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PROGRESS REPORT

ENGINEERING DEPARTMENT

ORGANIC CHEMICALS DIVISION

JOB NUMBER: EA No. 4-455

REPORT NUMBER: 1

DATE: November 27, 1963

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*** To Receive Details Section**

TITLE: Long Range Sewer Plan - WGK Plant
Part I • Storm Water Disposal

F. J. I. / Res. Return!

PERSONNEL: J. W. Caskey, C. N. Stutz (R. E. Howard)

PROBLEM: To determine the most economical long range method for disposing of storm water in Monsanto Village.

~~SUMMARY~~ CONCLUSIONS:

1. The present method of handling storm water by ponding and controlled discharge to the river should be continued until more intensive use of the land in the Village makes this method uneconomical.

2. When ponding is no longer desirable, the feasibility of using Dead Creek or an alternate route as an open channel to the river should be investigated.

3. If an open channel is not feasible, then a closed sewer should be built to carry storm water to the river via the most economical route.

PAUL HODGES DEPOSITION
May 31 - June 1, 1994
EXHIBIT NO. 10

CER 113159

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Background

The present Village sewer system provides drainage for about 250 acres. Report No. 5, EA No. 4-276 pointed out that the present sewers operating as a pressure system with two surge ponds, and numerous seepage ponds, are adequate for a runoff of 1.0 cubic feet per second (cfs) per acre from this area. Future development of the area could cause about 750 acres east of the Terminal railroad to be tributary to the Village sewers.

Seepage ponds are an important part of the present Village sewer system. The top layers of soil in the Village area are generally porous. A typical test well profile shown on page 3 indicates that the top layers of soil are silty sand or sandy clay with lenses of clay. Although local areas may contain enough clay in the top soil layers to make the ground almost impervious, most of the Village soil takes water readily. Lysimeter tests conducted on a five foot thick soil sample from the vicinity of the Village pump station indicated a seepage rate in excess of 75 inches of water per year. Areas now being cultivated or that are covered with vegetation have little or no present runoff. Future development which closes seepage ponds will cause runoff from areas not now contributing water.

Horner and Shifrin recommended Dead Creek as the ultimate outlet for storm water in their 1952 report on the Village sewer system.

Area Drainage Pattern

The map on page 9 indicates that natural drainage in the Monsanto Village, East St. Louis and Cahokia areas is essentially parallel to the river. East St. Louis has intercepted this drainage pattern and constructed two major sewers to the river, just north of Monsanto Village. The present Village sewer system also intercepts this natural drainage. Cahokia has no storm sewer system, but uses Dead Creek and open ditches for drainage, which drain to a drainage ditch south of Cahokia, and then to the river. Dead Creek is the primary natural drainage facility in the Monsanto Village and northwest Cahokia areas.

Four principal Monsanto Village drainage areas are shown on the drainage pattern map, page 9. Area A is west of the main levee, and although natural drainage is parallel to the river, the probable best route for future drainage would be direct to the river. The natural drainage for Area B is south to the Cahokia slough. This area is now reserved primarily for waste treatment purposes. Should drainage facilities be necessary in the future, they may be connected to the existing system.

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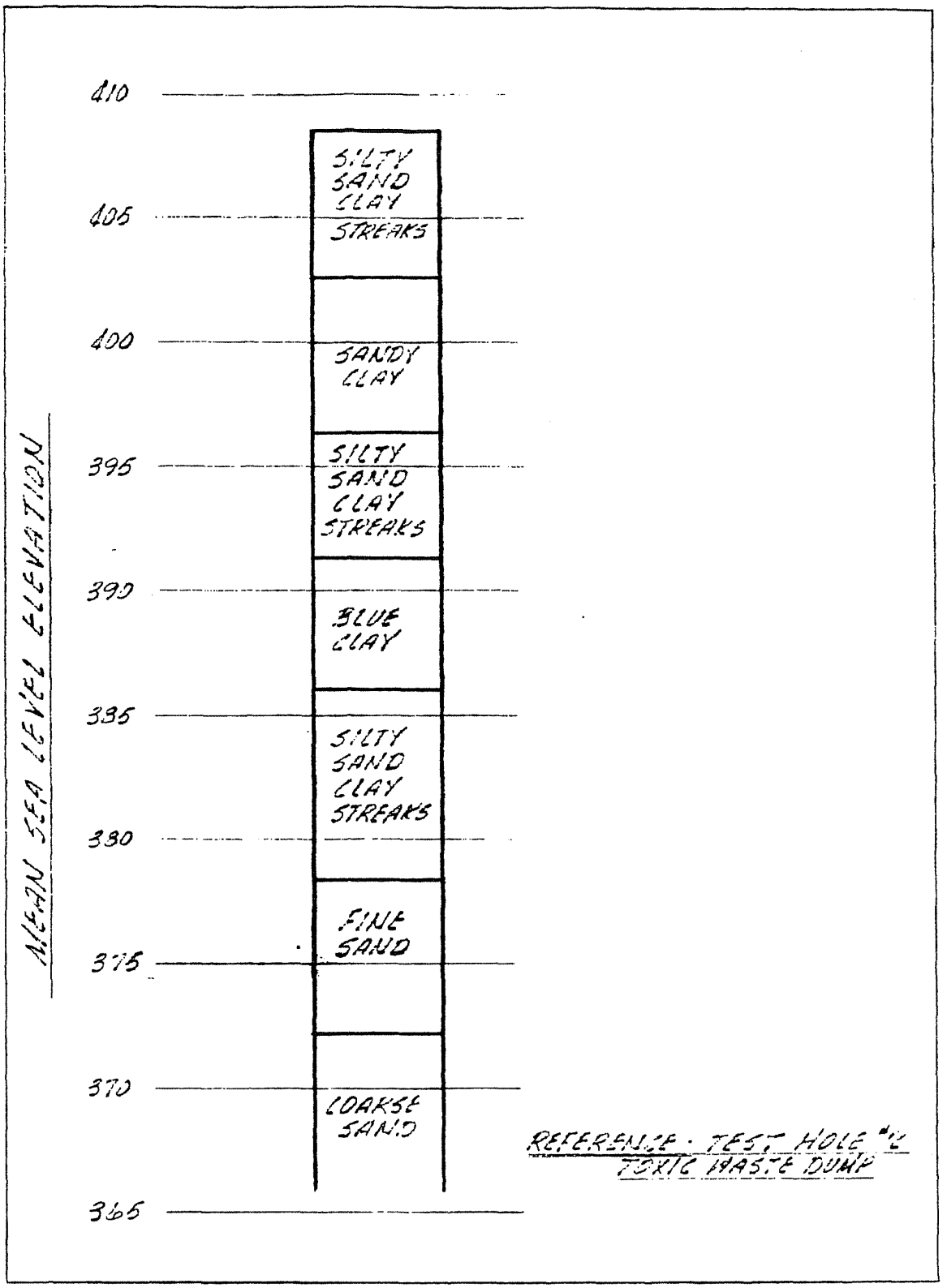
TYPICAL SOIL PROFILE
MONSANTO VILLAGE AREA



CER 113161

Area C is the major area on the map, and encompasses in excess of 700 acres between its north boundary and Judith Lane. This area is naturally tributary to Dead Creek.

Area D includes the north WGK plant, and is drained naturally toward the north. The pattern of natural drainage for this area should be maintained if possible.

Alternate Drainage Systems

Four alternate methods of handling future storm runoff from Area C were considered as follows:

I. Continue the present system of surge ponds and seepage ponds, adding capacity as required.

II. Construct box sewers to carry all storm water to the river via a route essentially perpendicular to the river.

III. Use Dead Creek in its present location or along an alternate route as an open channel to carry storm water to the river.

IV. Construct box sewers in the present Dead Creek channel and use it as an enclosed sewer to the river.

The future drainage for area D should involve ponding in the existing ponds until the pond areas are to be developed. At that time, a storm water sewer can be connected to the East St. Louis system.

Basic Features of Area C Alternates

Alternate I maintains the present concept of ponding. As such, it is an intermediate, rather than a long range method of storm water disposal. It requires no major sewer construction, but will eventually require additional pond capacity. The Dead Creek and 19th St. surge ponds will be used until it becomes necessary to abandon them. When sufficient pond capacity can no longer be made available, a different method of storm water disposal must be used.

Alternates II, III, and IV involve elimination of the present ponds shown on page 11. The primary ponds now in use, their approximate drainage areas, their type, and possible methods for their elimination are as follows:

Pond No. 1) The Dead Creek surge pond drains about 202 acres, which includes 45 acres from south WGK. The future drainage area, including ponds #3, #4, and #5, could be about 408 acres, while

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inclusion of Pond # 2 would increase the drainage to about 525 acres The surge pond may be eliminated by methods shown on pages 12 and 13.

Pond No. 2) The 19th St. surge pond drains about 117 acres from Socony and tax lot A. Elimination of the pond would require a sewer to MH # 2 or to Dead Creek as shown on pages 14 and 15.

Ponds No. 3) Midwest Rubber and Darling Fertilizer seepage ponds have a tributary acreage of about 40 acres of which 8 acres are in tax lot F. The shortest route for elimination would be a sewer to Dead Creek.

Ponds No. 4) T. J. Moss seepage ponds serve about 68 acres, and are also used for sanitary and process waste. A sewer to Dead Creek would eliminate the ponds.

Pond No. 5) A seepage pond on the northeast end of Queeny Ave. serves about 63 acres. A sewer to Dead Creek would eliminate the pond.

All four alternates for draining area C require use of the existing sewer system, and construction of a new United States Corps of Engineers (USCE) pump station near the Monsanto Village pumping station. The new pump station must at least be capable of handling dry weather flow and some storm water. Under alternate I, storm water is drained from the surge ponds at a controlled rate, but must go through the pump station. Under alternate II, the USCE pump station to be built near the present Village pump station may be given added capacity and the sewers constructed along the present route, or an entirely new sewer system and pump station may be built for storm flows. Alternate III requires enlargement of the Levee District pump station if the route is along Dead Creek. If an alternate open channel route is taken, a new pump station is required. Alternate IV requires enlargement of the Levee District pump station on the south end of Dead Creek.

Basis of Calculations

Calculations are based on the conditions described in Report No. 5, EA No. 4-276. On a five year frequency, a storm of 2.5 inches per hour for 45 minutes, and 1.0 inches per hour for three hours may be expected. The 2.5 inch per hour storm and 40% runoff causes a CI = 1.0 cfs per acre while the 1.0 inch per hour storm and 50% runoff cause a CI = 0.5 cfs per acre.

Although alternate I proposes maintaining the present system of ponds, some added capacity would eventually be necessary. As pointed out in the previous report, the storm duration affects pond capacity more than does intensity.

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The 19th Street surge pond now serves Socony and north WGK. Under alternate I, north WGK ponds north of the plant, leaving the 19th Street pond for Socony and lot A. The present pond is large enough to handle a CI = 1.0 for 45 minutes from lot A and Socony. For storms of longer duration, more pond capacity would be required to prevent exceeding elevation 407.0 at MH#9.

An earlier section stated that Dead Creek drains about 202 acres including 45 acres from south WGK. This acreage encompasses all land adjacent to the creek on the east and west, between Judith Lane and the Alton and Southern Railroad. Report #5, EA 4-276 considered only 43 acres along the creek as presently contributing drainage, plus a back flow from MH#24 of 54 cfs at CI = 1.0. As the area along the creek is developed, more water will reach the creek. In the future, therefore, it may be necessary to increase the ponding capacity.

For alternate I then, the hydraulic grade line (HGL) would be elevation 407.0 at MH#9, elevation 402.8 at the north end of Dead Creek and elevation 394.0 at the pump station with a CI = 0.5 cfs per acre for three hours, which would cause a four foot depth of water in the ponds.

In alternates II, III, and IV, the HGL is elevation 407.0 at MH#9, elevation 402.4 at the north end of Dead Creek and elevation 394.0 at the pump station used for each particular alternate.

The elevation 407.0 at MH#9 allows 0.5 feet free board on the Socony API separators. The 402.4 and 394.0 elevations are consistent with elevations shown in Report #5, EA # 4-276 for CI = 1.0 cfs per acre. The 394.0 elevation is the maximum HGL at the present village pump station consistent with maximum capacity of the present sewer system. All calculations assume adequate pump capacity.

Cost of Alternates for Draining Area C

Alternate I

Continue the present system of ponding, adding capacity as required Pond sizes are those required in the future to handle a CI = 0.5 for three hours.

Add capacity to 19th Street pond to handle 117 acres	$ 60,000
Add capacity to Dead Creek pond to handle 408 acres	200,000
Pipe overflow from MH#26 to Dead Creek	100,000
Total basic cost of Alternate I	$360,000

Alternate II

Construct sewers to carry all storm water to the river, in a path essentially perpendicular to the river.

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Sewers from Dead Creek to the river (see p. 12)	$3,870,000
Sewer from MH#9 to Dead Creek (see p. 15)	450,000
Pipe overflow from MH#26 to sewer from MH#9	50,000
Total basic cost of Alternate II	$4,370,000

Alternate III

Use Dead Creek or an alternate route as an open channel to drain all storm water to the river.

Open channel to River (see p. 13)	$1,300,000
Pipe overflow from MH#26 to sewer from MH#9	50,000
Sewer from MH#9 to Dead Creek (see p. 15)	450,000
Total basic cost of Alternate III	$1,800,000

Alternate IV

Use Dead Creek as an enclosed sewer to drain all storm water to the river.

Enclosed sewer along Dead Creek to River (see p.12)	$13,000,000
Pipe overflow from MH#26 to sewer from MH#9	50,000
Sewer from MH#9 to Dead Creek (see p. 15)	450,000
Total basic cost of Alternate IV	$13,500,000

Discussion of Alternates for draining Area C **CER 113165**

The total basic cost figures show costs for equivalent drainage ability for each alternate, but do not include allowances for pump stations or lateral sewers. Alternate I would require pump station capacity of about 200 cfs while II, III, and IV would require about 750 cfs capacity. Alternate I requires the least number of lateral sewers and II, III, and IV each require essentially the same laterals.

Under any alternate it will be necessary to use the portion of Dead Creek between Queeny Avenue and the Alton and Southern Railroad as a sewer. The creek may be open or enclosed, as long as adequate capacity is provided.

Alternate I appears to be the most economical method of handling storm water, followed by III, II, and IV. As long as land is available for ponds, alternate I is the most economical. Should it be desirable to close the ponds, alternate III would be the next most economical method.

Dead Creek provides a natural route for an open channel to the river. The cost of an alternate open channel route from Dead Creek west to the river, is of the same order of magnitude

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If it is not feasible to use an open channel to the river, then alternate II is more economical than alternate IV. The best location for a sewer to the river is probably just south of the south Village limits. This location would allow maximum use of natural drainage. Dead Creek would act as an interceptor and the main sewer would run from Dead Creek west to the river. The cost of a sewer along this route would be of the same order of magnitude as the cost developed for a sewer paralleling the present Village sewers.

Discussion of Methods of Eliminating Dead Creek Pond

The discussion for Area C alternates includes all pertinent comments on the Dead Creek pond.

Discussion of Sewers for Elimination of 19th Street Pond

Costs for eliminating the pond by two sewer routes are shown. There is no present hydraulic advantage over either route, nor is any hydraulic advantage gained by eliminating the 19th Street pond. If, the 19th Street pond should be eliminated, the most economical route is to Dead Creek. This route, also, fits into the scheme to use Dead Creek as an open channel to the river or to use the creek as an interceptor for a sewer direct to the river

Discussion for Alternates for Area D

Natural drainage for area D is toward the north. A portion of this area is now drained by the Village sewers which intercept the natural drainage. The Village sewers are not adequate to provide drainage for the entire area D. Future storm drainage facilities should take advantage of natural drainage and use the seepage ponds along the Illinois Central Railroad. Industrial waste water should still be taken to the Village system. If and when, it becomes necessary to eliminate the ponds, they can be drained to the East St. Louis sewers.

CER 113166

Conclusions

1. The present method of handling storm water by ponding and controlled discharge to the river should be continued until more intensive use of the land in the Village makes this method uneconomical.

2. When ponding is no longer desirable, the feasibility of using Dead Creek or an alternate route as an open channel to the river should be investigated.

3. If an open channel is not feasible, then a closed sewer should be built to carry storm water to the river via the most economical route.

J. W. Caskey

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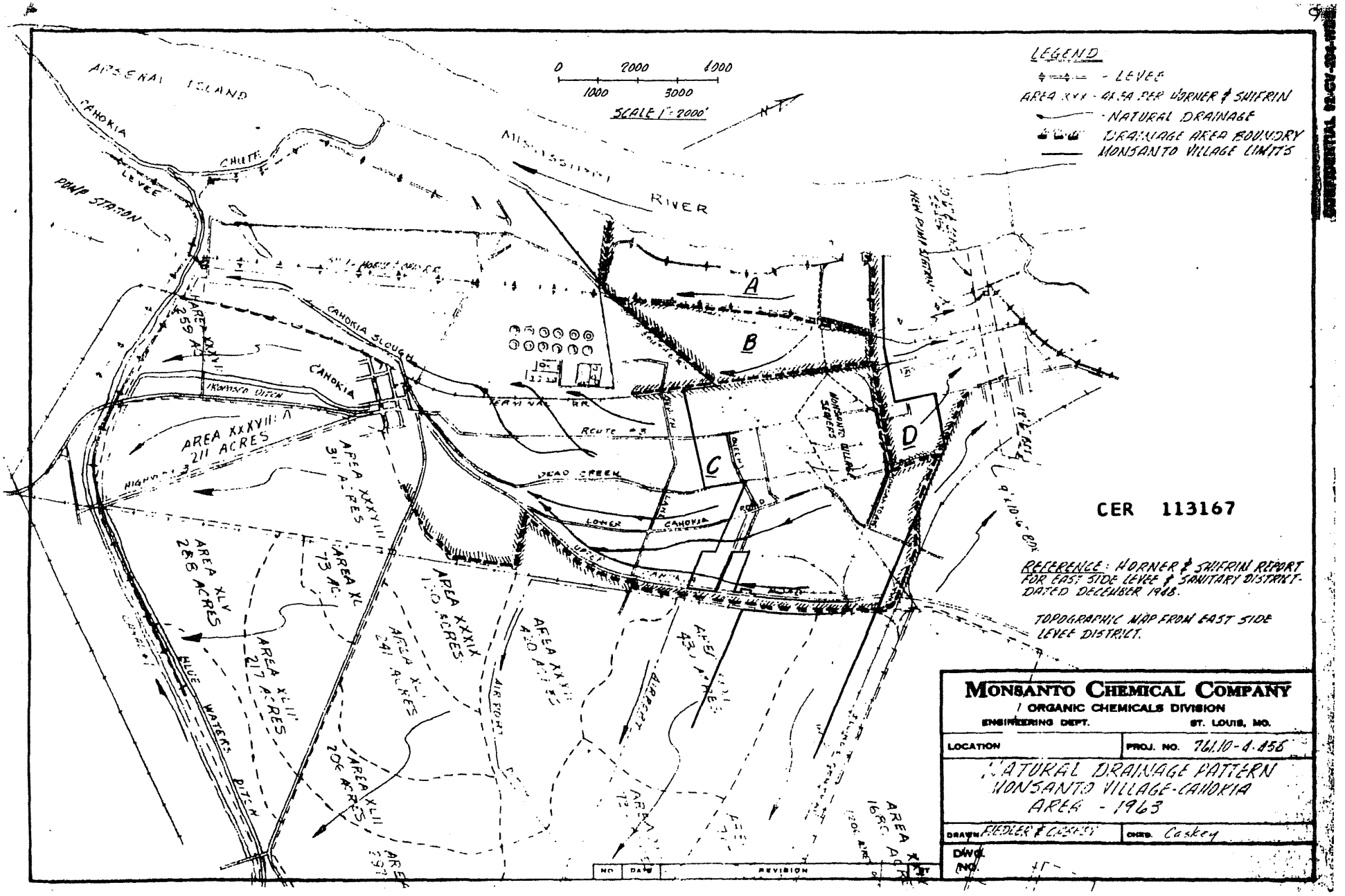

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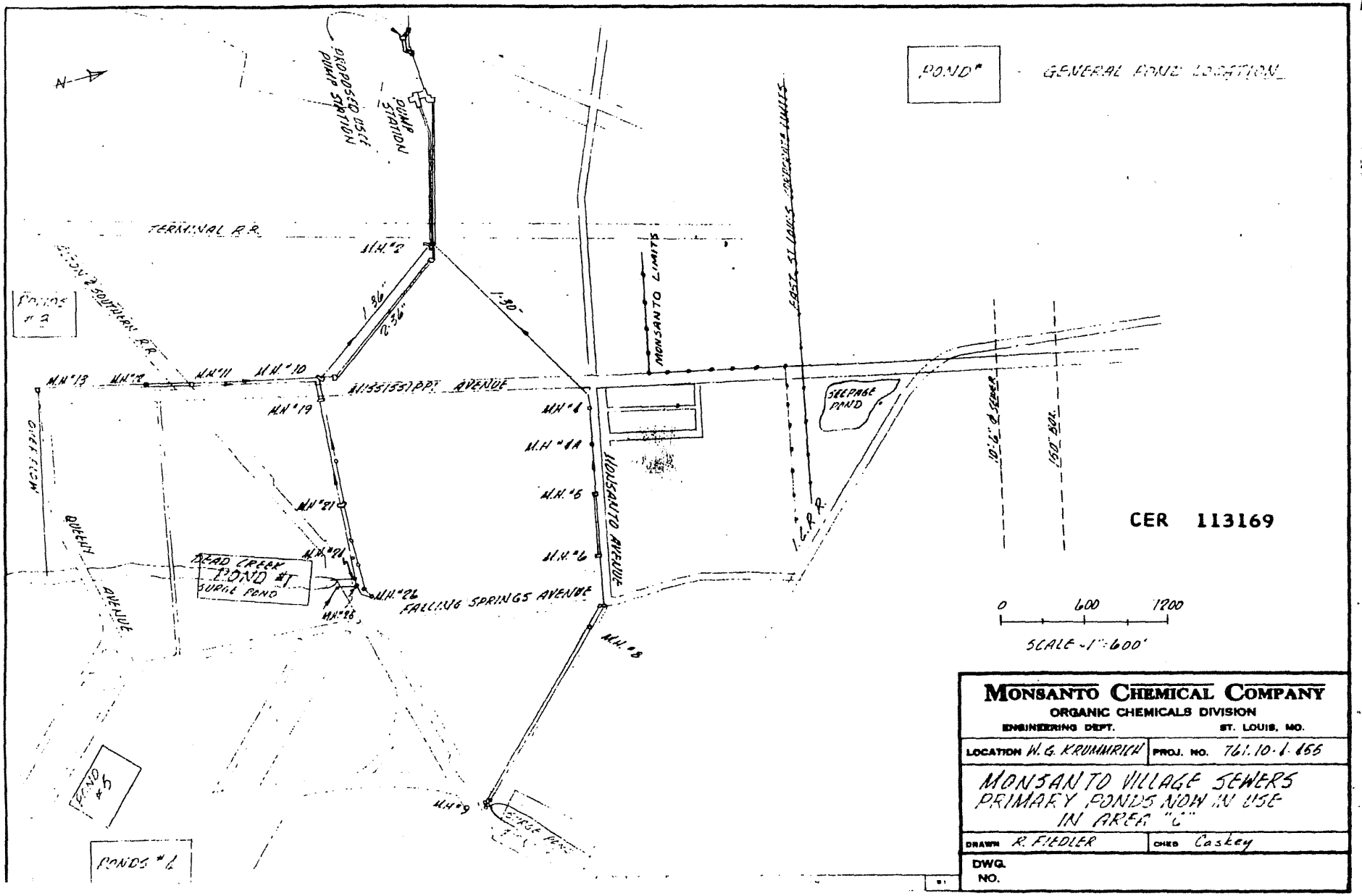

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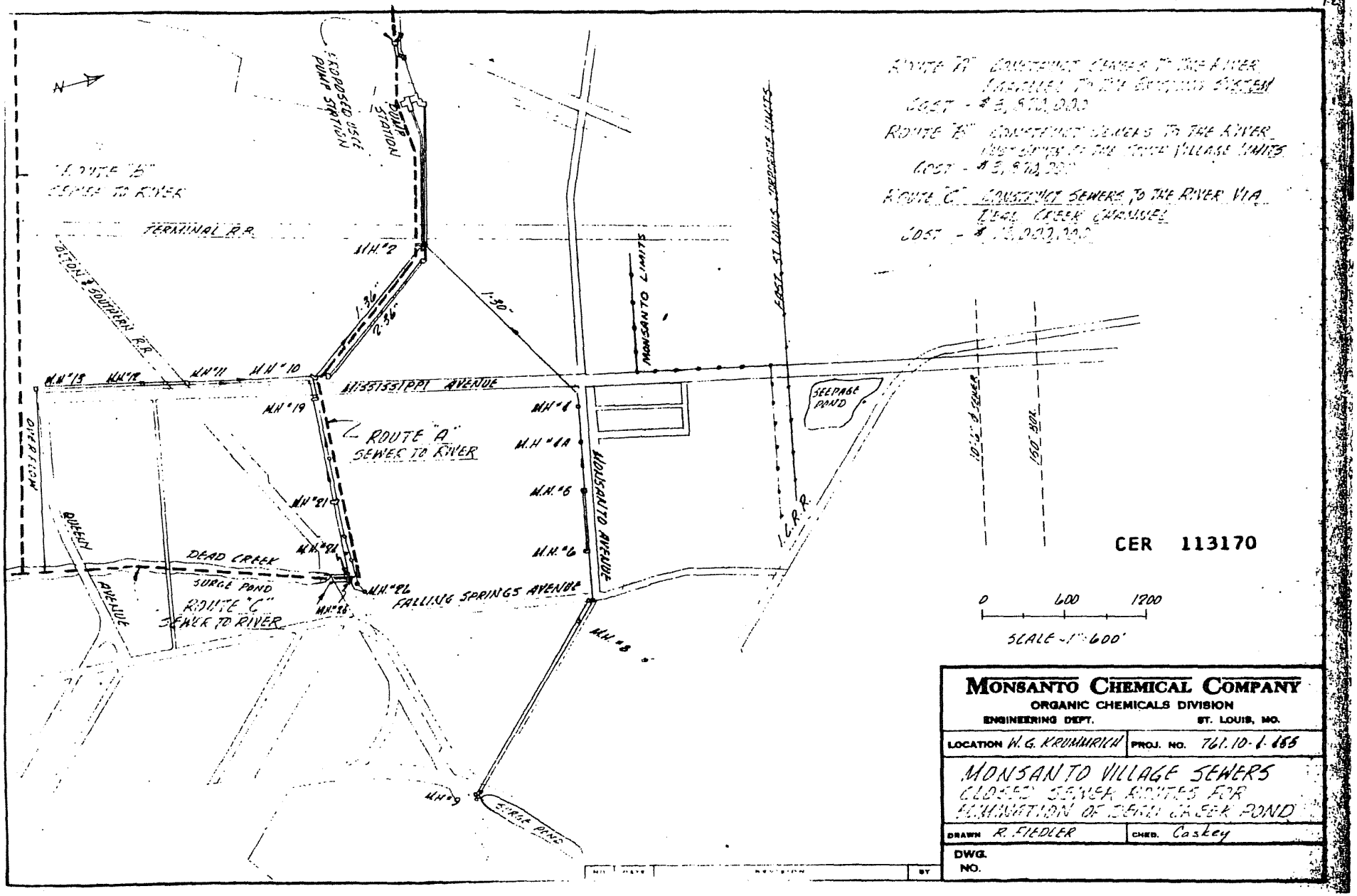

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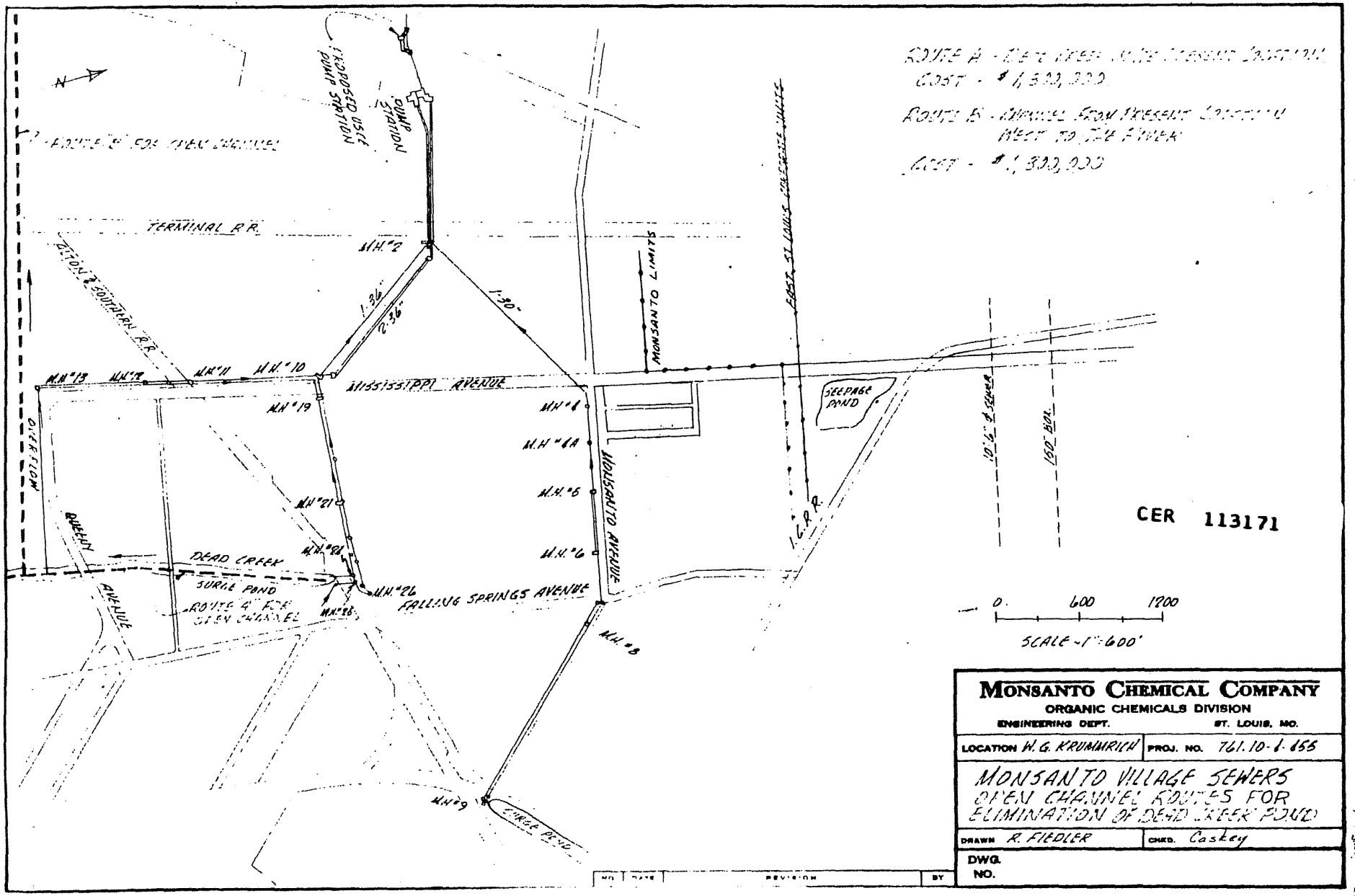

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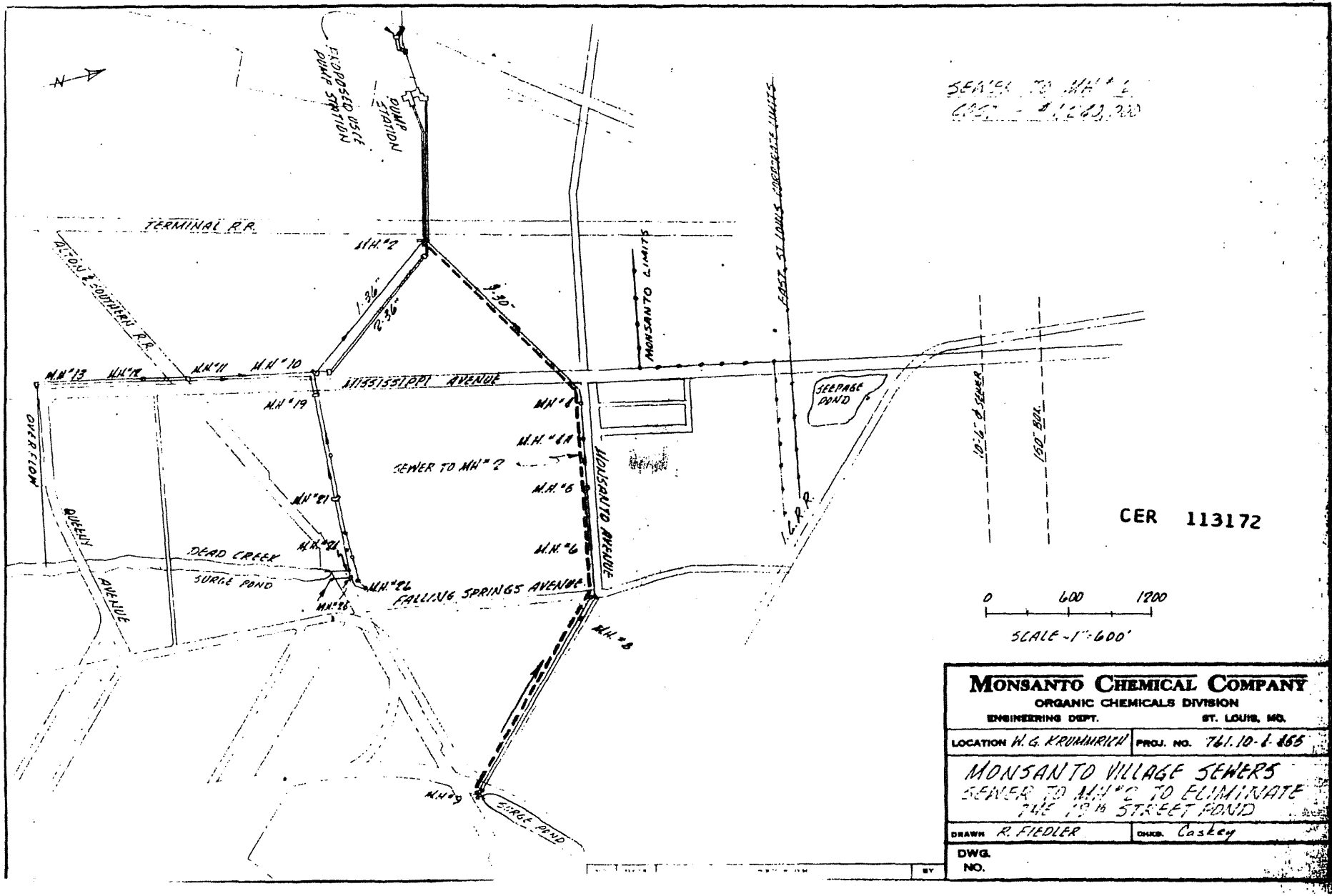

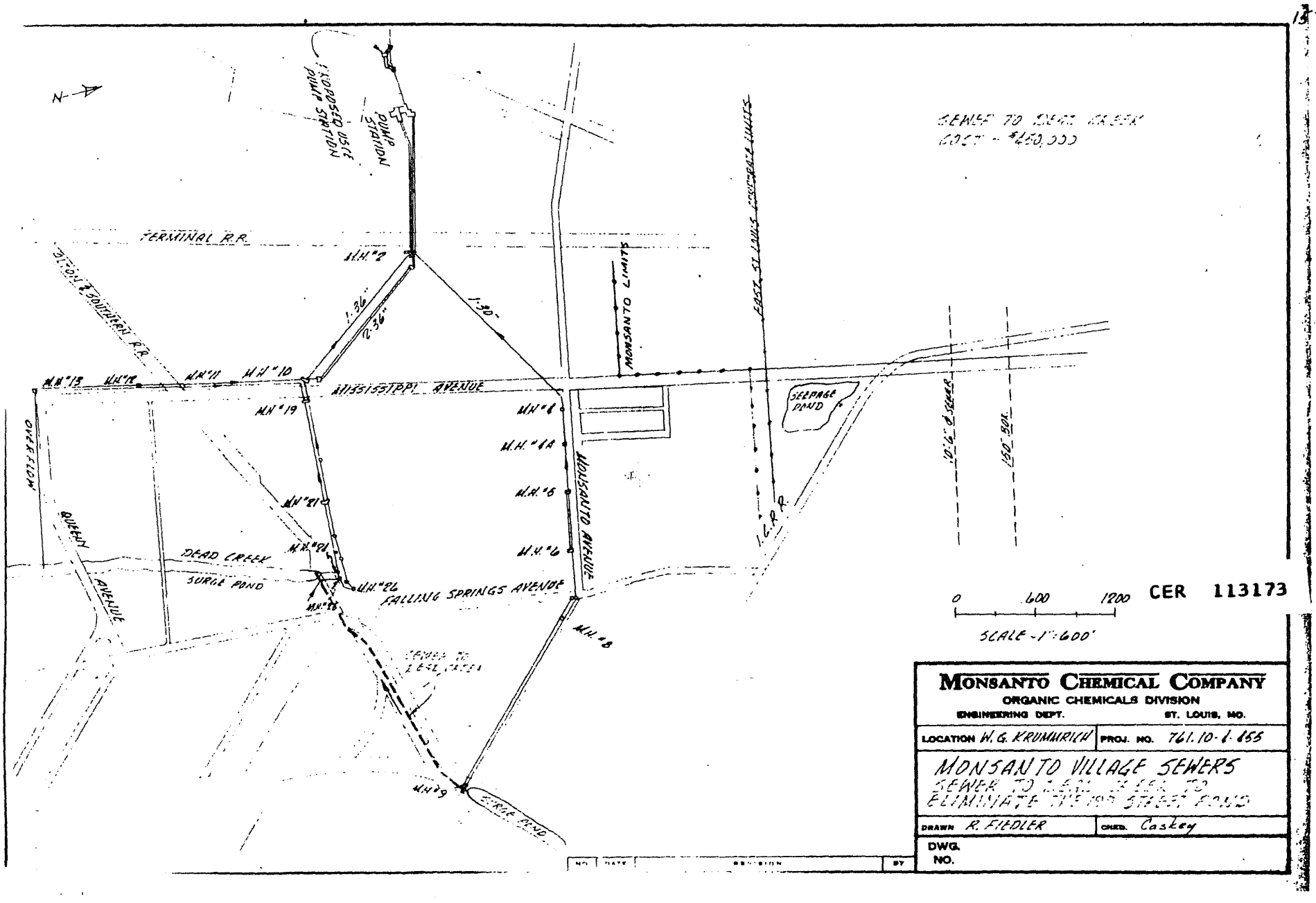

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