHIN AND EXTENDING 3'-0" BEYOND FENCE ON ALL OPEN SIDES.

STRUCTURAL CONNECTIONS SHALL BE WELDED OR RIVETED IN ACCORDANCE WITH STANDARDS OF A.I.S.C.

CONNECTORS AND INSULATORS SHALL BE SIMILAR AND EQUAL TO TYPE AND MANUFACTURE NOTED HEREON.

SCREWS, BOLTS, NUTS, LOCKWASHERS, ETC. USED TO ATTACH ITEMS OF ELECTRICAL EQUIPMENT SHALL BE "EVERDUR" OR EQUAL.

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY
1	4 APR 50	Note added Section A-A	WEK

A.M. KINNEY, INC.
CONSULTING ENGINEERS - ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN L.P.K. E.A.K.
TRACED E.A.K.
CHECKED L.P.K. R.D.
SUBMITTED: A.M. KINNEY, INC.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
TRANSFORMER SUB-STATIONS

APPROVED: DATE SEPT. 1948
LT. COL., CORPS OF ENGINEERS, ACTING DISTRICT ENGINEER, LOUISVILLE DISTRICT

APPROVING RECOMMENDED
CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

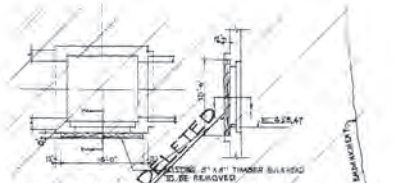
SCALE: AS NOTED SHEET 8 OF 46 SHEETS

DRAWING NUMBER
471-12.2/19

AS BUILT

CORPS OF ENGINEERS

U.S. ARMY



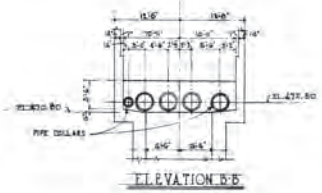
PLAN 1-1 SECTION 2-2

EXISTING CONDITIONS AT MANHOLE NO. 3

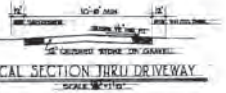
SCALE 1"=10'-0"

SITE PLAN

SCALE 1"=100'

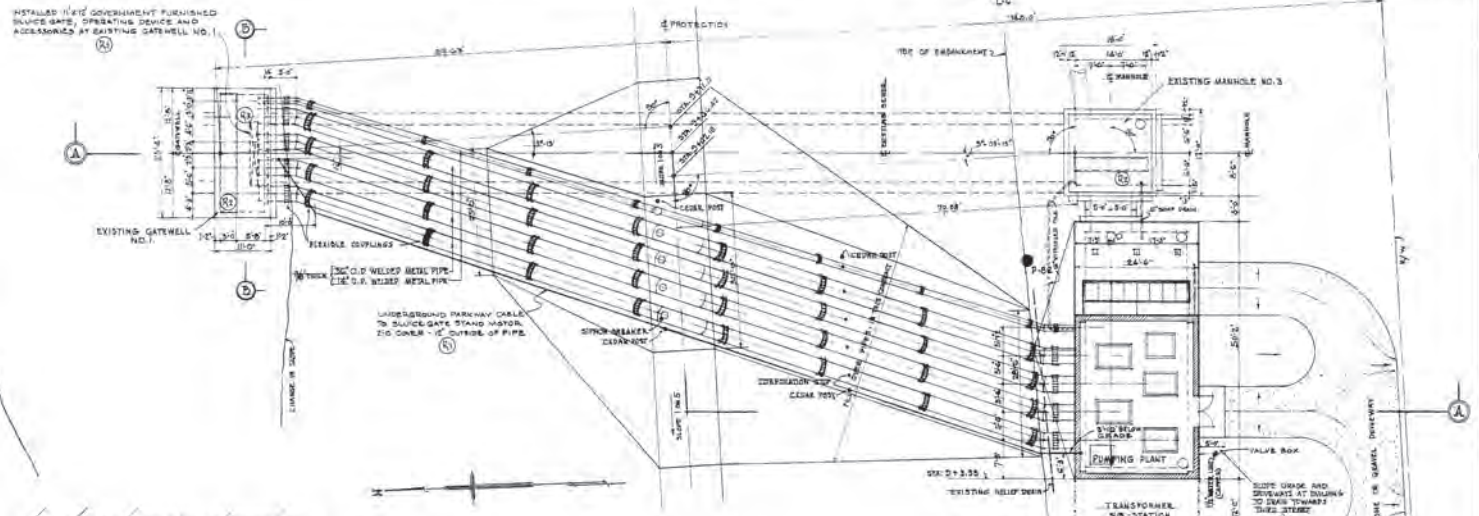


ELEVATION B-B



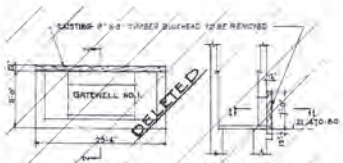
TYPICAL SECTION THRU DRIVEWAY

SCALE 1"=10'



LOCATION PLAN

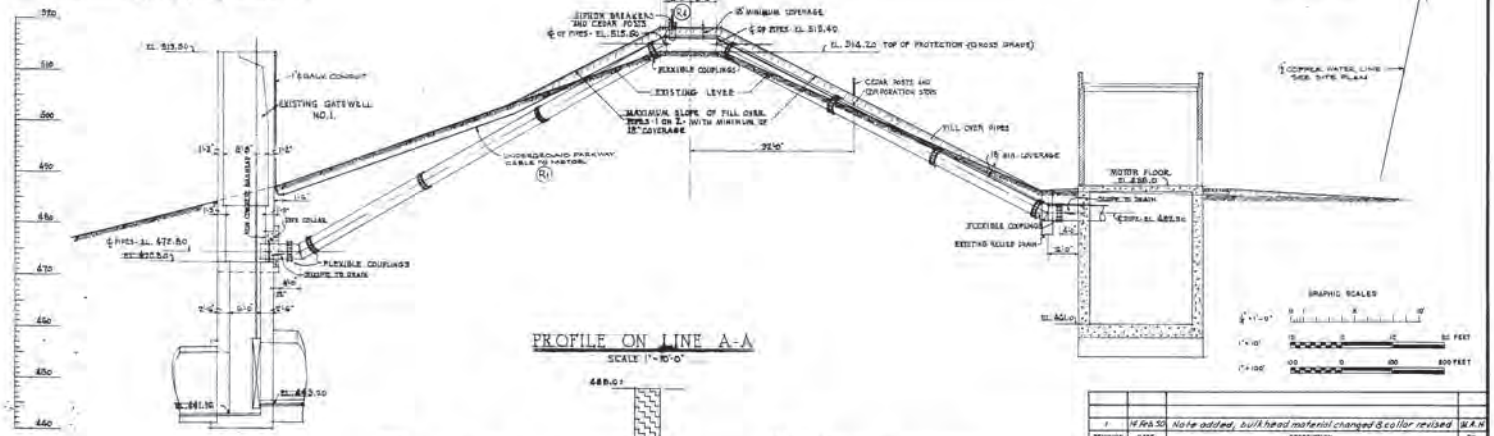
SCALE 1"=10'-0"



PLAN 1-1 SECTION 2-2

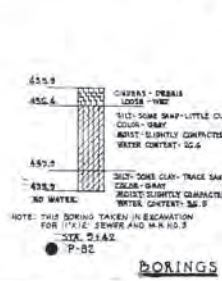
EXISTING CONDITIONS AT OPENING FOR DISCHARGE PIPES - GATEWELL NO. 1

SCALE 1"=10'-0"



PROFILE ON LINE A-A

SCALE 1"=10'-0"



BORINGS

NOTES:

1. R/W = RIGHT OF WAY
2. C/E = CONSTRUCTION EASEMENT
3. FOR DETAIL OF SIPHON BREAKERS ON DISCHARGE PIPES SEE SHEET 16.
4. FOR DETAILS OF TRANSFORMER SUB-STATION SEE SHEET 19.
5. SEE SHEET 16 FOR CORROSION STOPS.
6. CEDAR POSTS SHALL BE 12" DIAMETER BY 6'10" LONG, 2'6" IN GROUND ADJACENT TO AND IN LINE WITH CORROSION STOPS AND SIPHON BREAKERS.
7. RESTORE RELIEF DRAIN AT TOE OF EMBANKMENT WHERE DISTURBED BY INSTALLATION OF DISCHARGE PIPING.

(24) REPLACING THE COTTER KEYS ON THE STEM OF POPPET VALVES AND WELDING WASHER ON END OF STEM

(23) SLUICE GATE INSTALLED C.O. NO. 1

(22) HINGES REPLACED C.O. NO. 3

(21) PARKWAY CABLE ADDED C.O. NO. 1

GRAPHIC SCALES

1"=10' 0 10 20 30 FEET

1"=100' 0 100 200 FEET

REVISION	DATE	DESCRIPTION	BY
1	14 Feb 50	Note added, bulkhead material changed & collar revised	W.R.H.

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

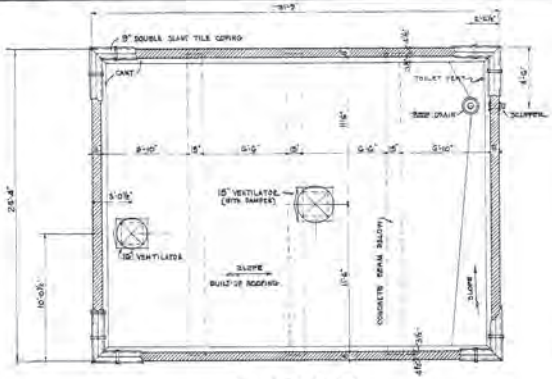
OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
LOCATION PLAN AND PLOTTING

DRAWN: B.E.R. C.C.
TRACED: C.C.
CHECKED: C.C.
SUBMITTED: A.M. KINNEY, INC.
APPROVED: DATE: SEPT 1946
APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT
U.S. CORPS OF ENGINEERS, FIFTH DISTRICT ENGINEER, LOUISVILLE DISTRICT
SCALES AS NOTED SHEET 34 OF 46 SHEETS
DRAWING NUMBER 471-12.2/36

AS BUILT

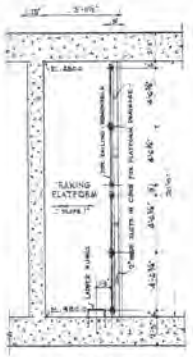
CORPS OF ENGINEERS

U.S. ARMY



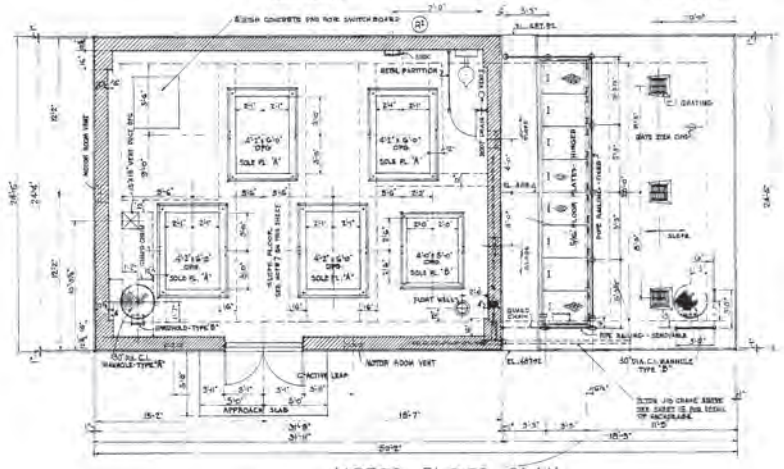
ROOF PLAN

SCALE 3/16"=1'-0"



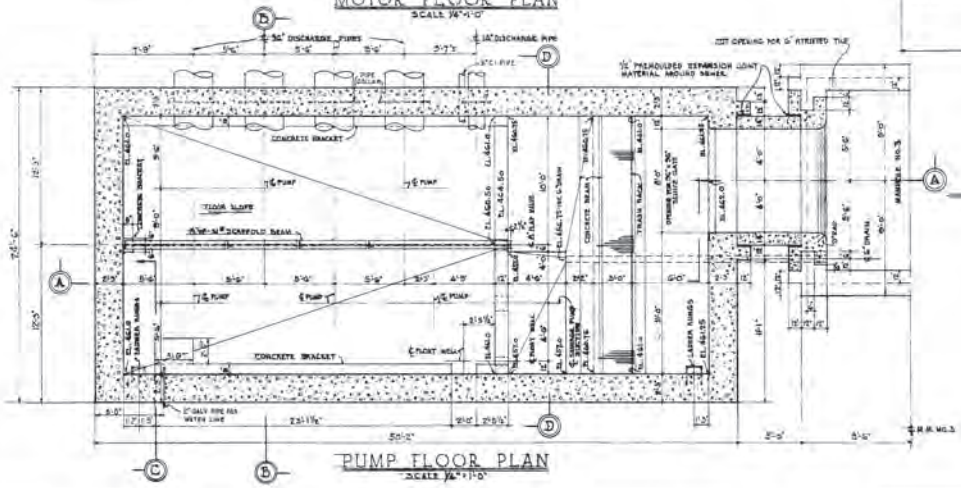
RAKING PLATFORM PLAN

SCALE 1/8"=1'-0"



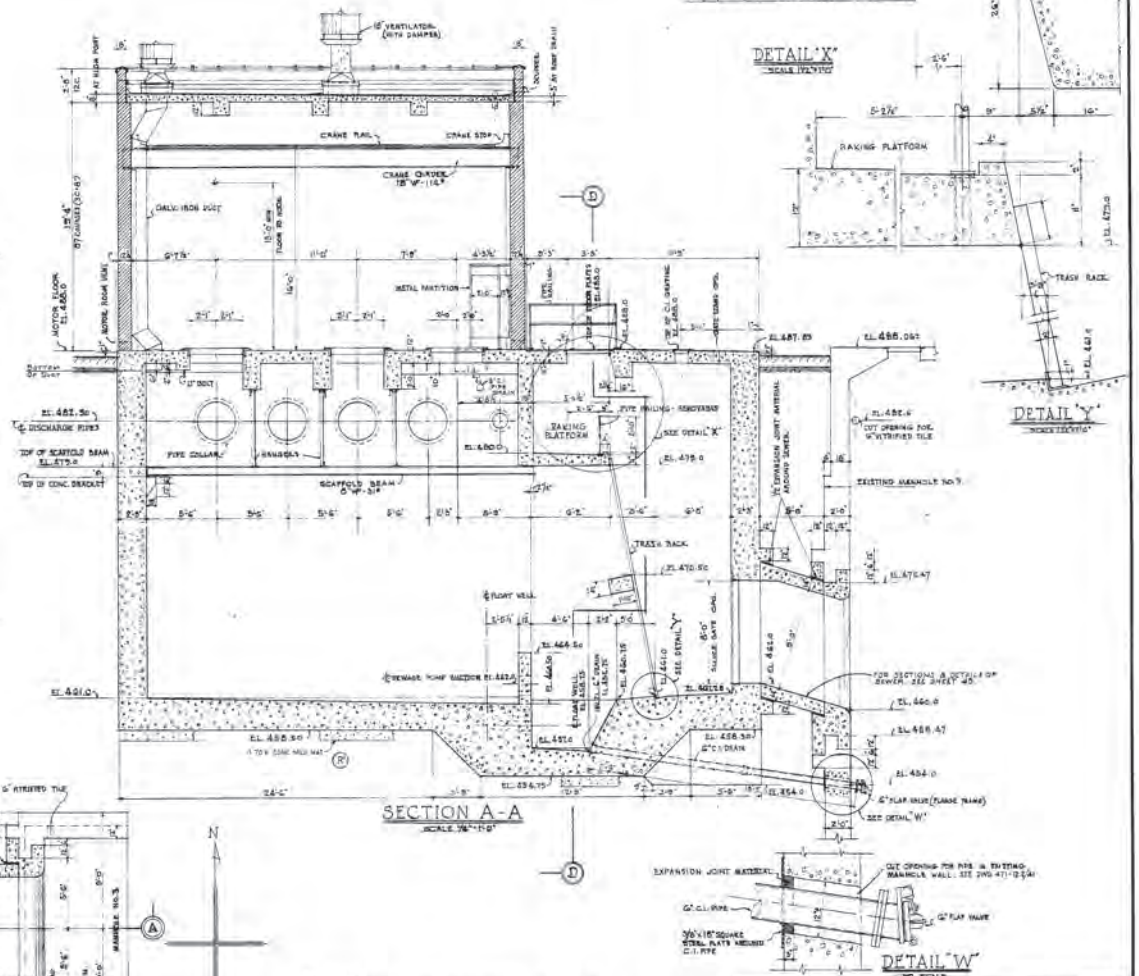
MOTOR FLOOR PLAN

SCALE 1/4"=1'-0"



PUMP FLOOR PLAN

SCALE 1/4"=1'-0"



SECTION A-A

SCALE 1/4"=1'-0"

DETAIL 'X'

SCALE 1/2"=1'-0"

DETAIL 'Y'

SCALE 1/2"=1'-0"

DETAIL 'W'

NO SCALE

NOTES:

1. FOR LOCATION PLAN AND PROFILE - SEE SHEET 34.
2. FOR SOUTH ELEVATION AND SECTIONS B-B, C-C, AND D-D - SEE SHEET 38. FOR NORTH, EAST AND WEST ELEVATIONS - SEE SHEET 39.
4. FOR WALL SECTIONS, ENTRANCE DOORS, MOTOR ROOM VENTS, HANDHOLDS, LADDER RUNGS, PIPE COLLARS, J-BOLTS, PIPE RAILING, ROOF VENTILATOR GUARD, ROOF DRAIN AND SCUPPER, MANHOLE AND CHAIN GUARDS, - SEE SHEET 11.
5. FOR DETAILS OF TRASH RACK AND CRANE BEAMS - SEE SHEET 13. FOR DETAILS OF FLOOR PLATES AND ANGLE FRAMES - SEE SHEET 14. FOR DETAILS OF SOLE PLATES AND SCAFFOLD BEAMS - SEE SHEET 15.
6. FOR DETAILS OF FLOAT WELL, BAFFLE, PORTABLE, ENCLOSURE, AND HAND RAILS - SEE SHEET 12.
7. ELEVATION 488.0 IS ELEVATION OF MOTOR FLOOR AT WALLS AND AROUND PUMP BASE PLATES AND SWITCHBOARD PAD. SLOPE SURFACE FROM ELEV. 488.0 TO DRAIN TO ELEV. 487.85 AT SILL OF DOUBLE DOOR.
8. SEE SHEET 15 FOR DETAIL OF JIB CRANE ANCHORS.

(R) BINK ADDED, ADD. NO. 1.
(R) MUD MAT ADDED "FIELD"

GRAPHIC SCALES

6"=1'-0"

1/2"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	4 Feb 38	Type A-8-8 W.H.3 revised & relocated collar change, handrail and note added, dimensions changed.	W.B.K.

A.M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN: G.D., E.A.R.
TRACED: E.A.R.
CHECKED: G.D.

SUBMITTED: A.M. KINNEY, INC.

APPROVED: DATE: SEPT. 1938
LT. COL., CORPS OF ENGINEERS, ACTING DISTRICT ENGINEER, LOUISVILLE DISTRICT

APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
MASONRY DETAILS
PLANS AND SECTION

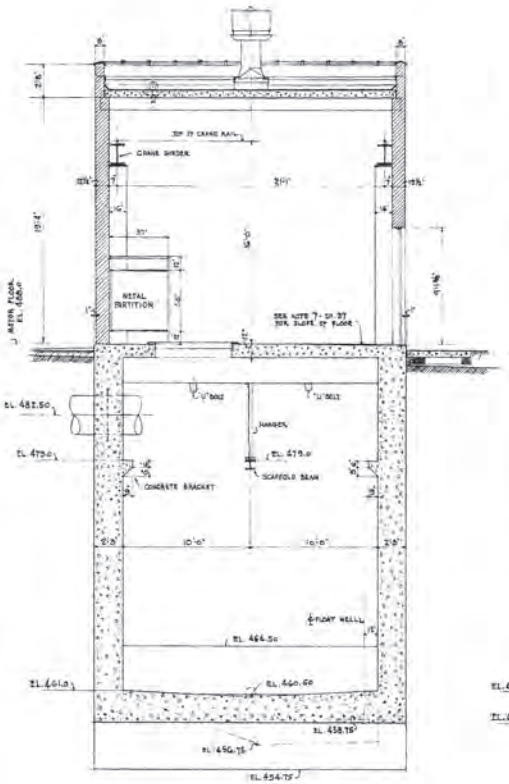
SCALE: AS NOTED | SHEET 37 OF 46 SHEETS

DRAWING NUMBER
471-12.2/37

AS BUILT

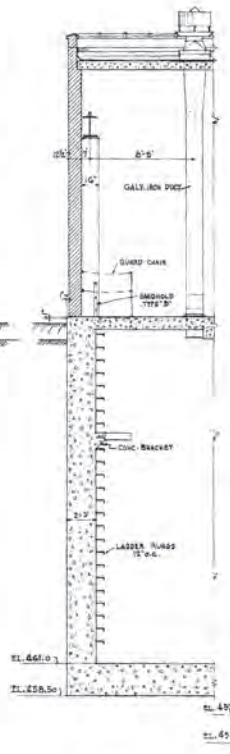
CORPS OF ENGINEERS

U.S.ARMY



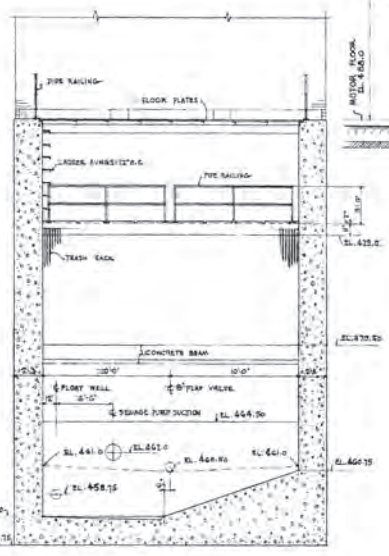
SECTION B-B

SCALE 1/4"=1'-0"



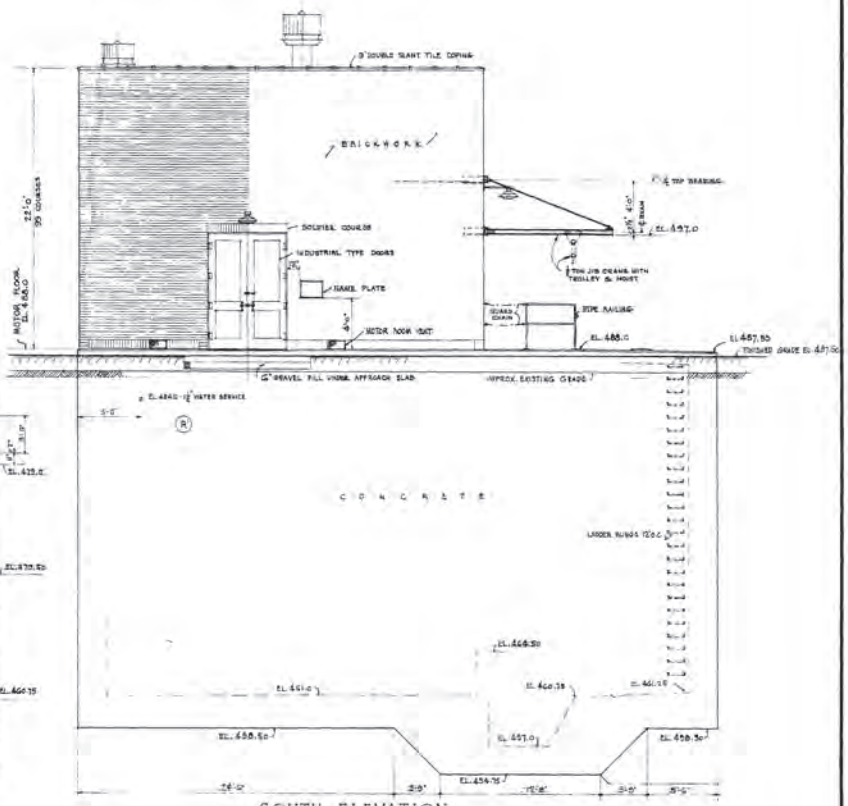
SECTION C-C

SCALE 1/4"=1'-0"



SECTION D-D

SCALE 1/4"=1'-0"



SOUTH ELEVATION

SCALE 1/4"=1'-0"

(R) WATER SERVICE ADDED.

REVISION	DATE	DESCRIPTION	BY
1	18 Feb 50	Duct revised, Landing and crane added	WAH

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN: E.A.R. R.E.
TRACED: E.A.R.
CHECKED: E.C.
SUBMITTED: A.M. KINNEY, INC.
APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
MASONRY DETAILS
SECTIONS AND ELEVATION

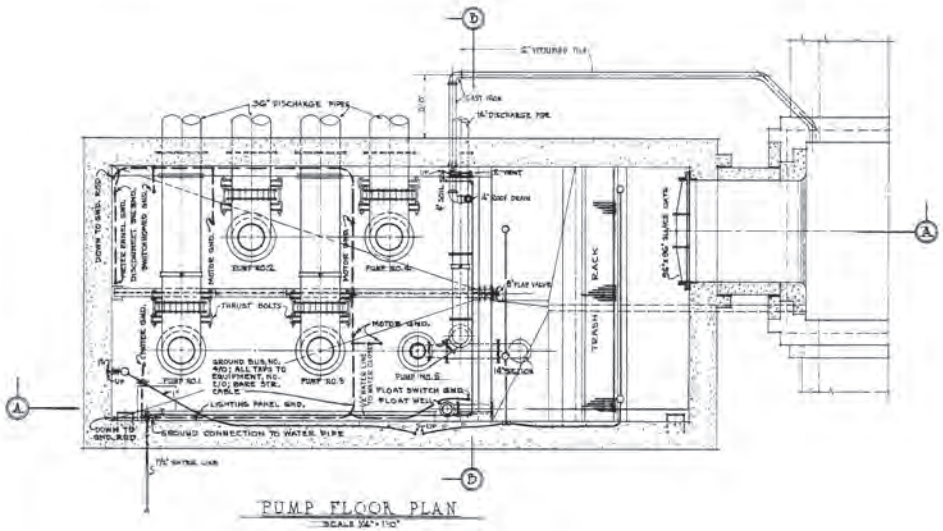
APPROVED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT
DATE: SEPT 1948
SCALE: 1/4"=1'-0" | SHEET 38 OF 48 SHEETS
DRAWING NUMBER: 471-122/38

AS BUILT

116

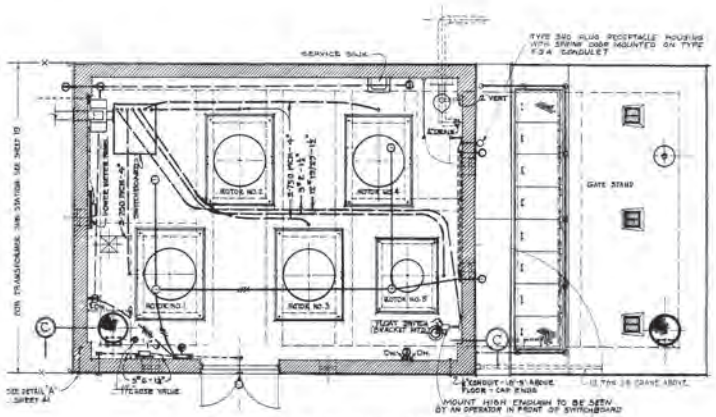
CORPS OF ENGINEERS

U. S. ARMY



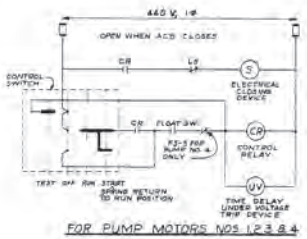
PUMP FLOOR PLAN

SCALE 1/4"=1'0"



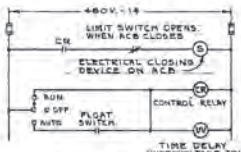
MOTOR FLOOR PLAN

SCALE 1/2"=1'0"



FOR PUMP MOTORS NOS 1 2 3 & 4

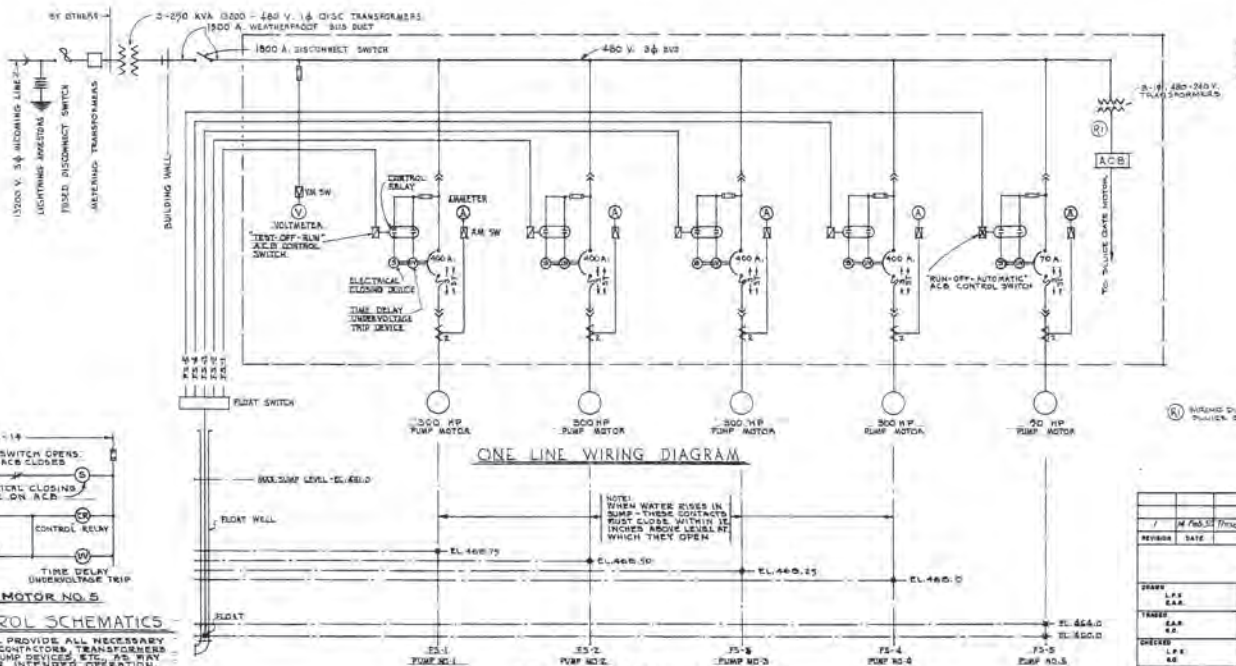
CONTROL SWITCH



FOR PUMP MOTOR NO. 5

PUMP CONTROL SCHEMATICS

CONTRACTOR SHALL PROVIDE ALL NECESSARY AUXILIARY RELAYS, CONTACTORS, TRANSFORMERS RECTIFIERS, ANTI-PUMP DEVICES, ETC. AS MAY BE REQUIRED FOR INTENDED OPERATION.



ONE LINE WIRING DIAGRAM

PUMP CONTROL DIAGRAM

X LEVEL AT WHICH FLOAT SWITCH CONTACTS CLOSE WITH RISING WATER SURFACE IN SUMP
O LEVEL AT WHICH FLOAT SWITCH CONTACTS OPEN WITH FALLING WATER SURFACE IN SUMP

LEGEND

- INCANDESCENT LIGHT OUTLET.
- RECEPTACLE OUTLET.
- SPECIAL OUTLET, 3 WIRE, POLARIZED.
- CONDUIT CONCEALED IN CEILING OR WALL.
- CONDUIT UNDER FLOOR.
- EXPOSED CONDUIT.
- INDICATES NUMBER OF NO.12 CONDUCTORS (3 SHOWN) IN LIGHTING CIRCUIT CONDUITS. CONDUITS NOT MARKED CONTAIN TWO CONDUCTORS.

(R) WIRING DIAGRAM REVISED ADDING WIRING FOR POWER GATE MOTOR, C.O. NO. 1

GRAPHIC SCALE

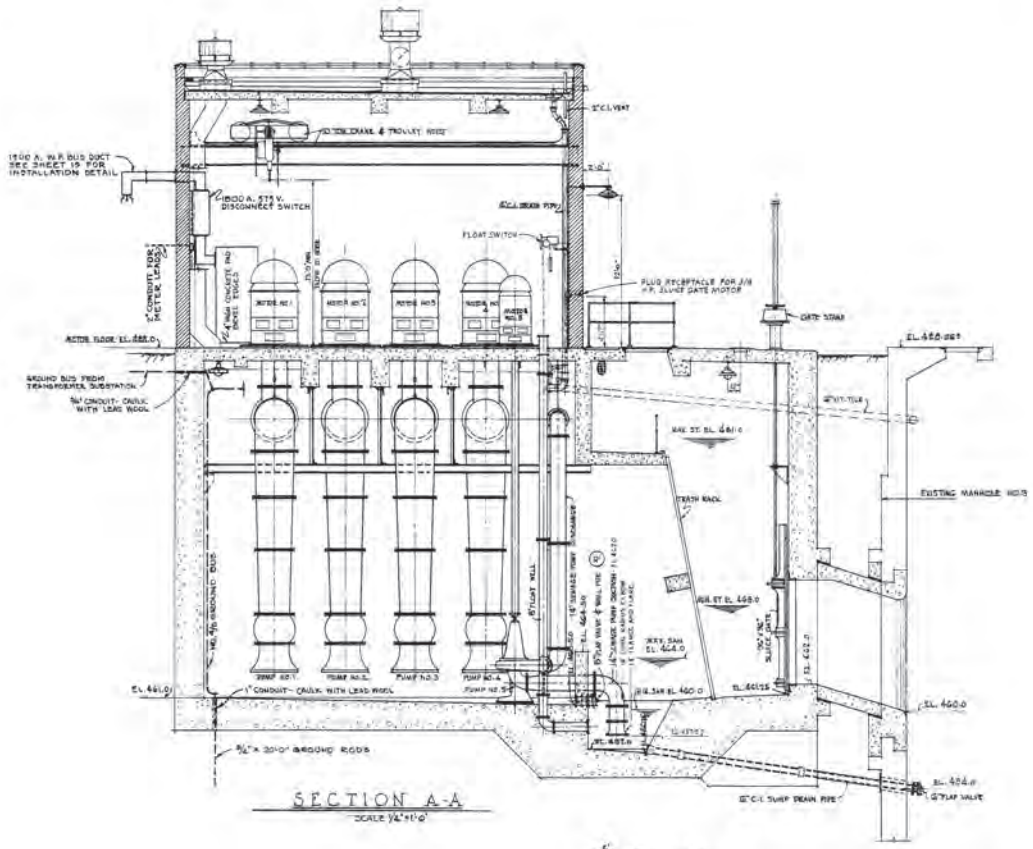
REVISION	DATE	DESCRIPTION	BY
1	14 Feb 50	Thrust bolts added, wiring & wiring diagram revised.	H.A.R.

A. N. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
MECHANICAL EQUIPMENT
PLANS

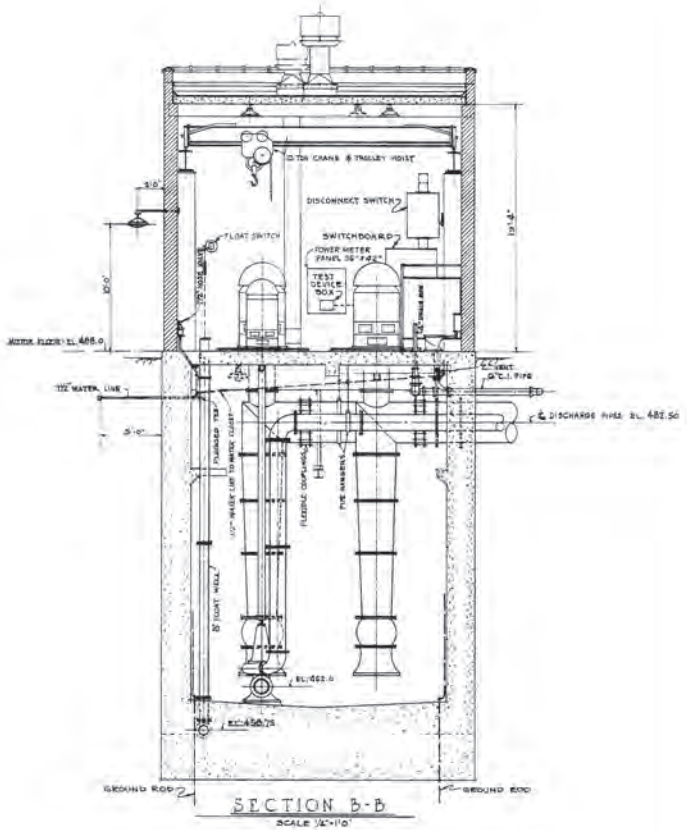
DRAWN: L.P.K. E.A.R.
TRACED: E.A.R. H.R.
CHECKED: L.P.K.
SUBMITTED: A.N. KINNEY, INC.
APPROVED: SEPT. 1949
APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT
SCALE: AS NOTED | SHEET 40 OF 46 SHEETS
DRAWING NUMBER 471-122/40

AS BUILT



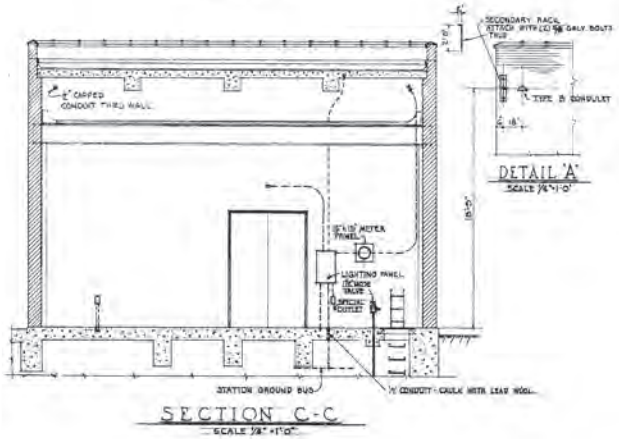
SECTION A-A

SCALE 1/4"=1'-0"



SECTION B-B

SCALE 1/4"=1'-0"

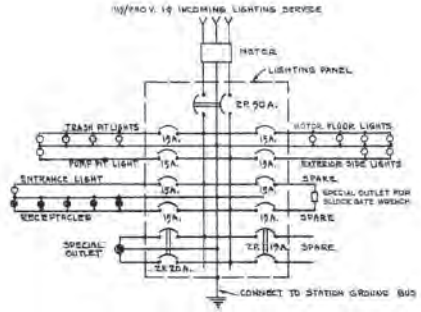


DETAIL 'A'

SCALE 1/4"=1'-0"

SECTION C-C

SCALE 1/4"=1'-0"



LIGHTING PANEL WIRING DIAGRAM

NOTES

1. ALL LIGHTING CIRCUIT WIRING NO.12 S/S UNLESS OTHERWISE INDICATED.
2. MINIMUM SIZE CONDUIT - 3/4 INCH.
3. FURNISH 500 WATT LAMPS FOR MOTOR FLOOR FIXTURES, 200 WATT LAMPS FOR ALL OTHERS.

(K) FLAP GATE FURNISHED BY GOV'T. (C.O. NO. 8)

GRAPHIC SCALE

1"=10'-0" 0 5' 10' 20'

REVISION	DATE	DESCRIPTION	BY
1	16 Feb 50	Float switch relocated Platform and plug receptacle added duct revised	WAK

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN: E.A.B., L.P.K.
TRACED: E.A.B.
CHECKED: L.P.K., E.G.
SUBMITTED: A.M. KINNEY, INC.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
MECHANICAL EQUIPMENT
SECTIONS

APPROVED: DATE: SEPT. 1949
CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

APPROVED, RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

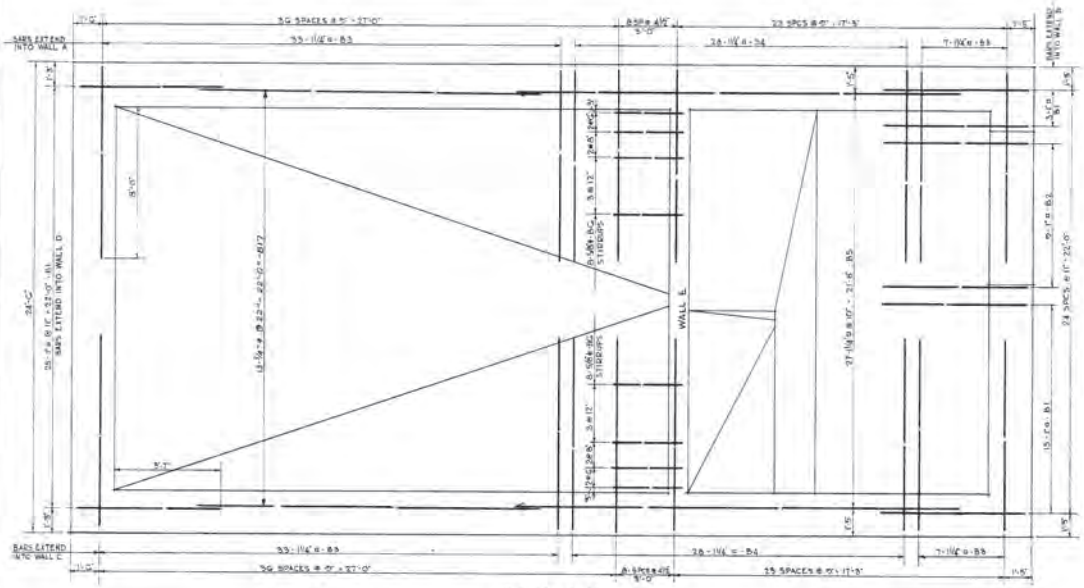
SCALE: AS NOTED SHEET 41 OF 46 SHEETS

DRAWING NUMBER
471-122/41

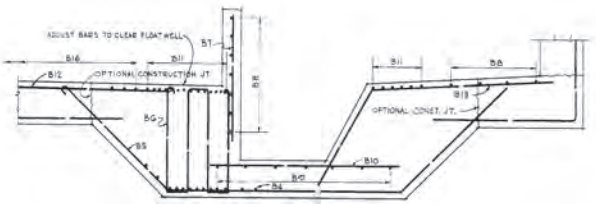
AS BUILT

CORPS OF ENGINEERS

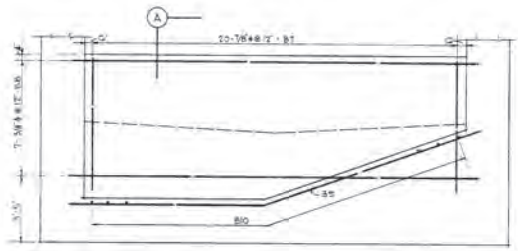
U. S. ARMY



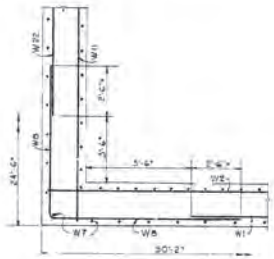
BASE SLAB
BOTTOM REINFORCING
SCALE: 3/8"=1'-0"



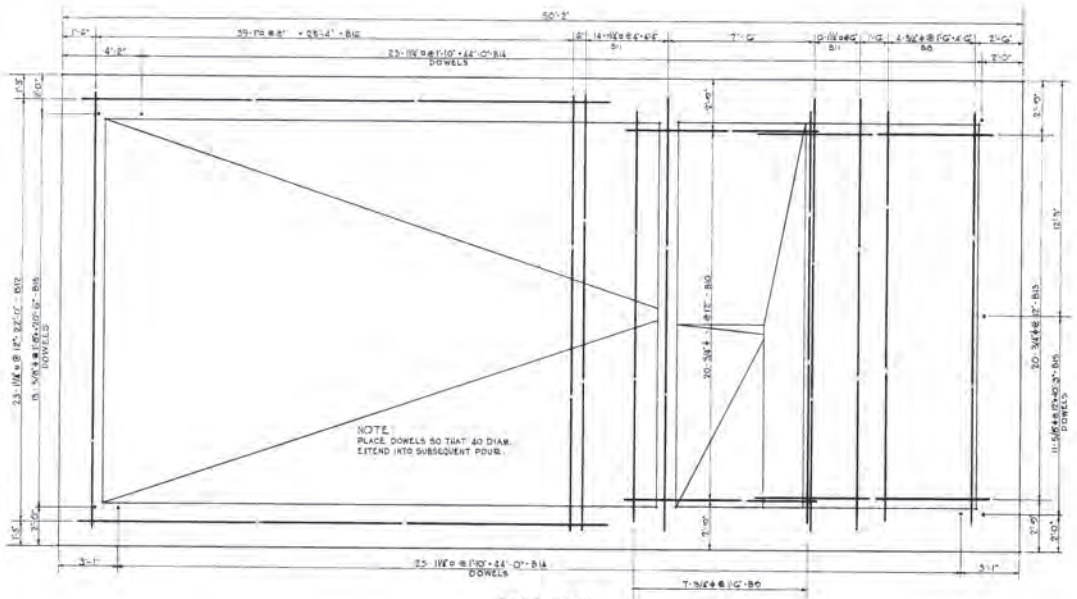
SECTION A
SCALE: 3/8"=1'-0"



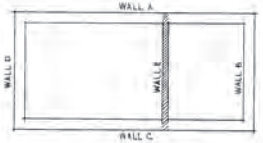
ELEVATION WALL E
LOOKING WEST
SCALE: 3/8"=1'-0"



PLAN SECTION OF TYPICAL CORNER
SCALE: 3/8"=1'-0"



BASE SLAB
TOP REINFORCING
SCALE: 3/8"=1'-0"



KEY PLAN OF WALLS

GRAPHIC SCALE
3/8"=1'-0"

REVISION	DATE	DESCRIPTION	BY
1	4 Feb 50	Reinforcing added	W.A.H.

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO.

DRAWN: R.D.M.C.
TRACED: E.A.R.
CHECKED: J.H. H.S.R.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
REINFORCEMENT DETAILS - BASE SLAB

SUBMITTED: A. M. KINNEY, INC.
APPROVED: DATE: SEPT. 1948
LEGAL, CORPS OF ENGINEERS, ACTING DISTRICT ENGINEER, LOUISVILLE DISTRICT
APPROVAL RECOMMENDED:
CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

SCALE: AS NOTED | SHEET 42 OF 46 SHEETS

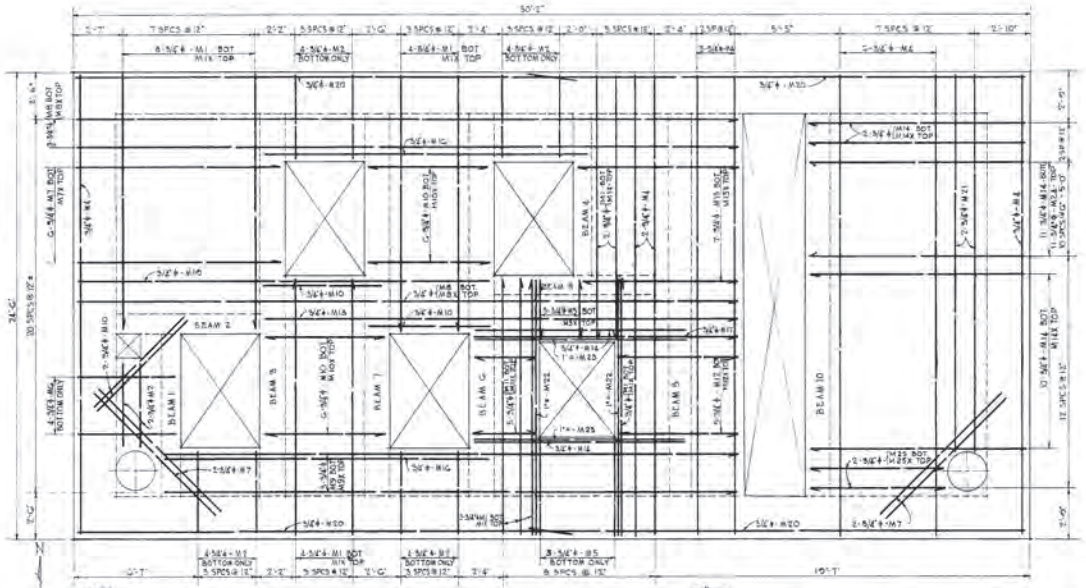
DRAWING NUMBER
471-12.2/42

AS BUILT

120

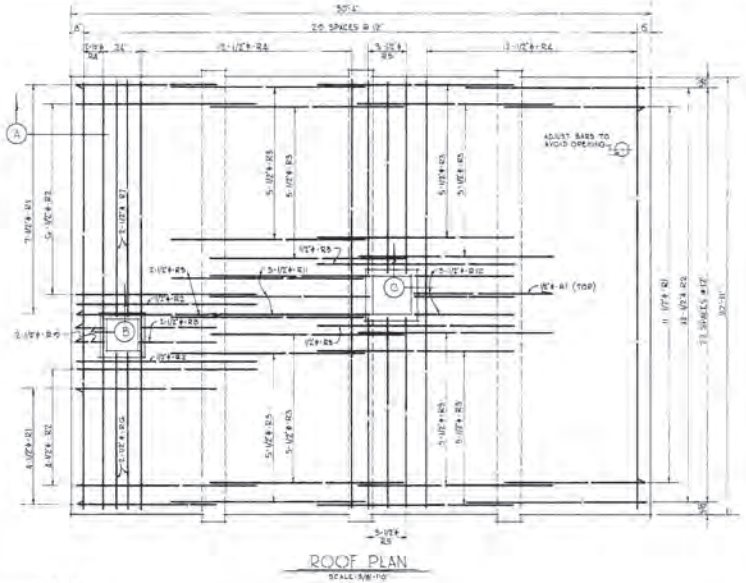
CORPS OF ENGINEERS

U.S. ARMY

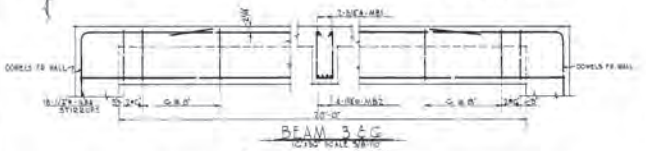


NOTE:
SAME REINFORCEMENT TOP & BOTTOM
EXCEPT AS NOTED.
PLACEMENT: HIGH BARS RUN EAST & WEST
LOW BARS RUN NORTH & SOUTH

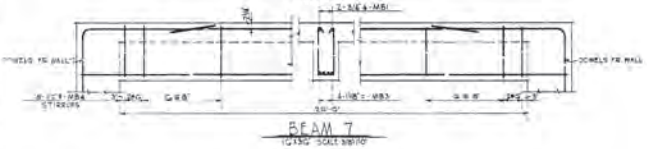
MOTOR FLOOR SLAB
SCALE 3/8"=1'-0"



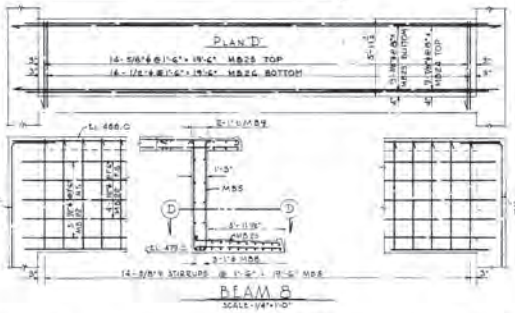
ROOF PLAN
SCALE 3/8"=1'-0"



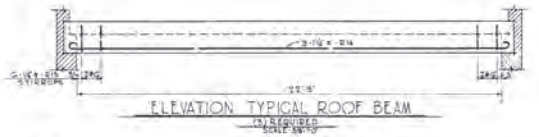
BEAM 3 & 6
12"x30" SCALE 3/8"=1'-0"



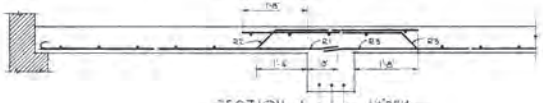
BEAM 7
12"x30" SCALE 3/8"=1'-0"



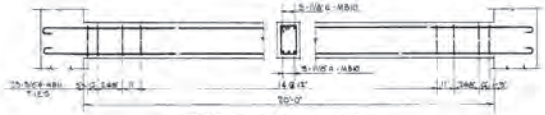
BEAM 8
SCALE 1/4"=1'-0"



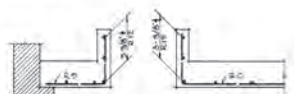
ELEVATION TYPICAL ROOF BEAM
(12 REQUIRED)
SCALE 3/8"=1'-0"



SECTION A
SCALE 3/4"=1'-0"

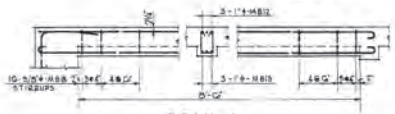


TRASH RACK SUPPORT
14"x22" SCALE 3/8"=1'-0"

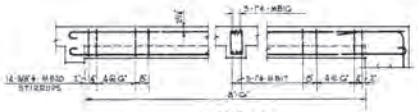


SECTION B
SCALE 3/4"=1'-0"

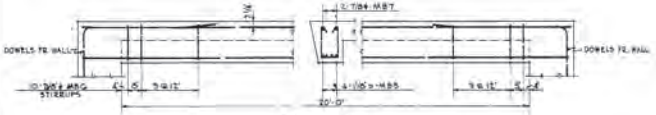
SECTION C
SCALE 3/4"=1'-0"



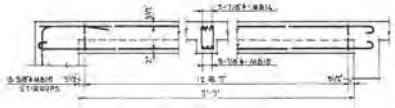
BEAM 1
12"x30" SCALE 3/8"=1'-0"



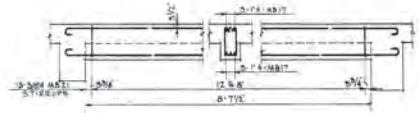
BEAM 4
12"x30" SCALE 3/8"=1'-0"



BEAM 10
12"x30" SCALE 3/8"=1'-0"



BEAM 2
12"x30" SCALE 3/8"=1'-0"



BEAM 5
12"x22" SCALE 3/8"=1'-0"

REVISION	DATE	DESCRIPTION	BY

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN: R.B.N.G.
TRACED: K.A.R.
CHECKED: J.W. H.E.R.
SUBMITTED: A. M. KINNEY, INC.
APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
REINFORCEMENT DETAILS
MOTOR FLOOR AND ROOF SLAB

APPROVED: DATE: SEPT. 1948
U.S. CORPS OF ENGINEERS, OHIO RIVER DIVISION ENGINEER, LOUISVILLE DISTRICT

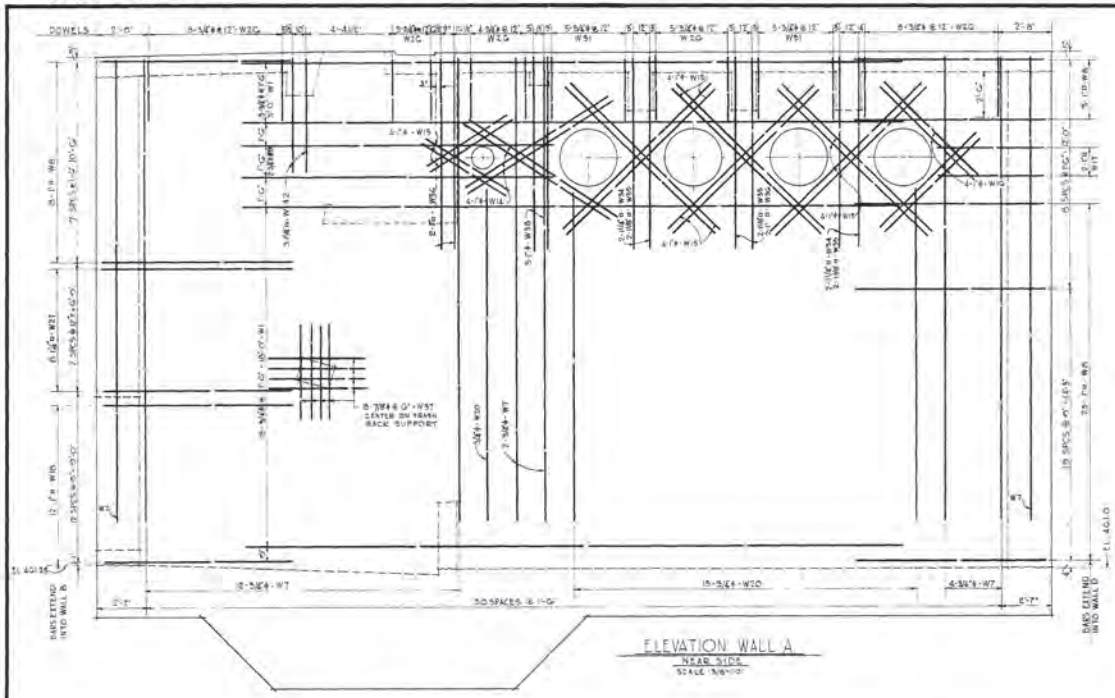
SCALE: AS NOTED | SHEET 43 OF 46 SHEETS
DRAWING NUMBER
471-122/43

AS BUILT

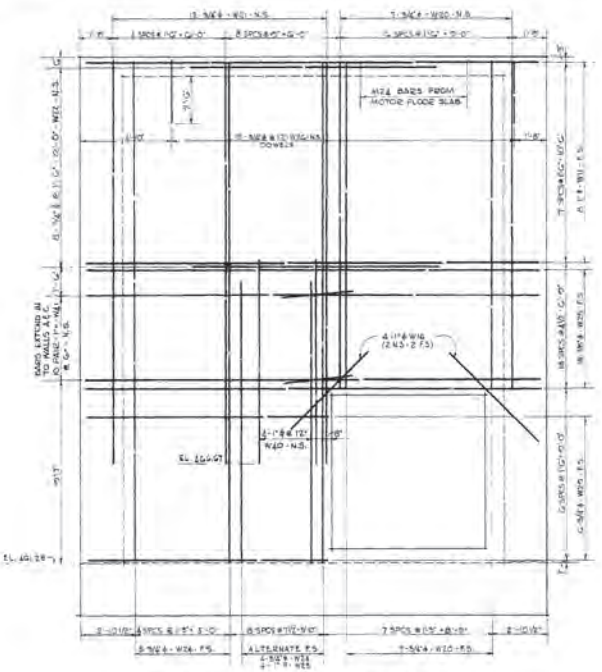
121

CORPS OF ENGINEERS

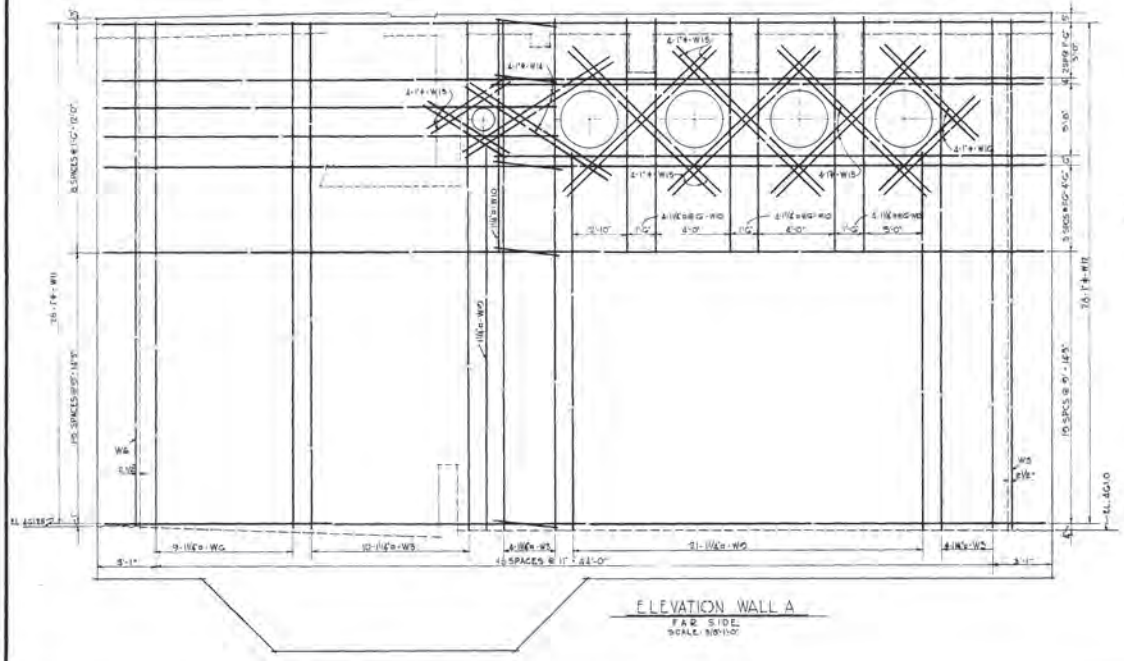
U.S. ARMY



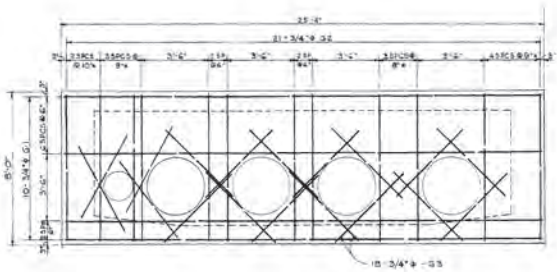
ELEVATION WALL A
NEAR SIDE
SCALE 3/8"=1'-0"



ELEVATION - WALL B
SCALE 3/8"=1'-0"



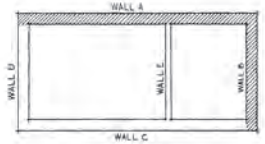
ELEVATION WALL A
FAR SIDE
SCALE 3/8"=1'-0"



ELEVATION BULKHEAD
FOR EXISTING GATEWELL NO. 1
SCALE - 3/8"=1'-0"

SECTION

GENERAL NOTES FOR WALLS
VERTICAL WALL STEEL SHALL BE 2½" CLEAR FROM WALL FACE.
HORIZONTAL WALL STEEL SHALL BE ON INNER SIDE OF VERTICAL STEEL.



KEY PLAN OF WALLS

REVISION	DATE	DESCRIPTION	BY
1	4 Feb 50	Reinforcing Size and Spacing changed. ELEV. WALL A	W.A.H.

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN: R.B.M.G.
TRACED: E.A.K.
CHECKED: J.R. K.E.B.
SUBMITTED: A.M. KINNEY, INC.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
REINFORCEMENT DETAILS - WALLS

APPROVED: [signature] DATE: SEPT. 1948
COL. CORPS OF ENGINEERS, OHIO DISTRICT ENGINEER, LOUISVILLE DISTRICT

APPROVAL RECOMMENDED: [signature]
CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

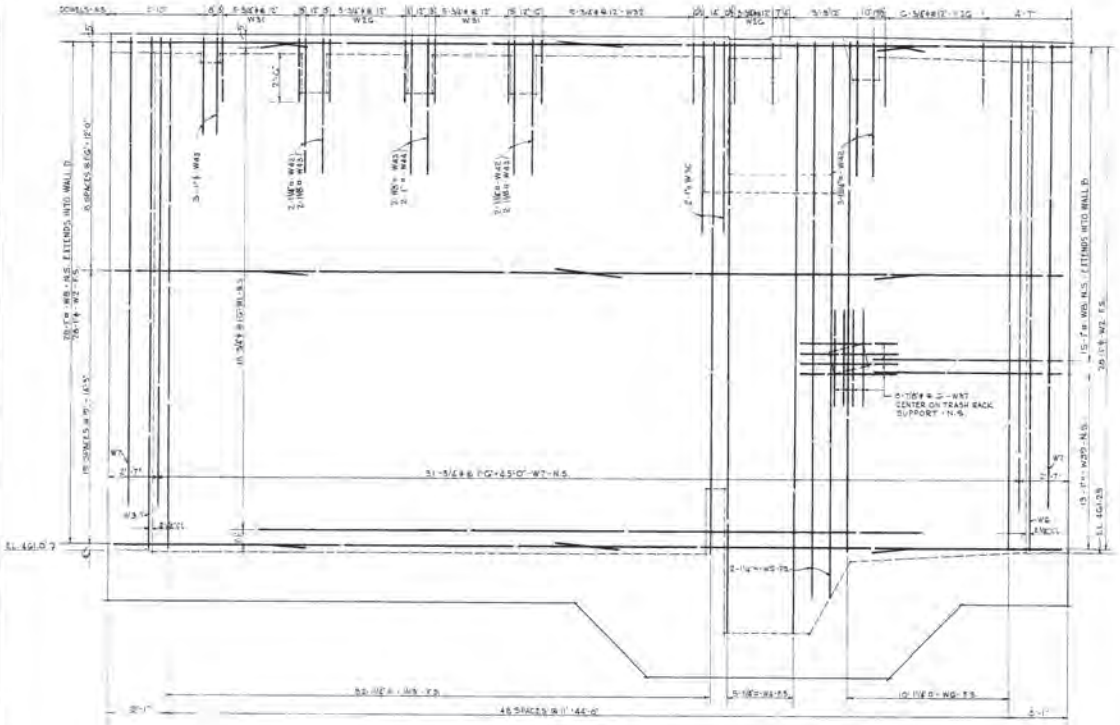
SCALE: AS NOTED SHEET 44 OF 46 SHEETS

DRAWING NUMBER
471-12.2/44

AS BUILT

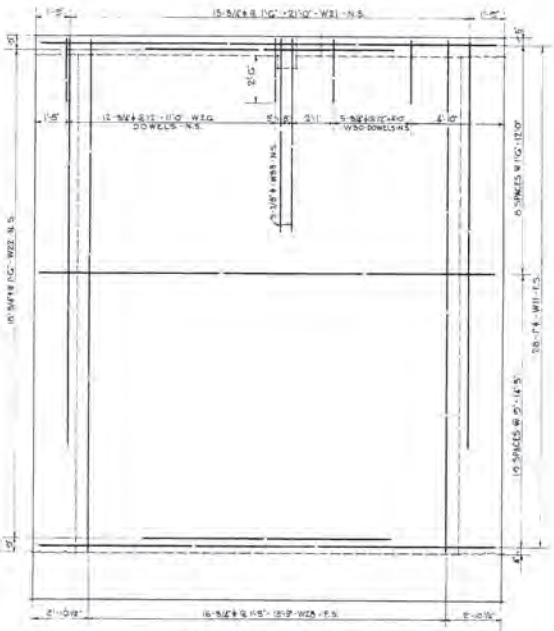
CORPS OF ENGINEERS

U.S. ARMY



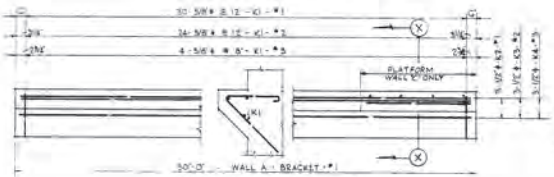
ELEVATION WALL C

SCALE - 3/8"=1'0"



ELEVATION WALL D

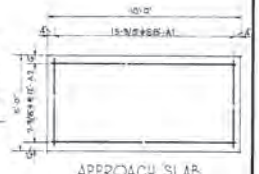
SCALE - 3/8"=1'0"



ELEVATION - WALL BRACKETS

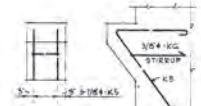
SCALE - 3/4"=1'0"

NOTE: FOR SECTION X-X SEE SHEET 8.



APPROACH SLAB

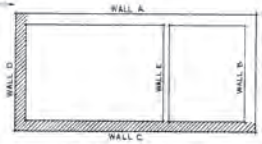
SCALE - 3/8"=1'0"



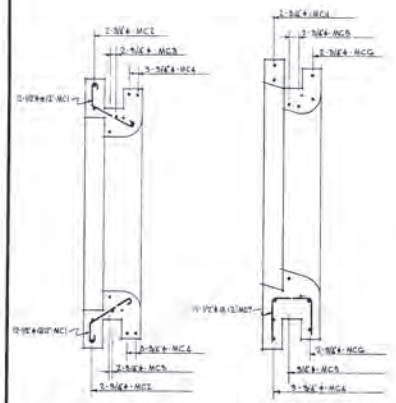
ELEVATION SECTION

WALL D BRACKET

SCALE - 3/4"=1'0"



KEY PLAN OF WALLS

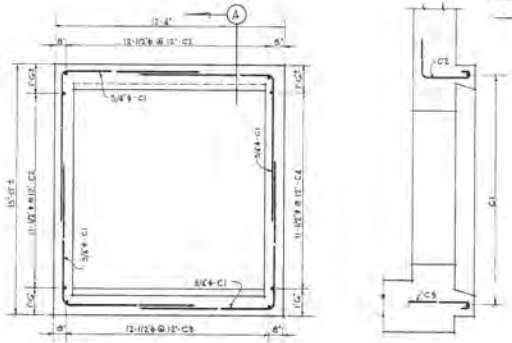


SECTIONAL PLAN SECTIONAL ELEVATION

MANHOLE NO. 3 - SEWER COLLAR

SCALE - 3/8"=1'0"

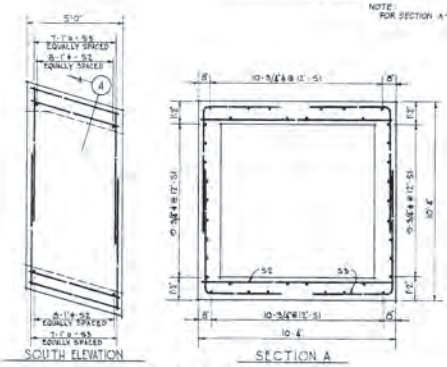
NOTE: BEND OR CUT EXISTING STEEL AS REQUIRED



ELEVATION SECTION A

PLANT SEWER COLLAR

SCALE - 3/8"=1'0"



SOUTH ELEVATION SECTION A

96" SEWER

SCALE - 3/8"=1'0"

REVISION	DATE	DESCRIPTION	BY
1	14 Feb 50	Section X-X shown, note added	WAH

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN: H.B.M.C.
TRACED: E.A.P.
CHECKED: J.W. H.E.B.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
REINFORCEMENT DETAILS - WALLS

SUBMITTED: A.M. KINNEY, INC.

APPROVED: DATE: SEPT. 1949
LT.COL., CORPS OF ENGINEERS, ACTING DISTRICT ENGINEER, LOUISVILLE DISTRICT

APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

SCALE: AS NOTED | SHEET 45 OF 46 SHEETS

DRAWING NUMBER
471-12.2/45

AS BUILT

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CORPS OF ENGINEERS

U.S. ARMY

BAR	NO REQ'D	SIZE	LENGTH	BENDING DIAGRAM	WEIGHT EACH	TOTAL WEIGHT
				BASE SLAB		
B1	21	1" ▭	12'-9"	10'-2"	40.35	2474.4
B2	9	1" ▭	11'-7"	2'-11"	39.37	354.3
B3	80	1-1/4" ▭	17'-2"	7'-2"	51.22	7259.6
B4	56	1-1/4" ▭	21'-0"	10'-0"	11.57	6247.0
B5	27	1-1/4" ▭	28'-11"	10'-0"	153.63	4148.0
B6	16	3/8"ϕ	25'-5"	5'-3"	20.51	424.2
B7	20	7/8"ϕ	6'-8"	6'-8"	15.65	272.6
B8	11	3/4"ϕ	21'-4"	STRAIGHT	32.04	352.4
B9	7	3/4"ϕ	22'-0"	10'-3"	33.06	231.3
B10	20	3/4"ϕ	10'-0"	STRAIGHT	15.02	300.4
B11	20	1-1/4" ▭	22'-6"	"	110.38	2590.8
B12	23	1-1/4" ▭	27'-8"	"	141.01	3581.2
B13	20	3/4"ϕ	13'-6"	5'-6"	23.18	405.6
B14	50	1-1/2" ▭	7'-7"	5'-3"	20.27	2015.5
B15	24	5/8"ϕ	4'-10"	4'-3"	5.06	121.0
B16	39	1" ▭	22'-0"	STRAIGHT	74.80	2917.2
B17	13	3/4"ϕ	18'-0"	"	27.04	351.5
				MOTOR FLOOR SLAB		
M1	22	3/4"ϕ	13'-4"	STRAIGHT	20.02	440.4
M2	20	3/4"ϕ	2'-4"	"	9.50	190.0
M3	3	3/4"ϕ	3'-1"	"	6.65	19.9
M4	29	3/4"ϕ	24'-1"	"	36.17	940.4
M5	5	3/4"ϕ	4'-10"	"	7.25	36.3
M6	4	3/4"ϕ	5'-3"	"	7.89	31.6
M7	14	3/4"ϕ	10'-9"	"	16.15	226.1
M8	4	3/4"ϕ	34'-3"	"	51.15	204.6
M9	3	3/4"ϕ	30'-6"	"	45.51	136.4
M10	20	3/4"ϕ	6'-8"	"	10.01	200.2
M11	5	3/4"ϕ	5'-3"	"	7.88	39.4
M12	5	3/4"ϕ	9'-4"	"	14.01	70.1
M13	7	3/4"ϕ	8'-6"	"	12.77	89.4
M14	27	3/4"ϕ	11'-4"	"	17.01	459.5
M15	4	3/4"ϕ	17'-1"	STRAIGHT	25.65	102.6
M17	2	3/4"ϕ	14'-8"	14'-8"	22.03	44.1
M18	2	3/4"ϕ	25'-8"	25'-8"	38.56	77.1
M19	2	3/4"ϕ	21'-8"	STRAIGHT	32.51	65.0
M20	8	3/4"ϕ	26'-1"	"	39.17	313.4
M21	4	3/4"ϕ	19'-6"	"	29.29	117.2
M22	4	1" ▭	13'-4"	"	45.32	181.3
M23	4	1" ▭	11'-4"	"	38.52	154.1
M24	11	3/4"ϕ	18'-0"	6'-0" 11'-6"	27.04	297.4
M25	2	3/4"ϕ	7'-1"	STRAIGHT	10.64	21.3
SEE LAST		COLUMN SCH.		CONTINUATION		

BAR	NO REQ'D	SIZE	LENGTH	BENDING DIAGRAM	WEIGHT EACH	TOTAL WEIGHT
				MOTOR FLOOR BEAMS		
MB1	6	3/4"ϕ	15'-0"	STRAIGHT	22.53	135.2
MB2	8	1-1/4" ▭	24'-0"	"	127.51	1020.1
MB3	8	1-1/2" ▭	24'-0"	"	183.27	1826.2
MB4	56	1/2"ϕ	7'-8"	2'-8½"	5.12	276.5
MB5	14	5/8"ϕ	19'-4"	15'-3" 16"	20.16	282.2
MB6	10	3/8"ϕ	5'-8"	1'-10½" 1'-11"	2.13	21.3
MB7	2	7/8"ϕ	24'-0"	STRAIGHT	45.09	90.1
MB8	3	1" ▭	24'-0"	"	84.08	192.2
MB9	2	1" ▭	24'-0"	"	81.90	163.2
MB10	6	1-1/8" ▭	26'-7"	2'-4"-1"	114.38	686.3
MB11	29	3/8"ϕ	5'-10"	5" 1'-7" 10"	2.15	30.4
MB12	3	1" ▭	12'-5"	11'-8"	53.18	99.5
MB13	3	1" ▭	13'-6"	11'-4"	36.08	108.2
MB14	3	7/8"ϕ	11'-7"	10'-9"	23.67	71.0
MB15	3	7/8"ϕ	12'-5"	10'-9"	23.35	76.2
MB16	3	1" ▭	12'-4"	11'-3"	32.92	98.8
MB17	5	1" ▭	13'-5"	11'-3"	35.88	332.5
MB18	16	3/8"ϕ	4'-0"	2'-2½" 9"	1.50	24.0
MB19	13	3/8"ϕ	4'-2"	1'-3½" 9"	1.57	20.4
MB20	14	3/8"ϕ	6'-4"	5'-4½" 9"	1.63	22.8
MB21	13	3/8"ϕ	4'-5"	1'-5" 9"	1.66	21.6
MB22	9	1/2"ϕ	23'-0"	STRAIGHT	15.36	138.2
MB23	9	7/8"ϕ	22'-0"	"	44.87	404.7
MB24	9	7/8"ϕ	23'-8"	24'-0"	32.47	292.2
MB25	14	5/8"ϕ	7'-4"	6'-8"	7.65	107.1
MB26	14	1/2"ϕ	6'-11"	STRAIGHT	4.62	64.7
				EDGE		
E1	23	1/2"ϕ	8'-0"	7'-0"	5.34	122.8
E2	74	1/2"ϕ	9'-8"	5½" 3'-11½" 4" 3'-6"	6.51	156.2
E3	44	1/2"ϕ	10'-5"	5½" 4'-3½" 4" 3'-8"	6.96	306.2
E4	24	1/2"ϕ	22'-8"	STRAIGHT	15.14	363.4
E5	8	1/2"ϕ	11'-3"	1'-3" 10'-2"	7.63	45.8
E6	2	1/2"ϕ	9'-6"	1'-3" 8'-3"	6.35	12.7
E7	2	1/2"ϕ	15'-9"	1'-3" 12'-6"	9.15	18.4
E8	2	1/2"ϕ	5'-2"	1'-3" 3'-11"	3.45	6.9
E9	2	1/2"ϕ	3'-2"	1'-3" 1'-5"	2.12	4.2
E10	3	1/2"ϕ	8'-5"	1'-3" 5'-2"	4.26	12.8
E11	3	1/2"ϕ	9'-8"	1'-3" 8'-5"	6.46	19.4
E12	3	3/8"ϕ	8'-6"	6" 3'-0" 3'-0"	3.20	9.6
E13	3	3/8"ϕ	9'-10"	6" 2'-4" 7'-4"	3.70	11.1
E14	9	1-1/4" ▭	26'-2"	23'-8"-2"	130.04	1254.4
E15	18	1/2"ϕ	6'-2"	1'-2" 1'-0"	4.70	12.6

BAR	NO REQ'D	SIZE	LENGTH	BENDING DIAGRAM	WEIGHT EACH	TOTAL WEIGHT
				WALLS		
W1	34	3/4"ϕ	34'-8"	STRAIGHT	52.07	1770.4
W2	56	1"ϕ	26'-6"	"	70.76	3962.6
W3	32	1-1/2" ▭	26'-9"	"	142.12	4548.0
W4	5	1-1/2" ▭	30'-8"	"	162.95	814.8
W5	2	1-1/2" ▭	28'-10"	"	159.17	306.3
W6	21	1-1/4" ▭	26'-3"	"	140.37	2947.8
W7	53	3/4"ϕ	24'-3"	"	36.42	1930.2
W8	77	1" ▭	18'-0"	8'-0" 10'-0"	61.20	4712.4
W9	22	1-1/4" ▭	19'-9"	STRAIGHT	104.53	2300.5
W10	13	1-1/4" ▭	12'-2"	"	64.05	840.5
W11	64	1"ϕ	24'-0"	"	64.08	4101.1
W12	28	1"ϕ	29'-0"	"	77.43	2168.0
W13	6	1"ϕ	5'-0"	"	3.35	106.8
W14	8	1"ϕ	9'-0"	"	24.03	192.2
W15	24	1"ϕ	11'-0"	"	29.37	704.9
W16	12	1"ϕ	7'-0"	"	18.09	324.9
W17	2	1" ▭	13'-9"	8'-0" 5'-3"	46.78	93.5
W18	12	1" ▭	13'-10"	2'-3" 10'-0"	47.02	564.2
W19	2	3/4"ϕ	10'-6"	STRAIGHT	5.28	10.6
W20	28	3/4"ϕ	17'-3"	"	28.31	792.5
W21	27	3/4"ϕ	21'-2"	"	31.80	858.6
W22	26	3/4"ϕ	13'-0"	"	19.88	507.8
W23	4	1" ▭	14'-9"	"	50.16	200.6
W24	9	3/4"ϕ	29'-4"	"	39.58	353.0
W25	18	7/8"ϕ	24'-0"	"	69.06	868.1
W26	73	3/4"ϕ	5'-9"	2'-6" 3'-3"	8.64	630.7
W27	8	1-1/8" ▭	18'-0"	8'-0" 10'-0"	93.63	749.0
W28	16	3/4"ϕ	26'-3"	STRAIGHT	40.16	642.6
W29	6	3/4"ϕ	12'-9"	"	19.15	114.9
W30	3	3/4"ϕ	8'-5"	5'-3" 3'-2"	12.65	63.3
W31	20	3/4"ϕ	7'-8"	6'-3" 1'-3"	11.27	225.4
W32	3	3/4"ϕ	8'-0"	4'-9" 3'-3"	12.02	108.2
W33	3	7/8"ϕ	12'-11"	11'-11" 10'-0"	26.41	79.2
W34	4	1-1/4" ▭	17'-3"	7'-3" 10'-0"	91.65	366.6
W35	5	1-1/8" ▭	17'-0"	7'-0" 10'-0"	73.15	365.8
W36	6	1" ▭	17'-0"	7'-0" 10'-0"	57.80	346.8
W37	16	7/8"ϕ	5'-0"	STRAIGHT	10.22	163.5
W38	3	1"ϕ	13'-4"	5'-4" 10'-0"	35.53	106.6
W39	13	1"ϕ	22'-8"	12'-8" 10'-0"	73.08	1002.0
W40	4	1"ϕ	10'-9"	STRAIGHT	28.04	112.2
W41	20	1"ϕ	21'-1"	7'-5" 13'-7"	71.67	1433.4
W42	10	1¼"ϕ	14'-6"	7'-5" 7'-1"	77.06	770.6

BAR	NO REQ'D	SIZE	LENGTH	BENDING DIAGRAM	WEIGHT EACH	TOTAL WEIGHT
W43	6	1"ϕ	14'-0"	7'-0" 7'-0"	48.14	564.4
W44	2	1"ϕ	14'-0"	7'-0" 7'-0"	47.80	95.2
W45	3	1"ϕ	8'-4"	5'-0" 3'-4"	32.24	96.7
				WALL BRACKETS		
K1	58	5/8"ϕ	6'-10"	2'-7" 2'-7" 3'-0" 3'-0"	7.12	413.0
K2	3	1/2"ϕ	29'-8"	STRAIGHT	59.62	178.8
K3	3	1/2"ϕ	28'-2"	"	15.45	46.4
K4	3	1/2"ϕ	2'-2"	"	1.45	4.4
K5	3	7/8"ϕ	7'-8"	2'-7" 3'-0" 2'-7" 3'-0"	15.68	47.0
K6	1	3/8"ϕ	5'-8"	3'-0" 2'-8"	2.04	2.0
K8	4	3/8"ϕ	4'-8"	"	4.61	17.4
K10	2	1/2"ϕ	5'-8"	STRAIGHT	1.97	3.9
				APPROACH SLAB		
A1	15	3/8"ϕ	4'-8"	STRAIGHT	1.76	26.4
A2	7	3/8"ϕ	5'-8"	"	3.64	25.5
				PLANT SEWER COLLAR		
C1	4	3/4"ϕ	16'-0"	6'-9" 7'-3"	21.03	84.1
C2	23	1/2"ϕ	3'-3"	2'-9" 2'-0"	3.51	80.7
C3	12	1/2"ϕ	3'-6"	3'-0"	2.34	28.1
C4	11	1/2"ϕ	5'-3"	2'-3" 1'-6"	3.51	38.6
				MANHOLE #3 - SEWER COLLAR		
MC1	24	1/2"ϕ	4'-7"	1'-2" 7'-6" 2'-9" 1'-6"	3.08	73.9
MC2	4	3/4"ϕ	14'-8"	STRAIGHT	22.03	88.1
MC3	4	3/4"ϕ	11'-6"	"	17.53	70.1
MC4	11	3/4"ϕ	18'-8"	"	28.03	225.8
MC5	3	3/4"ϕ	10'-8"	"	16.08	48.1
MC6	4	3/4"ϕ	12'-8"	"	19.03	76.1
MC7	11	1/2"ϕ	5'-2"	1'-10" 4'-4" 2'-0"	5.45	97.0
				96" SEWER		
S1	38	3/4"ϕ	4'-10"	STRAIGHT	7.25	275.5
S2	19	1"ϕ	9'-11"	"	20.49	423.8
S3	28	1"ϕ	10'-11"	4'-4" 5'-7"	37.13	1050.9
				TRANSFORMER FOOTINGS		
T1	6	3/4"ϕ	5'-0"	STRAIGHT	7.54	45.1
T2	8	3/4"ϕ	4'-0"	"	6.01	48.1
T3	6	3/4"ϕ	8'-3"	"	9.35	56.3

BAR	NO REQ'D	SIZE	LENGTH	BENDING DIAGRAM	WEIGHT EACH	TOTAL WEIGHT
				MOTOR FLOOR SLAB CONT.		
M1X	22	3/4"ϕ	16'-0"	15'-4"	21.05	462.7
M3X	3	3/4"ϕ	4'-6"	3'-2"	6.76	20.3
M7X	6	3/4"ϕ	11'-8"	10'-8"	17.19	103.1
M8X	4	3/4"ϕ	38'-5"	36'-5"	55.30	221.2
M9X	3	3/4"ϕ	31'-8"	30'-6"	46.81	140.4
M10X	12	3/4"ϕ	7'-10"	6'-8"	11.76	141.1
M11X	5	3/4"ϕ	4'-8"	3'-4"	7.01	35.1
M12X	5	3/4"ϕ	7'-8"	6'-4"	11.51	57.6
M13X	7	3/4"ϕ	9'-10"	8'-6"	14.76	103.3
M14X	12	3/4"ϕ	12'-0"	11'-4"	18.02	216.2
M23X	2	3/4"ϕ	8'-3"	7'-1"	12.64	25.3
				BULKHEAD GATEWALL NO. 1		
G1	10	3/4"ϕ	24'-11"	STRAIGHT	37.49	374.9
G2	21	3/4"ϕ	11'-7"	"	17.35	364.2
G3	18	3/4"ϕ	6'-0"	"	9.01	162.2

TOTAL WEIGHT OF REINFORCEMENT
98876.3#

REVISION	DATE	DESCRIPTION	BY
1	4/6/38	Additions and changes .	WKH

A. M. KINNEY, INC.
CONSULTING ENGINEERS ASSOCIATED ARCHITECTS
CINCINNATI, OHIO

DRAWN: K.B.H.C.
TRACED: K.B.H.C.
CHECKED: J.R. K.E.A.
SUBMITTED: A.M. KINNEY, INC.

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS - OHIO RIVER SECTION
WILLOW RUN PLANT
REINFORCEMENT SCHEDULE

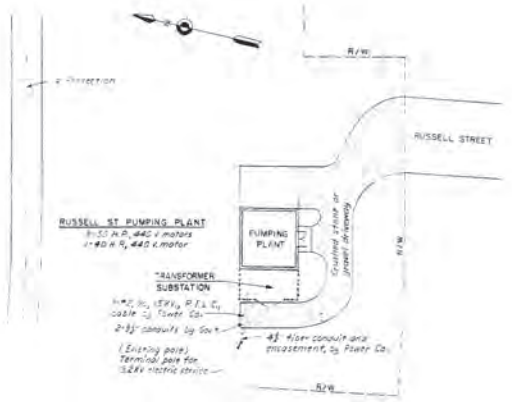
APPROVED: [signature] DATE: SEPT. 1942
CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

APPROVED RECOMMENDED: [signature]
CHIEF, ENGINEERING DIVISION, CORPS OF ENGINEERS, LOUISVILLE DISTRICT

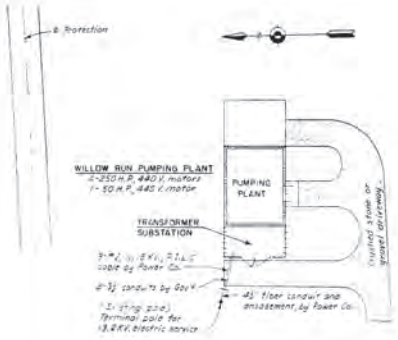
SCALE: AS NOTED | SHEET 46 OF 46 SHEETS
DRAWING NUMBER 471-12.2/46

AS BUILT

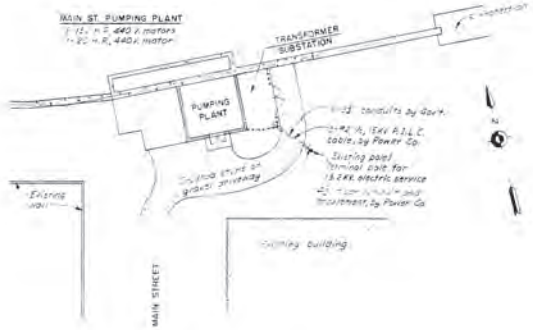
124



RUSSELL STREET PUMPING PLANT



WILLOW RUN PUMPING PLANT



MAIN STREET PUMPING PLANT

(2493)

Pumping Plant Transformer Stations to be provided by the Government. Metering equipment to be furnished and installed by the Union Light, Heat and Power Company. The metering transformers shall be installed on the transformer structures. The metering panels and meters shall be installed in the pumping plants.

REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
LOUISVILLE, KENTUCKY

DESIGNED BY D.S.
DRAWN BY C.S.
TRACED BY J.S.J.
CHECKED BY D.S.
SUBMITTED
CHIEF, ENGINEERING DIVISION
APPROVED

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.

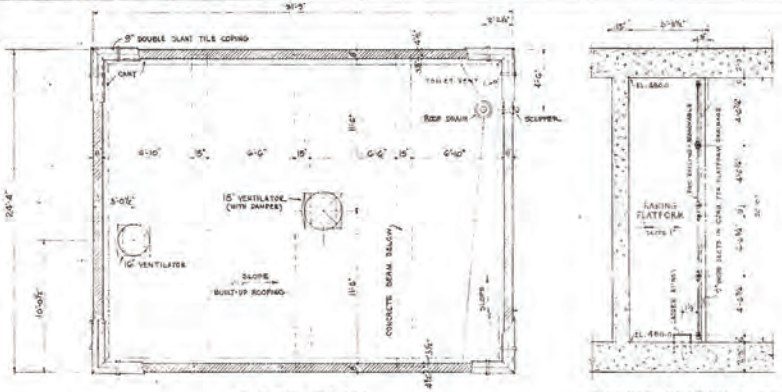
EXTENSION OF POWER FACILITIES

APPROVED
LT. COL., CORPS OF ENGINEERS, ACT. DISTRICT ENGINEER
DATE SEPT. 1950

CHIEF ENGINEERING ASSISTANT
APPROVED
DATE

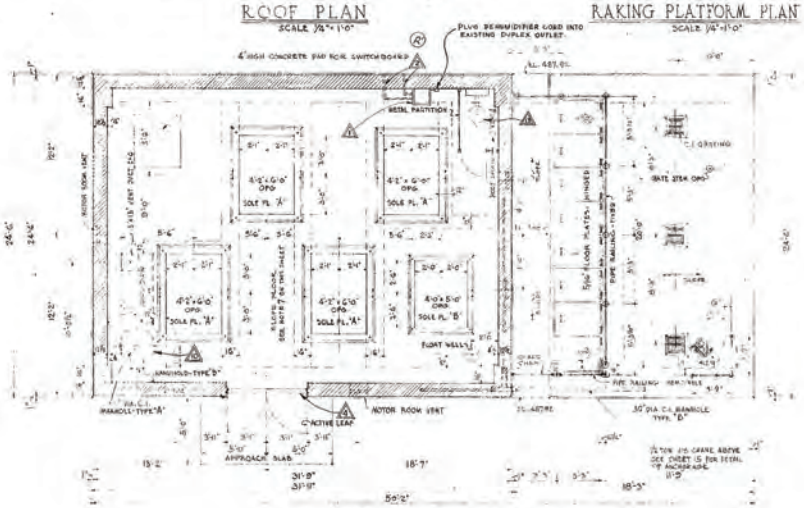
SCALE: NONE

DRAWING NUMBER
471-12.5/1

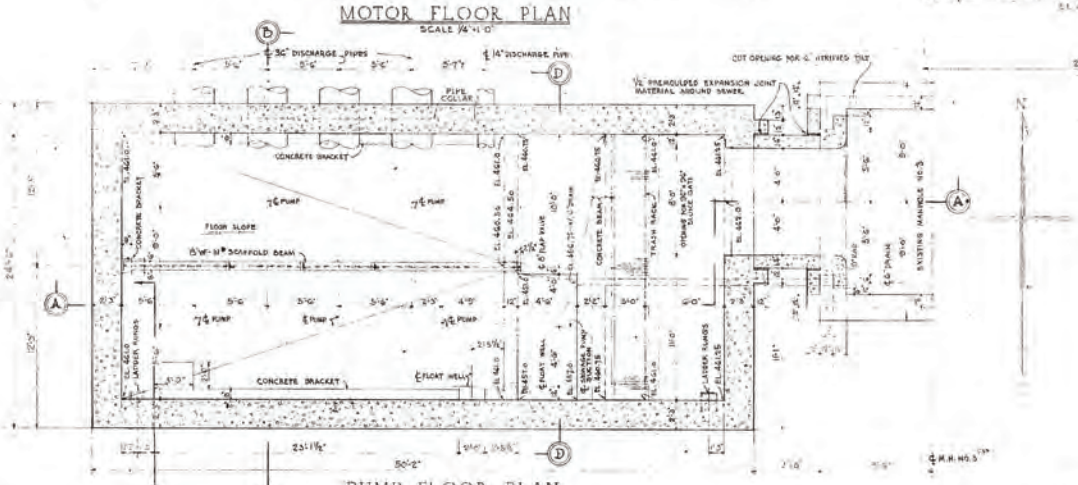


ROOF PLAN
SCALE 1/4"=1'-0"

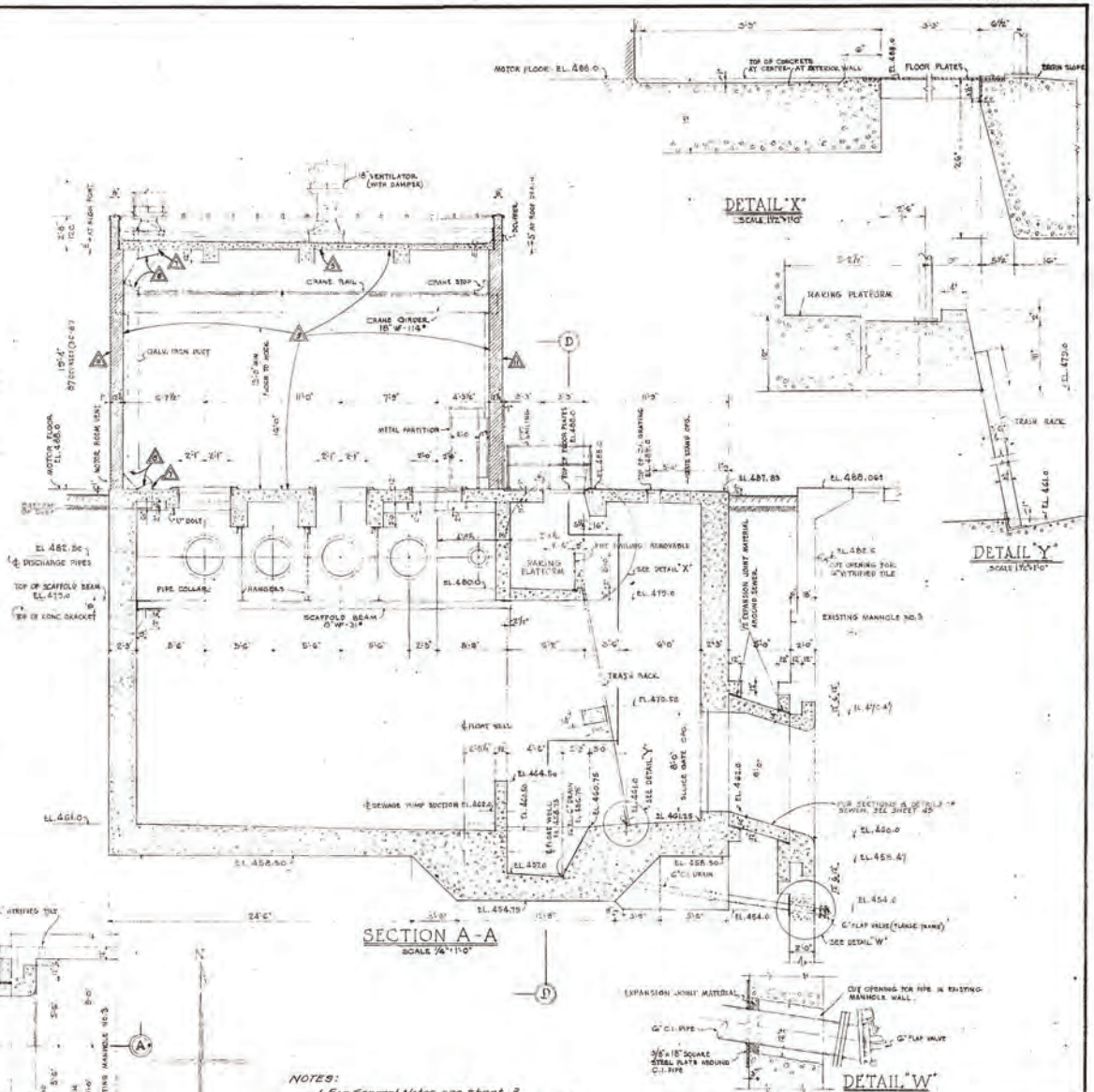
RAKING PLATFORM PLAN
SCALE 1/4"=1'-0"



MOTOR FLOOR PLAN
SCALE 1/4"=1'-0"



PUMP FLOOR PLAN
SCALE 1/4"=1'-0"



NOTES:
1. For General Notes see Sheet 3.
2. For Ventilator Cover plate see sheet 2.

(R) Relocation "Field"

GRAPHIC SCALES

REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
LOUISVILLE, KENTUCKY

DESIGNED BY:
DRAWN BY: G. G.
TRACED BY: E. L. B
CHECKED BY: D. S.
SUBMITTED:
CHIEF ENGINEERING DIVISION
APPROVED:
CHIEF ENGINEERING ASSISTANT
APPROVED:
DATE:

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
WILLOW RUN PUMPING PLANT

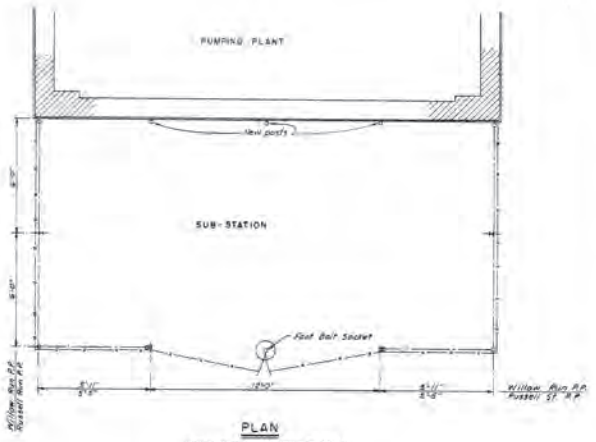
DEHUMIDIFICATION DETAILS

APPROVED:
LT. COL., CORPS OF ENGINEERS, DISTRICT ENGINEER
DATE: AUGUST 1952
SCALE: AS SHOWN
DRAWING NUMBER
471-12.8/6

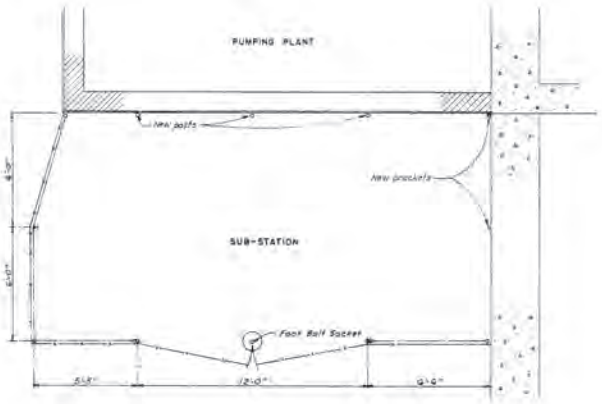
AS BUILT

CORPS OF ENGINEERS

U.S. ARMY

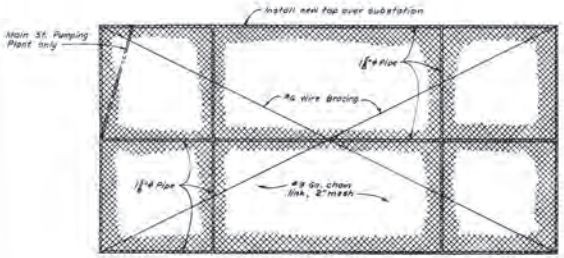


PLAN
(WILLOW RUN PUMPING PLANT)
(RUSSELL ST. PUMPING PLANT)

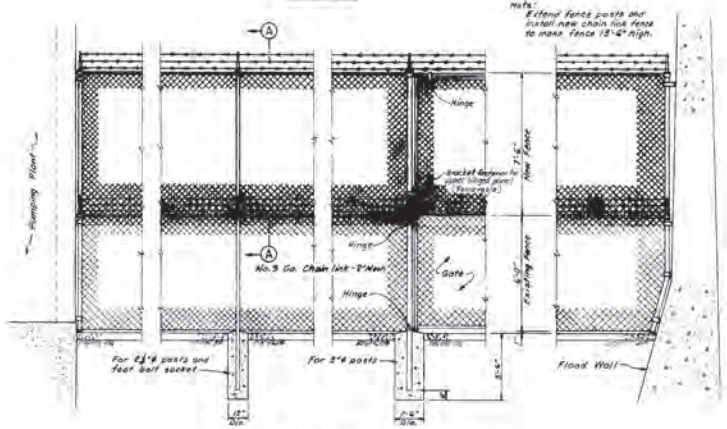


PLAN
(MAIN ST. PUMPING PLANT)

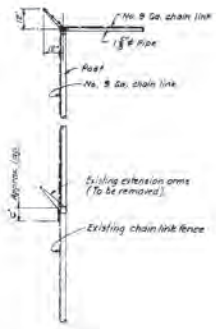
LOCATION PLAN
SCALE: 1"=1200'



TOP PLAN



FENCE DETAILS



SECTION A-A

Notes:
1. Line and gate post extensions to match existing construction.
2. New posts adjacent to buildings shall match existing line posts in section and shall be set in concrete similar to original construction.

REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
LOUISVILLE, KENTUCKY

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY.
PUMPING PLANTS

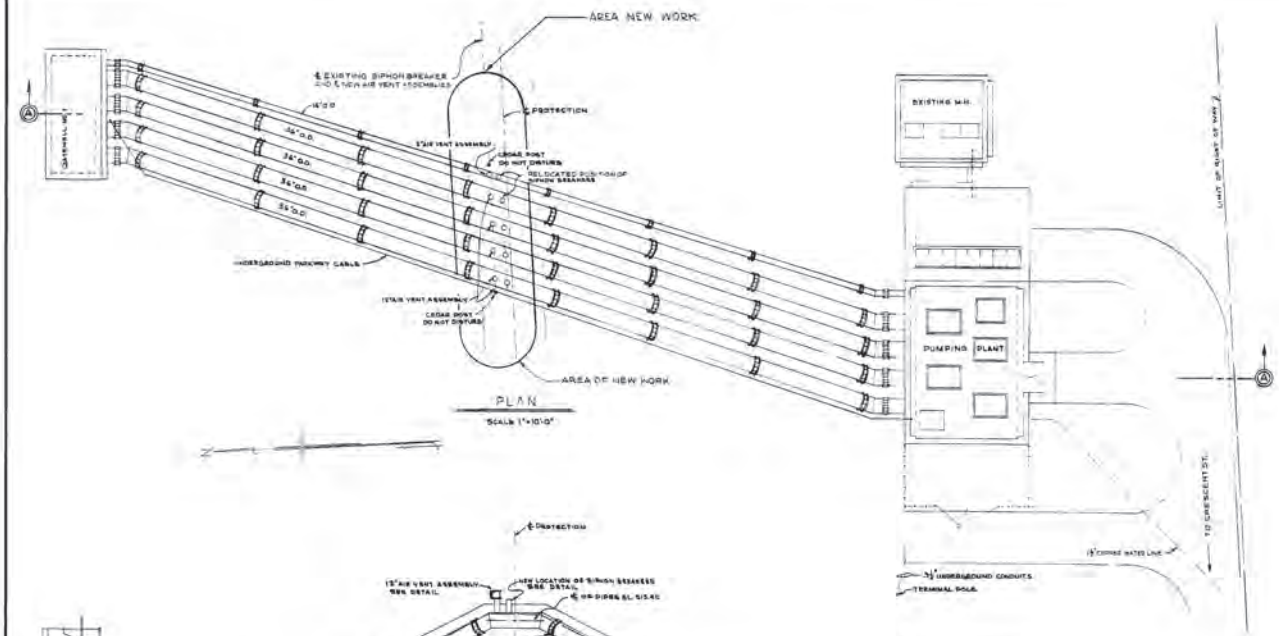
ALTERATIONS TO SUBSTATION FENCES

DESIGNED BY: ——
DRAWN BY: C.B.G.
TRACED BY: J.D.J.
CHECKED BY: J.D.A.
SUBMITTED: ASST. CHIEF, ENGINEERING DIV.
APPROVED: CHIEF, ENGINEERING DIVISION
APPROVED: DATE:
APPROVED: COL., CORPS OF ENGINEERS, DISTRICT ENGINEER — 31 DEC 1954
DATE:
SCALE: 1"=1'-0"
DRAWING NUMBER
471-12-13/1

AS BUILT

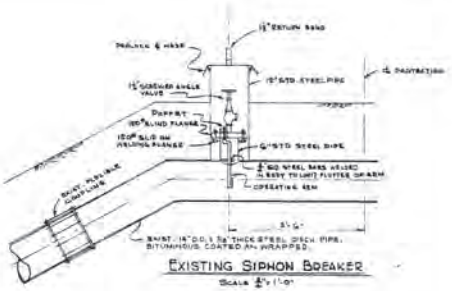
CORPS OF ENGINEERS

U.S. ARMY



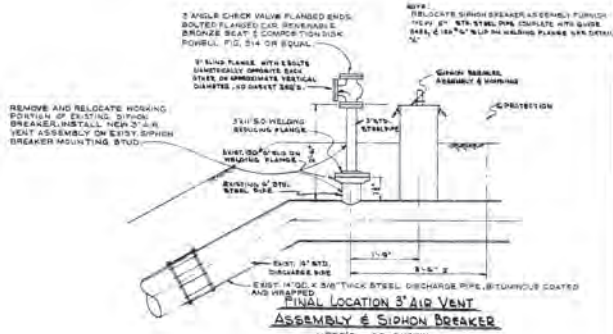
PLAN

SCALE 1"=10'-0"



EXISTING SIPHON BREAKER

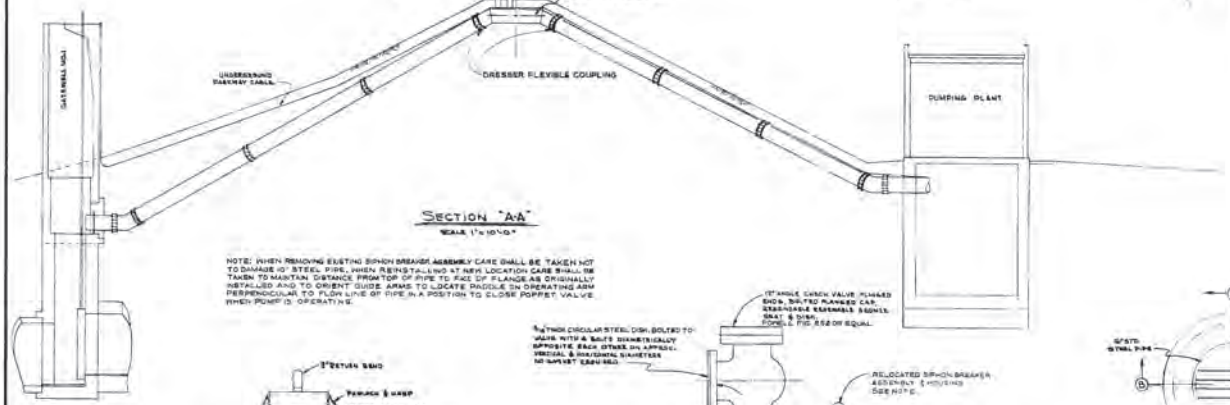
SCALE 1/2"=1'-0"



FINAL LOCATION 3" AIR VENT ASSEMBLY & SIPHON BREAKER

4 REQ'D AS SHOWN

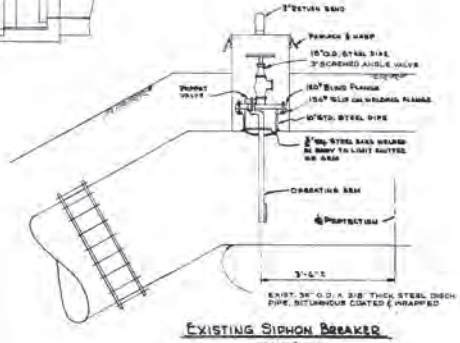
SCALE: 1/2"=1'-0"



SECTION "A-A"

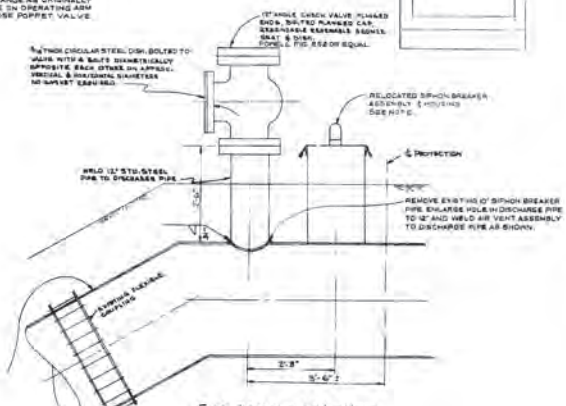
SCALE 1"=10'-0"

NOTE: WHEN REMOVING EXISTING SIPHON BREAKER ASSEMBLY CARE SHALL BE TAKEN NOT TO DAMAGE 10" STEEL PIPE. WHEN REINSTALLING AT NEW LOCATION CARE SHALL BE TAKEN TO MAINTAIN DISTANCE FROM TOP OF PIPE TO FACE OF FLANGE AS ORIGINALLY INSTALLED AND TO ORIENT GUIDE ARMS TO LOCATE PADDLE IN OPERATING ARM PERPENDICULAR TO FLOW LINE OF PIPE IN A POSITION TO CLOSE POPPET VALVE WHEN PUMP IS OPERATING.



EXISTING SIPHON BREAKER

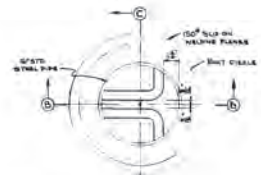
SCALE 3/4"=1'-0"



FINAL LOCATION 12" AIR VENT ASSEMBLY & SIPHON BREAKER

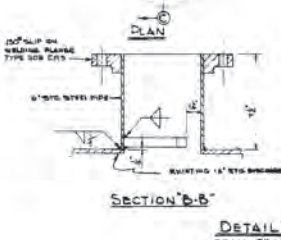
4 REQ'D AS SHOWN

SCALE: 1/2"=1'-0"



NOTE:
LOCATE GUIDE BARS AND ORIENT FLANGE BOLTS AS SHOWN & MENTIONED THAT PADDLE WHEN INSTALLED WILL BE PERPENDICULAR TO FLOW LINE OF PIPE AND WILL CLOSE POPPET VALVE WHEN PUMP IS OPERATING.

NOTE:
SEE GENERAL NOTE 1 SHEET 471-12.16/1



SECTION "B-B"

DETAIL "A"

SCALE: 3"=1'-0"

SECTION "C-C"

GRAPHIC SCALES

1/2"=1'-0" 0 1 2 3

3"=1'-0" 0 6" 12"

1"=10'-0" 0 5 10 FEET

REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
LOUISVILLE, KENTUCKY

OHIO RIVER BASIN
FLOOD PROTECTION COVINGTON, KY
AIR VENTS AND VACUUM PRIMERS
WILLOW RUN PUMPING PLANT
INSTALLATION OF AIR VENTS

DESIGNED BY:
DRAWN BY: J.P.M. - W.S.C.
TRACED BY: J.P.M.
CHECKED BY:
SUBMITTED: DEPT. CHIEF, ENGINEERING DIV.
APPROVED: CHIEF, ENGINEERING DIVISION
APPROVED: DATE:
COL. CORPS OF ENGINEERS, DISTRICT ENGINEER
6 SEPT 1956
APPROVED:
DATE:
SCALE: AS SHOWN
DRAWING NUMBER 471-12.16/7

AS BUILT

APPENDIX D

Meeting Minutes

MEETING DOCUMENTATION

Project: I-71/I-75 (Brent Spence Br.) Willow Run Storm Water Separation Study

Location: Virtual – Teams Meeting

Meeting Date: February 21, 2022

Subject: Alternative Review Meeting

ATTENDEES

Gary Valentine	KYTC – CO	gvalentine@ky.gov
Stacee Hans	KYTC – D6	Stacee.hans@ky.gov
Tim Robinson	KYTC – CO	tims.robinson@ky.gov
David Lanham	Palmer Engineering	dlanham@palmernet.com
Janet Woods	Palmer Engineering	JWoods@palmernet.com

EXHIBITS

- Microstation DGN files

MEETING SUMMARY

David Lanham gave an overview of the study area. He reviewed the existing drainage system from the Kyles Lane interchange to the Ohio River, including detention basins, where storm water leaves the interstate drainage system, the location and operation of the Willow Run combined sewer trunk line, its major branches, and its low-flow diversion system.

David then reviewed the proposed alternatives. Alt 1 constructs a separate storm sewer system from approximately 16th Street northward toward the river. Alt 2 builds upon Alt 1, and it constructs a separate storm sewer system from the Kyles Lane interchange northward toward the river. The roadway drainage inlets were all placed based on the proposed DTMs and proposed cross sections, using actual low points, super transitions, etc. Judgements were made on spread, but in many areas, the maximum length of pipe controlled the spacing of inlets. Exact locations of bridge deck drains were not determined, but runoff from bridge decks was accounted for in the flow calculations.

There is a low area, approximately 1 acre in size near the intersection of Bullock and 12th Street that is not be intercepted by the proposed separate storm sewer system. Doing so would have caused the proposed storm sewer to be too low and would create a conflict with the Willow Run combined sewer downstream, where it was necessary to cross the existing Willow Run combined sewer with the proposed storm sewer trunk line

3403 Stony Spring Circle ■ Louisville, KY 40220
Phone: (502) 491-2411 ■ Fax: (502) 491-2448 ■ Email: peclouis@palmernet.com ■ Web Site: www.palmernet.com

The trunk line in Alt 1 is located primarily under Jillians Way, which also helps navigate the low area of Goebel Park since that section of Jillians Way will be built up with retaining wall. The exact layout of where it cross back to the west side of the interstate, near the floodwall, will have to be fine-tuned during later design phases based on bridge pier locations.

Segments of the existing combined sewer and its low-flow diversion will need to be reconstructed to avoid conflicts with the proposed roadway and bridge layout. Side streets will need to be reconnected to these relocated systems

The designed outflows from the existing basins are unknown. After discussing with Tim prior to this meeting, it was decided to roughly assume that the detention basins may attenuate 25% of the peak flow as compared to no basin at all. This may still be overly conservative, considering the size of the pipes in the outflow structures at the basins. But, that approach was used to size the pipes downstream of the basins at Lt Sta 478+00 and Lt Sta 490+00. For the basin at Lt Sta 518+00, that approach was determined to be too conservative. The size of that watershed (221 acres plus the upstream interchange watershed flowing to it) yielded flows that were far too high for the existing 36" pipe in the outflow system. Therefore, at that location an outflow was assumed, and it was based on the capacity of the existing 36" pipe at its existing slope. This assumption may be revisited, since Alt 2 sends more of the upstream watershed toward this basin.

Both Alts tie into the existing pump station and assume that it will need to be modified. The thinking at this point, although it is not known for certain, is that modifying the pump station versus constructing a separate one just for the proposed separate storm sewer system may make it easier to work through the Section 408 permitting process. This will be discussed in more detail with SD1 during a subsequent meeting.

Gary said that Palmer should focus the efforts going forward on Alt 2, as the preferred alternative to present to the City of Covington and SD1.

Next Steps:

- Palmer will prepare a cost estimate for Alt 2.
    - Note: this needs to also account for the relocated existing sewers.
- Palmer will quantify the area that Alt 2 removes from the Willow Run combined sewer system, to help with presenting the information to the City and SD1; and Palmer will quantify the interstate area that currently drains into the exiting combined sewer system.
- Stacee will set up a meeting with the City and SD1.

3403 Stony Spring Circle ■ Louisville, KY 40220
Phone: (502) 491-2411 ■ Fax: (502) 491-2448 ■ Email: peclouis@palmernet.com ■ Web Site: www.palmernet.com

MEETING DOCUMENTATION

Project: I-71/I-75 (Brent Spence Br.) Willow Run Storm Water Separation Study

Location: Hybrid – KYTC District 6, 1st Floor Conference Room; and Virtual Option – Teams

Meeting Date: March 3, 2022

Subject: Local Officials Review Meeting

ATTENDEES

Joe Meyer	City of Covington - Mayor	jumeyer@covingtonky.gov
Stacee Hans	KYTC - D6	Stacee.Hans@ky.gov
Tim Robinson	KYTC - C.O. Drainage	tims.robinson@ky.gov
Gary Valentine	KYTC - C.O. – Exec. Advisor	gvalentine@ky.gov
David Lanham	Palmer Engineering	dlanham@palmernet.com
Diana Martin	RL Record	dmartin@rlrecord.com
Rick Record	RL Record	rrecord@rlrecord.com
Phil Sebastian	SD1	psebastian@sd1.org
Lydia Watkins	SD1	lwatkins@sd1.org
Juan Carrizo	VS Engineering	jcarrizo@vsengineering.com
Josh Epperson	VS Engineering	jepperson@vsengineering.com

EXHIBITS

- Microstation DGN files

MEETING SUMMARY

After introductions, Gary reviewed the City's concerns with the 2012 drainage layout. The goal at that time was a net-zero flow change in the existing Willow Run combined sewer system. The Cabinet's goal with our updated layout was to address the City's concerns by developing a new drainage layout. Palmer Engineering was contracted to study the area and develop the revised drainage layout.

David Lanham reviewed the City's specific requests detailed in their Jan. 5, 2022 letter to the Cabinet, and then highlighted those areas in Google Earth for reference. One of the main points was the City's request to separate storm water from the combined sewer system from 16th Street north to the Ohio River along the I-75 corridor. The Cabinet developed a proposed drainage layout that not only achieved that goal, but went beyond by extending the separation concept upstream to the Willow Run watershed boundary at Kyles Lane.

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David gave an overview of the study area. He reviewed the existing drainage system from the Kyles Lane interchange to the Ohio River, including detention basins, where storm water leaves the interstate drainage system and flows eventually into the combined system; the location and operation of the Willow Run combined sewer trunk line, its major branches, and its low-flow diversion system.

David then reviewed the proposed drainage alternative, which would construct a separate storm sewer system from the Kyles Lane interchange northward toward the river. The roadway drainage inlets were all placed based on the proposed DTMs and proposed cross sections, using actual low points, super transitions, etc. Exact locations of bridge deck drains were not determined, but runoff from bridge decks was accounted for in the flow calculations.

There is a low area, approximately 1 acre in size near the intersection of Bullock and 12th Street that is not being intercepted by the proposed separate storm sewer system. Doing so would have caused the proposed storm sewer to be too low and would create a conflict with the Willow Run combined sewer downstream, where it was necessary to cross the existing Willow Run combined sewer with the proposed storm sewer trunk line

The trunk line is located mostly along the west side of the interstate from Kyles Lane to just south of 12th Street, where it crosses to the east side. It then is located under Jillians Way, which also helps navigate the low area of Goebel Park since that section of Jillians Way will be built up with a retaining wall. The exact layout of where it cross back to the west side of the interstate, near the floodwall, will have to be fine-tuned during later design phases based on bridge pier locations.

Segments of the existing combined sewer and its low-flow diversion will need to be reconstructed to avoid conflicts with the proposed roadway and bridge layout. Side streets will need to be reconnected to these relocated systems. Gary stated that the Cabinet would be willing to partner with SD1 for relocation and sizing of the relocated segments.

The existing basins are proposed to be modified when impacted by the project, to replace any lost storage. The designed outflows from the existing basins are not known, and some assumptions were made to assume an outflow for the purpose of sizing the proposed pipes. But, for the basins where the outflow leaves the interstate area, the proposed flows are reduced because of area being removed from their watershed. And for the basins where the outflow is contained in the proposed separate storm sewer, the outflow from the basin will only affect the proposed pipe sizes.

The total acreage removed from the combined sewer system, which would now be drainage via the proposed separate storm sewer system is estimated to be 467 acres (170 acres of impervious area and 297 acres of pervious area).

The proposed storm sewer system ties into the existing pump station and assumes that it may need to be modified. However, we are not changing the total watershed that drains to the pump station. We only be redirecting the separated storm sewer runoff to reach the pump station, rather than it reaching the pump station via the combined sewer system. Subsequent to the

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meeting, the project team decided to set up a meeting with the USACE and SD1 to discuss potential modifications to the pump station, and to discuss the Section 408 permitting process.

Josh asked if SD1 has a hydraulic model for the existing system. Lydia and Phil said it is a part of the Bromley model, and also that SD1 has record plans for the pump station.

SD1 currently is planning to install real-time controls in the basins along the interstate to regulate flows differently for low-flow and high-flow events. Our proposed drainage could be a benefit to SD1 by negating the need for that in basins that would be separated from the combined sewer system, and by reducing flows to those that would still drain toward the combined sewer system.

It is not expected that the construction will directly impact the pump station, besides the potential modifications mentioned above.

Mayor Meyer asked if this plan would help with the flooding along Highland and Euclid. The team discussed how the proposed plan would reduce the storm water runoff that reaches those problem areas.

Josh asked if DGN files could be shared, which the Cabinet agreed to. Josh and David will coordinate about that.

Subsequent to the meeting, Rick asked for the PDF plots of the proposed layout.

Next Steps:

- Palmer will provide PDFs to Rick and DGNs to Josh.
- Palmer will contact SD1 to obtain the record plans, and any other pertinent info, for the existing pump station.
- Palmer will contact the USACE and work to set up a meeting with them, SD1, and the project's permitting team.

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MEETING DOCUMENTATION

Project: I-71/I-75 (Brent Spence Br.) Willow Run Storm Water Separation Study

Location: Virtual – Teams

Meeting Date: March 17, 2022

Subject: Section 408 Coordination Meeting

ATTENDEES

Richard Anthony	City of Covington	Oliver.Anthony@covingtonky.gov
Andrew Brooks	USACE (Levee Safety POC)	Andrew.T.Brooks@usace.army.mil
Stacee Hans	KYTC - D6	Stacee.Hans@ky.gov
David Lanham	Palmer Engineering	dlanham@palmernet.com
Gary Valentine	KYTC - C.O. – Exec. Advisor	gvalentine@ky.gov
David Waldner	Palmer Engineering	dwaldner@palmernet.com

EXHIBITS

- N/A

MEETING SUMMARY

After introductions, David gave a brief overview of the project and its history. The goal of this meeting is to discuss the requirements for obtaining a Section 408 permit, since KYTC's project team is unfamiliar with the process.

The current layout for the project does not directly impact the floodwall, as it will be spanned by bridges similar to the existing condition. Impacts to the associated pump station are possible, however. The proposed separated storm sewer trunk line will tie in at the pump station. The exact details of that tie-in have not been developed at this time. Flow rates at the pump station could be affected by the separated storm water, by changing the timing of runoff reaching the pump station. However, the total watershed boundary for the pump station is not changing.

The levee, floodwall, and pump station system are owned by the City of Covington. They are operated and maintained by SD1.

The Section 408 application package will consist of the permit application, plans (showing easements), specifications, and an H&H report. The H&H report should focus on the flows as they reach the pump station and the criteria used to determine that. The application form should include a summary of the project. The form will require Richard's signature for the City of

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Covington as the sponsor, a signature by KYTC as the applicant, and then a signature by the Corps when approved.

During their review, the Corps will be interested in seeing that there are no impacts that cause additional ponding on the landside of the system. Their ROW section will also review access, staging areas, etc. in the vicinity of the floodwall as part of the application package. It is preferable to maintain a 15-foot buffer from the levee and floodwall during construction.

The review process should be expected to take at least 120 days. There is an initial 30-day introductory review period. After the completion of the review period, the technical review begins and takes 90 days. However, any questions, requests for clarification/information, or general back-and-forth correspondence pauses the clock for the technical review period. So, that could cause the review period to take longer than 90 days.

Richard requested a copy of the preliminary drainage layout, which David provided by email after the meeting.

Also after the meeting, Andrew provided a copy of the 408 application form and the document that goes into detail about the levee alteration process. David will include those documents with this meeting summary for KYTC.

Next Steps:

- The information from this meeting will be used to develop the design-build RFP
- During final design, the H&H team should coordinate with the City of Covington and SD1 regarding design flow rates, their effect on the H&H model for the levee system, and potential modifications to the pump station.

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