



BURGESS & NIPLE

Mr. George Jackson
Water Resources Engineer
City of Gahanna
200 South Hamilton Road
Gahanna, OH 43230

College Park/
Re: Heritage Subdivision
I/I Remediation Program

January 15, 2001

Dear Mr. Jackson:

Burgess & Niple, Limited

5085 Reed Road
Columbus, OH 43220
614 459.2050
Fax 614 451.1385

I. PROJECT UNDERSTANDING

- A. Project Overview.** On December 16, 2000, a storm system moved through the central Ohio area which produced 24-hour rainfall totals ranging from 1.9 inches to 2.5 inches as measured at the various local recording stations. This storm event, which occurred during saturated ground conditions, resulted in many cases of flooded basements in several communities within Franklin County.

The City of Gahanna received over a half dozen complaints regarding basement flooding from residents in the Heritage Subdivision. This subdivision is situated just north of Port Columbus International Airport and is bounded on the south by Interstate 270, on the west by Goshen Lane, on the north by the back of properties on Hermitage Road and Brookhaven Drive North, and on the east by James Road. See Attachment 1 for the location of this subdivision. Attachment 2 shows the subdivision at a larger scale.

- B. Project Objective.** In the City's ongoing efforts to proactively eliminate basement flooding for its constituents, Burgess & Niple, Limited (B&N) was formally directed by George Jackson, at a meeting on January 9, 2001, to develop a program for identifying and remediating the major sources of infiltration and inflow (I/I) that are entering the sanitary sewer system in the Heritage Subdivision.

This letter contains an outline of the proposed Heritage I/I Program including major field efforts, approximate time frames, and projected budgetary estimates to enable the City of Gahanna to begin appropriation of necessary program funding.

EXHIBIT A

II. THE HERITAGE SUBDIVISION I/I PROGRAM

A. **Overview.** Based upon the successful results of the investigative field procedures that were executed in remediating the flooded basement situation in the Royal Manor/Brentwood Subdivisions, a similar program is recommended for the Heritage Subdivision. It is, therefore, recommended that the Heritage I/I Program include the following investigative procedures:

- Physical Manhole Inspection
- Flow Monitoring
- Smoke and Dye Testing
- Foundation Flood and Dye Testing

B. Physical Manhole Inspection Program

1. Season. To optimize the results of I/I investigation efforts, it is most important that proven detection methods be undertaken during the most optimum climatic conditions. Past experience has shown that optimum results from physical manhole inspections and flow monitoring can best be achieved when a) the groundwater level is at its highest, b) the ground is saturated, and c) rainfall events are most frequent and intense. For these reasons, it is recommended that a physical manhole inspection program be undertaken sometime during the months of April – June of this year.
2. Methodology and Duration. Prior to the fieldwork, it will be necessary to develop drawings showing sanitary sewers, storm sewers, lots, and address numbers. This would require approximately one week to complete. The actual fieldwork can commence following the development of these drawings.

It is also recommended that a questionnaire be developed and mailed to each of the residents in the Heritage Subdivision prior to starting the Physical Manhole Inspection Program. This questionnaire would help profile the location and history (dates, frequency, and type of flooding) of flood occurrences and profile the presence or lack of basement sumps. It is recommended that this questionnaire be developed and sent to the residents during the month of February.

There are approximately 145 manholes within the Heritage Subdivision. A 2-man field crew can, under normal conditions, physically inspect up to 40 manholes per day. At this rate, the physical manhole inspection would require four days of fieldwork.

A written report would be presented to the City which would contain the results of the physical manhole inspection program. This report

would also contain recommendations for remediation along with associated construction costs. The preparation of the written report would require approximately 2 weeks.

The entire physical manhole inspection program could be completed within a 4-week period assuming normal weather conditions.

3. Estimated Fee. It is estimated that this phase of the Heritage I/I Program could be completed for a fee of \$20,000.

C. **Flow Monitoring Program**

1. Season. As stipulated earlier, optimum flow monitoring results could best be obtained during the months of May-June based upon past climatic conditions in the central Ohio area.
2. Methodology and Duration. The sanitary sewer system in the Heritage Subdivision is comprised of gravity sewers ranging in size from 8-inch to 20-inch. There are two 15-inch trunk sewers that enter the Subdivision from the north and northwest. These transition into an 18-inch trunk sewer and then into a 20-inch trunk sewer before exiting the Subdivision to the east at James Road.

There are three main collector sewer systems within the Heritage Subdivision -- one north system that runs north of Hermitage Road, one central system that runs south of Hermitage Road, and one south system that is south of Dunbarton Road. This south collection system is further comprised of three smaller collection systems.

In order to assess the full impact of I/I throughout the Heritage Subdivision while attempting to focus and confine further field investigations, it is proposed that up to twelve flow monitors be installed at key manhole locations for a period of 2 months. This flow monitor program would enable comparative evaluation of the extent of I/I in eight sub-districts or sectors within the subdivision. Installation of an automatic tipping bucket type rain gauge would also be required to compare the measured flow hydrographs to actual rainfall intensity as measured in inches per hour.

Following the installation of the flow monitors and rain gauge, data would be uploaded and evaluated once every two weeks during the two-month monitoring program. The results of the flow monitoring program would be summarized in a written report that would be presented to the City.

The entire flow monitoring program could take up to three months to complete depending upon the rainfall patterns this coming spring.

Should two significant rainfall events occur early in the flow monitoring program, this portion of the I/I investigation could possibly take only two months.

3. Estimated Fee. It is estimated that this phase of the Heritage I/I Program could be completed for a fee of \$50,000.

D. Smoke and Dye Testing Program

1. Season. To optimize the results of a smoke and dye testing program, it is essential that the groundwater table be as low as possible and that the soil be loose and dry. These conditions enable the smoke to more readily permeate through the soil from possible cracks or broken sections of sanitary sewer pipe. It is best to conduct smoke and dye testing programs during the months of July-September.
2. Methodology and Duration. A smoke and dye testing program is instrumental in identifying possible indirect connections between storm and sanitary sewers and possible stormwater intrusion sources that may exist at individual residences. At this time, it is proposed that the entire sanitary sewer system within the Heritage Subdivision be smoke tested. It is also recommended that certain sections of storm sewers that cross over sanitary sewers be flood and dye tested.

Once again, the results of this smoke and dye testing program would be summarized in a written report that would also contain recommendations for remediation along with associated remediation costs. This smoke and dye testing program would require approximately six weeks to complete.

3. Estimated Fee. It is estimated that this phase of the Heritage I/I Program could be completed for a fee of \$30,000.

E. Foundation Flood and Dye Testing Program

1. Season. Should the results of the above programs indicate that there are yet undetected sources of I/I entering the sanitary sewer system, a foundation flood and dye testing program may be required. This situation occurred in both the Royal Manor Subdivision and the Brentwood Subdivision. If this would be required, it would be best to conduct this program during the months of September and October while the soil is normally dry and loose.
2. Methodology and Duration. Hopefully during the course of the prior field investigation efforts, specific information gathered from onsite observations coupled with comments received from home owners would enable the identification and tabulation of homes to be targeted.

for foundation flood and dye testing. Notifications would be sent by mail to these homeowners informing them of the upcoming field testing procedure and schedule.

The ground along one side of the house would be saturated with water supplied from the nearest hydrant. While dyed water is being applied along the foundation of the house, another field crewmember would make timed observations at the nearest downstream sanitary manhole. Presence of dye would be noted along with the time interval.

It is difficult to estimate the duration of this investigative program at this time. Past experience has shown that up to seven homes could be flood and dye tested per day with a 2-man crew.

3. Estimated Fee. It is difficult to estimate this portion of the Heritage I/I Program since the exact number of homes that may be targeted for flood and dye testing is not known. Assuming that the Heritage Subdivision foundation flood and dye testing program would possibly be similar to the Brentwood Subdivision program, this foundation flood and dye testing program could require a fee of approximately \$82,000.

III. SUMMARY OF THE HERITAGE SUBDIVISION I/I PROGRAM

- A. **Investigative Procedures.** Based upon limited data at this time, it is recommended that the chronological order of investigative procedures for the Heritage Subdivision I/I Program include a Physical Manhole Inspection Program followed by a Flow Monitoring Program, then a Smoke and Dye Testing Program, and finally a Foundation Flood and Dye Testing Program. It should be noted that the identification of major sources of I/I during any of these programs could possibly negate the need for any subsequent field investigation. The need for any further investigation work will be evaluated at the end of each program and be part of the summary and recommendations contained in the written reports.
- B. **Seasons and Duration.** Should all of the above investigative programs be necessary, the Heritage Subdivision I/I Program could be completed during the year 2001 between the months of April through November assuming normal climatic conditions prevail. Based upon this conservative scenario, actual remediation may not be undertaken until the year 2002.

As stated previously, this estimated time frame could be greatly reduced should major sources of I/I be identified during the initial investigative programs.

- C. **Estimated Fees.** The following estimated fees are based upon the assumption that the condition of the manholes, sanitary sewers, storm sewers, downspouts, sumps, laterals, and foundation drains in the Heritage Subdivision are similar to those that have been encountered in the Royal Manor and Brentwood Subdivisions.

Physical Manhole Program	\$ 20,000
Flow Monitoring Program	50,000
Smoke and Dye Testing Program	30,000
Foundation Flood & Dye Testing Program	<u>82,000</u>

Estimated Possible Investigation Fee \$182,000

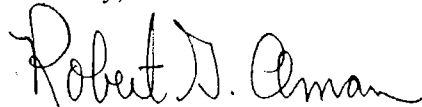
The information contained herein is our best appraisal of the work effort that might be needed to identify and remediate sources of stormwater infiltration and inflow that are causing basement flooding conditions in the Heritage Subdivision. The actual extent of subsequent field investigation work will be determined and appraised at the end of each program. The above estimated fees should be revisited at the end of each prior program and be modified either upward or downward depending upon the information obtained during each program.

Assuming that the information contained in this letter will meet the City of Gahanna's approval, I have also attached our Proposal No. 01-3005 pertaining to the Physical Manhole Inspection Program.

Please call me at 459-2050 if you should you have any questions on the above or if you need any further information.

Once again I would like to take this opportunity to thank you in advance for allowing us this opportunity to serve you in alleviating the flooded basement conditions in the Heritage Subdivision. It has been a pleasure working with you over these last several years and we are optimistic that the Heritage I/I Program will be as successful as the achievements accomplished in the Royal Manor/Brentwood Subdivisions.

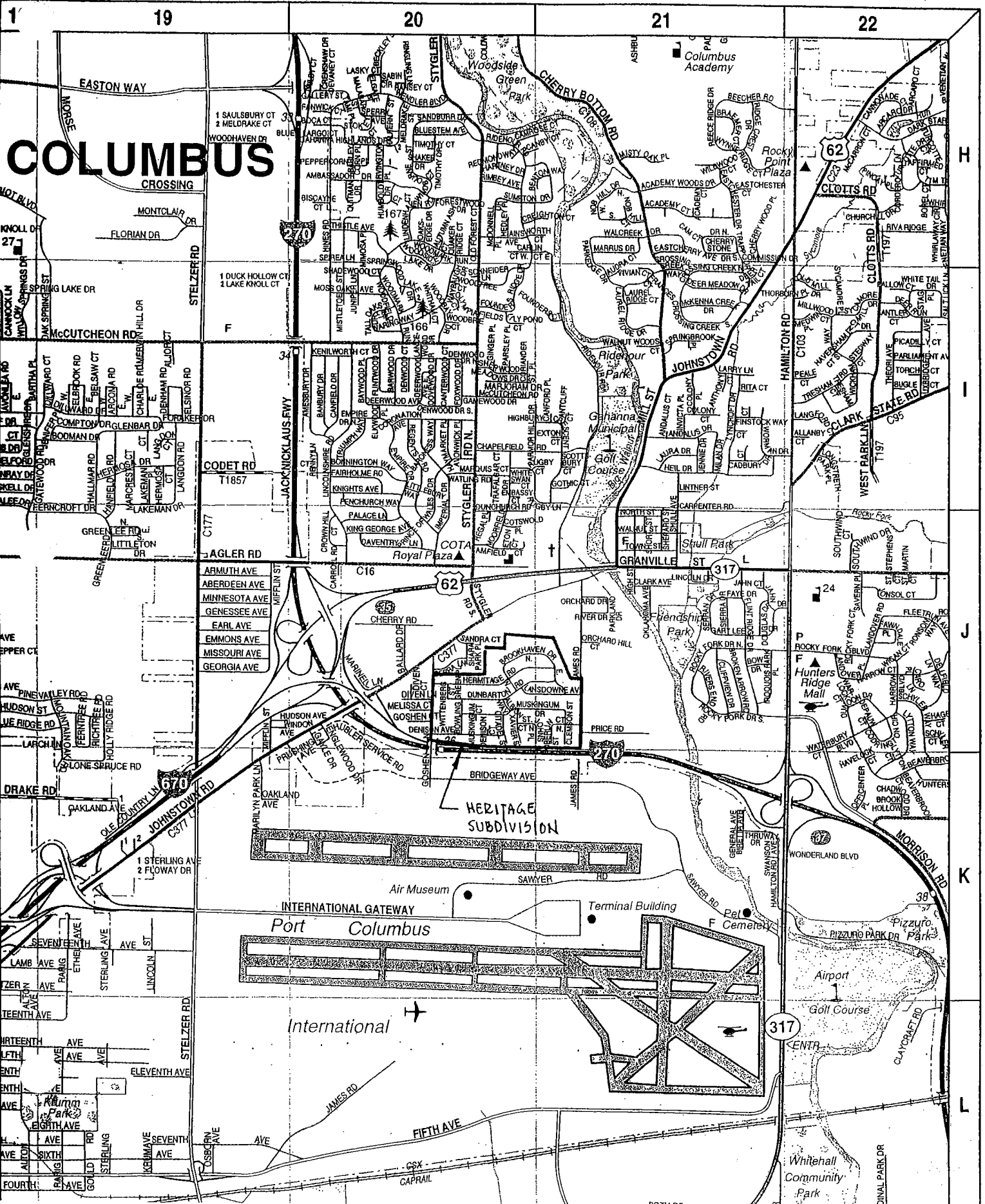
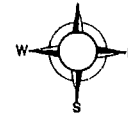
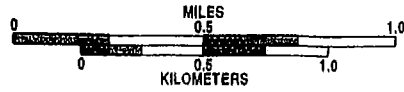
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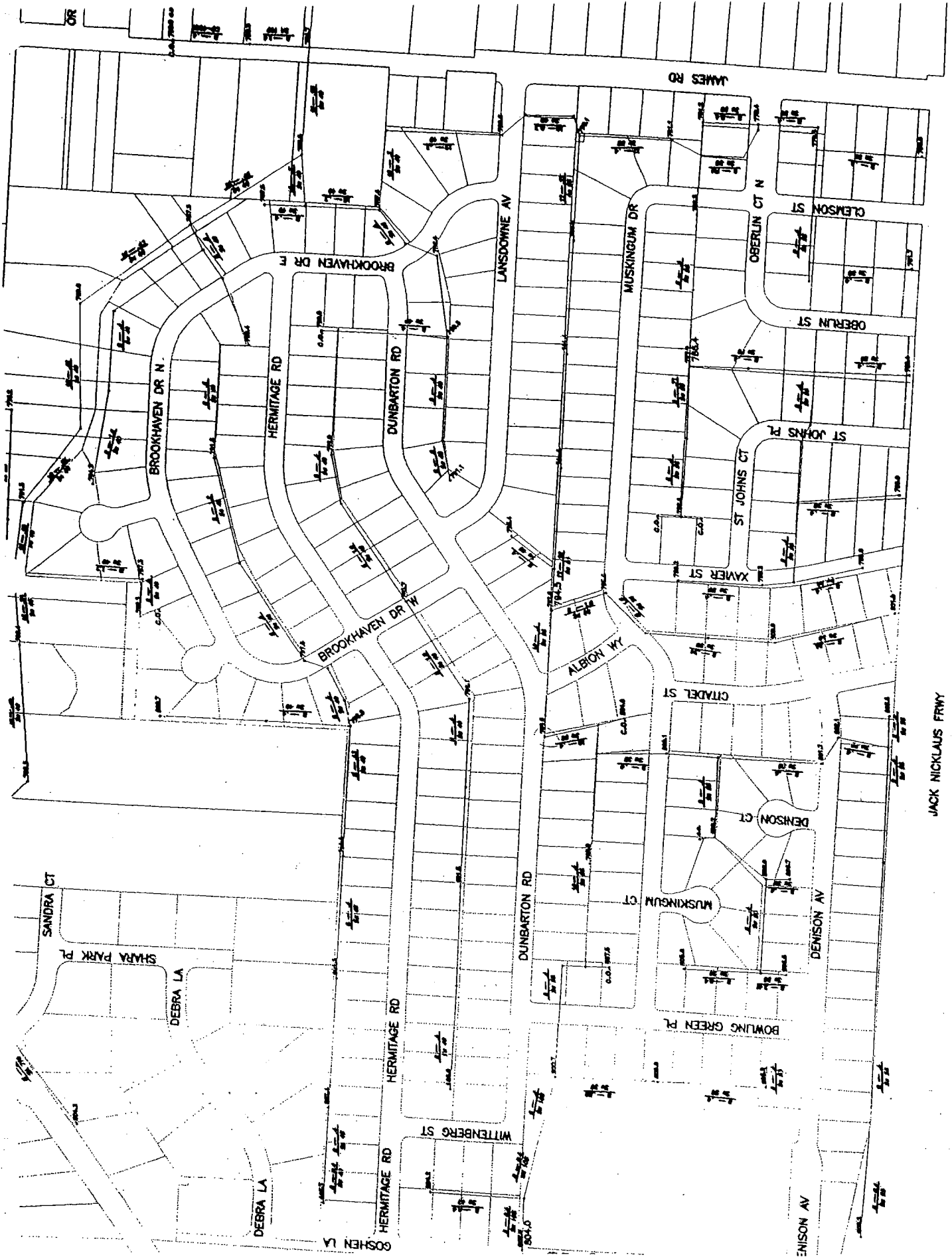


Robert G. Oman, PE
RGO:csm

Attachments
Copy: Bill Horning

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21	22	23
29	30	31





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