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PROGRESS REPORT

ENGINEERING DEPARTMENT

ORGANIC CHEMICALS DIVISION

JOB NUMBER
EA No. 4-276

REPORT NUMBER
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DATE
December 10, 1962

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*To Receive Details Section

CI = 0

The South WGK wastes flows are somewhat incorrect in that they are based on segregation study of R+H.

TITLE: Sewer Study - Monsanto Village, Illinois (P. S. No. 96)

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

PROBLEM: To determine the adequacy of the existing Monsanto Village sewers, and where additional sewers should be located, if and when they are required as they may affect the WGK plant.

SUMMARY:

1. The present system is adequate for runoff rates up to 1.0 cfs per acre when operated as a pressure system using present surge pond facilities. This runoff rate is considered adequate for the present.

2. Elimination of Dead Creek and 19th St. pond facilities would require the addition of at least two new 60 inch sewers to carry storm runoff. It is not recommended that this be done at the present time.

3. The addition of one 36 inch sewer between manhole No. 2 and No. 5 would provide additional capacity for the north Monsanto Village area to take care of future plant additions.

CER 113174

PAUL HODGES DEPOSITION
May 31 - June 1, 1994
EXHIBIT NO. 9

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SUMMARY (continued)

4. The 19th St. pond can be eliminated by draining to Dead Creek. This may be considered desirable by Socony.

5. If Dead Creek is used to its full surge pond capacity, the Lewin Mathes sewers to Dead Creek will require pumping to prevent flooding of the Lewin Mathes plant.

6. Additional capacity in the south WGK plant sewers can be provided by installing a 48 inch overflow sewer from manhole No. 26 to Dead Creek.

John W. Caskey

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att.

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Background

Monsanto Village has a combined sewerage system which now serves eight industries: American Zinc, Darling Fertilizer, Lewin Metals, Midwest Rubber, Monsanto Chemical, Socony Mobil, Sterling Steel, and Waggoner Transport, and two residential areas. Two industries within the Village limits, T. J. Moss Tie Company and Union Electric are not served by the present system.

Joe Goldenberg, Metcalf and Eddy, and Horner and Shifrin have each issued reports covering the objectives of their particular study on the Village sewerage system.

The latest report, by Metcalf and Eddy Consulting Engineers, dated September 21, 1962, includes a proposal for new sewers as part of the Monsanto Village pollution control program.

Present System

The system involves essentially three sections. One section serves the North Village which includes Manchester Subdivision, American Zinc, the north WGK plant and part of the south plant, and Socony Mobil.

A second section serves the majority of the south WGK plant, part of Lewin Metals, Waggoner Transport, Sterling Steel, and the south Village residential area. The third section is along Mississippi Avenue and serves Midwest Rubber, Lewin Metals, and Darling Fertilizer.

Storage and Pond Facilities

In addition to the sewers, there are ponds provided for storm and waste waters. T. J. Moss ponds all of their water. Sterling Steel and the south residential area have excavated ponds which store storm water.

The north WGK plant, American Zinc, and Manchester Subdivision use the extreme north portion of the Village to pond a portion of their storm water. Midwest Rubber and Darling Fertilizer use ponds, one of which is excavated, to store storm runoff. The south WGK plant uses some storage ponds. Lewin Metals use Dead Creek as an interceptor sewer for waste flows and as a temporary storm water storage and surge pond. Dead Creek is also used by the other south sewer system contributors, during time of storm, for temporary storage.

Socony Mobil uses the ditch east of 19th St. and an excavated area west of 19th St. for a waste and storm water storage and surge

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pond. This surge pond is used by the north WGK plant during storms of high intensity.

Drainage Survey

A map showing drainage areas in Monsanto Village has been prepared. Of the 24 areas shown, 14 contribute flow to the Village sewers. The map is based on existing maps and reports and on actual field observations. All drainage areas were established, where possible, by field information.

Basic Considerations

The waste water quantities used for the calculations are as follows:

*	American Zinc	8.30 cfs	8.3
*	Lewin Metals	4.59	4.6
*	Midwest Rubber	3.39	3.4
**	Monsanto Chemical	36.68	36.7
*	Socony Mobil	2.33	2.3
	Others	nil	55.3

* Metcalf and Eddy Report - March 1962
** Joe Goldenberg Report - March 1962

The expected hydraulic gradients shown on the sewer profiles are based on storm runoff calculations using the rational method where Q = CIA. Basing the calculations on CI factors (cfs per acre) shows the effect of various rainfall intensities (I) and various runoff coefficients (C). Profiles are shown for CI values of 0.5, 0.75 and 1.0 which could represent rainfalls of 1 inch per hour with 50 percent runoff, 75 percent runoff, and 100 percent runoff respectively.

The water level in the Dead Creek and 19th St. surge ponds is affected more by rainfall duration than by intensity, so definite storm lengths were chosen. The profiles show a three hour duration storm for CI = 0.5, and a 45 minute storm for CI = 0.75 and 1.0. The profile for a given CI factor may be used to indicate various combinations of rainfall intensity and percent runoff, if it is remembered that longer or shorter duration rains will change the surge pond levels and, therefore, the hydraulic gradients shown.

The Village pump station near the levee is now operated whenever the river stage is above 14 ft. Calculations for hydraulic gradients in the sewers are based on maintaining this level in the pump station.

Dead Creek channel is sealed off at Judith Lane to prevent drainage to the south, so it acts as a surge pond.

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These calculations are based on water levels in manhole No. 24 and Dead Creek being the same, and on water levels in manhole No. 9 and the Socony ditch being the same. Some increase in relief capacity to Dead Creek and to the ditch may be required to maintain satisfactory water levels in manholes No. 24 and No. 9 during heavy storm.

Present Sewer Conditions

Dry Weather Flow - The north and south area sewers flow essentially full with dry weather flow. The Mississippi Avenue sewers are about one-third full. No increase in capacity is required at this time for dry weather flow. The sewers are so constructed that they can operate as pressure sewers and this increases their capacity greatly over normal gravity operation without surcharge. Dry weather flow is 55.3 cfs.

Storm Water Flows - The United States Department of Commerce Technical Paper No. 25 lists rainfall intensities for the St. Louis area. On a five year frequency, storms of 1 inch per hour for three hours, and 2.5 inches per hour for 45 minutes may be expected.

CI = 0.5 cfs per Acre - 180 Minute Duration - The entire sewer system is adequate for this runoff rate, which could be produced by a 1 inch per hour rain with 50 percent runoff, when operated under a slight surcharge. The water level at manhole No. 6 would be at elevation 405.0. There would be very little flow leaving Socony however, and the water level in the ditch would reach elevation 405.5 in 180 minutes.

Dead Creek would receive a flow of 17 cfs from the south area with the water level reaching elevation 400.8 in 180 minutes. The water level at manhole No. 26 would reach elevation 401.6. Mississippi Avenue sewers would flow less than full.

Total flow to the Village levee pump station will be approximately 117 cfs.

CI = 0.75 cfs per Acre - 45 Minute Duration - The sewer system is adequate for this CI factor which could be caused by a 2.5 inch per hour rain with 30 percent runoff.

The hydraulic gradient at manhole No. 6 is elevation 404.8, and the flow is from manhole No. 6 toward the 19th St. surge pond. The water level in the pond will reach elevation 403.8 in 45 minutes. The south sewers discharge 39.5 cfs to Dead Creek where the water level will reach elevation 399.6 in 45 minutes. There is no surcharge in the Mississippi Avenue sewers, and the total flow to the Village levee pump station is approximately 122.5 cfs.

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CI = 1.00 cfs per Acre - 45 Minute Duration - The north area sewers will not handle this rate of runoff, which could be caused by a 2.5 inch per hour rain with 40 percent runoff. The hydraulic gradient would reach elevation 406.0, the approximate street level, at manhole No. 6 and approximately 2.3 cfs will pond in Area C. All Areas served by the sewers along Monsanto Ave. would drain satisfactorily under this duration rainfall. A longer duration rainfall, however, would raise the water level in the 19th St. surge pond and could cause additional ponding in Area C. A runoff rate in excess of 1.0 cfs per acre could cause some flow restriction in Area J, in the south WGK plant.

The south sewers are adequate, with a discharge of 54 cfs to Dead Creek, where the water level reaches 399.8 in 45 minutes.

Mississippi Ave. sewers are adequate, with operation under a partial surcharge. Approximately 0.5 cfs would overflow to Dead Creek from manhole No. 13.

The discharge to the levee pump station is approximately 137 cfs with this runoff rate.

Recommended Sewer Additions

Based on past flooding history and the full use of present ponding facilities, no new sewers are needed at this time for storm water relief.

The only area now operating near full capacity is the Monsanto Ave. system. Future plant improvements in either Area J or B, however, by increasing the runoff rate, could cause flow restrictions in Area J and/or ponding in Area C. In the event of such improvements, additional capacity would be desirable for the north sewer system. The profiles for CI = 0.75 and 1.0 show the effect of adding one 36 inch pipe from manhole No. 5 to manhole No. 2. This addition at the present time could increase the flow to the levee pump station to approximately 158 cfs for CI = 1.0 cfs per acre.

Other Possible Sewer Additions

Reduction in the use of the ditch along 19th St. and of Dead Creek as surge ponds can be accomplished by constructing additional sewers. A 60 inch sewer from Socony to Dead Creek could carry the entire storm runoff for a CI = 1.25 cfs per acre, and maintain a water elevation of 405 at manhole No. 9. The water level in Dead Creek would rise to elevation 402.5.

The water level in manhole No. 26 could be maintained near the Dead Creek water level with a CI factor of 1.25 by the addition of a 48 inch sewer from manhole No. 26 to Dead Creek.

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In order to eliminate the need for the Dead Creek and 19th St. surge ponds, two new 60 inch sewers would have to be added to the present system to handle a rainfall yielding a CI = 1.25 cfs per acre. One sewer would be needed from Area D to the levee pump station, and one from Dead Creek to the pump station.

Lewin now drains approximately 18 acres directly to Dead Creek through the sewers discharging into the creek. Raising the water level in Dead Creek by full utilization of its surge pond capacity would back water up in these sewers. To provide protection against possible plant flooding, an interceptor sewer would have to be provided along Dead Creek, and the necessary pumping facilities added. Dead Creek could still be used as a storm water outlet. Normal flows would be handled through existing sewers, or a connection could be made to the sewers in the south WGK plant.

Summary

1. The present system is adequate for runoff rates up to 1.0 cfs per acre when operated as a pressure system using present surge pond facilities. This runoff rate is considered adequate for the present.

2. Elimination of Dead Creek and 19th St. pond facilities would require the addition of at least two new 60 inch sewers to carry storm runoff. It is not recommended that this be done at the present time.

3. The addition of one 36 inch sewer between manhole No. 2 and No. 5 would provide additional capacity for the north Monsanto Village area to take care of future plant additions.

4. The 19th St. pond can be eliminated by draining to Dead Creek. This may be considered desirable by Socony.

5. If Dead Creek is used to its full surge pond capacity, the Lewin Mathes sewers to Dead Creek will require pumping to prevent flooding of the Lewin Mathes plant.

6. Additional capacity in the south WGK plant sewers can be provided by installing a 48 inch overflow sewer from manhole No. 26 to Dead Creek.

John W. Caskey

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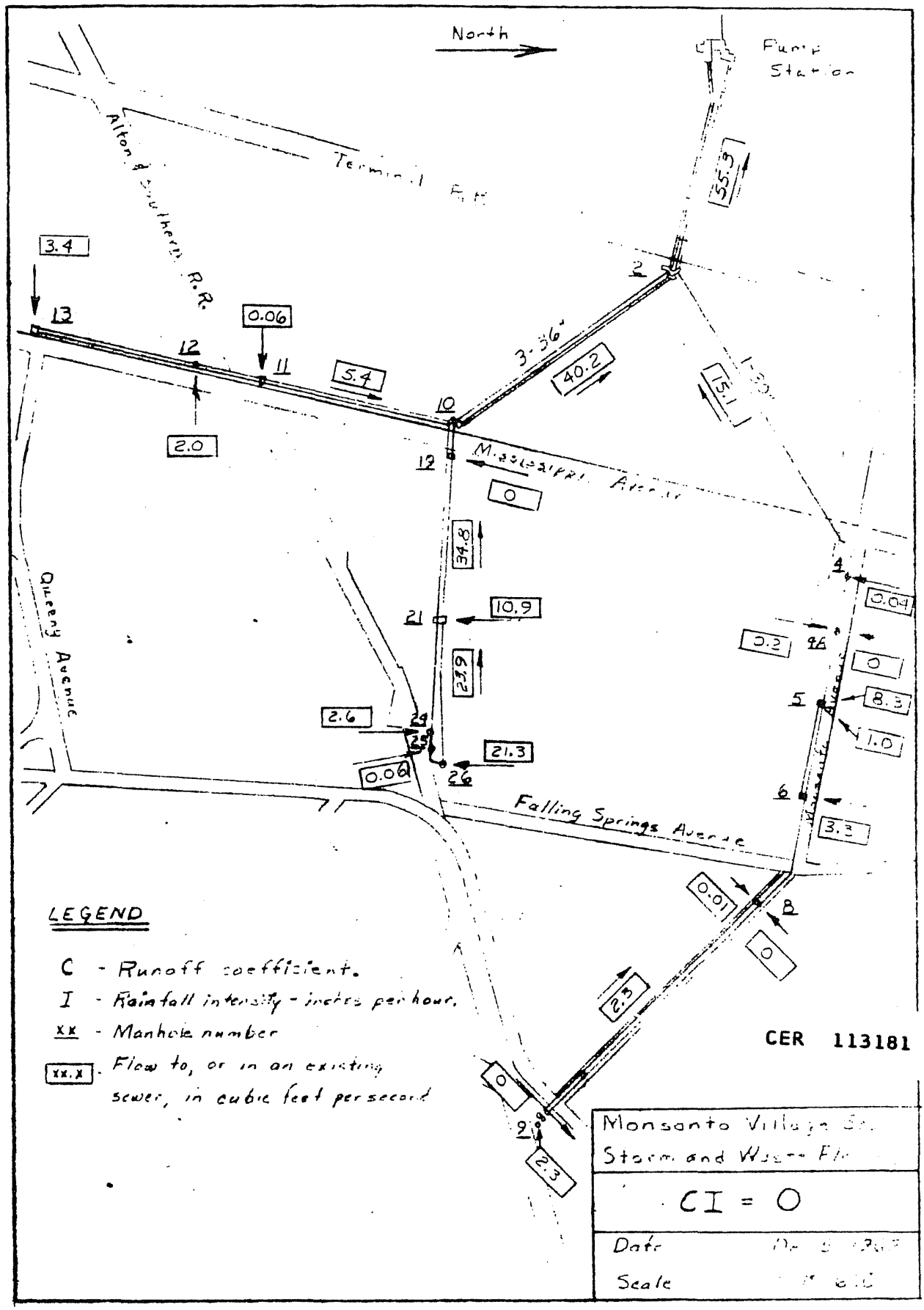

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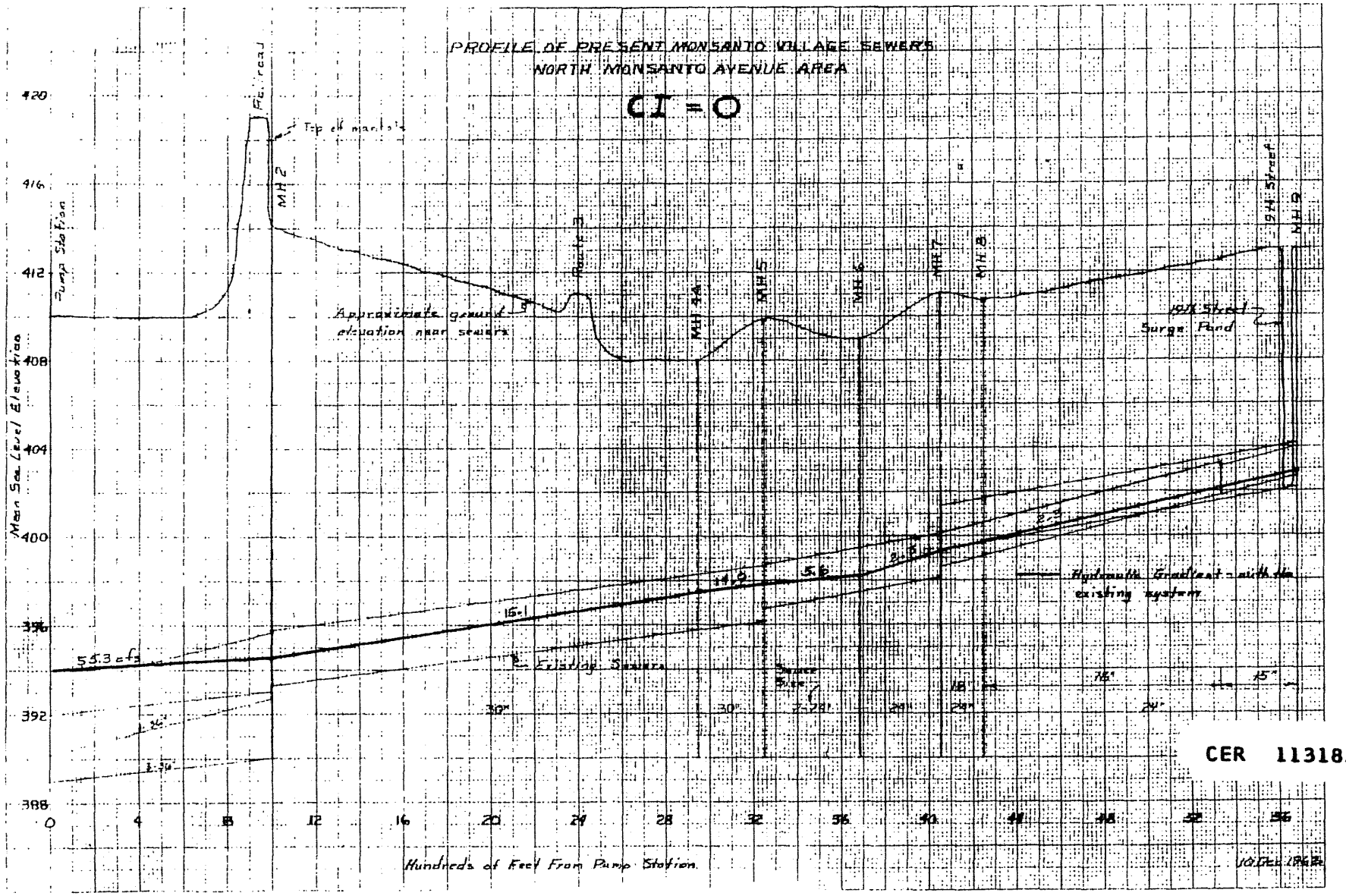

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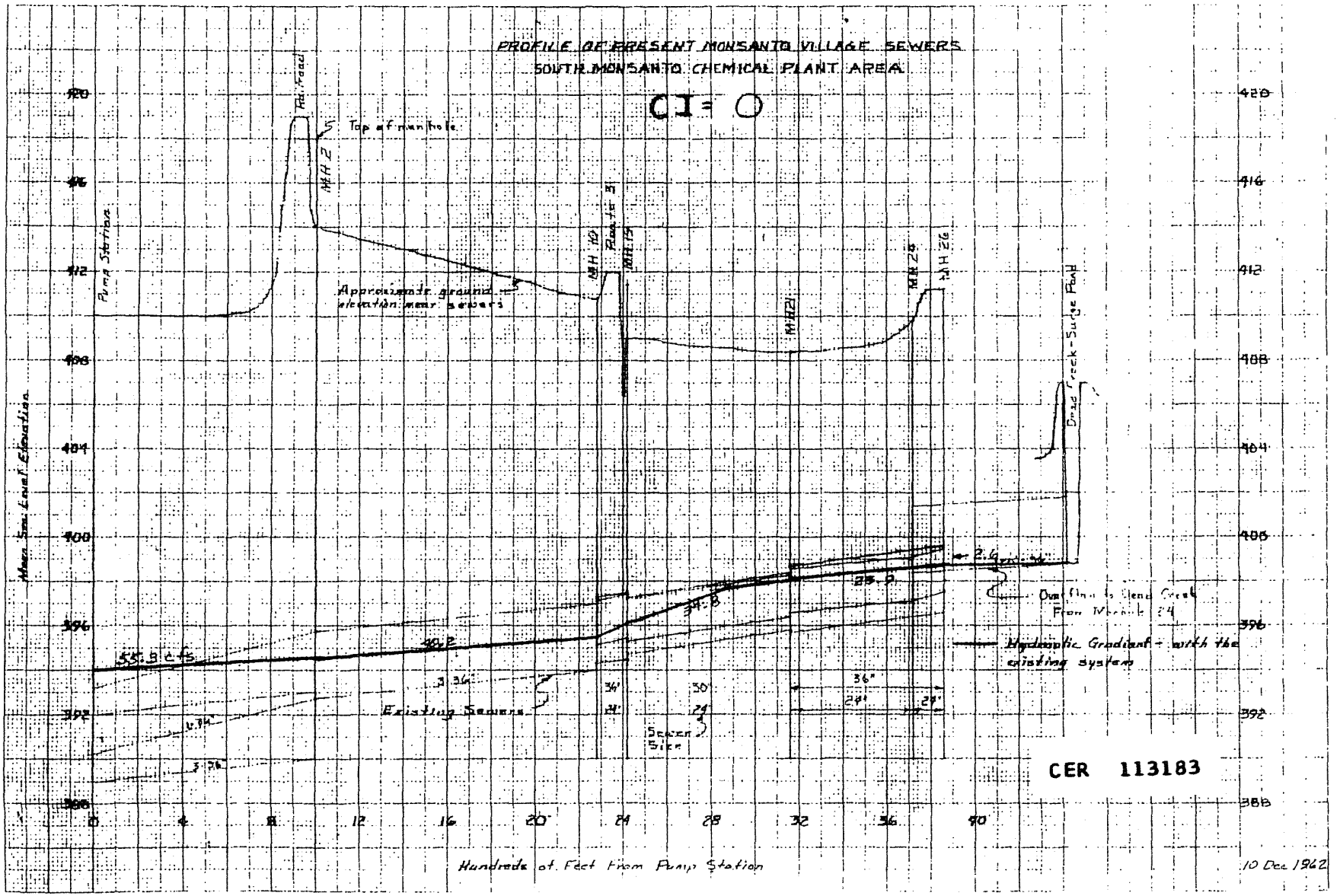

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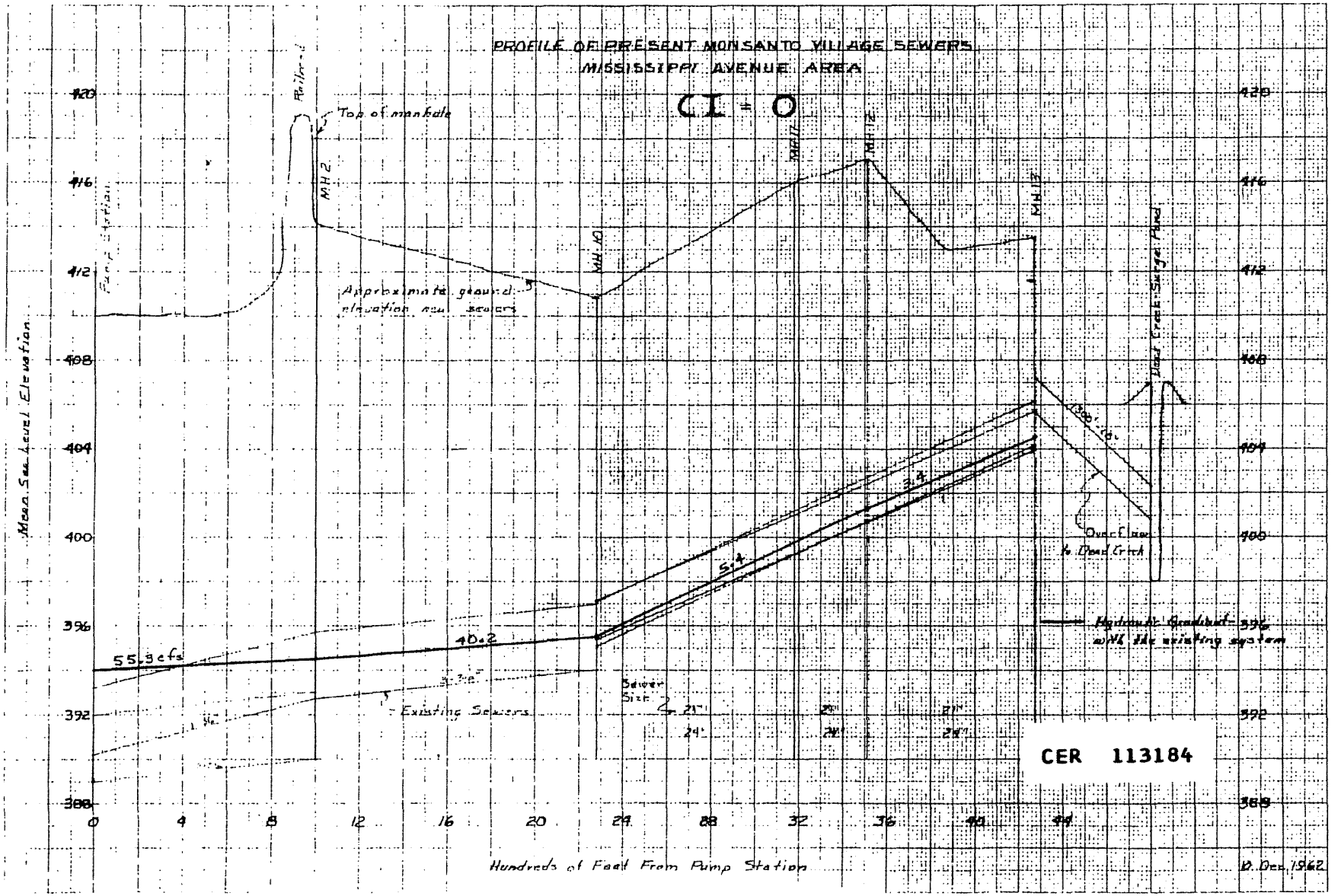

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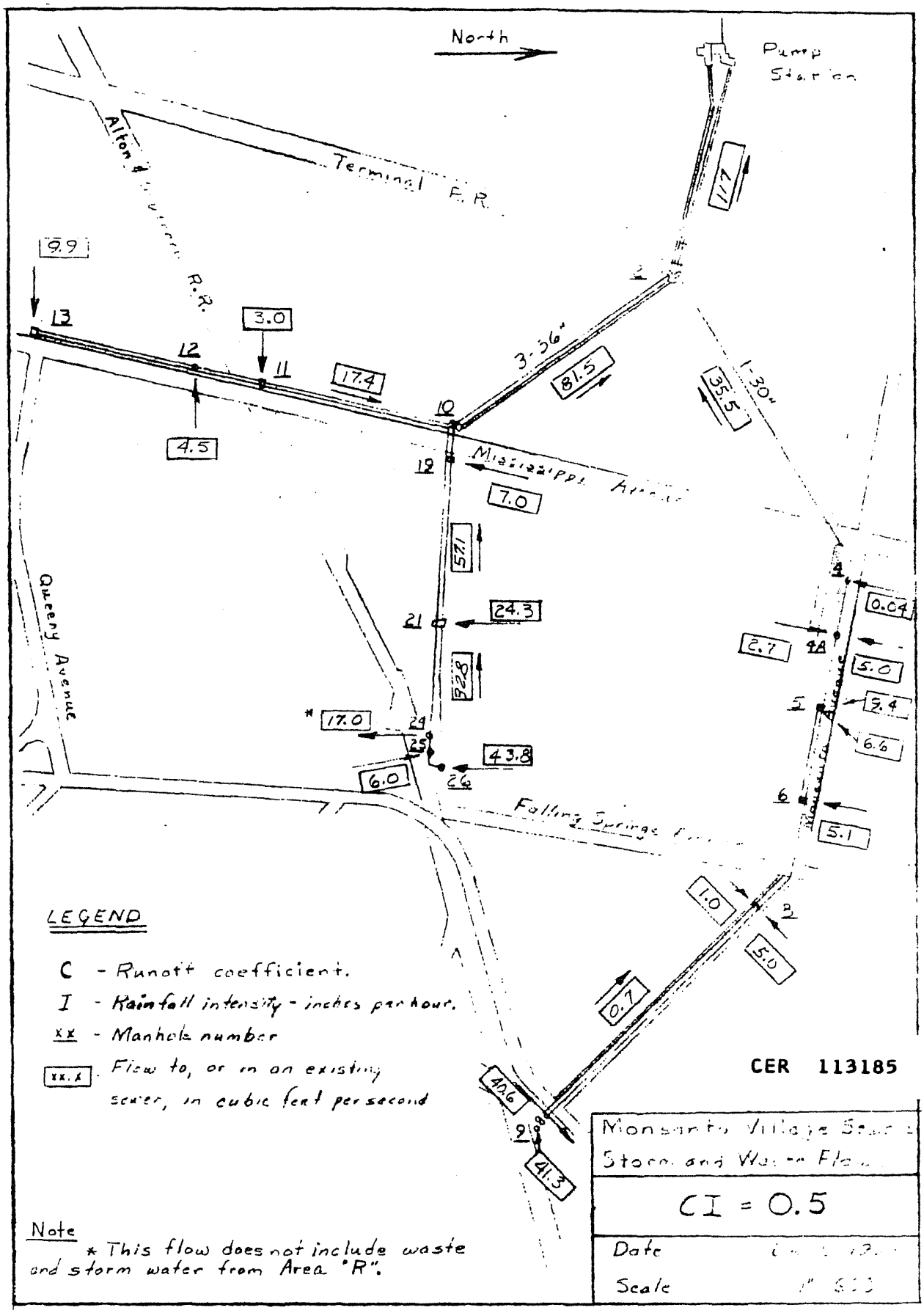

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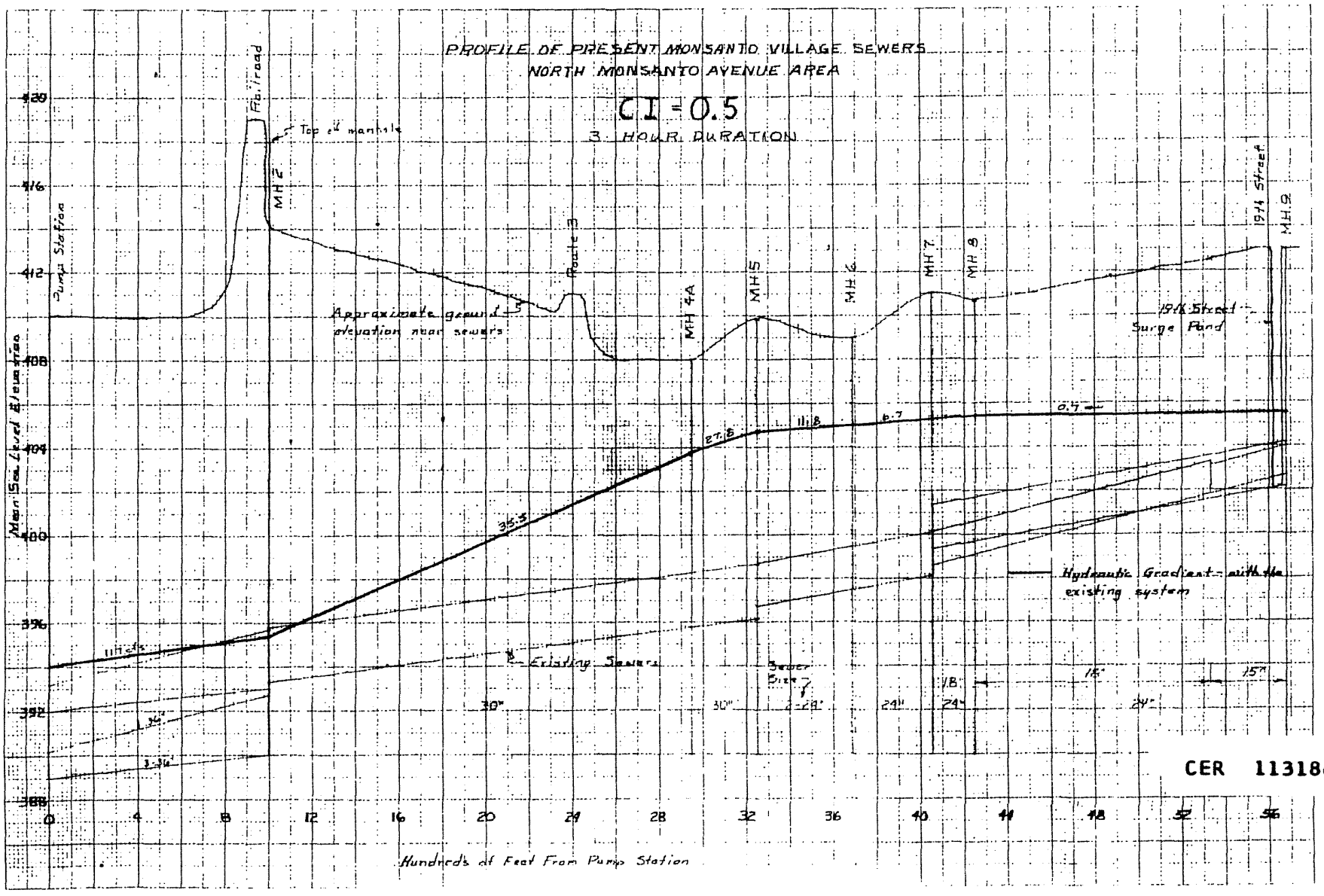

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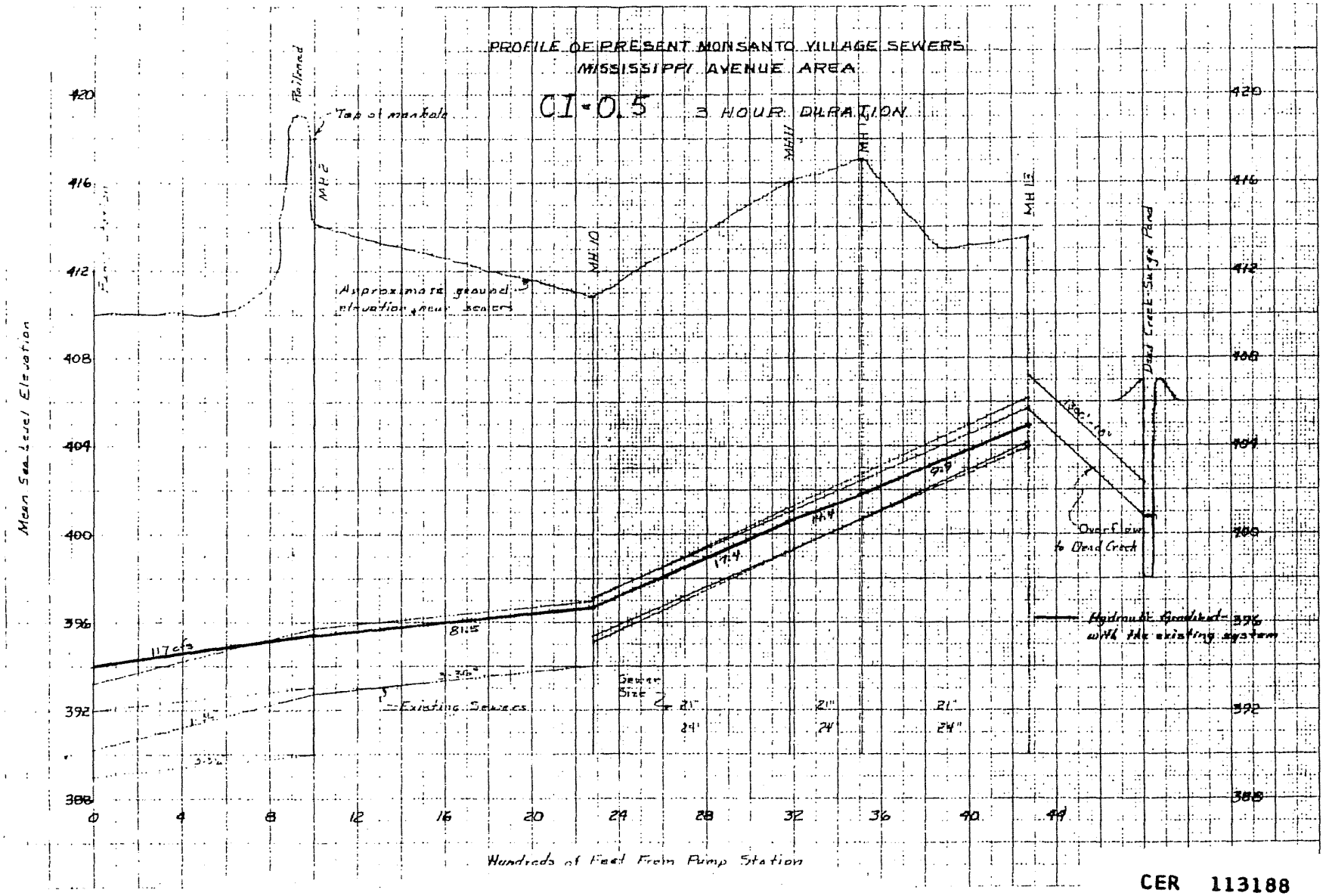

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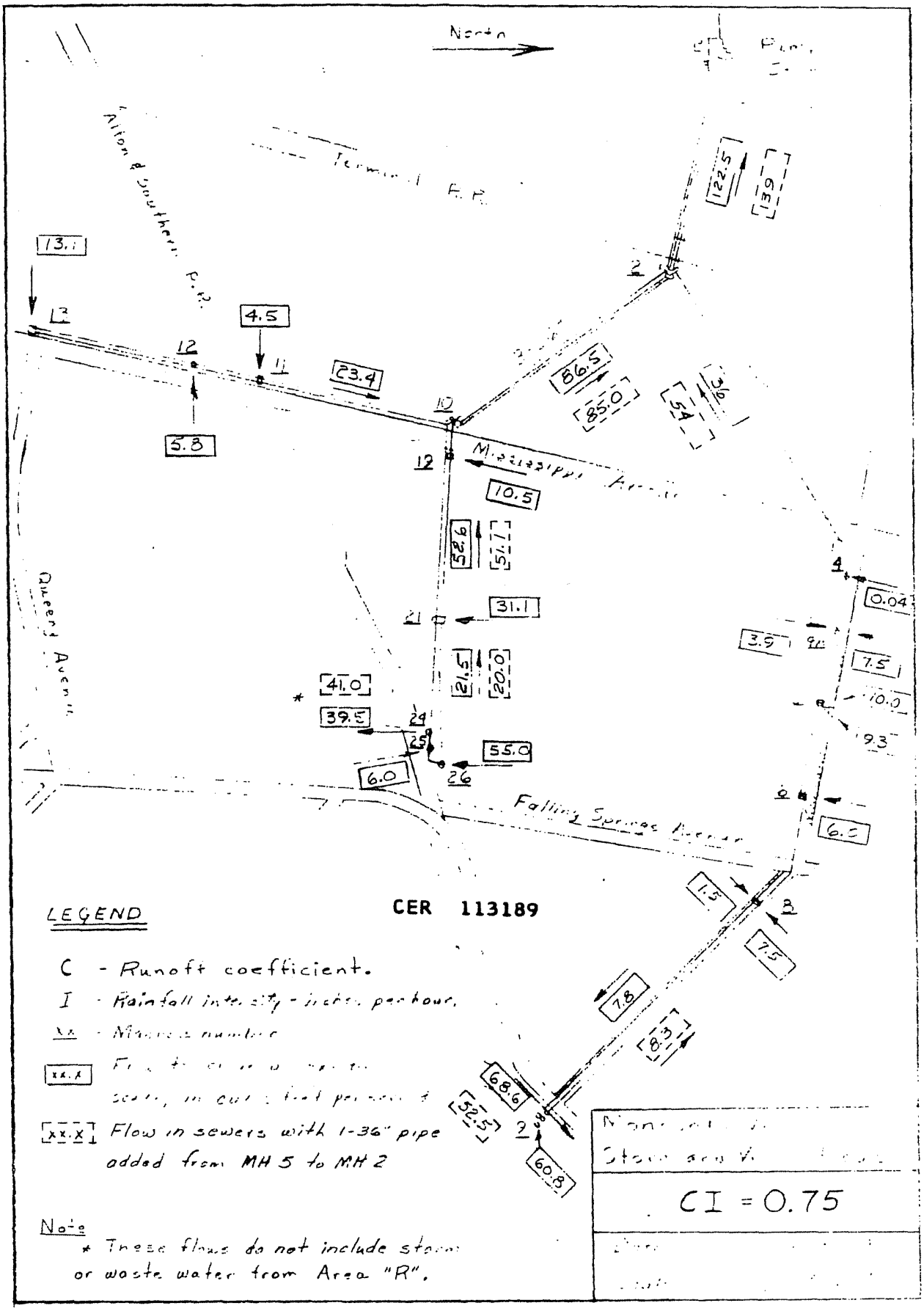

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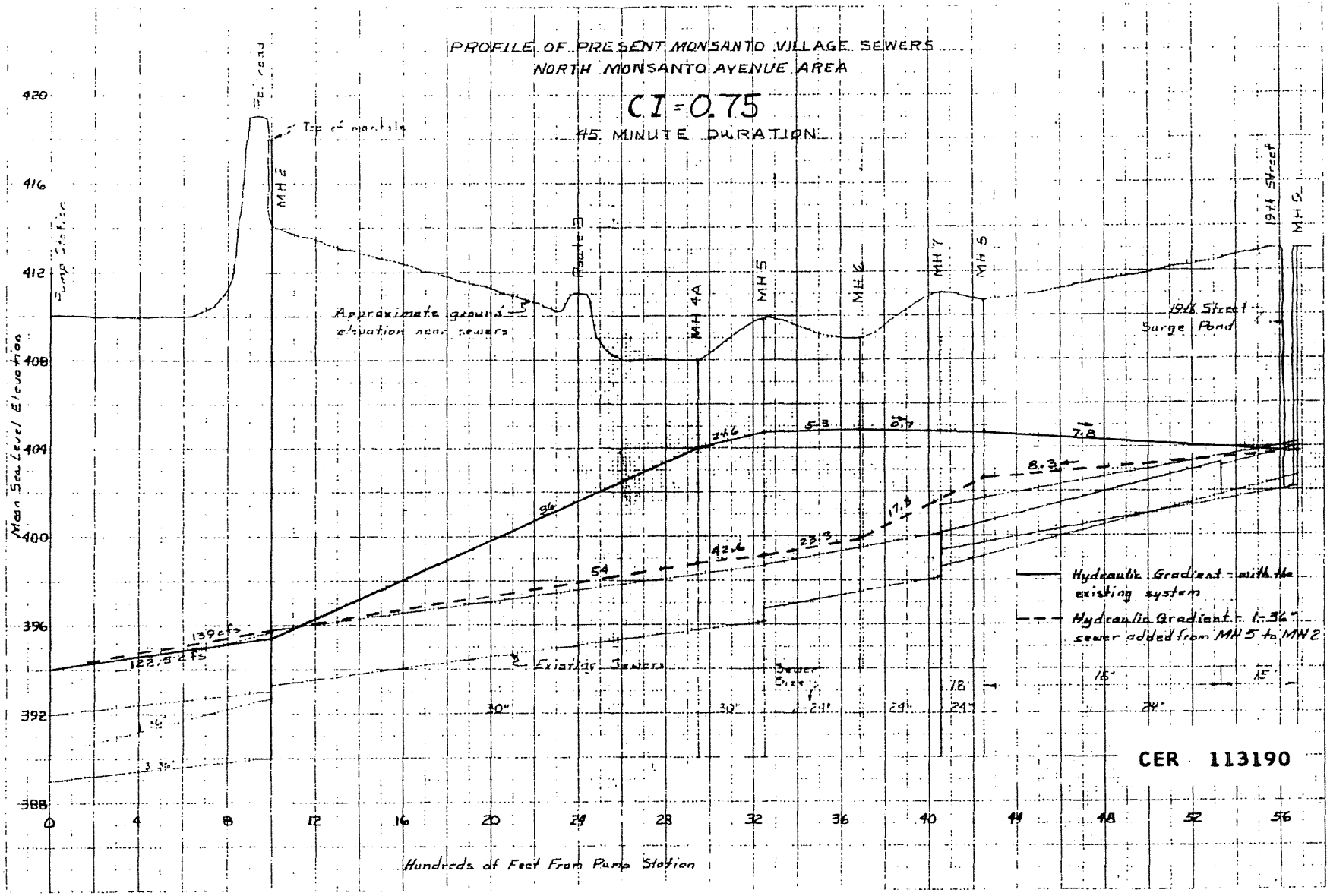

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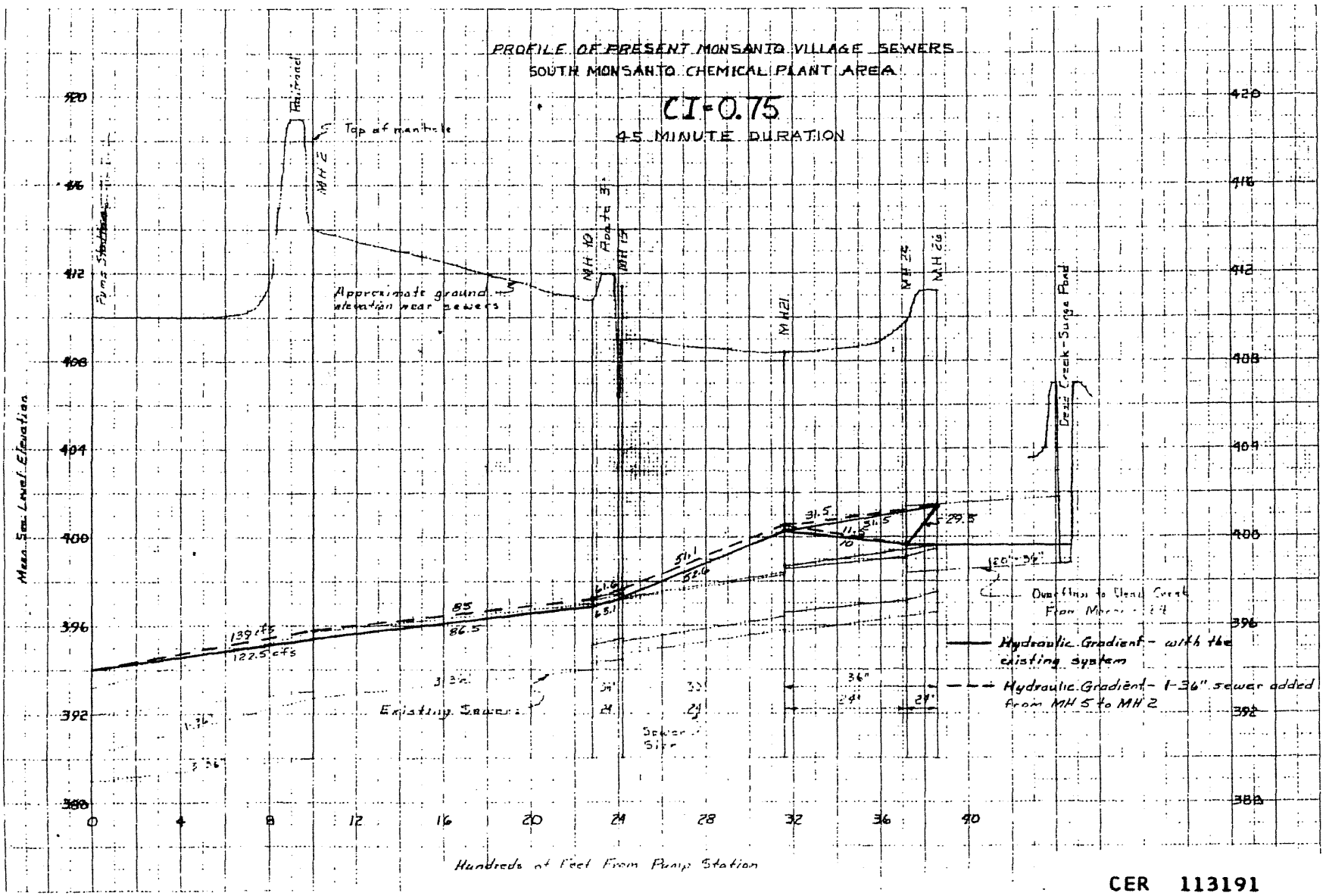

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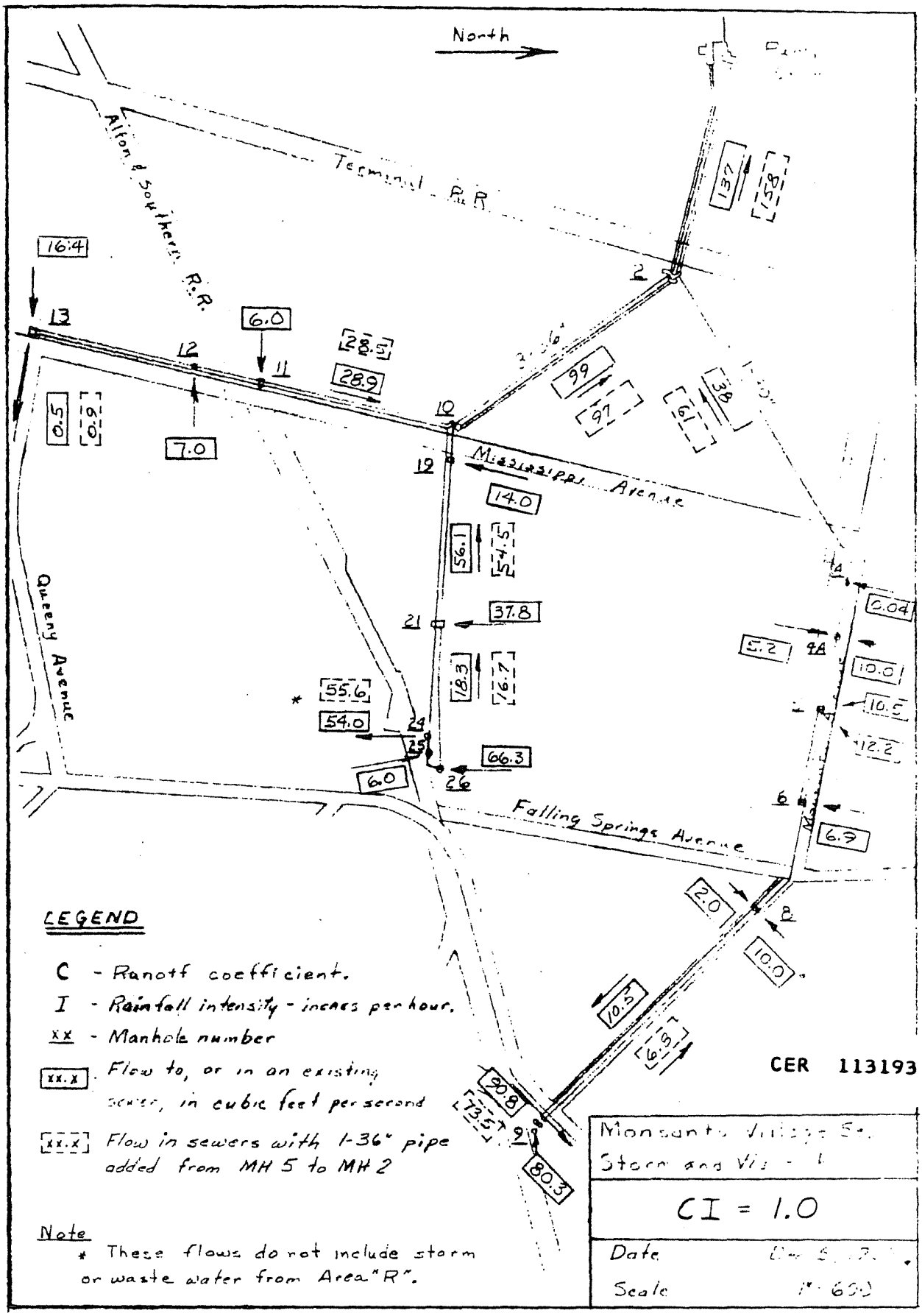

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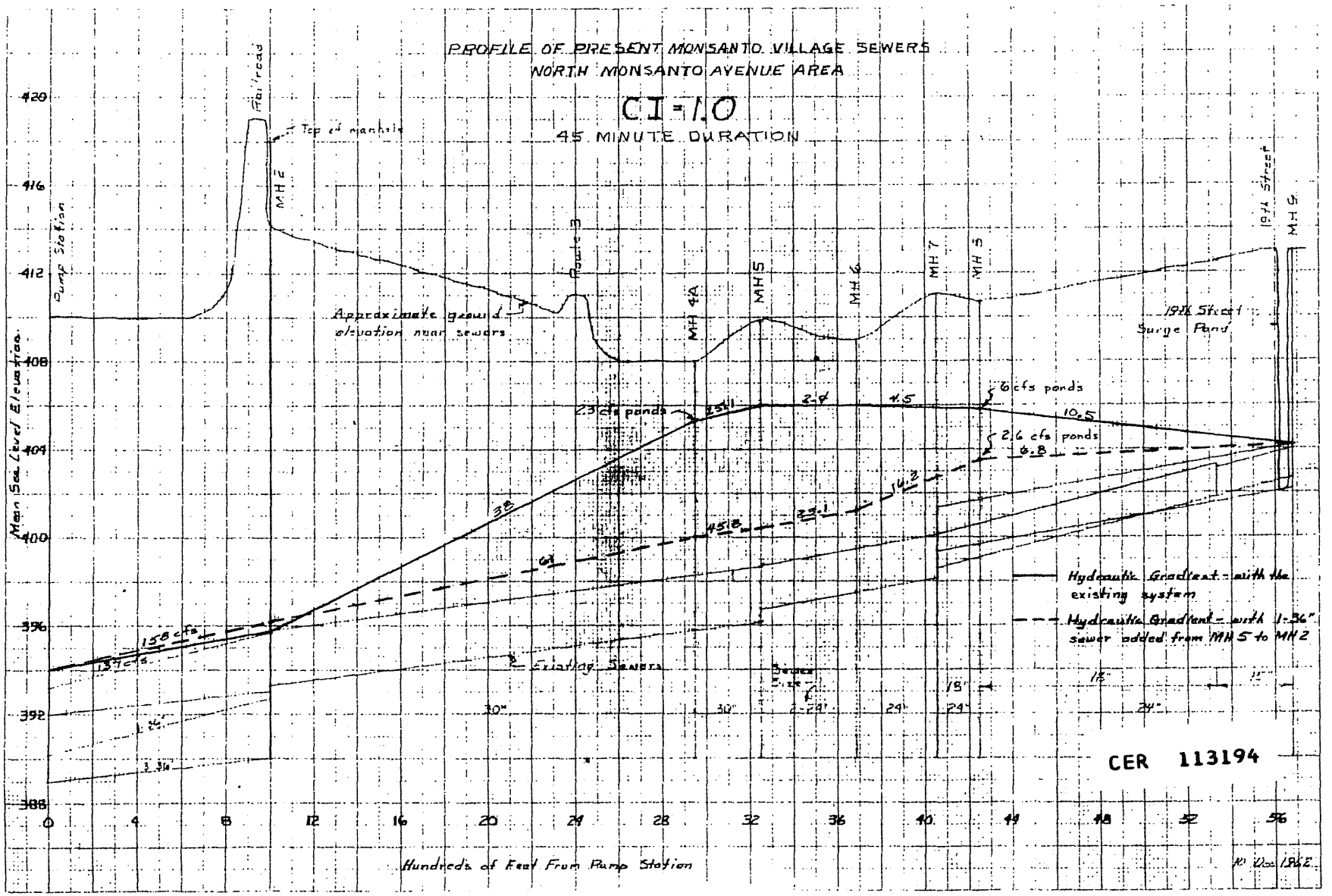

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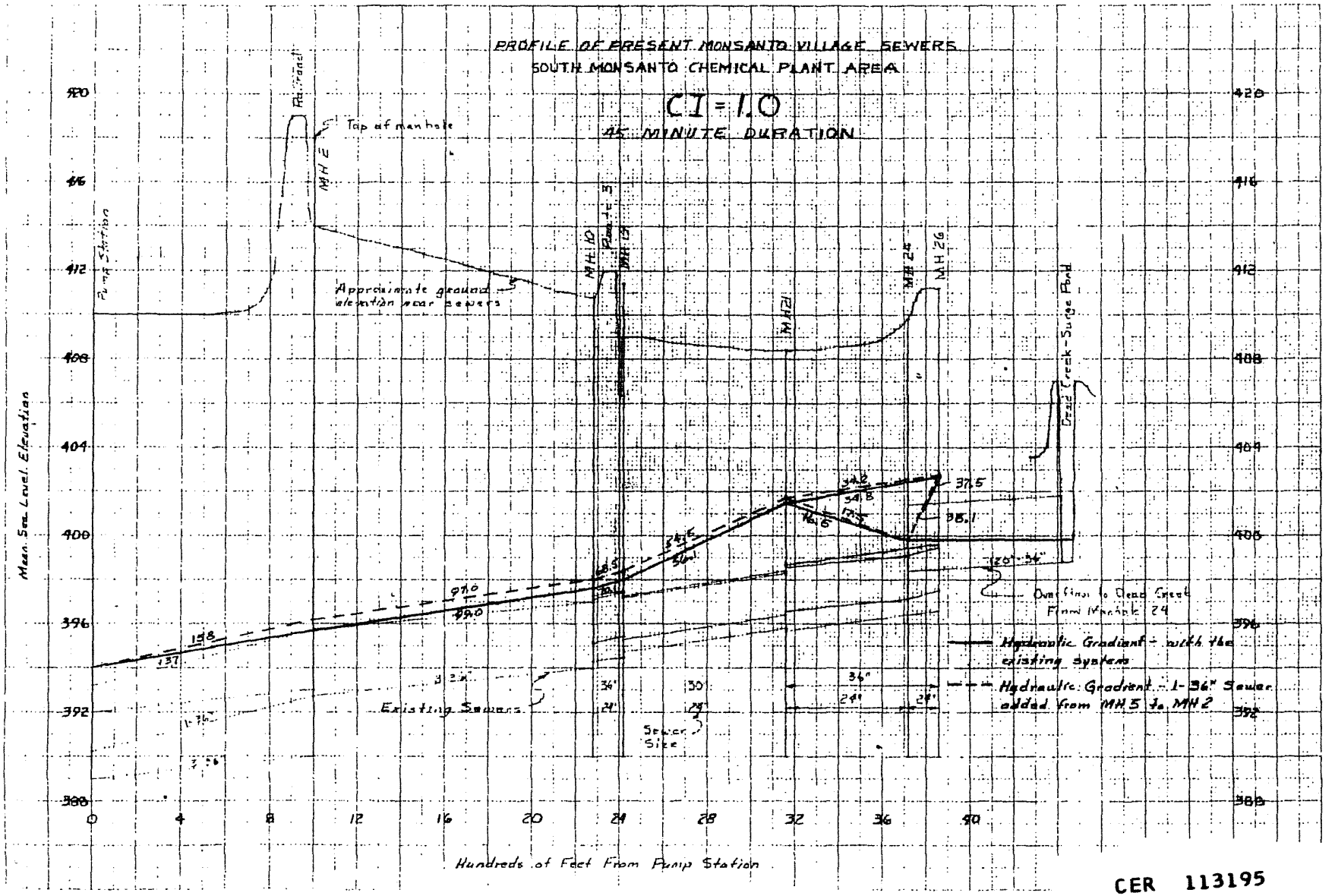

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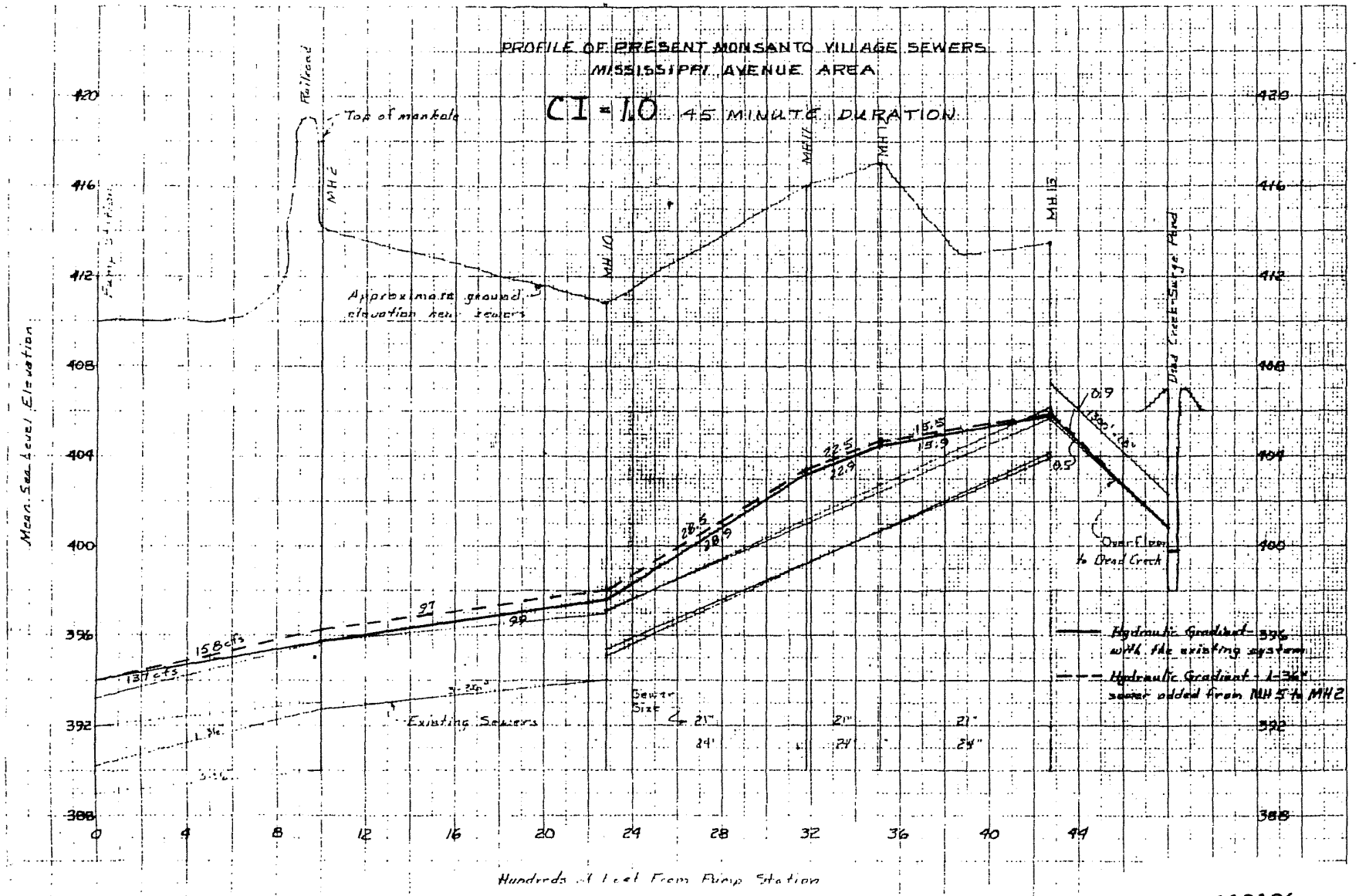

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