



ENGINEERING REPORT

PROJECT NO. 7104-2

STEAM DISTRIBUTION SYSTEM

MIDDLETOWN WORKS

PREPARED BY

KAISER ENGINEERS

ENGINEERING REPORT

PROJECT 7104
STEAM DISTRIBUTION SYSTEM
MIDDLETOWN WORKS
MARCH 31, 1966

KAISER ENGINEERS, INC.

REPORT NO. 7104-2

PREPARED BY

A. J. Saric
A. J. SARIC
KAISER PROJECT ENGINEER

4-15-66
DATE

APPROVED BY

F. X. Kast
F. X. KAST
KAISER ENGINEERING MANAGER

4/15/66
DATE

APPROVED BY

T. R. Foley
T. R. FOLEY
ARMCO PROJECT MANAGER

4-15-66
DATE

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1. INTRODUCTION AND SUMMARY

This report covers the extension of the Steam Distribution System to the South Area Finishing Facilities for Project "600" at the Middletown Works. Steam distribution within each facility will be covered in the Engineering Report for that facility.

All steam lines have been sized to satisfy Phase I and Phase II steam requirements. Generally, the lines will be laid underground utilizing Ric-Wil conduit systems.

2. GENERAL DESCRIPTION

2.1 Main Steam Line

A 16" 425 psig, 750°F steam line is routed from a connection in the Hot Strip Mill at Column C to the Hot Strip Mill Pump House and is covered in the Hot Strip Mill Engineering Report. A 12" line will be routed from a connection off this 16" line to the Pickle Line Building where it will terminate at a pressure reducing and desuperheating station within the building. This pressure reducing and desuperheating station will be furnished under the Pickle Line Facility.

A 12" 165 psig, 500°F steam line will be routed from a connection in the north end of the Hot Strip Mill to the Pickle Line Building where it will connect to the loop serving that facility. The routing of the steam lines is shown on Drawing No. PR-3297-1453P.

2.2 Branch Lines and Connections for Future Needs

At the Hot Strip Mill Pump House, a 12" valve will be provided for future maintenance requirements. Also, a blanked tee will be provided for future extension to additional finishing facilities.

A 10" valved connection will be provided at the finishing area for furnishing steam to the finishing facilities.

2.3 Design Criteria

The Steam Distribution System will conform to the A.S.M.E. Code for Unfired Pressure Vessels and Bulletin No. 214 of the Ohio State Code. The 425 psig line will be designed for 750°F superheated steam and the 165 psig line will be designed for 500°F superheated steam.

2.4 Materials

Pipe for the 425 psig, 750°F line will be seamless A.S.T.M. A-106, Grade B, and pipe for the 165 psig, 500°F line will be A.S.T.M. A-53, Grade B. Wall and insulation thickness will be as follows:

<u>Line Pressure</u>	<u>Nominal Pipe Size</u>	<u>Wall Thickness</u>	<u>Insulation Thickness</u>
425 psig	12"	0.406"	4.5"
165 psig	12"	0.406"	3.0"

Ric-Wil corrugated conduit systems will be used for all underground installation. Insulation will be double layer calcium silicate with staggered joints. Conduit will be 14 gage galvanized Helcor, asphalt coated and wrapped with fiberglass reinforced asphalt impregnated felt. The underground conduit will be cathodically protected.

Valves in the 425 psig, 750°F line will conform to Armco Standard Specification ACS-400-04 and will be suitable for 600 psig and 750°F service. Valves in the 165 psig, 500°F line will conform to Armco Standard Specification ACS-400-03 and will be suitable for 300 psig and 500°F service.

Expansion joints will be bellows type with Inconel 600 corrugations internally guided full inlet pipe area throughout, welded ends, and cast iron reinforcing rings.

2.5 Structures

All underground valves, expansion joints and anchor ells will be located in reinforced concrete pits with removable steel cover plates for access. Expansion joint pits will be located approximately 240 feet on centers.

3. SCHEDULE

Work covered by this report will be performed in accordance with the schedule on the following page.

ENGINEERING AND CONSTRUCTION SCHEDULE
STEAM DISTRIBUTION SYSTEM
ARMCO STEEL CORPORATION, MIDDLETOWN, OHIO

KAISER ENGINEERS

PROJECT NO. 7104

4. CHART OF ACCOUNTS

PROJ. CONSTR.
SECT. DETAIL

710 --- STEAM DISTRIBUTION

This project section will include all costs for labor, material, and equipment usage to install the underground steam line in the South Area as follows:

1. A 12 inch 425# steam line from the Hot Strip Mill Pump House to the Pickle Line Structure. This line connects to the 16 inch line from the Hot Strip Mill to the Pump House.
2. A 12 inch 165# steam line from the north end of the Hot Strip Mill Structure to the Pickle Line Structure.
3. One 12 inch and one 10 inch valved connection for future connections.
4. Concrete anchor and guide blocks for the steam lines.
5. Excavation and backfill for the steam lines.
6. Cathodic protection.

This project section does not include any sleeves for crossing under roads and railroads.

034	Ditching and Backfill
052	Pumping
170	Concrete Anchors and Guides
461	Purchase - Pipe and Fittings
462	Purchase - Valves
464	Pipe Installation
465	Pipe Insulation
468	Purchase - Expansion Joints
469	Expansion Joint Covers
519	Cathodic Protection

PROJ. CONSTR.
SECT. DETAIL

711 --- VALVE PITS

This project section will include all costs for labor, material, and equipment usage to construct the concrete pits for valves, anchor ells and expansion joints.

Excavation and backfill is included in Project Section 710.

120	Formwork
130	Re-Steel
140	Embedded Metals
150	Concrete
220	Miscellaneous Steel

PROJ. CONSTR.
SECT. DETAIL

<u>690</u>	<u>643</u>	<u>SPARE PARTS</u>
<u>691</u>	<u>643</u>	<u>MECHANICAL REPLACEMENT PARTS</u>
<u>693</u>	<u>644</u>	<u>MIDDLETOWN WORKS, START-UP - MECHANICAL</u>

The above project sections have been established to provide accounts for future use. These accounts will be available for property accounting or other uses that may be necessary at some subsequent time. The accounts are not, at the present time, part of this project.

<u>694</u>	<u>641</u>	<u>VENDOR'S ASSISTANCE - MECHANICAL</u>
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This project section will include all the costs for Personnel assistance rendered by the Mechanical vendor.

<u>695</u>	<u>644</u>	<u>CONSTRUCTION FORCES - START-UP</u>
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This project section will include the costs for labor, material, and equipment for oil, grease, final tests, tune-up, etc.

PROJ. CONSTR.
SECT. DETAIL

880

ELECTRICAL SUBCONTRACTOR OVERHEAD AND FEE

This project section shall include the estimated allowance for the electrical subcontractor's overhead and fee.

The overhead allowance is based on a percentage of the total direct labor and includes such items as follows:

1. Supervisory and clerical expense including superintendent, assistant superintendent, field engineers, secretarial and clerical personnel.
2. Electrical construction small tools (under \$500).
3. Consumable supplies
4. Office supplies

Such items as the following are furnished by Kaiser Engineers and are not included in the subcontractor's overhead allowance:

1. Construction Plant and facilities
2. Construction equipment and equipment usage
3. Services such as reproduction, accounting, cost control, scheduling, purchasing, etc.
4. Telegraph, telephone and utilities consumption

The fee for this estimate is based on a percentage of the total direct labor and material.

500

Electrical subcontractor's overhead and fee

PROJ. SECT.	CONSTR. DETAIL
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910	---	CONSTRUCTION OVERHEAD
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911		Surveying
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This account shall include the wages, employee benefits, and equipment usage of field survey crews. Chief of survey, his assistants and clerical help are provided for in Project Section No. 7100.

958		Small Tools and Consumables
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This account shall include the cost of pro-rate distribution of total small tool and consumables accumulated for the program. Acquisition of these tools and consumables will be charged to clearing account 995-995. The relief on this clearing account will be charged to 910-958.

962		Winter Protection
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This account shall include all wages, materials, employee benefits, and equipment usage for protection from the cold whenever necessary during construction of the Hot Strip Mill.

964		Clean Up
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This account shall include wages, employee benefits and equipment usage for general site clean up for the specific project.

PROJ. CONSTR.
SECT. DETAIL

940 --- ENGINEERING AND STAFF

906 Design Engineering

This account shall include wages, and employee benefits for all project engineering efforts, excluding those individuals assigned to Project No. 7100, after the date of preparation of the engineering report. Direct labor charges for engineering effort by home office personnel after the completion of the engineering report are also included. (The overhead portion of home office personnel will be included in its proper project under account 940-957.)

910 Feasibility Engineering

This account shall include wages, and employee benefits for all project engineering efforts, excluding those individuals assigned to Project No. 7100, before the date of preparation of the engineering report. Direct labor charges for engineering effort by home office personnel before the completion of the engineering report are also included. (The overhead portion of home office personnel will be included in the proper project under account 940-957.)

927 Reproduction

This account shall include the reproduction expenses for the Chicago office only with respect to the Hot Strip Mill. The Middletown reproduction expenses are included in Project No. 7100.

953 Permits

This account includes the cost of all permits required by local statute for constructing the facilities included in the specific project.

957 Home Office Overhead

This account shall include the home office overhead related to reimbursable home office labor chargeable to the specific project. The direct labor charges for home office personnel are included in, and are to be charged to their respective accounts.

PROJ. CONSTR.
SECT. DETAIL

960 --- ESCALATION

966 This account shall include the estimated allowance for escalation required for the specific project. No charges are to be made to account.

970 --- CONTINGENCY

967 This account shall include the estimated allowance for contingency required for the specific project. No charges are to be made to account.

5. ESTIMATE

The estimated cost of this project is on the following pages.

PROJECT 7104 APPROPRIATION ESTIMATE NO. 04-2

This estimate covers the cost of the Steam Distribution System for the Middletown Works as described in this report, together with the following additional estimate criteria:

- Engineering, manufacturing, and construction personnel will work the standard forty (40) hour week and no allowance has been made in the estimate for scheduled overtime work. If it becomes necessary to work the construction forces an extended work week to man the project, the premium pay exposure could amount to \$23,000. This amount is based on eight (8) hours of overtime per week for the duration of the project for KE Craft Labor, KE Equipment Usage Labor and Subcontract Craft Labor, and includes ten percent (10%) Labor Burden applicable to premium pay.
- Construction is scheduled to start January 1, 1967, and the scheduled completion date is June 1, 1967.
- Since current labor contracts for the major crafts cover the scheduled major work periods, future wage increases specified in these contracts have been included in the labor estimate. Estimated wage increases for the minor crafts have also been included based on precedent established for the major crafts.
- Material, Subcontract and Equipment prices are as of the date of the Estimate. Increases due to escalation are not included in the estimate and this exposure is estimated to be approximately as follows:

<u>Item</u>	<u>Total Direct Cost</u>	<u>Estm. Amt. Subject To Escalation</u>	<u>Estm. % Escala.</u>	<u>Estm. Total Escalation</u>
Material	236,500	236,500	7.1%	16,800
Subcontract	15,500	13,200	4.0%	500
Engineered Equipment	-----	-----	---	-----

Total Estimated Escalation Exposure \$17,300

- Material and equipment prices include freight costs to the job site.
- Ohio State Use, Sales, and similar taxes are not included in the estimate.

PROJECT 7104 APPROPRIATION ESTIMATE NO. 04-2 Continued

- Indirect costs, which are a pro-rata share of Project 7100, are not included in the estimate total. This pro-rata amount of \$21,300 is included as a part of the fee base.
- The estimated fee shown is based upon an average fee for the Middletown and Butler Programs and a total estimated fee base for such programs in excess of \$400,000,000.
- Spare Equipment, Spare Parts and Middletown Works Startup costs are not included in the estimate.

