✓ 12-18-06 12.5.1

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date	: 5/3/93.	13. Decision:	Approved
2. Review Engineer	: Fred Evans	Date:	5/7/93
3. Date Received	: 4/12/		
4. Facility Name	: City of McGregor	14. Appeal:	
5. County Number	: 22	Date:	
6. Program Area	: CP		
7. Facility Type	: CO1		
8. Subject Area	: 305		
9. Rule Reference	: 64.2(9)		
10. Design Std. Ref.	: 12.5.1		
11. Consulting Engr.	: Eidman Engineering		
12. Variance Rule	: 64.2(9)c		

15. Description of Variance Request

Several years ago the City of McGregor purchased property on higher ground on the north side of McGregor for an industrial site and possible housing development. The industrial development did not occur; therefore, the City now proposes to subdivide the property into 25 large building lots for housing by extending municipal sewers to the area. In view of the limited development, the steep grades available and the proposed discharge into an existing 6" municipal sanitary sewer, the designing engineer originally submitted the project to be constructed entirely of 6" diameter pipe. Following initial review and discussion with the engineer the project has now been revised to limit the quantity of 6" pipe to comply with our design requirements for unsewered communities. These design standards permit the use of 6" sewers for the last 800' of sewer provided the 6" sewer is a dead end not subject to future extension. Inasmuch as DNR design standards require a minimum pipe diameter of 8" for public gravity sanitary sewers in sewered communities, the designing engineer has requested a variance to use 6" diameter sewer pipe for the terminal portions of the sanitary sewer extensions as indicated on the attached plat. Existing 6" sewers in green, proposed 6" sewers in pink, proposed 8" sewers in yellow.

16. Consulting Engineer's Justification

1. The existing sewers in McGregor which will receive the flows are six inch.

   Investigations on the capacity of these sewers indicate that the additional flows coming from the subdivision will not over load the sewers.

2. The subdivision sewers will serve only 25 houses. Six-inch pipe will easily handle these flows. Because of the terrain it will be literally impossible to extend the sewers beyond this project's boundaries.

16. Consulting Engineer's Justification (cont.)

The exception to this will be the one large lot which was originally to be an industrial site. If this area was ever to be developed it would be for a non-water using industry with only toilet facilities involved.

3. Grades for the sewers in the subdivision have been revised from the normal 0.40% for eight-inch sewers to 0.60% for six-inch pipe in case the variance is approved.

4. The sewer connecting the subdivision to the City system is down a hill and grades would be the same for either size pipe.

5. As far as cost savings is concerned, it is estimated that $8,533 can be saved with the use of six-inch pipe. A calculation sheet on costs accompanies this letter.

17. Department's Justification — Approval of the variance request is recommended based upon the above justification and following additional considerations:

1. Only 1,627 feet of the proposed total of 5,428 feet of sewer to serve the new subdivision will be constructed of 6" pipe. The portions of sewers to be constructed of 6" pipe are in accordance with our design standards for unsewered communities as pertains to maximum length and minimum slope for 6" sewers.
2. The applicant for the proposed sanitary sewer construction is the City of McGregor the project also includes a new deep well and 2,870 feet of new water mains; therefore, the City desires to reduce costs whenever possible.
3. Calculations indicate that the carrying capacity of the existing downstream 6" sewer at the critical section (0.61% slope) is adequate to handle the additional hydraulic loading from the proposed subdivision.
4. The critical section of the existing 6" sewer is located one block from an existing 8" sewer; therefore, relief sewer capacity can be readily provided if found necessary in the future.
5. The City administrator for McGregor advises that the City is under contract annually with Municipal Pipe Tool Co. of Hudson, Iowa to clean sewer lines. He also advises that the City owns a sewer rodder that works very well.

18. Precedents Used — Variances for use of 6-inch diameter sewers in sewered communities have been approved for the following cities:

1. Albia - Approved 7/22/87
2. Fairfield - Approved 10/10/89
3. Keokuk - Approved 6/2/87
4. Leon - Approved 10/1/91
5. Lisbon - Approved 1/11/89
6. Pleasantville - Approved 6/1/89
7. University Park - Approved 8/24/88
8. West Union - Approved 7/1/88

19. Staff Reviewer : Fred M. Evans Date: 5/6/93

20. Supervisor : [signature] Date: 5/6/93

21. Authorized by : [signature] Date: 5/7/93

STATE OF IOWA
DEPARTMENT OF NATURAL RESOURCES
HENRY A. WALLACE BUILDING
DES MOINES, IOWA 50319

CONSTRUCTION PERMIT

City of McGregor
P.O. Box E
McGregor, IA 52157

PERMIT NO.: 93-151-S

FILE: McGregor - Sewage

SUBJECT: Ridgewood West Subdivision

PROJECT NO.: S93-108

In accordance with the provisions of Sections 455B.173.3 and 455B.174.4 Code of Iowa, and Rule 567--64.2(455B) or Rule 567--65.6(455B), or Rule 567--43.3(455B) of the Iowa Administrative Code, the Director of the Department of Natural Resources does hereby issue a permit for the construction of:

3,801 feet of 8-inch and 1,627 feet of 6-inch sanitary sewer and appurtenances, Ridgewood West Subdivision, City of McGregor, Iowa.

The requested variance from our design standards to permit the use of 6-inch diameter sewers for this project has been approved in accordance with the exception on pipe diameter which is applicable to unsewered communities. This exception will apply to the portions of sewer lines between M.H. No. 110 and C.O. No. 107A, between M.H. No. 110 and C.O. No. 110A, and between M.H. No. 15 and C.O. No. 16A.

The construction of the project shall be initiated within one year of issuance of this permit or this permit is no longer valid. Within thirty days after completion of construction, the permit holder shall submit a certification by a registered professional engineer that the project was completed in accordance with the approved project documents.

Pursuant to Section 455B.174.4, Code of Iowa, you have the right to appeal any condition of this permit by filing with the Director of the Department of Natural Resources a notice of appeal and request for administrative hearing within thirty days of receipt of this permit.

Contact Fred M. Evans at 515/281-8995 with any questions or comments.

For the Department of Natural Resources:

Larry J. Wilson, Director

By: _____
ENVIRONMENTAL PROTECTION DIVISION

Date: May 11, 1993

cc: Erdman Engineering, P.C., Decorah, IA
Field Office 1

(FME130.BP)

Plan Distribution
2 Engineer; 1 DNR File

ERDMAN ENGINEERING, P.C.
708 COMMERCE DRIVE / P. O. BOX 246
PHONE (319) 382-4194
FAX (319) 382-3623
DECORAH, IOWA 52101

Consulting
Civil Engineering
Land Surveying

April 9, 1993

Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, Iowa 50319

Re: Water and Sanitary Sewer Improvements
Ridgewood West Subdivision
McGregor, Iowa

Gentlemen:

The City Council of McGregor has requested me to ask for a variance for the diameter of a proposed sanitary sewer in the referenced project. The request is for six-inch diameter pipe to be approved in lieu of the eight-inch normally required. Reasons for the request are as follows.

1. The existing sewers in McGregor which will receive the flows are six inch.

   Investigations on the capacity of these sewers indicate that the additional flows coming from the subdivision will not over load the sewers.

2. The subdivision sewers will serve only 25 houses. Six-inch pipe will easily handle these flows. Because of the terrain it will be literally impossible to extend the sewers beyond this project's boundaries.

   The exception to this will be the one large lot which was originally to be an industrial site. If this area was ever to be developed it would be for a non-water using industry with only toilet facilities involved.

3. Grades for the sewers in the subdivision have been revised from the normal 0.40% for eight-inch sewers to 0.60% for six-inch pipe in case the variance is approved.

4. The sewer connecting the subdivision to the City system is down a hill and grades would be the same for either size pipe.

5. As far as cost savings is concerned, it is estimated that $8,533 can be saved with the use of six-inch pipe. A calculation sheet on costs accompanies this letter.

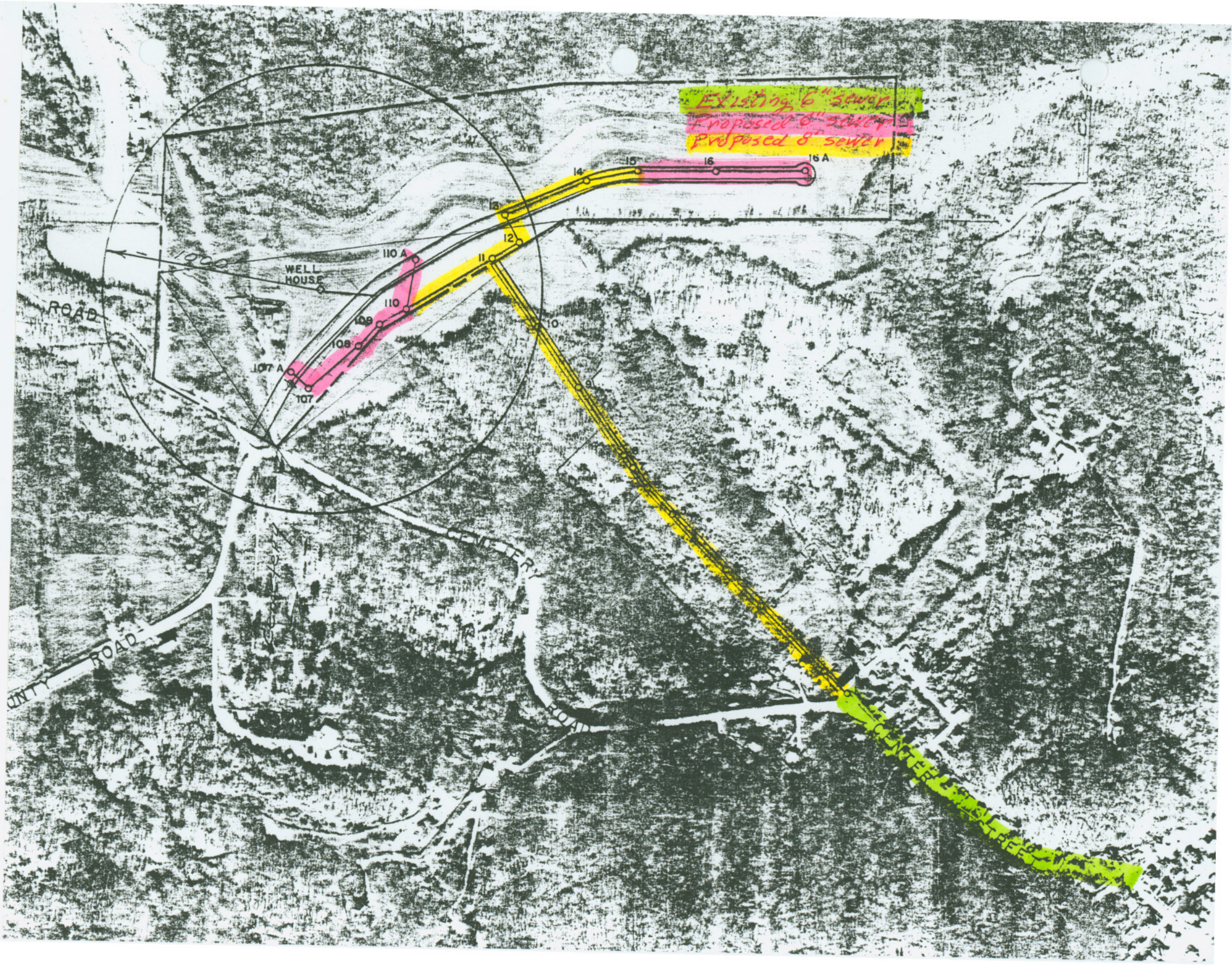
Included as part of this request is a letter from Norman Lincoln, City Administrator for McGregor, and minutes of the February 9th council meeting authorizing the request for the waiver.

Very truly yours,

L.P. Erdman, P.E.

LPE/kh

Enclosures


Existing 6" sewer
Proposed 6" sewer
Proposed 8" sewer
16 A
16
15
14
13
12
11
10
9
110 A
110
109
108
107 A
107
WELL HOUSE
ROAD
ROAD
ROAD

McGregor 5/5/93

Ridge wood West Subdivision

Calculations

Check carrying capacity & flow in existing 6" sewer

From nomograph based upon Kutters formula, n = 0.013

Critical section = 0.61% slope

Full capacity of 6" @ 0.61% ≅ 0.25 MGD

From Nomograph based upon partial flow for pipes

Partial flow @ 0.67% = 0.8 times full capacity

Carrying capacity = 0.25 MGD x 0.8 = 0.20 MGD

Flow in existing pipe - Engineer gives 70 homes @ 4/home

Population now served = 70 x 4 = 280 people

@ 100 GPCD

280 x 100 = 28,000 GPD

@ peaking factor of 4 times

28,000 x 4 = 112,000 GPD

Proposed subdivision Flow - 25 homes @ 3.5

25 homes x 3.5/home = 88 people

@ 100 GPCD

88 x 100 = 8800 GPD

@ peaking factor of 4 times

8800 x 4 = 35,200 GPD

Total flow in critical section @ peak flow

Q = 112,000 + 35,200 = 147,200 GPD

Carrying capacity = 200,000 GPD - OK

FAX 382 3623

City of McGregor

'The Original Switzerland of America' 'Pocket City' P.O. Box E 'On The Mississippi', McGregor, Iowa

April 8, 1993

Mr. Lowell Erdman
Erdman Engineering, P.C.
Decorah, Iowa

Dear Lowell,

I have developed some information pertaining to our conversation yesterday relating to the sewer extension to the Ridgewood West subdivision to McGregor.

First, relating to the number of lots available for housing and potential subdividing by an owner. Each lot sold by the City of McGregor will include a deed restriction that the lot can not be further subdivided or another home built on it.

Second, the City realizes that any commercial development on the lot set aside for such development has to be a minimum water user. That user will only be using basic drinking water, restroom facilities type use.

Third, it is difficult to come up with a date that the existing sanitary sewer was built. A plat by Barber-Schenk Eng. in 1928 shows the as builts of the concrete curbed streets in place. Also the Sanborn Eng. water plat shows all utilities in place in 1930. On the other hand, the 1908 Marstad-Ewing Eng. map of the storm sewers makes no reference to sanitary sewer. I would assume that leaves a window between 1908 and 1928 that it was installed.

Fourth, as to the condition of the sewer line, various sections of the towns sewer system have been televised in the last three years. It is all clay tile and has the basic problem of service lines being extended poorly into the mains. Some cracking is present but the tile seem to be well aligned and clean. The Center Street main to which we are connecting has little history of maintenance problems. The City is under contract annually with Municipal Pipe Tool Co. of Hudson, Iowa, to clean sewer lines. All maintenance cleaning is related to "trouble spots" that used to build up sand deposits. Since our contract with Municipal Pipe began, our sewer problems have virtually disappeared. They are on call for immediate service if problems develop. Furthermore, the City owns a sewer rodder-cleaner machine that works very well. I am very confident that the Center Street main is adequate and is well maintained.

Included is a copy of the minutes from the March Council meeting requesting you to proceed with the Sewer Variance as discussed.

If there are further items necessary please call.

Norman Lincoln

Norman Lincoln, City Administrator

February 18, 1993

L. P. ERDMAN REGISTERED 2886 IOWA PROF. ENGR. & LAND SURVEYOR

I hereby certify that this plan, specification or report was prepared by me or under my direct personal supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

Signed L P Erdman Date 3-05 19 93

L. P. ERDMAN, P.E. Iowa Reg. No. 2886

RIDGEWOOD WEST SUBDIVISION
McGREGOR, IOWA

PRELIMINARY ENGINEERING REPORT

Several years ago the City of McGregor purchased a piece of property on the north side of McGregor for the purpose of developing an industrial site with a possible housing development to be developed later. The industry which was to have occupied the industrial site chose to go elsewhere so the industrial site did not develop.

The City now is in the process of attempting to develop the housing area. A large part of this work will involve building a water and sewer system.

Sanitary Sewer System

Although the subdivision lots are large enough for septic tank and drain field systems, for the following reasons the Owner wishes to have the lots connected to the City sewer system.

1. Soil borings and street grading have both shown that heavy clay soil would require drain fields to be large and expensive.

2. Most people prefer not having to depend on septic systems and that should make the lots more desirable.

3. The City feels that the central water and sewer systems will attract home owners willing to spend more on lots and houses and thus will increase the tax base more than lower cost homes.

4. The City system is capable of handling the flow and this will increase the income from the sewerage system.

Projected Flows

Flows are based on 25 building lots with an average of 3.5 people per lot. Calculation sheets are included with this report.

Capacity of Existing Sewers

The existing sewer mains have been surveyed for size and grade plus the number of houses contributing. The receiving sewer is six inches in diameter with grades varying from 4.29 percent to a minimum of 0.61 percent. The section of sewer with 0.61% grade is one block long and within one block of the eight-inch sewer into

which it discharges. If in the future this section should need to be enlarged it only requires approximately one block to do so.

The capacity of this sewer is 193 GPM. Existing peak flows are 62 GPM. Anticipated peak flows from the subdivision are 35 GPM. This total of 97 GPM is approximately 50 percent of the sewer capacity so the sewers should not have a problem handling the load.

The treatment system is new and has adequate capacity to treat the additional load.

The City Council is requesting that because of the small loads being handled by the new sewers that approval be given to the use of six-inch diameter sewers for the subdivision and the sewer connecting the subdivision to the City system. Because of topography the subdivision itself will never be expanded and the only additional load that could be applied would be from one large lot which might yet become the site for a small industry.

Such an industry would be restricted to a type where only toilet and possibly shower facilities would be contributors. A six-inch sewer would handle such flows.

The grades for the sewer system are designed for six-inch and would be kept the same if eight-inch is mandated. A substantial amount of money can be saved with the use of six-inch pipe. With the limited resources of a small community like McGregor it would seem to be justified to waive the eight-inch requirement.

The sewer main connecting the proposed subdivision collector sewers to the City system will be approximately 2,500 feet long. There is a total elevation difference of 331 feet for an average slope of 13%. A six-inch sewer with this slope will handle far greater flows than the collector will deliver in either six or eight-inch size and will also handle far greater flows than the receiving sewers can handle.

Again, it does not seem necessary to build an eight-inch sewer.

Calculation sheets for the sewer system flows are included with this report.

AVERAGE FLOW:

Design Year Population: 88 people

Design Usage: (From Water Source Development): 60 gpcpd

Daily Flow = 88(60) = 5280 gallons / day.

= 3.7 gpm

PEAK FLOW:

Use a peaking factor of 4.

Peak Flow = 3.7 (4) = 14.8 gpm

Note: Instaneous peaking factor for the water source development = 9.

Using a peaking factor of 9:

Peak Flow = 3.7 (9) = 33.3 gpm

Peak Flow should range between 14.8 and 33.3 gpm.

between MH#11 & #12	Ridgewood West	Jan. 23, 1995

On Ann Street
between 3rd & 4th Street

Data from survey done by Terry Rollins 4-06-89.

Pipe between MH #11 & #12:

6" Clay

Slope = 0.61%

$$Q = \frac{1.486}{0.013}\left(\frac{\pi r^2}{2\pi r}\right)^{\frac{2}{3}}(0.0061)^{\frac{1}{2}} A$$

$$Q = \frac{1.486}{0.013}\left(\frac{3}{2(12)}\right)^{\frac{2}{3}}(0.0061)^{\frac{1}{2}}\left(\pi\left(\frac{3}{12}\right)^2\right) = \underline{0.438 \text{ CFS}}$$

$$Q = 0.438(7.5)(60) = \underline{197 \text{ GPM}}$$

Projected Flow from Subdivision:

25 lots w/ 3.5 people/lot = 88 people

Average flow = 100(88) = 8800 gpd

$$\text{Peak Flow} = \frac{4(8800)}{24(60)} = \underline{24.4 \text{ gpm}}$$

Projected Flow from Existing Sewer to MH #12:

70 Houses w/ 4 people / House = 280 people

Average Flow = 280(100) = 28,000 gpd

$$\text{Peak Flow} = \frac{4(28000)}{24(60)} = 77.8 \text{ gpm}$$

TOTAL PROJECTED FLOW: 24.4 + 77.8 gpm = 102.2 gpm < 197 gpm ✓OK

Capacity of 6" & 8" Pipe @ 16% Slope

$Q = A \frac{1.486}{0.013} (R^{\frac{2}{3}}) S^{\frac{1}{2}}$ $\quad R = \frac{A}{P}$

$Q = \frac{\pi \cdot .5^2}{4} \left(\frac{1.486}{0.013}\right)\left(\frac{.5}{4}\right)^{\frac{2}{3}} (.16)^{\frac{1}{2}}$

$Q = 2.25$ CFS $=$ <u>1010 GPM</u> 6" Pipe

$Q = \frac{\pi (.67)^2}{4} \left(\frac{1.486}{0.013}\right)\left(\frac{.67}{4}\right)^{.67} (.16)^{\frac{1}{2}}$

$= 4.9$ CFS $=$ <u>2204 GPM</u> 8" Pipe

Mc Gregor Sewer (Existing 6" sewer)

Going from Hyd. @ Center St. & Walnut; the SE'ly to Girard St & Kinney St; thence to 4th St & Ann St.; thence to Ann St. & 3rd St., thence to 3rd St. & Main St.

Bk 390 P p. 32 — 6 April 1989 — T. Rollin

16

M.H. #1	Top = 732.3	Fl (out) = 724.0		Comp Copy
↓	S42°31'54"E	77.23'	8" Clay @	-3.47% 98
M.H. #2	Top = 728.0	Fl In = 721.4		
↓	Note: 6" Plastic coming in from SW Fl = 720.2			
M.H. #2	Top = 728.0	Fl In. = 720.2		
↓	S67°16'11"W	238.55	6" Plastic @	+3.48% 45
M.H. #3	Top = 735.8	Fl Out = 728.5		

M.H. #2	Top = 728.0	Fl Out = 719.4		
↓	S45°46'04"E	365.95'	6" Clay @	-4.29% 50
M.H. #4	Top = 710.4	Fl = 703.7		
↓	S45°52'01"E	319.33'	6" Clay @	-3.88% 4
M.H. #5	Top = 698.0	Fl = 691.3		
↓	S58°39'27"E	315.13'	6" Clay @	-4.13% 49
M.H. #6	Top = 684.9	Fl = 678.3		
↓	S58°44'33"E	412.06'	6" Clay @	-2.18% 35
M.H. #7	Top = 675.2	Fl = 669.3		
↓	N51°35'36"E	192.80	6" Clay @	-1.56% 32
M.H. #8	Top = 672.6	Fl = 666.3		
↓	S49°26'05"E	251.99	6" Clay @	-3.57% 45
M.H. #9	Top = 666.0	Fl = 657.3		
↓	S49°16'37"E	152.45'	6" Clay @	-4.41% 51
M.H. #10	Top = 658.5	Fl = 650.6		
↓	N41°40'23"E	275.37'	6" Clay	-3.53% 4
M.H. #11	Top = 650.8	Fl = 640.9		
↓	N40°54'10"E	292.91'	6" Clay @	-0.61% 19
M.H. #12	Top = 648.6	Fl = 639.1		
↓	S48°46'40"E	130.8[illegible]'	6" Clay @	-2.00% 3
M.H. #13	Top = 646.6	Fl = 636.5		
↓				

M.H. # 13 — TOP = 646.6 — FE 636.5

↓ S48°53'11"E — 154.29 - 6" CLAY @ -1.30' = 3146

M.H. # 14 — TOP = 641.7 — FE 634.6

@ M.H # 14 BEGINS 8" CLAY

Total length of existing 6" sewer = 2,940.4'

Capacity of critical section of sanitary sewer on Ann Street between MH #11 & MH #12.

Use Kutter's Formula

% Depth of Pipe = 67%

Pipe : 6" Clay

Slope = 0.61 %

Kutter's Formula:

$$Q = A c \sqrt{RS}$$

$$C = \frac{41.65 + \frac{0.00281}{S} + \frac{1.811}{n}}{1 + \left(41.65 + \frac{0.00281}{S}\right)\frac{n}{\sqrt{R}}}$$

$$C = \frac{41.65 + \frac{0.00281}{0.0061} + \frac{1.811}{0.013}}{1 + \left(41.65 + \frac{0.00281}{0.0061}\right)\frac{0.013}{\sqrt{\frac{3}{12}}}} = 71.2$$

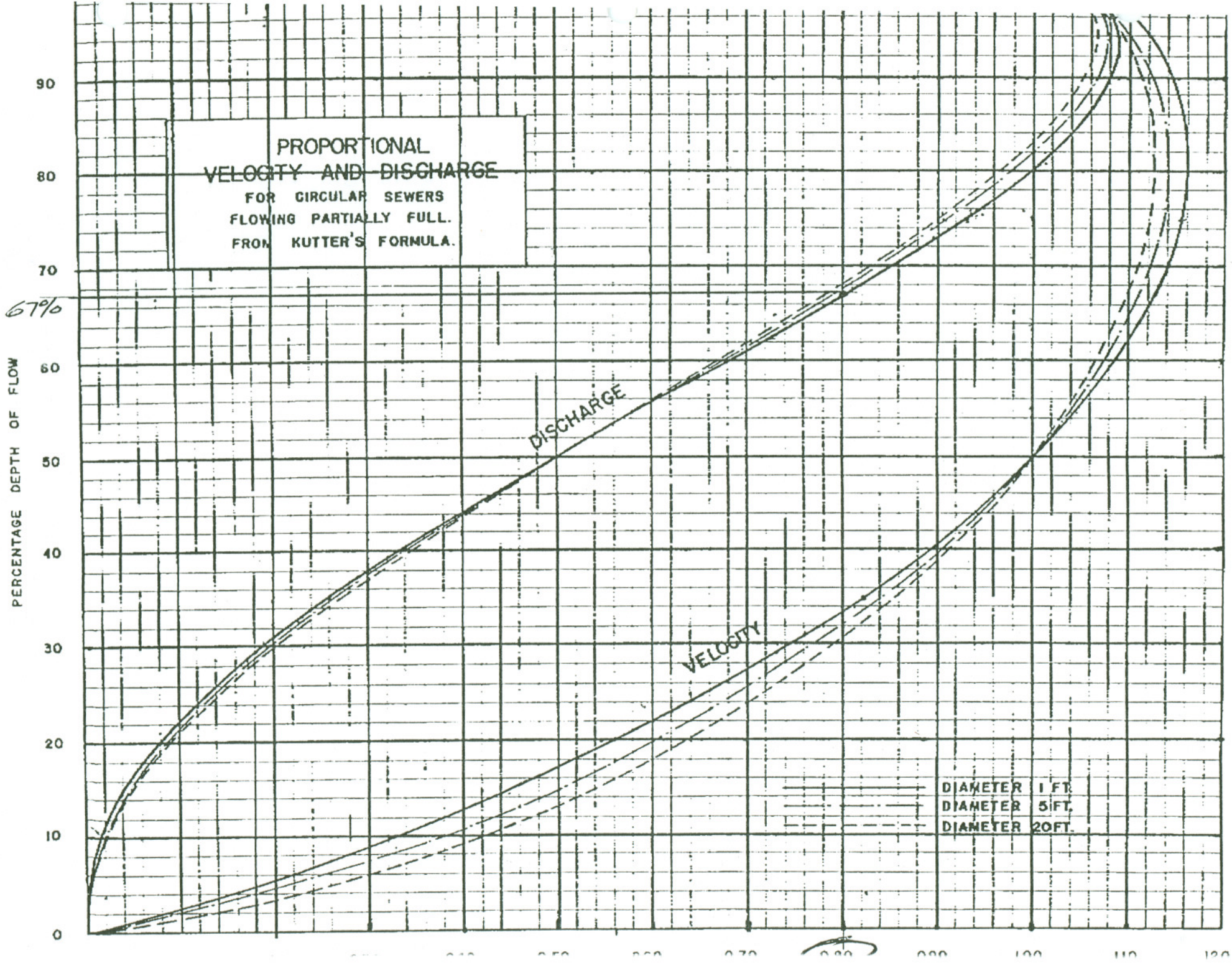
$$Q_{FULL} = \left(\frac{\pi 3^2}{144}\right) 71.2 \left(\frac{3}{12}(0.0061)\right)^{\frac{1}{2}} = 0.386 \text{ CFS}$$

$$Q_{FULL} = 0.386\,(7.48)(60) = 173 \text{ GPM}$$

From Proportional Velocity & Discharge Chart

$Q_{67\%} = 173(.8) = 139 \text{ GPM} > 102.2 \text{ GPM}$ ✓OK (Projected Flow as calc. previously)

$= 139(60)(24) = 200{,}160 \text{ GPD}$


PROPORTIONAL
VELOCITY AND DISCHARGE
FOR CIRCULAR SEWERS
FLOWING PARTIALLY FULL.
FROM KUTTER'S FORMULA.
PERCENTAGE DEPTH OF FLOW
0
10
20
30
40
50
60
67%
70
80
90
DISCHARGE
VELOCITY
DIAMETER 1 FT.
DIAMETER 5 FT.
DIAMETER 20 FT.

Pipe Cost (from Kirk @ WaterPro)

6" SDR 35 = $1.28 / L.F. 6"x4" Tee = $3

8" SDR 35 = $2.36 / L.F. 8"x4" Tee = $8

Bedding Cost

Difference in pipe area = $\frac{(4^2-3^2)\pi}{144} = 0.153$ ft³/L.F.

Extra bedding for pipe height = $\frac{2}{12}(4) = 0.667$ ft³/L.F.

Bedding Cost = $10 / ton

Extra cost for bedding 8" pipe: $(.667-.153)\left(\frac{150}{2000}\right)10$

$= \underline{\underline{\$0.39 / L.F.}}$

Project Cost Difference:

Length of Pipe = 5400 L.F.

Tees = 25 EACH

Extra pipe cost = $(2.36 - 1.28 + 0.39)(5400)$ (1.47)

$= \underline{\underline{\$7,938}}$

Extra Tee Cost = $25(7) = \underline{\underline{\$175}}$

A-loc = $21(2)(10) = \underline{\underline{\$420}}$

Total extra cost for 8" pipe instead of 6" pipe:

$= 7938 + 175 + 420 = \underline{\underline{\$8,533}}$