ARMCO PROJECT 600

PLAINTIFF'S EXHIBIT
ARO-127

1964 - 1970

SPECIAL PROGRAM

MIDDLETOWN WORKS

DECEMBER 1965

M I D D L E T O W N

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M I D D L E T O W N

BLAST FURNACE FACILITIES

BACKGROUND AND EXISTING FACILITIES

The Middletown Works iron making facilities consist of three blast furnaces with supporting coke ovens. In 1964 the average production of these facilities was 4859 tons per day. This total is made up of 2,775 tons per day from Middletown #3 Furnace, 962 tons per day from Hamilton #1 Furnace, and 1,122 tons per day from Hamilton #2 Furnace.

When all three furnaces are operating, it is estimated that an average of 6,000 tons per day can be produced without an increase in coke oven capacity.

PROPOSED FACILITIES

Figuring the downtime for relining furnaces, the overall average is 5,700 tons per day. In order to obtain this increase in production, it is necessary to make the following provisions to the furnaces.

To make 3,800 tons per day at the Middletown #3 Furnace, the work will be accomplished in two steps.

Step I has been completed and the cost was $3,400,000 capital, and $350,000 expense. The work in Step I consisted of adding a second tap hole and increasing the material handling facilities. This work was done during the reline of the furnace in the summer of 1964.

Step II will consist of the remainder of the work on the Middletown Furnace #3 and all the work for the Hamilton Furnaces #1 and #2.

The hot metal production from the blast furnace facilities at Hamilton will be increased from an average of 2,084 to an average of 2,200 tons per day. This increase in production will be attained by relining all of the stoves, by adding stove burners to provide a 2000°F. straight line blast temperature, and by adding gas fuel injection systems for both #1 and #2 Furnaces.

The #1 Furnace is down for a furnace reline at the present time and will be ready for operation by February 1, 1966. Relining each of the four stoves and revamping them to handle 2000° hot blast temperature will follow the furnace reline job on a scheduled outage of each of the stoves which were not remodeled during the furnace reline.

Automatic stove changing for the #1 Furnace was considered a part of the 1965 Normal Program.

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AKE-005497

M I D D L E T O W N

BLAST FURNACE FACILITIES

The following items are considered as part of the Special Program for #1 Furnace:

1. Reline #1, #2, #3, and #4 Stoves, including new stove burners and fans.

2. Gas fuel injection system.

For #2 Furnace, the timing of the proposed plan for increasing the stove capacity for straight line hot blast temperature of 2000 F., adding new stove burners and fans, and an automatic stove changing system is contingent on replacing the existing boilers with new facilities. The existing boiler house facilities interfere with the proposed additional equipment.

The only item that is considered part of the Special Program for #2 Blast Furnace is a gas fuel injection system.

Additional facilities needed in Step II for the Middletown #3 Furnace are:

1. New fourth stove.

2. Reline top 30' of three existing stoves, which will be done after the fourth stove is installed.

3. Three new ore bins.

4. Five new cinder pot cars.

With the completion of Step II, there will be hot metal production capacity for making an average 6,000 tons per day.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

12/65

BIG RED, YELLOW (W-A)

AKE-005498

M I D D L E T O W N

MELTING FACILITIES

BACKGROUND AND EXISTING FACILITIES

Current ingot producing facilities at Middletown consists of seven Open Hearth furnaces at the No. 1 Shop; six furnaces at the No. 2 Shop, and two Electric Furnaces which are currently out of operation.

The No. 1 Shop began operations in 1910 with the first four furnaces. In 1917 a second bank of four was added to the line. These furnaces have been progressively increased in size from the original 85 ton heats until today, the average heat size is approximately 185 tons. Even though constant improvement has been made in increasing output and reducing processing costs, No. 1 Open Hearth's cost per ingot ton is still approximately $3 higher than No. 2 Open Hearth, and roughly $6 per ton higher than would be the cost per ingot ton from a Basic Oxygen Furnace. Structurally, the building which houses these furnaces is in need of strengthening and most of the auxiliary pit side equipment would have to be revamped to handle larger ingots. In every study made to date, the cost of revamping this shop and adding precipitators to control air pollution has been considered too great to warrant the undertaking, especially in view of the production cost advantages in a Basic Oxygen Furnace.

No. 2 Open Hearth Shop began operations in October, 1950, with three furnaces. In 1956, two additional furnaces were added. The last furnace in the shop was put on the line in 1957. This shop now consists of six furnaces which tap an average heat size of 310 tons. The major units of auxiliary equipment consist of three stockyard cranes; 216 scrap cars, each of which will handle four 45 cubic feet charging pans; three charging machines; two 150 ton hot metal cranes; teeming positions for four heats and two cranes in the mold yard. This auxiliary equipment is adequate to sustain operations up to about 18 heats per day or an average rate of 38 to 40 tons per hour per furnace.

The Electric Melt Shop (currently inactive) contains two electric furnaces of the Heroult type. These furnaces were installed in 1947-1948. They were rated at 70 ton furnaces, however, at the time they were shutdown in 1960, they were producing 100 ton heats. Lack of trained crews; cost of reactivating; and unfavorable production costs have discouraged all suggestions to start up these furnaces in recent years. Because of this, the 13.8 Kv distribution system to the furnace transformers has been reconnected to provide 13.8 Kv to No. 2 Open Hearth and the Blast Furnace area. To reactivate these furnaces now would require additional substation capacity.

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BIG RED, YELLOW (W-A)

AKE-005499

M I D D L E T O W N

Melt Shop Capacities

Because of the many variables that affect Open Hearth production, it is difficult to generalize about melting capacities. However, with a reasonable amount of hi-purity oxygen and medium ranges of hot metals, the following is considered to be Middletown's melting capacities:

No. 1 Open Hearth Shop	7 Furnaces	90,000 tons/month
No. 2 Open Hearth Shop	6 Furnaces	145,000 tons/month
Electric Melts (If reactivated)		25,000 tons/month
	Grand Total	260,000 tons/month

PROPOSED FACILITIES

In Phase I it is planned to abandon No. 1 Open Hearth Shop and to provide additional steelmaking capacity by the installation of a Basic Oxygen Shop consisting of two 200-ton furnaces and auxiliaries, expandable to three furnaces. Building this shop will eliminate the expense of repairs required in No. 1 Open Hearth Shop to maintain operable conditions; estimated at $6,400,000 and eliminate the necessity for installing fume control equipment in No. 1 Open Hearth Shop estimated at a cost of $6,000,000 capital and $1,000,000 expense, totaling $13,400,000.

With the blast furnace capacity averaging 6,000 tons of hot metal per day, the total ingot making capacity for both melt shops will be figured at 300,000 ingot tons per month.

No. 2 Open Hearth Shop	6 Furnaces	130,000 tons/month @ 31% H.M.
Basic Oxygen Shop	2 Furnaces	170,000 tons/month @ 70% H.M.

With the addition of a third furnace at the Basic Oxygen Shop, the melting facilities at Middletown will be able to make the steel required to fully utilize the Hot Strip Mill capacity, which is 400,000 tons of hot bands per month.

The site selected for the Basic Oxygen Shop is approximately 2,000 feet southeast of the No. 2 Open Hearth Shop and northeast of the Coke Plant.

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AKE-005500

M I D D L E T O W N

The plant will include a flux handling, storing and weighing system, hot metal station, scrap handling and charging system, mold preparation building, refractory storage building, locker and washroom, additive storage building, metallurgical laboratory, gas cleaning and dust handling system and transfer cars for handling slag pots and hot metal ladles. The mold preparation facilities will handle the molds for both the Basic Oxygen Shop and the #2 Open Hearth Shop.

The major complex of buildings will have approximately 370,000 square feet of area under roof.

A communication system between operating pulpits, offices, shops, and operating areas will be provided.

For Phase I, total steel tonnage requirement to the Hot Strip Mill is set at 266,000 slab tons per month. 207,000 slab tons will be rolled from 235,000 tons of ingots. 30,000 slab tons of silicon killed grades will be continuously cast. Whether the remaining 29,000 tons of slabs per month required will be continuously cast or rolled from ingots will be determined by the success of continuously casting grades other than silicon killed steel. There is capacity in the proposed casting machine to handle this tonnage. If continuous casting of other grades is not successful, it will be necessary to add another block of 4 holes to the soaking pit facilities.

Financial review of this project is included in the total Ashland/ Butler/Middletown evaluation.

BIG RED, YELLOW (W-A)

AKE-005501

M I D D L E T O W N

VACUUM DEGASSING

BACKGROUND

There are no facilities for vacuum degassing in the present plant. In order to maximize the tonnage of steel to be continuously cast and to improve certain slab and product limitations, vacuum degassing will be required.

PROPOSED FACILITIES

In Phase I, it is planned to install a 200-ton, single operating unit of a circulating ladle type degasser. This unit will comprise a single steam ejector, barometric condenser system and two vacuum treatment and weigh stations located adjacent to the pit of the proposed Basic Oxygen Shop and serviced by transfer cars. It will vacuum treat ladle steel scheduled for continuous casting and some steel scheduled for ingot teeming. It will further function as a limited holding facility to equalize material flow through the Basic Oxygen Shop.

Installed equipment will admit to processing 200-ton heats to residual oxygens of 40-50 ppm within a 20-30 minute cycle and will be programmed to a frequency of no more than alternate BOF heats in Phase I.

Ladle additive and processing equipment will be located in a 30 ft. aisle adjacent to the melt shop pit. Provision for expansion of these facilities for future requirements will be made.

Vacuum Degassing units at Butler Works and Houston Works are currently in startup plus operation. These units will be observed for the selection of a vacuum degassing system for Middletown.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

BIG RED, YELLOW (W-A)

AKE-005502

M I D D L E T O W N

CONTINUOUS CASTING

BACKGROUND

Continuous casting of slabs is new to Armco.

Observed facilities for the continuous casting of slabs for hot strip mill products verify that a limited portion of the Phase I products are being successfully produced by continuous casting.

The proposed Hot Strip Mill has a full range capability of 1100 PIW to 82" width requiring a 90,000 lb. slab. The proposed melting facilities are limited to the production of a maximum ingot weight of 70,000 lbs. Continuous casting is the proposed means whereby the full weight-size capacity of the hot strip mill will be utilized.

Continuous casting offers improved slab quality through uniformity compared with ingot casting along with acceptable surface quality on certain product grades. In conjunction with vacuum degassing, a broader scope of product capability is under study and is yet to be fully described.

PROPOSED FACILITIES

In Phase I, it is planned to install one slab casting machine with capacity to cast 210-ton heats of steel from the Basic Oxygen Shop. The building to house the machine and slab yard will comprise a single aisle located adjacent to the shop pit aisle and the vacuum degassing aisle with ladle metal access by transfer car. Six high bays will house the casting machine and twelve low bays will house strand cut-off equipment, slab transfer, runout tables, slab storage and slab car loading.

The casting machine will be equipped with two parallel casting strands with independent drive providing for casting any heat within 70 minutes. Slabs will be produced with a fixed thickness of 10". Slab length, hence weight, will be programmed into oxy-gas torch equipment to maximize yield. Optimum loading of slab heating furnaces dictates 27 ft. to 33 ft. (900-1100 PIW) for full slabs or 13-1/2 ft. to 16 ft. (450-533 PIW) for half slabs. Minimum cast slab length will be 10 ft. (330 PIW).

No surface conditioning facilities are planned at this time; however, adequate space in the slab yard area will be provided for such an eventuality.

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AKE-005503

M I D D L E T O W N

Cooling water and spray water recirculating systems for the casting machine will be installed to operate local to the machine and in conjunction with the water plant of the Basic Oxygen Shop.

The experimental slab casting machine at Butler Works is expected to establish the design information necessary to design and build this Middletown machine and to establish operating and rolling practices.

Equipment will be provided to test and develop the principle of sequential casting of successive ladles of steel. The capacity of this machine will be 65,000 tons/month, including 35,000 tons/month of the Phase I committed tonnage in grades that have been continuously cast at other locations.

The demonstrated advantages of continuous casting compared to conventional slab practice are:

1. Reduced slab conversion costs due to improved metal yield and decreased rolling costs.

2. Slab quality improvement through uniformity of cast slabs.

Financial review of this project is included in the total Ashland/ Butler/Middletown evaluation.

12/65

BIG RED, YELLOW (W-A)

AKE-005504

M I D D L E T O W N

INGOT STRIPPING FACILITIES

BACKGROUND AND EXISTING FACILITIES

The present ingot stripping building is located at the south end of the soaking pit building and has two 200/15 ton stripping cranes on the runway. Another 200/15 ton stripping crane is located in the end of the No. 1 Open Hearth Mould Yard and is used on an emergency basis during peak ingot production and when an existing crane is being repaired.

PROPOSED FACILITIES

The proposed ingot stripping facility will be located in the South Area approximately 800 feet west of the new Soaking Pit Building.

The Stripper Building, 94 ft. by 240 ft. long, will be provided with two ingot tracks, two mould tracks and a scrap track. A 400/40 ton stripping crane will be provided to strip 180 ft. long drags of ingots, ranging in thickness from 23" to 40", in width from 30" to 86" and with a maximum weight of 70,000 pounds.

The rated processing capability of the Ingot Stripping Facility will average 400 ingot tons per hour. This capability is based on using the new, larger-sized ingot family.

It is anticipated that major equipment and building additions will be necessary to satisfy future ingot processing requirements above the Phase I ingot requirement of 235,000 tons per month.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

12/65

BIG RED, YELLOW (W-A)

AKE-005505

M I D D L E T O W N

SOAKING PIT FACILITIES

BACKGROUND AND EXISTING FACILITIES

The existing soaking pits are located centrally in the building, forming a "T" with the slab mill roller table line. Ingots are heated in 36 pits, 20 of which are in 10 rows of two pits each and 16 in 4 rows of four pits each. All pits are heated by coke oven gas with pressure and temperature controls. The total hearth area of the soaking pits is 5,910 sq. ft. which is estimated to provide a maximum peak productivity rate of 355 TPH.

The soaking pits are serviced by three 15-ton cranes.

PROPOSED FACILITIES

The new soaking pit facility will be located in the South Area in a building 112' wide by 760' long. This building will run East and West and will be located at the South end of, and perpendicular to, the new slab mill building. All of the pits will be located west of the slab mill ingot receiving tables, with room for future expansion reserved to the East.

The facility will consist of 24 soaking pits arranged in six (6) batteries of four (4) pits each. Each pit will be 12'-6" wide by 26'-0" long by 17'-0" deep. The total hearth area is 7,800 sq. ft. Two 35/35 ton soaking pit cranes will service the 24 pits.

The new pits have a designed capability to heat ingots varying in size from 36" x 36" x 112" to 86" x 40" x 92" with a maximum weight of 70,000 pounds each for the large size ingots.

Initial Phase I production requirements of 235,000 ingot tons per month will be provided, based on a 21-turn per week operation with a breakdown as follows:

Tons per Month	Track time in Hours
145,750	4
72,800	7
16,450	Cold Charge
235,000	

One cable driven ingot buggy with side discharge and a capacity of 70 tons will deliver either two of the smaller ingots to the slab mill roller line for tandem rolling, or a single large ingot.

12/65

BIG RED, YELLOW (W-A)

AKE-005506

M I D D L E T O W N

UNIVERSAL SLABBING MILL FACILITIES

BACKGROUND AND EXISTING FACILITIES

The existing 45", two-high Slabbing Mill was installed in 1939. Since that time, the mill equipment has undergone various repairs and rebuilds. The entire complement of mill tables have been replaced. The mill proper remains as installed over 25 years ago.

The existing Slabbing Mill does not have the ability to process the product from the proposed melting facilities, nor can it produce necessary tonnage of slabs to meet the demand of the new Hot Strip Mill now under construction.

The present Slabbing Mill does not have the ability to produce 82" wide slabs necessary for realizing the additional width capabilities of the new 86" Hot Strip Mill. The existing mill has a limitation of approximately 23,000 pound maximum slab, which is far less than the 90,000 pound slabs required to fully utilize the potential of the new Hot Strip Mill.

PROPOSED FACILITIES

The basic design of the proposed Universal Slabbing Mill facility provides for the initial Phase I production requirement of 235,000 ingot tons per month. Phase II production requirement for the slab mill will depend upon the grades of steel and the tonnage that can be continuously cast. The capacity of the new slab mill will be approximately 400,000 ingot tons per month.

The new slab mill will be of the Universal type with the edger integral with the mill and located on the entry side. The mill will be equipped with a card program system for automatic sequencing of all operational functions. The mill proper will be serviced by conventional delivery, approach, front, back and runout tables. A four-sided scarfer, slab shear, scale and stamping device will be provided.

Two slab piling stations will be located after the slab marker which will be equipped to stock, transport, and unload slab piles into the slab storage yard.

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AKE-005507

M I D D L E T O W N

HOT STRIP MILL

BACKGROUND AND EXISTING FACILITIES

The original edition of the present Hot Strip Mill began operation at Middletown in July, 1928. During the next ten years, the first upcoilers were installed, roller bearings introduced on all work rolls, descaling system improved, the finishing mills were widened, soaking pits were added, and slabbing furnaces were enlarged.

In 1939 came an almost complete rebuild of the mill. New ingot buggies were added, and a new 120 inch slab mill was installed to replace the old 40 inch blooming mill along with its steam engine. A new vertical edger was installed along with a new scarfing machine, a slab shear and a third slab furnace. The roughing mills were respaced and the total motor horsepower nearly doubled. In the finishing mill, the sixth stand was added, the five old stands widened to 80 inches, and larger work rolls installed. Two new 4,000 horsepower motors were installed. The mill runout table was extended. From 1928 to 1939 the widest slab rolled was 36 inches. Heavier slabs up to 75 inches wide were processed after the 1939 rebuild.

From 1939 to 1958, only periodic changes were made. Three rows of Soaking Pits were added, as was the fourth slab furnace, an X-ray thickness gauge, larger finishing mill housings and pinion stands, and again motor horsepower was increased.

In 1955, General Management decided it was necessary to increase the rolling capacity of the Middletown mill. After reviewing various courses of action, it was decided to rebuild the existing mill.

The planned increase in capacity dictated that slab thickness be increased from a three to five inch range to a five to seven inch range. This larger slab required the purchase of some new and larger roughing mills and respacing the whole roughing train. The designed capabilities of this roughing train made it one of the most powerful roughing mills in the country.

Other modifications that were made during the 1958-1959 rebuild included installing an improved two-sided scarfer, rebuild and enlargement of the four slab furnaces, the installation of two new ingot buggies capable of travelling 1,000 feet per minute, and new screwdowns for the slab mill which more than doubled speed of roll opening adjustment. A new preset control system was added at the slab mill which automatically adjusted the screw setting for each pass. A new modern control system was added to the existing motors, generators, and rectifiers in the finishing mill. Three new rows of Soaking Pits were added. Three new type down coilers were installed to replace the old upcoilers.

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AKE-005508

All of these things have been done to improve quality and to progress from a yearly output of 342,281 product tons in 1929 to 2,022,760 product tons in 1964.

PROPOSED FACILITIES

It is proposed to construct a Hot Strip Mill Facility to be located in an area which is situated each of the Pennsylvania Railroad and bounded on the north by Lefferson Road and on the south by Oxford State Road. This Hot Strip Mill will have a designed capability to roll reheated slabs to coils, 24 to 80 inches in width and weighing up to 1,100 pounds per inch of width.

The mill design will include the latest in proven equipment, control, and process technology to assure a competitive marketing position. The mill will produce a produce having improved surface quality, consistent strip width and profile, a minimum variation of end to end gauge, and high metallurgical quality.

Major features which will be integrated into the mill system are as follows:

- On line computer control of the complete rolling process.
- Data logging to optimize the rolling process and integrate with logistics tracking system from slab through finished hot band.
- Automatic gauge control together with interstand tension control, motor speed regulation, and speed capability to accelerate strip throughout the rolling process.
- Slab extraction from the furnace to provide an improved slab surface.
- Quick workroll changing to provide a fast means of replacing worn or defective rolls.
- Speed matching of table rolls to mill rolls to improve strip surface.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

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BIG RED, YELLOW (W-A)

AKE-005509

M I D D L E T O W N

HOT BAND STORAGE BUILDINGS

PROPOSED FACILITIES

The hot band coils from the new Hot Strip Mill will be moved on two conveyors into two storage buildings 760' long x 120' wide. Each building will have two 50 ton cranes to handle the hot bands in these buildings. Coils will be conveyed from the south building to the front end of the new #4 Pickler. Coils stored in the north building will be shipped to the North Area to the Hot Band Storage Building ahead of the existing picklers.

These buildings have been designed to store 65,000 tons of coils in process inventory ahead of the pickler lines.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

12/65

BIG RED, YELLOW (W-A)

AKE-005510

M I D D L E T O W N

NO. 4 STRIP PICKLING FACILITIES

BACKGROUND AND EXISTING FACILITIES

The strip pickling facilities consist of three sulphuric acid picklers.

No. 1 Pickler was constructed during 1935-1936 and was placed in production in 1936.

No. 2 Pickler was constructed in 1941.

No. 3 Pickler began operations in 1948.

All three of these picklers received major rebuilds in 1958, during which new McKay Processors were installed as well as Drag Generators, welders, and trimmers. The line speeds were increased from 200 FPM to 400 FPM. New acid tanks complete with lining, granite partitions and covers were added. The drive system was changed from DC constant potential to DC variables voltage. In the 1962-1964 period, acid control systems have been installed, weld identification punches have been placed in the lines, strip lifters added, and X-ray gauges placed on No. 1 and No. 3 picklers.

The condition of all three picklers is such that the tanks and covers are in need of repair and fume eliminators are not adequate. Mechanically all three picklers are considered to be at best in only fair shape. They are totally underpowered and do not readily lend themselves to conversion to Hydrochloric Acid processing.

Using present hot band weights, the three picklers, producing at an average of 85 tons per hour each, operating 19 turns per week, will process 168,000 tons of pickled steel per month.

PROPOSED FACILITIES

The No. 4 Strip Pickler Line will be designed to process strip .060" to .250" in gage, 25" to 80" in width and handle up to 88,000# coils, will pickle 110,000 tons per month and operate at a rate of 160 tons per hour.

This line will be designed to use hydrochloric acid in four horizontal tanks along with a regeneration plant for reclaiming the hydrochloric acid.

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AKE-005511

M I D D L E T O W N

The regeneration plant will be capable of removing the iron from the hydrochloric acid and permit the acid to be recirculated for pickling. This system eliminates the need for an acid disposal system.

The hot band coils will be conveyed from the hot band storage building to the front end of the line in the pickler building. The pickled coils will be stored in the pickler building for storage ahead of the Tandem Mill. The pickled coils will be fed onto the entry conveyor to the Tandem Mill in this building.

The pickling facility will contain approximately 191,000 square feet of building space and will be located in the South Area.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

BIG RED, YELLOW (W-A)

AKE-005512

M I D D L E T O W N

MODIFY EXISTING PICKLER FACILITIES & H. R. PICKLE COIL HANDLING FACILITIES

PROPOSED FACILITIES

The three existing pickler lines will have to be modified on the front end to handle the maximum coil size of the new Hot Strip Mill, which is 78" outside diameter, 30" inside diameter. The maximum coil weight that can be handled in the North Area is 50,000#.

Modifications will be made to two of the three existing pickler lines before the tonnage from the #4 Pickle Line can replace the production from any one of the existing pickle lines. This is necessary to be able to handle the hot bands that weigh between 25,000# and 50,000#.

Modifications to the third existing pickler line can be made after the new pickler line is built.

Railroad tracks into the hot band storage buildings ahead of the existing pickler lines are required to bring in the coils from the new Hot Strip Mill in the South Area.

The present hot band storage buildings need to be repaired and braced to handle the four new 30 ton cranes which will replace the existing 15 ton cranes.

Existing coil conveyors in the building that now bring the coils from the Hot Strip Mill will be removed.

After the new #4 Pickler in the South Area is completed, and until the new Tandem Cold Mill in the South Area is completed, it will be necessary to transport hot rolled pickled coils from the South Area to the North Area for cold rolling.

The coils will be transported by railroad cars into Building 22X, where the coils will be put on narrow gage buggies which will take the coils into the coil storage building ahead of cold rolling.

Changes to the present narrow gage railroad system are required to load and unload these coils.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

12/65

BIG RED, YELLOW (W-A)

AKE-005513

M I D D L E T O W N

TANDEM COLD MILL FACILITIES

BACKGROUND AND EXISTING FACILITIES

The first Cold Reduction Mill was installed at Middletown in 1935-1936. This was an 80" 3 stand United Mill. It has been in continuous operation ever since. In 1939-1941 a 54", 4 stand Mesta Mill was added to increase Cold Rolled capacities.

In 1958, a major rebuild was initiated on the United Mill during which time new mill motors were added that increased the horsepower from 1,500 to 4,000 and increased speeds from 600 FPM to 1,500 FPM. Reel motors were also increased in size. Belt wrappers, new reel and billy rolls, and coil elevator cars were installed. New coil conveyor, coil box, pinch rolls, tail breaker, and side guides were installed at the entry end of the mills. A whole new hydraulic system was activated.

In 1960, a major overhaul of the Mesta Mill was begun. New tension reels, elevator buggies and spot welders were installed. New feed ramp, cradle rolls, and payoff reels were put on the entry end. All mill motors were rewound and the hydraulic system rebuilt.

On both mills, the general condition of the mechanical equipment is considered good. The hydraulic valves and accumulators on the Mesta Mill need to be replaced and the windows of the mill housings are worn and not equipped with liners.

The Mesta Mill is considered to be underpowered. Both mills need automatic gauge controls to improve yield and quality. The United mill presents a serious problem of stream pollution. However, the demands have been so great on these mills that it hasn't been possible to take the extended shutdown required to correct these conditions. Even today, with continued running of the underpowered Mesta Mill at high rates, we run a great risk of losing considerable production if a complete breakdown occurs.

The capacity on these mills is considered to be 115 tons per hour average per mill. At 20 turns operation, this rate will produce 159,500 tons per month of Cold Reduced Steel.

PROPOSED FACILITIES

The new Tandem Cold Mill will be a five stand, 4-high mill which will receive hot rolled pickle strip in the gauge ranges of .200" to .061" and deliver cold reduced strip between 2,000 FPM and 5,000 FPM in gauges between .012" to .120" in width ranges from 24" to 80" with a maximum coil weight of 80,000#.

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AKE-005514

M I D D L E T O W N

The capacity of the proposed mill will be 110,000 tons per month or an average of 160 tons per hour.

The most efficient method of loading coils into the front end of the mill will be provided. This will allow the maximum capabilities of the mill to be used, since loading time constitutes serious delay periods on small orders or small coil weights. The mill will have automatic gauge control with the latest control innovations.

The most modern roll coolant system will be installed to provide the cleanest strip possible for further processing requirements throughout the plant. The coolant solution will be clarified and filtered before it is disposed.

The motor drives and motor generator sets will be located in the main mill building, 680' long by 125' wide.

The roll shop will be located in the west end of the main mill building and serviced by a 125/50 ton overhead crane.

The cold rolled coils will be conveyed into an adjacent building for storage ahead of further processing. At the present time these coils will be shipped out of this building to the North Area for annealing and finishing.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

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BIG RED, YELLOW (W-A)

AKE-005515

M I D D L E T O W N

ANNEALING FACILITIES

BACKGROUND AND EXISTING FACILITIES

The history of annealing can be traced by the variety of annealing facilities that exist at the Middletown Works.

In the period 1922-1924, two so-called Continuous Annealing Furnaces were installed. These furnaces are unique in that stacks of coils are prepared and charged to one end of the furnace, moved through the annealing zone where they are heated to the required temperature and held to obtain proper physical characteristics of the strip and thence to a cooling zone prior to their stripping. These furnaces were rebuilt in 1935-1940 to change them from sheet bases to coil bases and in making this change many compromises were made in design and efficiency. These furnaces are limited both in piling height and in coil diameter. Although these furnaces are still in use, they are considered to be an obsolete method for annealing coils.

Between 1936 and 1947, 45 Multiple Stack Furnaces and 128 Bases were installed in East and West Processing. In these furnaces, three or four stacks of coils up to 110" high can be built and covered by a single furnace. These bases can be adapted for sheet annealing. All of these facilities are still in use and are considered to be in fair to good condition. These furnaces too are limited to 61" OD Coils which complicates scheduling processes.

Armco, in cooperation with the Lee Wilson Company, virtually pioneered the development of the Single Stack Annealing Furnace starting at Middletown in 1947. Between 1954 and 1958, 42 furnaces and 123 bases were installed at Middletown. The Single Stack Furnace is one of the most widely accepted annealing processes in the industry today. In this process only one stack of coils up to 154" high and 72" outside diameter are built and covered by a single furnace. This is the most flexible and efficient means of annealing coils found to date. Another bank of 18 furnaces and 56 bases were put into production in 1964. Any additional annealing capacity that will be added will be of the single stack type.

The 1960-1962 addition to the annealing complex was 12 furnaces, 39 bases, and two rewinding units for what is known as "Open Coil" Annealing. This process consists of interwinding a stainless steel wire between each lap of the coil through one rewinder, annealing the coil in its opened state and then tight winding the coil for further processing. This installation was originally intended for the processing of one coat Enameling Iron called UNIVIT, however, it has been extensively used for retreats, remakes, short promise orders, and cold rolled products where extreme cleanliness

BIG RED, YELLOW (W-A)

AKE-005516

of strip is required. One limitation of this equipment is that to date we have not been able to develop a satisfactory cycle for drawing quality rimming steel.

Present Annealing Capacities

Utilization of furnaces and bases is largely determined by the mix of material available for annealing. As the ratio of drawing quality tonnage increases over commercial quality, the total tons through annealing decreases. This is due to the longer firing cycles required for drawing quality material. Based on the present mix of material (60% DQ versus 40% CQ), the following is considered to be maximum capacity from the Middletown Annealing Facilities:

	Tons/Month
Continuous Annealing	14,000
Multiple Stack (Coil Annealing)	35,000
Multiple Stack (Sheet Annealing)	8,700
Single Stack Annealing	55,000
Open Coil Annealing	22,300
Total Capacity	135,000
Total Coil Anneal Capacity	126,300

PROPOSED FACILITIES

The expansion program of 1963-64 provided building space at the North Area for either additional annealing facilities or storage of pre-annealed coils.

For Phase I, it is now considered feasible to utilize some of this space, originally intended for storing an inventory of pre-annealed coils, for the installation of 15 single stack furnaces, 45 furnace bases, and the necessary atmosphere gas generating machines. This will eliminate the immediate need to construct buildings and facilities in the South Area. In the North Area an additional 15,000 tons per month of coil annealing capacity will be added to the present 126,000 tons per month.

The total of 141,000 tons per month of coil annealing capacity will still be approximately 23,000 tons per month short of the Phase I coil annealing capacity set at 164,000 tons per month. It is anticipated that additional coil anneal production can be obtained by adding forced coolers and replacing the existing obsolete furnace equipment with modern furnaces. Increasing the annealed production from the existing equipment to make up part of the 23,000 tons per month shortage will be done on the Normal Program. It is estimated that approximately 50% of this tonnage can be produced by improving the present facilities.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

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AKE-005517

M I D D L E T O W N

COIL TEMPER ROLLING FACILITIES

BACKGROUND AND EXISTING FACILITIES

Although no temper rolling facilities are proposed in Phase I, the goal of processing 206,000 ordered tons of steel per month is based on the full utilization of existing temper rolling equipment in the North Area. It is therefore considered necessary to review the conditions and capacities of these facilities.

With the completion of installation of No. 6 Coil Temper Mill, which is now in progress, the North Area will have 4 Coil Temper Mills; three located in East Processing, and one in West Processing. Two other temper mills are designed for sheet processing. Since sheet tempering, because of cost, is used only on items that require sheet processing and since adequate sheet temper rolling is available; these facilities will not be described.

No. 2 Coil Temper Mill, a four-high Morgan Mill, was purchased "used" in 1937 and installed in the East Processing Department. This mill has been in continuous use since that time, operating when required on a 20 turn per week basis. It is currently considered to be in fair condition. It can produce reasonably good quality on a limited range of gauges and widths, at only fair efficiency. It is considered to be underpowered which limits its range to 1.5% temper and under.

Number 4 Coil Temper Mill, a four-high Mesta Mill, was purchased "used" in 1941 and installed in the West Processing Department. This mill has 54" wide work rolls whereas the other mills have 80" rolls. This mill too has been in almost continuous operation on an around the clock basis since its installation. The mill is considered to be in fair to good shape, but it too is underpowered and limited in the percent it will temper.

Number 5 Coil Temper Mill, a four-high Bliss Mill, was purchased "new" in 1956 and installed in the East Processing Department. The mill is considered to be in good condition, capable of producing a quality product across our full range of gauge and width.

Number 6 Coil Temper Mill, a four-high Bliss Mill, is presently being installed in the East Processing Department.

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M I D D L E T O W N

Present Coil Temper Rolling Capacities:

No. 2 Temper Mill (60 tons per hour)	41,600 tons/month
No. 4 Temper Mill (35 tons per hour)	24,300 tons/month
No. 5 Temper Mill (80 tons per hour)	55,500 tons/month
No. 6 Temper Mill (80 tons per hour)	55,500 tons/month
Total Temper Rolling Capacity	176,900 tons/month

This temper rolling capacity when used at maximum rate (20 turns/week/mill) will be adequate to sustain an order delivery rate of 206,000 prime tons per month on the scheduled program.

Financial review of this project is included in the total Ashland/Butler/Middletown evaluation.

M I D D L E T O W N

ALUMINIZE FACILITIES

BACKGROUND AND EXISTING FACILITIES

The first ZINCGRIP pilot line was built at the Butler Works in 1936. Two other production models followed in 1938 and 1940. The war years interrupted further development at this point. The No. 1 ZINCGRIP unit at Middletown started in 1946, was therefore the fourth line to be constructed in the world. Prior to this, however, Middletown had a long history in coated products. The first heat of steel tapped on February 7, 1901, was galvanized in sheet form the latter part of that month. Since then the growing demand for coated products has been on an over ascending curve.

Since the start up of No. 1 ZINCGRIP Line in April, 1946, a major change was initiated in June, 1960, when post heating facilities were added to the line. These consisted of an electrical coil arrangement around the strip and above the pot. Its purpose was to post heat the material by inducing a current in the strip. Later an additional coil was added immediately above the coating machine. The use of this post heating technique has not been as satisfactory as expected primarily because of its limit to very light coating. New entry equipment was installed in December, 1962, and at that time a welder was added to the line. Although some wiring was replaced with the 1962 shutdown, the rest of the unit is badly in need of rewiring and awaits only a major down time. Driven hearth rolls are needed to replace the existing idlers; strip cooling and bridle arrangement at the leveller is planned; and a new oxidizing furnace is required.

The Number 2 Coating Unit was installed at Middletown and started up in May, 1949. This unit too received new entry equipment to permit it to process larger coils in 1961. In June, 1961 facilities were added to convert the No. 2 Unit to an ALUMINIZING Line. In the conversion the following changes were made: Driven hearth rolls were installed; new heating elements and insulation in the final cooling zones and larger pit furnace were added. Later that year a premelt furnace was installed as well as a preheat furnace. The general condition of this unit is considered good but "tracking" has always been poor. This is true especially on light gauges. The long pass line through No. 2 loop car contributes to the problem. The line needs a new welder. When it is converted back to ZINCGRIP as planned, additional facilities for strip cooling will be required. A pinch roll, bridle roll arrangement at the leveller is necessary and a new dancer roll and oxidizing furnace is needed.

The No. 3 Coating Line was installed and started up in April, 1961. Generally speaking this unit is in good condition.

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AKE-005520

M I D D L E T O W N

Capacities

The passed tons capacity of these lines is considered to be:

No. 1 Unit (ZINCGRIP)	7,200	Tons/Month
No. 2 Unit (ALUMINIZED)	*6,500	Tons/Month
No. 3 Unit (ZINCGRIP)	17,500	Tons/Month
Total	31,200	Tons/Month

* When the No. 2 Line is coating with zinc, the production is 15% more than when coating with aluminum.

PROPOSED FACILITIES

A new hot dip ALUMINIZED Line of approximately 14,600 tons per month capacity will be installed in the South Area during Phase I. The present coating lines, which produce both ZINCGRIP and ALUMINIZED coils, will produce ZINCGRIP exclusively when the ALUMINIZED Line is completed.

The line will process coil weights up to 63,000# in gages from #14 to #28 inclusive, and in strip widths from 24" to 60".

The line will be a continuous coating line in which the strip is annealed, cleaned, coated, temper rolled and recoiled in one single operation.

This line will be installed in a building 960' long by 120' wide and serviced by a 25/5 ton pot crane, 5 ton furnace service crane and a 50/15 ton coil handling crane. In Phase I, this building will also be used as a shipping building for coated products. As Phase II is completed, additional finishing facilities will be added in the South Area, and shipping will be handled from a new building, designed expressly for that purpose.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

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BIG RED, YELLOW (W-A)

AKE-005521

M I D D L E T O W N

SERVICE AND SUPPORTING FACILITIES

The addition of a new Melt Shop, Hot Strip Mill, Pickle Line, Tandem Mill, and Coating Line will require the installation of extensive supporting facilities and services. While some parts of these facilities will be included in each program request, the items listed are considered separately because they will service more than one producing unit. Careful consideration is being given for sizing of facilities so that they will be compatible with the facilities planned for the future expansion, and still be consistent with best investment practices.

Steam

At present, there are two 100,000#/hr. and four 60,000#/hr. boilers located in No. 1 Boiler House and four 125,000#/hr. boilers in No. 2 Boiler House. Increased steam requirements will be supplied by three new 167,000#/hr. slab furnace waste-heat boilers with provision for two additional boilers, as required.

A steam piping distribution system is to be installed between the existing and new facilities capable of handling Phase I and Phase II requirements.

Water

Water is presently supplied from the Great Miami River, from deep wells, and a clarified water system that reclaims and recirculates water for the existing hot strip mill.

In order to conserve water, meet quality requirements, comply with present and proposed state and national anti-pollution laws (which requires nearly potable water for plant effluent to the river) new water recirculation systems, treatment plants, clarifiers, and connecting piping, (including a fire loop) will be installed for the new facilities.

Makeup water for these systems will be obtained by increasing the pumping capacity of the existing river water line and by adding additional deep wells.

Air

The present facilities are supplied air from a 39,500 CFM pumping station located in the No. 1 Boiler House.

A centralized air compressor station will be installed in the Hot Strip Mill Pump Room with connecting piping to the various facilities located in the South Area. A separate station will be installed for the L-D Melting Facilities.

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AKE-005522

M I D D L E T O W N

Oxygen Services

The existing oxygen facility consists of Linde's 260 tons per day on site plant with up to 175 tons per day of shipped in liquid oxygen.

A new oxygen contract is being negotiated to supplement these units to meet the present and Phase I requirements.

The oxygen contracts are commodity purchase agreements and as such no capital investment is involved. However, the utilities to the oxygen facility and the oxygen distribution from the battery limits will be a capital expenditure, and will be covered under this item.

Power

Power is presently supplied by two 132 KV, 60 cycle lines from C. G. & E. which feed main substation 1A and substation 1B. These substations transform power to 6.6 KV for distribution to the present plant. There is also some 2,400 volt, 25 cycle power generated within the plant.

The new facilities will also be fed from the existing 132 KV lines which have adequate capacity into a new primary switching station and from there to three new 132 KV substations where the voltage is reduced to 13.8 KV. The 25 cycle power distribution system will be converted to 60 cycles on a future Normal Program item. Existing substations will continue to service the present facilities.

Waste Disposal

It is planned to connect sanitary sewers servicing the new steelmaking area and south area facilities into the City of Middletown's sewer system.

Final treatment of industrial contaminated water will have to comply with present and proposed state and national stream anti-pollution laws. The facilities and method of treatment of these wastes are contingent upon type of processes and chemicals used in the new facilities.

Site Development

In order to prepare the South Area for the proposed facilities, a general clearing and benching of the entire site is required. Site development for the present program will include the following items of work:

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AKE-005523

a. Studies to determine required properties.
b. Subsurface investigation.
c. Drainage.
d. Relocation of existing utilities and facilities.
e. Flood protection and relocation of drainage creeks not included in the Miami Conservancy work.
f. Fillings-spoils from Dick's Creek and buildings foundations.
g. Grading - both rough and finish.
h. Distribution of rubble from the present slag dump and No. 2 Open Hearth area.
i. Access roads.
j. Parking lots.
k. Yard lighting.
l. Fencing.

Tracks and Rolling Stock

The present Armco inbound and outbound yards and the Pennsylvania Railroad marshaling yard are located in an area that is east and south of No. 2 Open Hearth.

The proposed facilities necessitate the moving of the Pennsylvania's yards and incoming line to an area south of Oxford State Road to permit flow between the Melting and Rolling Facilities. This relocated Pennsylvania yard permits an interchange track to the New York Central main line. Armco will install more than 35 miles of intra-plant track required outside of buildings to handle transportation of materials by rail. Scales for weighing cars in motion and additional rolling stock such as gondolas, flat cars, locomotives, etc., will also be required. This trackwork will include subgrade preparation, drainage, ballast, ties, rails, turnouts, hardware, and crossing signals.

Relocation of Slag Processing Facilities

Site planning for the Program requires the new Hot Strip Mill be located in the present Slag Processing Facility and oriented in the north-south direction. This necessitates relocation of the Slag Processing Facility.

The area selected for the Slag Processing Facility (south of Oxford State Road and west of American Materials) includes approximately 75 acres of available space for the waste stockpile. With an ultimate practical average depth of 50 feet, the area will accommodate the proposed production rate for approximately 85 years.

All of the slag in the present dump will be used as fill in selected areas as part of site development.

BIG RED, YELLOW (W-A)

AKE-005524

M I D D L E T O W N

Other Services and Facilities

a. Distribution lines for natural and coke oven gas.

b. Locker rooms.

c. First aid station.

Financial review of this project is included in the total Ashland/Butler/ Middletown evaluation.

12/65

BIG RED, YELLOW (W-A)

AKE-005525

PIQUA QUARRIES

BACKGROUND AND EXISTING FACILITIES

The quarries real estate is composed of roughly 912 acres containing approximately 52 million tons of fluxstone and 28 million tons of top rock.

After quarrying the rock by means of the necessary excavating equipment, a 300 tons/hour gyratory crusher crushes the quarried rock discharging it through a bucket elevator into a 200 ton/hour secondary cone crusher. The crushed stone is screened for fluxstone and roadstone. All fines under 3/4" are further pulverized and dried for sale as agricultural lime dust or pulverized limestone. This material is stored in a 1,000 ton Armco MULTI-PLATE silo storage. The necessary truck and rail loading facilities are maintained on the site.

PROPOSED FACILITIES

The Sales Department forecasts a growing need for agricultural limestone including a new product of fertilizer conditioner. These pulverized products sales are expected to double by 1970. The new conditioner material sales are expected to reach 139,000 tons by 1970. In order to produce this increase, several equipment changes are required:

1. Additional storage facilities. By proper use of proposed new material handling facilities, the conversion of existing dust collecting silos to storage silos will increase our storage from the present 1,000 tons to 10,000 tons.

2. Additional drying capacity. Replace one 1925 model dryer with a new rotary 100 ton/hour dryer and its necessary dust collection facilities.

3. Crushing, screening, and conveying equipment. The addition of a new 100 ton/hour hammer mill with its related screening and conveying equipment will enable the production of the new fertilizer conditioner material.

4. Mechanical feeder for primary crusher. The addition of a mechanical feeder will assure an even rate of stone delivery to the crusher from a dumping surge bin. The bypassing of the undersized rock will permit the passage of the stone that does not require primary crushing to go directly to the secondary crusher. This feeder will make possible about a 14% increase in production rates.

Financial review of this project will be independent of any other projects.

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BIG RED, YELLOW (W-A)

J2769

STEEL
1964 - 1970 SPECIAL PROGRAM
CONSTRUCTION SCHEDULE

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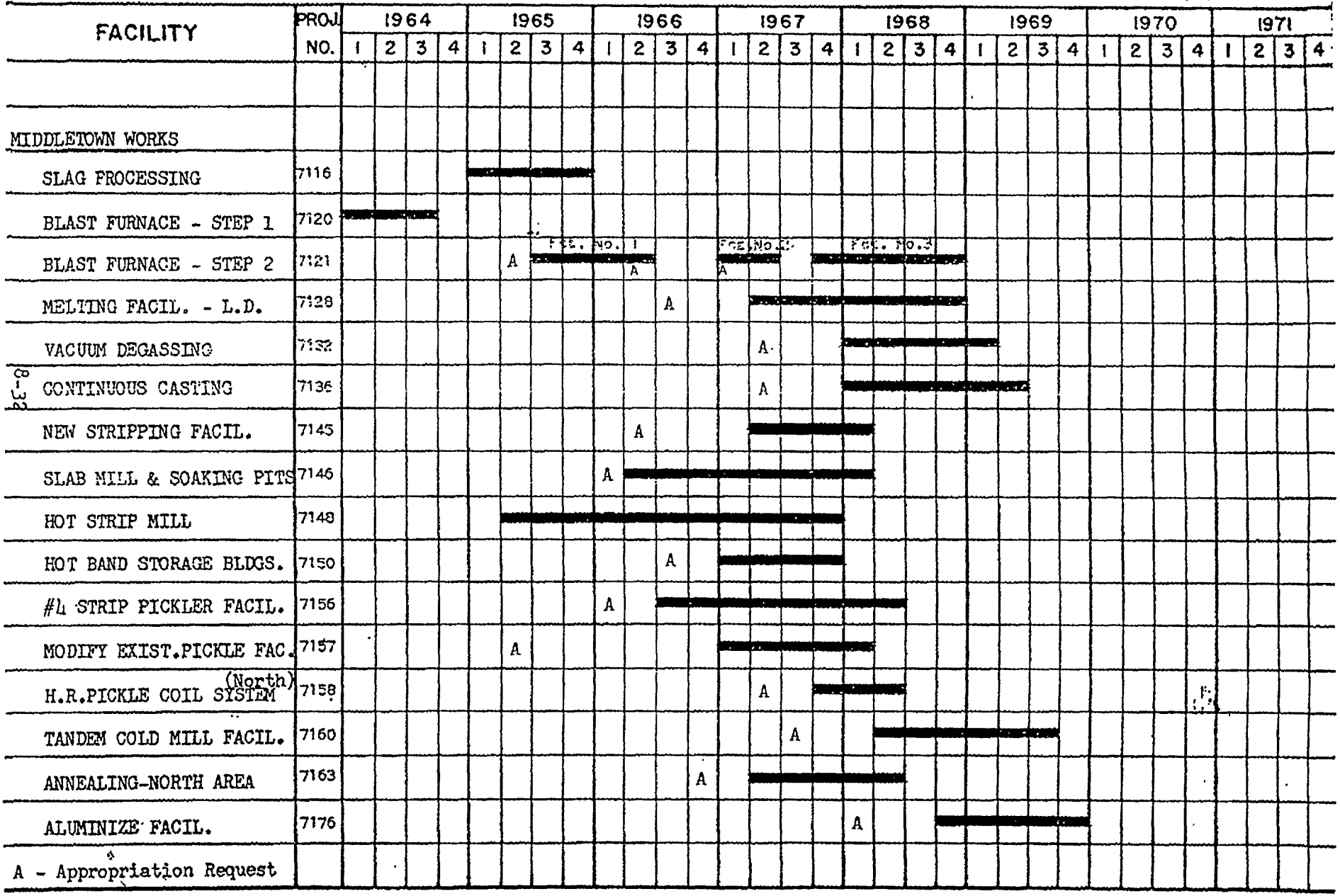

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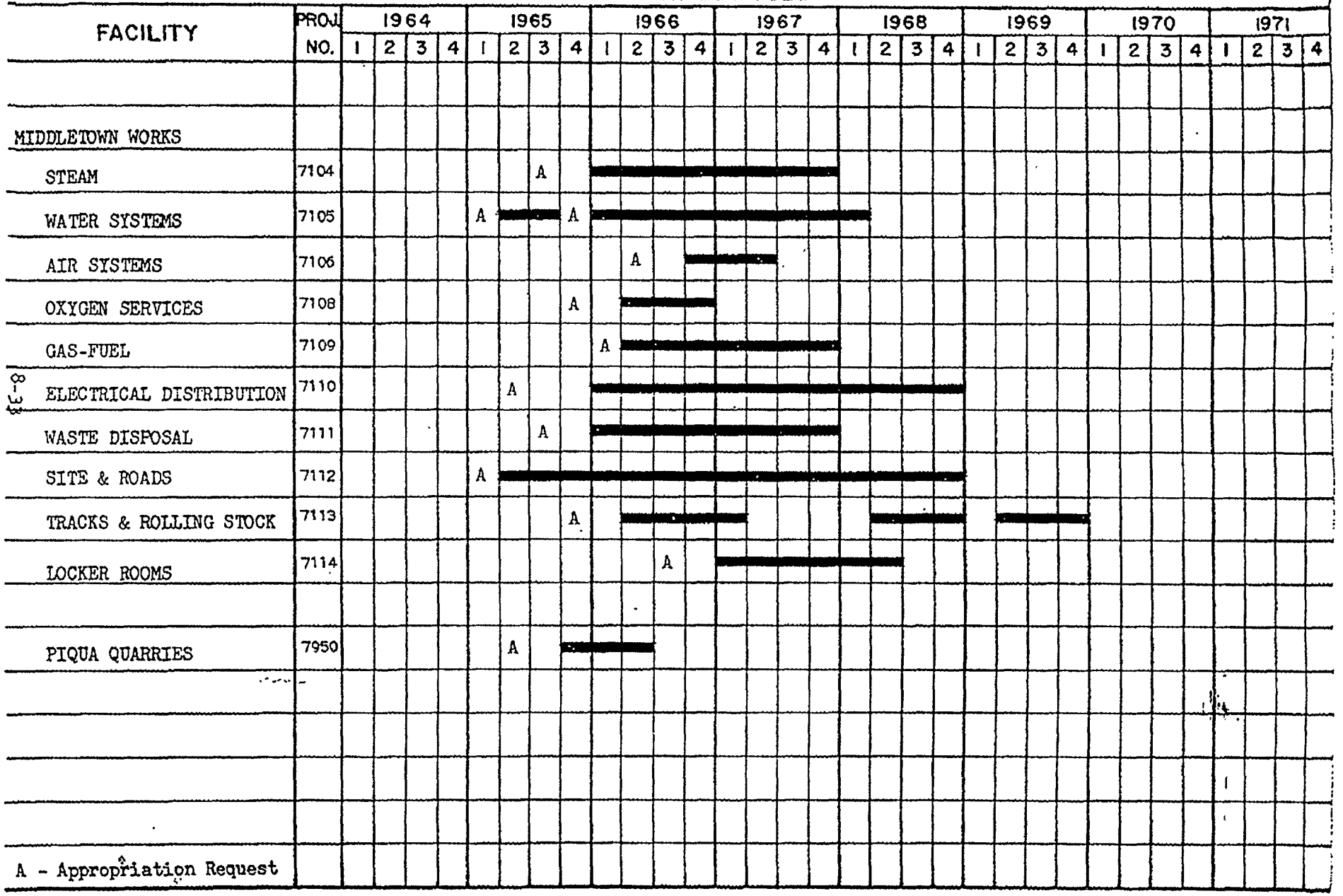
BIG RED, YELLOW (W-A)

13769

STEEL
1964 - 1970 SPECIAL PROGRAM
CONSTRUCTION SCHEDULE

12/65



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BIG RED, YELLOW (W-A)

ARMCO

1964-70 SPECIAL PROGRAM

ANALYSIS OF PROJECT COST

MIDDLETOWN WORKS

$000's OMITTED

Project Number		Capital	Capital Spares	Total Capital	Expense	Start-up Expense	Spares	Retirement	Total Expense	Total Cost
7115	Slag Processing	$ 835	$ -	$ 835	$1,600	$ -	$ -	$ -	$ 1,600	$ 2,435
7120	Blast Furnace - Step 1	3,400	-	3,400	625	100	60	-	785	4,185
7121	Blast Furnace - Step 2	6,135	50	6,185	1,160	90	40	-	1,290	7,475
7128	Melting Facilities - L.D.	33,320	80	33,400	100	500	200	-	800	34,200
7132	Vacuum Degassing	2,345	-	2,345	-	100	100	-	200	2,545
7136	Continuous Casting	11,140	100	11,240	100	200	460	-	760	12,000
7145	New Stripping Facilities	2,150	-	2,150	-	50	250	-	300	2,450
7146	Slab Mill & Soaking Pits	51,900	830	52,730	-	1,240	2,760	-	4,000	56,730
7148	Hot Strip Mill	124,750	4,630	129,380	-	2,800	4,450	-	7,250	136,630
7150	Hot Band Storage Bldgs.	4,250	50	4,300	-	30	170	-	200	4,500
7156	#4 Strip Pickler Facil.	14,100	150	14,250	100	500	500	-	1,100	15,350
7157	Modify Exist. Pickle Facil.	1,400	100	1,500	600	150	50	50	850	2,350
7158	H.R. Pickle Coil System (North)	400	-	400	800	50	20	30	900	1,300
7160	Tandem Cold Mill Facil.	22,725	975	23,700	-	500	1,200	-	1,700	25,400
7163	Annealing - North Area	1,945	55	2,000	50	50	100	-	200	2,200
7176	Aluminize Facilities	12,600	100	12,700	-	400	400	-	800	13,500

AKE-005529

BIG RED, YELLOW (W-A)

ARMCO

1964-70 SPECIAL PROGRAM

ANALYSIS OF PROJECT COST

MIDDLETOWN WORKS - SHEET #2

$000's OMITTED

PROJECT NUMBER		CAPITAL	CAPITAL SPARES	TOTAL CAPITAL	EXPENSE	START-UP EXPENSE	SPARES	RETIRE-MENT	TOTAL EXPENSE	TOTAL COST
7148-2	STEAM-WASTE HEAT BOILER	- - - - - - - - - - - (TOTAL COST OF $4,950 INCLUDED IN PROJECT #7148) - - - - - - - - - - -								
7104	STEAM	$ 2,950	$ 35	$ 2,985	$ 200	$ 65	$ -	$ -	$ 265	$ 3,250
7105	WATER SYSTEMS	9,890	65	9,955	250	50	100	-	400	10,355
7106	AIR SYSTEMS	1,480	20	1,500	-	30	20	-	50	1,550
7108	OXYGEN SERVICES	550	-	550	10	40	-	-	50	600
7109	GAS-FUEL	1,150	-	1,150	10	40	-	-	50	1,200
7110	ELECTRICAL DISTRIBUTION	5,875	-	5,875	-	100	50	-	150	6,025
7111	WASTE DISPOSAL	590	-	590	-	10	-	-	10	600
7112	SITE & ROADS	6,400	-	6,400	1,100	-	-	-	1,100	7,500
7113	TRACKS & ROLLING STOCK	8,300	-	8,300	650	-	-	-	650	8,950
	LOCKER ROOMS	450	-	450	-	-	-	-	-	450
	TOTALS	$331,030	$7,240	$338,270	$7,355	$7,095	$10,930	$80	$25,460	$363,730
	PIQUA QUARRIES	732	-	732	-	-	-	-	-	732
	GRAND TOTAL - MIDDLETOWN	$331,762	$7,240	$339,002	$7,355	$7,095	$10,930	$80	$25,460	$364,462

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AKE-005530

BIG RED, YELLOW (W-A)

STEEL

SPECIAL PROGRAM

FUTURE PLANNED FACILITIES

MIDDLETOWN WORKS

PHASE II - UTILIZATION OF COLD FINISHING FACILITIES

Step 1. Additional Coke Facilities
Step 2. #4 Blast Furnace & Aux. Including Boiler House & Ore Bridge
Step 3. #3 L-D Furnace
Step 4. Vacuum Degassing
Step 5. Continuous Casting
Step 6. #4 Slab Furnace - Hot Mill
Step 7. Box Annealing Facilities
Step 8. Coating Facilities
Step 9. Temper Rolling Facilities
Step 10. Finishing Facilities
Step 11. Shipping Facilities

MISCELLANEOUS

Air Pollution - #2 Open Hearth
Large Diameter Pipe
EMT - Continuous In Line Plating
Coil Preparation Facilities for S.W.P.
Maintenance Facilities

12/65

AKE-005531

BIG RED, YELLOW (W-A)

STEEL

SPECIAL PROGRAM

FUTURE PLANNED FACILITIES

M I D D L E T O W N W O R K S

PHASE II - UTILIZATION OF COLD FINISHING FACILITIES

Step 1. Additional Coke Facilities
Step 2. #4 Blast Furnace & Aux. Including Boiler House & Ore Bridge
Step 3. #3 L-D Furnace
Step 4. Vacuum Degassing
Step 5. Continuous Casting
Step 6. #4 Slab Furnace - Hot Mill
Step 7. Box Annealing Facilities
Step 8. Coating Facilities
Step 9. Temper Rolling Facilities
Step 10. Finishing Facilities
Step 11. Shipping Facilities

MISCELLANEOUS

Air Pollution - #2 Open Hearth
Large Diameter Pipe
EMT - Continuous In Line Plating
Coil Preparation Facilities for S.W.P.
Maintenance Facilities

12/65

AKE-005532

SMALL RED, PURPLE

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STEEL 1964-70 SPECIAL PROGRAM

MIDDLETOWN WORKS

CURRENT ESTIMATED COST OF PROGRAM (KAISER CONTRACT)

PROJECT NUMBER		KAISER DIRECT COSTS	KAISER 71XX INDIRECT COSTS	CONTINGENCY	KAISER START-UPS VENDORS ASSISTANCE	TOTAL DESIGN & CONST. BUDGET	ARMCO RELATED COSTS	TOTAL ESTIMATED APPROP.
7104	STEAM	$ 2,445,200	$ 199,000	$ 272,800	$ 60,000	$ 2,977,000	$ 40,000	$ 3,017,000
7105	WATER SYSTEMS	6,833,632	927,530	691,838	30,000	8,483,000	175,000	8,658,000
7106	AIR SYSTEMS	487,100	32,500	37,400	10,000	567,000	30,000	597,000
7108	OXYGEN SERVICES	380,900	62,600	48,500	40,000	532,000	-	532,000
7109	GAS - FUEL	939,100	53,900	100,000	40,000	1,133,000	-	1,133,000
7110	ELECTRICAL DISTRIBUTION	4,725,500	277,500	300,000	70,000	5,373,000	50,000	5,423,000
7111	WASTE DISPOSAL	477,600	27,400	52,000	10,000	567,000	-	567,000
7112	SITE & ROADS	5,604,000	358,000	560,000	-	6,522,000	-	6,522,000
7113	TRACKS & ROLLING STOCK	6,606,600	380,400	710,000	-	7,697,000	800,000	8,497,000
7114	LOCKER ROOMS	365,000	21,000	39,000	-	425,000	-	425,000
7116	SLAG PROCESSING	1,971,600	96,900	-	-	2,068,500	-	2,068,500
7120	BLAST FCE. - STEP 1	-	-	-	-	-	-	-
7121	BLAST FCE. - STEP 2	-	-	-	-	-	-	-
7123	MELTING FACILITIES - L.D.	27,065,230	1,558,770	2,930,000	100,000	31,654,000	680,000	32,334,000
7132	VACUUM DEGASSING	1,897,900	109,100	206,000	20,000	2,233,000	180,000	2,413,000
7136	CONTINUOUS CASTING	9,098,400	523,600	990,000	50,000	10,662,000	710,000	11,372,000
7145	NEW STRIPPING FACILITIES	1,740,000	100,000	190,000	10,000	2,040,000	290,000	2,330,000

AKE-006104

SMALL RED, PURPLE

STEEL 1964-70 SPECIAL PROGRAM

MIDDLETOWN WORKS

CURRENT ESTIMATED COST OF PROGRAM (KAISER CONTRACT)

PROJECT NUMBER		KAISER DIRECT COSTS	KAISER 71XX INDIRECT COSTS	CONTINGENCY	KAISER START-UPS VENDORS ASSISTANCE	TOTAL DESIGN & CONST. BUDGET	ARMCO RELATED COSTS	TOTAL ESTIMATED APPROP.
7146	SLAB MILL & SOAKING PITS	$ 42,001,000	$ 2,416,000	$ 4,570,000	$ 440,000	$ 49,427,000	$ 4,390,000	$ 53,817,000
7148	HOT STRIP MILL	110,700,400	7,579,800	4,931,800	1,450,000	124,662,000	7,481,000	132,143,000
7150	HOT BAND STORAGE BLDGS.	3,442,800	198,200	372,000	10,000	4,023,000	240,000	4,263,000
7156	#4 STRIP PICKLE FACIL.	13,863,000	776,000	715,000	158,000	15,512,000	1,050,000	16,562,000
7157	MODIFY EXISTING PICKLE FACIL.	-	-	-	-	-	-	-
7158	H.R. PICKLE COIL SYSTEM (NORTH)	-	-	-	-	-	-	-
7160	TANDEM COLD MILL FACIL.	18,395,400	1,058,600	2,000,000	100,000	21,554,000	2,575,000	24,129,000
7163	ANNEALING - NORTH AREA	-	-	-	-	-	-	-
7176	ALUMINIZE FACILITIES	10,205,800	587,200	1,100,000	100,000	11,993,000	800,000	12,793,000
7950	PIQUA QUARRIES	-	-	-	-	-	-	-
	TOTALS	$259,246,162	$17,344,000	$20,816,338	$2,698,000	$310,104,500	$19,491,000	$329,595,500

7100 - INDIRECT MANAGEMENT COSTS = $17,940,000 ← total O.H.

FEE BASE - TOTAL DESIGN & CONST. BUDGET + 7100 INDIRECT MANAGEMENT COST = $328,044,500

FEE - (2% OF TOTAL DESIGN & CONST. BUDGET + 7100 INDIRECT MANAGEMENT COST) = $6,560,800

GRAND TOTAL PROGRAM - TOTAL ESTIMATED APPROP. + 7100 INDIRECT MANAGEMENT COSTS + FEE = $354,096,300

W.B.B.
2-22-66

AKE-006105

AMCO STEEL CORPORATION

STATUS OF STEEL 1964-70 SPECIAL PROGRAM

FEBRUARY 22, 1966

Project Number		Board Approved Program	Approp. Approved	Current Qtr. To Be Requested	Total Estimated Approp.	Estimated Final Cost	(Overrun) Underrun Program	Estimated Completion Date
	MIDDLETOWN							
	Kaiser Fee	$ 6,340,000	$ -	$ 1,920,000	$ 6,561,000	$ 6,561,000 E	$ (221,000)	-
7100	Kaiser Indirects	11,650,000	5,010,000	4,584,000	17,940,000	17,940,000 E	(6,290,000)	-
7104	Steam	3,071,000	2,950,000	-	3,017,000	3,017,000 E	54,000	1/68
7105	Water Systems	9,708,000	9,415,000	-	9,415,000	8,658,000 E	1,130,000	3/68
7106	Air Systems	1,466,000	-	557,000	597,000	597,000 E	869,000	7/67
7108	Oxygen Services	567,000	532,000	-	532,000	532,000 E	35,000	1/67
7109	Gas - Fuel	1,133,000	-	670,000	1,133,000	1,133,000 E	-	1/68
7110	Electrical Distribution	5,692,000	5,031,000	158,600	5,423,000	5,423,000 E	269,000	1/69
7111	Waste Disposal	567,000	190,000	-	567,000	567,000 E	-	1/68
7112	Site & Roads	7,083,000	6,522,000	-	6,522,000	6,522,000 E	561,000	1/69
7113	Tracks & Rolling Stock	8,497,000	3,165,000	300,000	8,497,000	8,497,000 E	-	4/67-1/70
7114	Locker Rooms	425,000	-	-	425,000	425,000 E	-	6/68
7116	Slag Processing	2,300,000	2,300,000	(231,592)	2,068,500	2,068,500 C	231,500	Complete
7120	Blast Furnace - Step 1	4,185,000	3,353,000	832,000	4,185,000	4,185,000 C	-	Complete
7121	Blast Furnace - Step 2	7,475,000	-	2,780,000	7,475,000	7,475,000 E	-	-
7128	Melting Facilities - L.D.	32,334,000	-	-	32,334,000	32,334,000 E	-	1/69
7132	Vacuum Degassing	2,413,000	-	-	2,413,000	2,413,000 E	-	4/69
7135	Continuous Casting	11,372,000	-	-	11,372,000	11,372,000 E	-	7/69
7145	New Stripping Facilities	2,330,000	-	2,279,000	2,330,000	2,330,000 E	-	4/68
7146	Slab Mill & Soaking Pits	53,817,000	-	52,576,000	53,817,000	53,817,000 E	-	4/68
7148	Hot Strip Mill	129,636,000	130,008,000	2,135,000	132,143,000	132,143,000 E	(2,507,000)	1/68
7150	Hot Band Storage Bldgs.	4,263,000	-	4,162,000	4,263,000	4,263,000 E	-	1/68
7156	84 Strip Pickler Facilities	14,554,000	-	16,562,000	16,562,000	16,562,000 E	(2,008,000)	7/68
7157	Modify Existing Pickle Facilities	2,350,000	-	-	2,350,000	2,350,000 E	-	4/68
7158	M. R. Pickle Coil System (North)	1,300,000	-	-	1,300,000	1,300,000 E	-	6/68
7160	Tandem Cold Mill Facilities	24,129,000	-	-	24,129,000	24,129,000 E	-	10/69
7163	Annealing - North Area	2,200,000	-	-	2,200,000	2,200,000 E	-	7/68
7176	Aluminize Facilities	12,793,000	-	-	12,793,000	12,793,000 E	-	1/70
7950	Piqua Quarries	732,000	732,000	-	732,000	732,000 E	-	7/66
		$364,462,000	$169,208,000	$89,284,008	$373,095,500	$372,338,500	$ (7,876,500)	

SMALL RED, PURPLE

AKE-006106

SMALL RED, PURPLE

ARMCO STEEL CORPORATION

STATUS OF STEEL 1964-70 SPECIAL PROGRAM

February 22, 1966

Project Number		Board Approved Program	Approp. Approved	Current Qtr. To Be Requested	Total Estimated Approp.	Estimated Final Cost	(Overrun) Underrun Program	Estimated Completion Date
	MIDDLETOWN							
	Kaiser Fee	$ 6,340,000	$ -	$ 1,920,000	$ 6,561,000	$ 6,561,000 E	$ (221,000)	-
7100	Kaiser Indirects	11,650,000	5,010,000	4,584,000	17,940,000	17,940,000 E	(6,290,000)	-
7104	Steam	3,071,000	2,950,000	-	3,017,000	3,017,000 E	54,000	1/68
7105	Water Systems	9,788,000	9,415,000	-	9,415,000	8,658,000 E	1,130,000	3/68
7106	Air Systems	1,466,000	-	557,000	597,000	597,000 E	869,000	7/67
7108	Oxygen Services	567,000	532,000	-	532,000	532,000 E	35,000	1/67
7109	Gas - Fuel	1,133,000	-	670,000	1,133,000	1,133,000 E	-	1/68
7110	Electrical Distribution	5,692,000	5,031,000	150,500	5,423,000	5,423,000 E	269,000	1/69
7111	Waste Disposal	567,000	190,000	-	567,000	567,000 E	-	1/68
7112	Site & Roads	7,083,000	6,522,000	-	6,522,000	6,522,000 E	561,000	1/69
7113	Tracks & Rolling Stock	8,497,000	3,165,000	300,000	8,497,000	8,497,000 E	-	4/67-1/70
7114	Locker Rooms	425,000	-	-	425,000	425,000 E	-	6/68
7116	Slag Processing	2,300,000	2,300,000	(231,592)	2,068,500	2,068,500 C	231,500	Complete
7120	Blast Furnace - Step 1	4,185,000	3,353,000	832,000	4,185,000	4,185,000 C	-	Complete
7121	Blast Furnace - Step 2	7,475,000	-	2,780,000	7,475,000	7,475,000 E	-	-
7128	Melting Facilities - L.D.	32,334,000	-	-	32,334,000	32,334,000 E	-	1/69
7132	Vacuum Degassing	2,413,000	-	-	2,413,000	2,413,000 E	-	4/69
7136	Continuous Casting	11,372,000	-	-	11,372,000	11,372,000 E	-	7/69
7145	New Stripping Facilities	2,330,000	-	2,279,000	2,330,000	2,330,000 E	-	4/68
7146	Slab Mill & Soaking Pits	53,817,000	-	52,576,000	53,817,000	53,817,000 E	-	4/68
7148	Hot Strip Mill	129,636,000	130,009,000	2,135,000	132,143,000	132,143,000 E	(2,507,000)	1/68
7150	Hot Band Storage Bldgs.	4,263,000	-	4,162,000	4,263,000	4,263,000 E	-	1/68
7156	84 Strip Pickler Facilities	14,554,000	-	16,562,000	16,562,000	16,562,000 E	(2,008,000)	7/68
7157	Modify Existing Pickle Facilities	2,350,000	-	-	2,350,000	2,350,000 E	-	4/68
7158	H. R. Pickle Coil System (North)	1,300,000	-	-	1,300,000	1,300,000 E	-	6/68
7160	Tandem Cold Mill Facilities	24,129,000	-	-	24,129,000	24,129,000 E	-	10/69
7163	Annealing - North Area	2,200,000	-	-	2,200,000	2,200,000 E	-	7/68
7175	Alkinize Facilities	12,793,000	-	-	12,793,000	12,793,000 E	-	1/70
7350	Piqua Quarries	732,000	732,000	-	732,000	732,000 E	-	7/66
		$364,462,000	$169,208,000	$89,284,008	$373,095,500	$372,338,500	$ (7,876,500)	

AKE-006107

MIDDLETOWN

Kaiser Fee

This appropriation will cover the fee to be paid Kaiser during the current year 1966. It is based on a payment of $200,000 per month, covering both Middletown and Butler. The pro rata share for Middletown will amount to $1,920,000.

Project 7100 - Kaiser Indirects

This request will provide for the indirect management cost for the year of 1966. Items of cost included in this request are: construction overhead, temporary construction, engineering and staff, and general management expenses.

Project 7106 - Air Systems

This request will cover the funds to install the necessary air compressors in the Hot Strip Mill pump house and provide for the distribution systems for the hot strip mill, slabbing mill, pickler, and cold mill complex.

SMALL RED, PURPLE

AKE-006108

Project 7109 - Gas-Fuel

This request will provide funds for the installation of a 20" gas line from Oxford State Road, running north to the soaking pits and waste-heat boilers in the Hot Strip Mill, and for a 16" gas line to continue northward to provide gas to the pickler-cold mill complex.

Project 7110 - Electrical Distribution

This request is in process for signature and will provide funds for the installation of additional circuit breakers and transmission towers to feed the new slabbing mill-soaking pit area.

Project 7113 - Site & Roads

This is a partial request and will provide funds for the beginning of site preparation for the new Pennsylvania Railroad yard to be located on the south edge of our property. The final amount of this appropriation will be determined when we complete our negotiations for settlement of property and trackage with the Pennsylvania Railroad.

Project 7116 - Slag Processing

This will be a Memo Request for credit of $231,592 to write-down the appropriation approved to the actual final closed cost of this job.

Project 7120 - Blast Furnace, Step #1

This is a supplemental appropriation request to balance the funds actually spent against previous appropriations.

Project 7121 - Blast Furnace, Step #2

This request is in process for signature and will provide the funds necessary for the rebuilding of the #1 Hamilton Furnace to raise blast temperature and increase burner capacity. $700,000 was originally approved on the Normal Program of 1965, to begin this work and has subsequently been cancelled so that currently we are working with no appropriation on this project.

Project 7145 - New Stripping Facilities

This request will provide the funds to install one stripper bay and one stripper crane for the new slabbing mill.

Project 7146 - Slabbing Mill & Soaking Pits

This request will provide the funds to build the slabbing mill and minimum number of soaking pits consistent with the program as agreed to late last year.

Project 7148 - Hot Strip Mill

This is a supplemental request to provide funds consistent with the revised estimate and engineering report just completed for the Hot Strip Mill. A complete re-estimate of this project has been made using all available detail and latest prices to arrive at this realistic budget figure.

Project 7150 - Hot Band Storage Buildings

This request will provide the funds to install the two buildings necessary to store the hot bands from the conveyors from the new Hot Strip Mill. These same buildings will serve as the feeding buildings to the #4 Strip Pickler.

Project 7156 - #4 Strip Pickler Facilities

This request will provide the funds for the installation of a new strip pickler and its hydrochloric acid regenerating plant. The regenerating plant will have the capacity for processing all hydrochloric acid to be used at the Middletown Works for Phase I.

W.B.B.
2-22-66

SMALL RED, PURPLE

AKE-006110

SMALL RED, PURPLE

H.H.
The latest
JW

STEEL 1964-70 SPECIAL PROGRAM

MIDDLETOWN WORKS

CURRENT ESTIMATED COST OF PROGRAM (KAISER CONTRACT)

PROJECT NUMBER		KAISER DIRECT COSTS	KAISER 71XX INDIRECT COSTS	CONTINGENCY	KAISER START-UPS VENDORS ASSISTANCE	TOTAL DESIGN & CONST. BUDGET	ARMCO RELATED COSTS	TOTAL ESTIMATED APPROP.
7104	STEAM	$ 2,445,200	$ 199,000	$ 272,800	$ 60,000	$ 2,977,000	$ 40,000	$ 3,017,000
7105	WATER SYSTEMS	6,833,692	927,530	691,838	30,000	8,483,000	175,000	8,658,000
7106	AIR SYSTEMS	487,100	32,500	37,400	10,000	567,000	30,000	597,000
7108	OXYGEN SERVICES	380,900	62,600	48,500	40,000	532,000	-	532,000
7109	GAS - FUEL	939,100	53,900	100,000	40,000	1,133,000	-	1,133,000
7110	ELECTRICAL DISTRIBUTION	4,725,500	277,500	300,000	70,000	5,373,000	50,000	5,423,000
7111	WASTE DISPOSAL	477,600	27,400	52,000	10,000	567,000	-	567,000
7112	SITE & ROADS	5,604,000	358,000	560,000	-	6,522,000	-	6,522,000
7113	TRACKS & ROLLING STOCK	6,606,600	380,400	710,000	-	7,697,000	800,000	8,497,000
7114	LOCKER ROOMS	365,000	21,000	39,000	-	425,000	-	425,000
7116	SLAG PROCESSING	1,971,600	96,900	-	-	2,068,500	-	2,068,500
7120	BLAST FCE. - STEP 1	-	-	-	-	-	-	-
7121	BLAST FCE. - STEP 2	-	-	-	-	-	-	-
7128	MELTING FACILITIES - L.D.	27,065,230	1,558,770	2,930,000	100,000	31,654,000	680,000	32,334,000
7132	VACUUM DEGASSING	1,897,900	109,100	206,000	20,000	2,233,000	180,000	2,413,000
7136	CONTINUOUS CASTING	9,098,400	523,600	990,000	50,000	10,662,000	710,000	11,372,000
7145	NEW STRIPPING FACILITIES	1,740,000	100,000	190,000	10,000	2,040,000	290,000	2,330,000

AKE-006102

SMALL RED, PURPLE

STEEL 1964-70 SPECIAL PROGRAM

MIDDLETOWN WORKS

CURRENT ESTIMATED COST OF PROGRAM (KAISER CONTRACT)

PROJECT NUMBER		KAISER DIRECT COSTS	KAISER 71XX INDIRECT COSTS	CONTINGENCY	KAISER START-UPS VENDORS ASSISTANCE	TOTAL DESIGN & CONST. BUDGET	ARMCO RELATED COSTS	TOTAL ESTIMATED APPROP.
7146	SLAB MILL & SOAKING PITS	$ 42,001,000	$ 2,416,000	$ 4,570,000	$ 440,000	$ 49,427,000	$ 4,390,000	$ 53,817,000
7148	HOT STRIP MILL	110,700,400	7,579,800	4,931,800	1,450,000	124,662,000	7,481,000	132,143,000
7150	HOT BAND STORAGE BLDGS.	3,442,800	198,200	372,000	10,000	4,023,000	240,000	4,263,000
7156	#4 STRIP PICKLE FACIL.	13,863,000	776,000	715,000	158,000	15,512,000	1,050,000	16,562,000
7157	MODIFY EXISTING PICKLE FACIL.	-	-	-	-	-	-	-
7158	H.R. PICKLE COIL SYSTEM (NORTH)	-	-	-	-	-	-	-
7160	TANDEM COLD MILL FACIL.	18,395,400	1,058,600	2,000,000	100,000	21,554,000	2,575,000	24,129,000
7163	ANNEALING - NORTH AREA	-	-	-	-	-	-	-
7176	ALUMINIZE FACILITIES	10,205,800	587,200	1,100,000	100,000	11,993,000	800,000	12,793,000
7950	PIQUA QUARRIES	-	-	-	-	-	-	-
	TOTALS	$259,246,162	$17,344,000	$20,816,338	$2,698,000	$310,104,500	$19,491,000	$329,595,500

7100 - INDIRECT MANAGEMENT COSTS = $17,940,000

FEE BASE - TOTAL DESIGN & CONST. BUDGET + 7100 INDIRECT MANAGEMENT COST = $328,044,500

FEE - (2% OF TOTAL DESIGN & CONST. BUDGET + 7100 INDIRECT MANAGEMENT COST) = $6,560,800

GRAND TOTAL PROGRAM - TOTAL ESTIMATED APPROP. + 7100 INDIRECT MANAGEMENT COSTS + FEE = $354,096,300

W.B.B.
2-22-66

AKE-006103

ARMCO Steel Division

February 17, 1966

To: Mr. D. S. Holstein
Manager,
Middletown Works

From: W. B. Browning

Subject: 1964-70 Special Program
Middletown Works

We are enclosing eight (8) copies of the 1964-70 Special Program as approved, in principle, by the Board on January 28, 1966. These books contain a Description of Facilities, Construction Schedule, Analysis of Project Costs, and Future Planned Facilities.

We are also making direct distribution to those listed on the copy list.

W B Browning
Director - Engineering

WBB:nm
Encls.

cc: N. T. Kurfiss (2)

Steel Engineering	Kaiser Engineers
C. F. Bailey	D. A. Daly (9)
F. W. Barnes	R. J. Wolf
N. L. Cole	
T. R. Foley	
A. M. Greco	
T. M. Kilgo	
L. R. Larson	
G. A. Pettit	
E. G. Schlup	
P. R. Smith	

FORM G-1110

SMALL RED, PURPLE

AKE-006101

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