

**CONSTRUCTION PLANS FOR
WATER & SEWER
IMPROVEMENTS IN
LAKEWOOD HARBOR 4TH ADDITION
PHASE I
Mandan, North Dakota**

DESIGN ENGINEER'S CERTIFICATE

I, GREGORY J. FESER, A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT THE PLANS FOR WATER & SANITARY SEWER IMPROVEMENT PROJECT NO. 2005-19, MANDAN, NORTH DAKOTA WERE PREPARED UNDER MY SUPERVISION AND ARE COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.



Gregory J. Feser
GREGORY J. FESER, P.E.
REGISTERED PROFESSIONAL ENGINEER
NORTH DAKOTA REGISTRATION NO. 4680

APPROVAL OF CITY ENGINEER

I, THOMAS LITTLE, CITY ENGINEER FOR THE CITY OF MANDAN, NORTH DAKOTA, HEREBY APPROVE THESE PLANS FOR WATER & SANITARY SEWER IMPROVEMENT PROJECT NO. 2005-19, MANDAN, NORTH DAKOTA AS SHOWN ON THE ACCOMPANYING PLANS.



Thomas Little
THOMAS LITTLE, P.E.
REGISTERED PROFESSIONAL ENGINEER
CITY ENGINEER
MANDAN, NORTH DAKOTA

DESIGN ENGINEER

SWENSON, HAGEN & CO.

DEVELOPER

MITZEL BUILDERS, INC.

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WARRANTY / DISCLAIMER

The designs represented in these plans are in accordance with established practices of civil engineering. However, neither Swenson, Hagen & Co. nor its personnel can or do warranty these plans as constructed except in the specific cases where Swenson, Hagen & Co personnel inspect and control the physical construction on a full time basis.

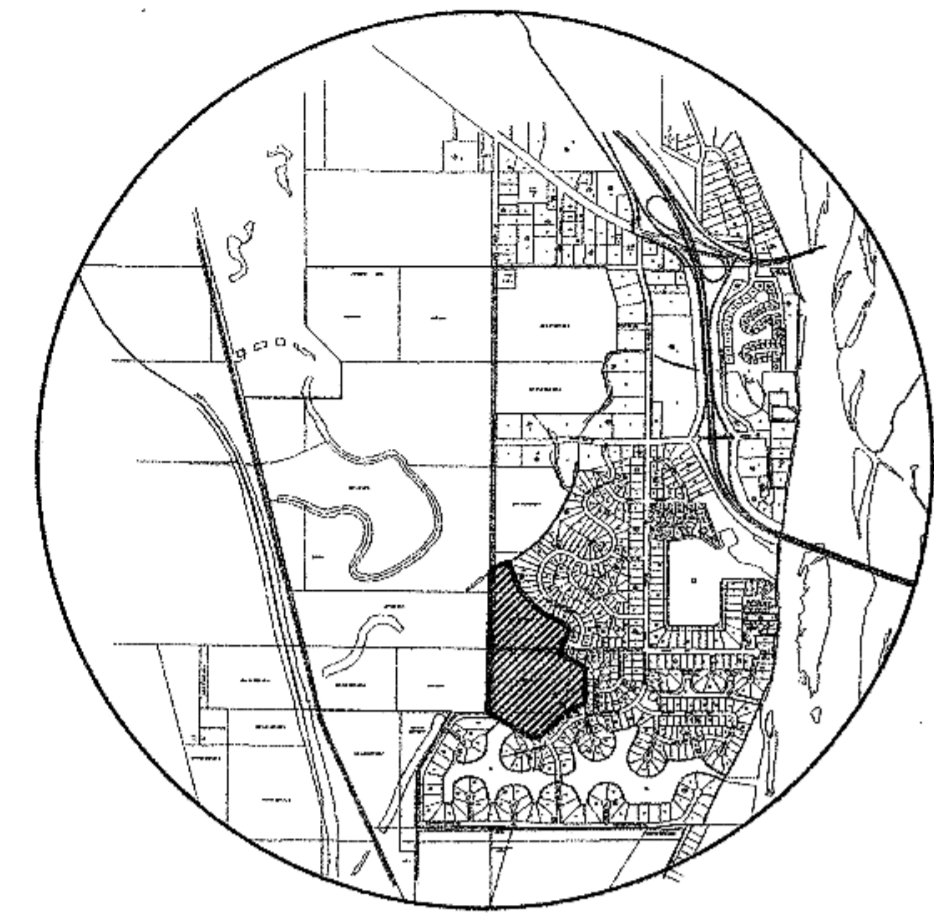
SAFETY NOTICE TO CONTRACTOR

In accordance with generally accepted construction practices the Contractor will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal business hours.

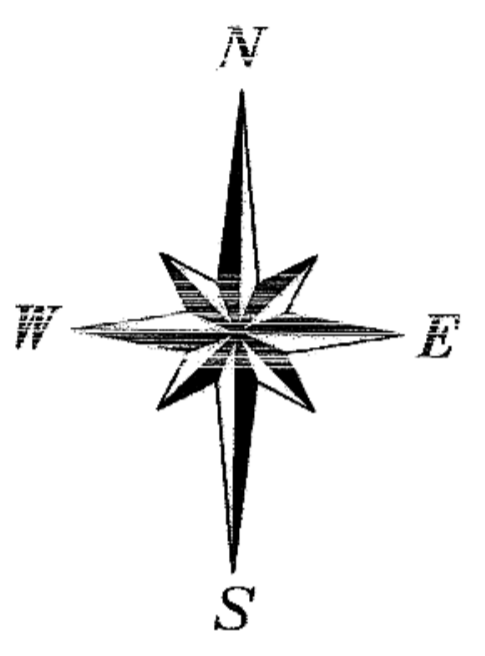
UTILITY NOTICE TO CONTRACTOR

The location of existing underground utilities are shown in an approximate way only and have not been independently verified by the Owner or its representatives. The Contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages which might be occasioned by the Contractor's failure to exactly locate and preserve any and all underground utilities. Underground locates can be made by using the "One Call" number 1-800-795-0555.

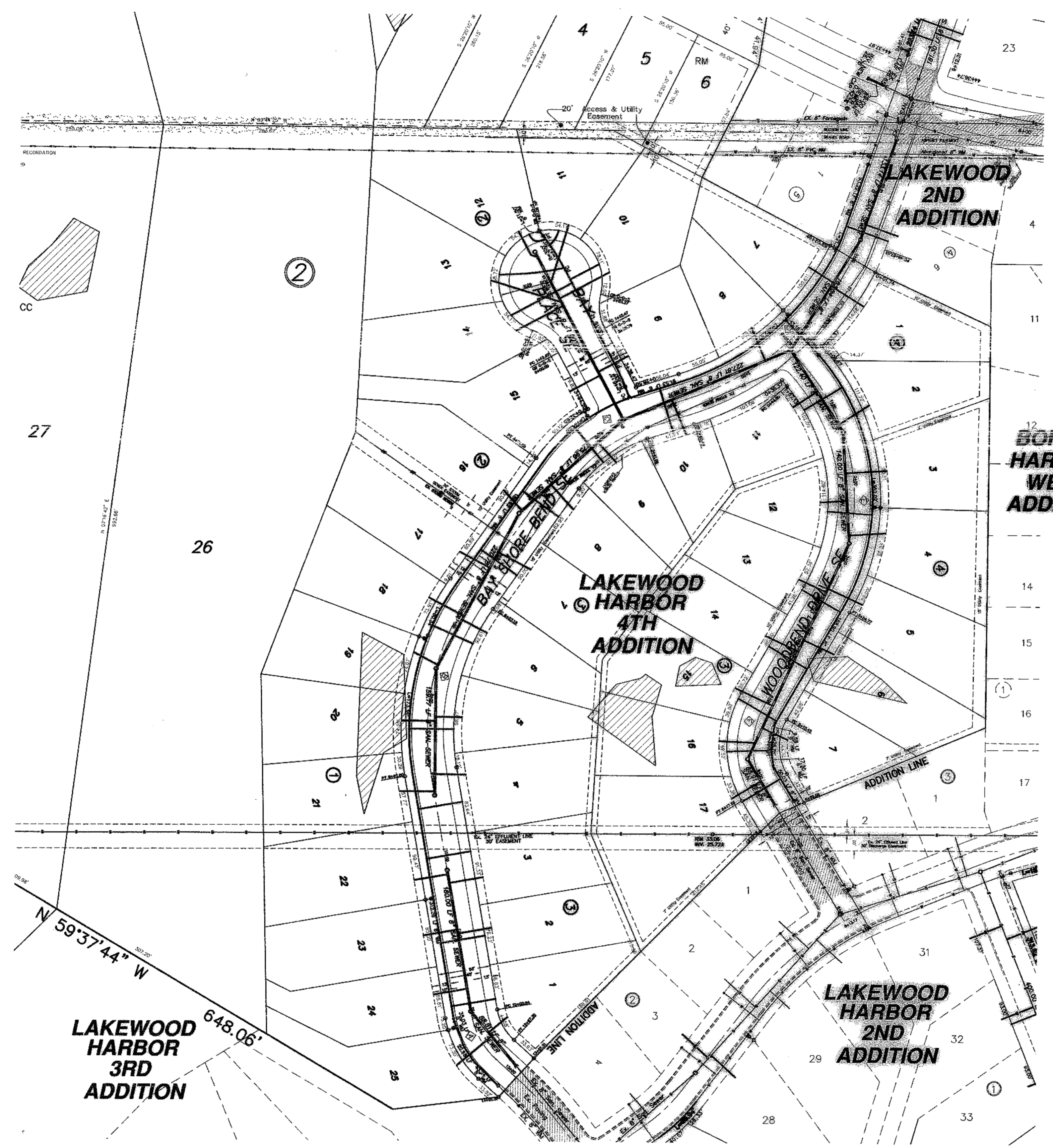
Contractor: *Bussard's Excavating & Driveways, LLC*
Completion Date: August 2005
Materials: C900 Watermain
SBR 35 Sewer



LOCATION MAP



SCALE 1" = 80'
Overall Schematic
NOT FOR CONSTRUCTION



LAKEWOOD HARBOR 3RD ADDITION
648.06'

**WATER & SANITARY SEWER
IMPROVEMENT PROJECT NO. 2005-19**

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Surveying
Hydrology
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Construction Management

DRAWN BY: MPH
CHECK BY: JLG, GJF
DATE: 4-28-05
FILE DESC:
COMPUTER FILE:
SURVEY FILE:

SHEET
1 OF 5

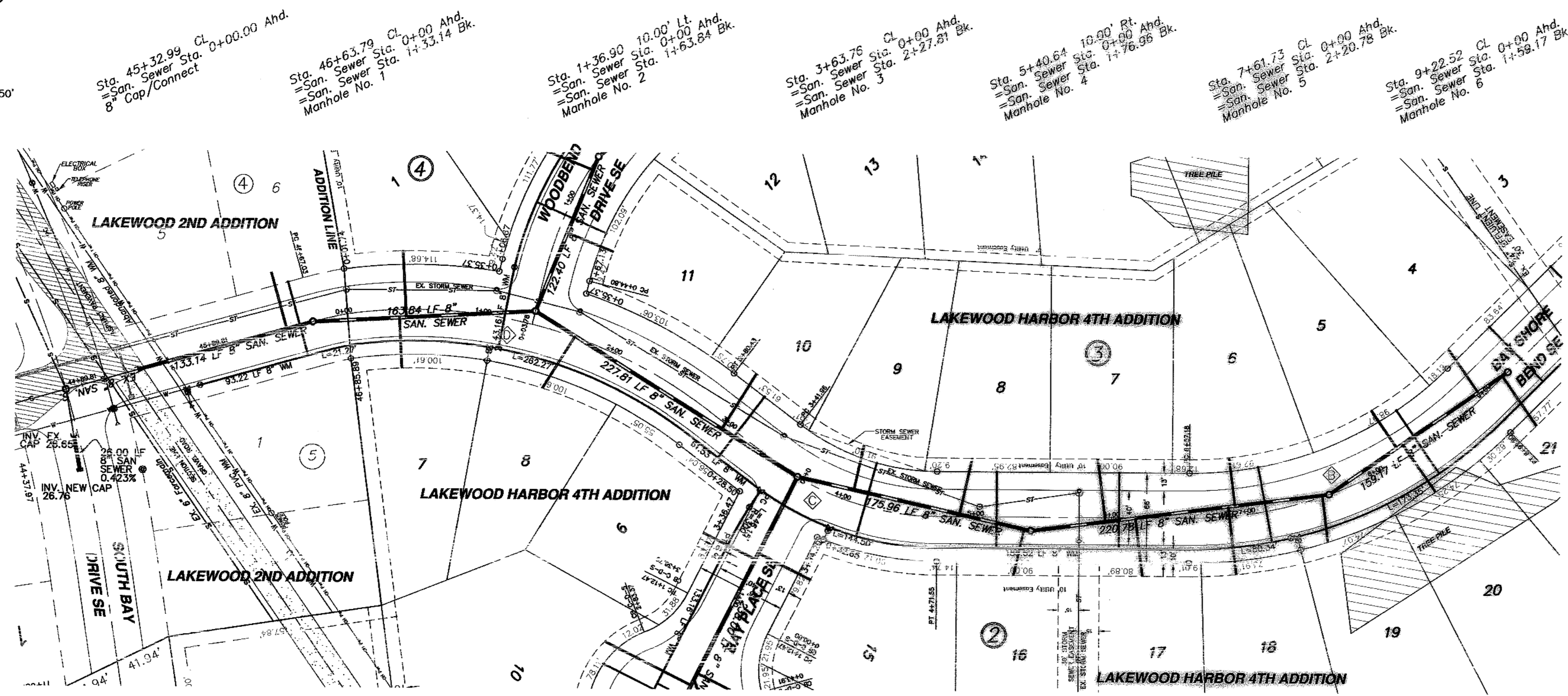
Record Drawing

05-19

SCALE - 1" = 50'

CONSTRUCTION NOTES (THIS SHEET)

1. BACKFILL SHALL BE CLASS 'A'.
2. THE PROFILE SHOWS THE EXISTING GROUND CENTERLINE OF THE STREETS. THIS WILL BE THE CONDITION AT THE TIME OF CONSTRUCTION.
3. THE CONTRACTOR SHALL VERIFY THE ELEVATION OF THE GROUND WATER AT THE TIME OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DEWATERING OR SOIL STABILIZATION (OTHER THAN USING SUBCUT GRAVEL) OF THE CONSTRUCTION SITE AS REQUIRED TO INSTALL THE PROPOSED UTILITIES.
4. PROTECT ALL SURVEY MONUMENTS. MONUMENTS DISTURBED OR DESTROYED SHALL BE REPLACED BY THE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
5. THE CONTRACTOR SHALL PROVIDE ALL SIGNAGE AND TRAFFIC CONTROL AS NECESSARY TO CONSTRUCT THE SANITARY SEWER. REMOVE AND DISPOSE OF OFFSITE PAVEMENT AS REQUIRED TO MAKE THE CONNECTION TO THE EXISTING SANITARY SEWER. MINIMIZE THE AMOUNT OF PAVEMENT REMOVED. PATCH THE AREA BACK IN WITH CLASS V GRAVEL. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO THE "S" SANITARY SEWER BID ITEM.
6. THE SEWER SERVICE LINE FOR LOT 10 BLOCK 3 WILL REQUIRE AN ADDITIONAL BEND TO GET ABOVE THE EXISTING STORM SEWER. CONSTRUCT THIS SERVICE LINE AS REQUIRED TO AVOID THE STORM SEWER.
7. ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.
8. MOVE THE EXISTING TREE PILE AS REQUIRED TO CONSTRUCT THE PROPOSED WATERMAIN AND SEWER SERVICES. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO THE "MOVE TREES" BID ITEM.



Lot	Block	4" Sewer Service	4" x 2 1/2 Bend	4" x 45' Bend	4" x 4" Wye Branch	Sewer Service Invert	At The Cap	1" Copper Service	1" No. 10 Pipe	Water Service Connection	7" Ball Valve	Curb Stop & 1 1/2" Box
6	4	43.0	1	1	28.00	56.0	1	1				
7	2	37.0	1	1	28.00							
1	4	48.8	1	1	27.00							
8	2	45.1	1	1	28.00							
10	3	48.0	2	1	28.00	56.0	1	1				
9	3	34.2	1	1	29.00	56.0	1	1				
8	3	42.3	1	1	29.00	56.0	1	1				
16	2	33.9	1	1	28.00							
0	4	64	1	1	29.00	56.0	1	1				
17	2	43.2	1	1	29.00							
18	2	50.2	1	1	29.00	56.0	1	1				
19	2	35.4	1	1	29.00							
8	3	35.2	1	1	29.00	56.0	1	1				
20	2	42.9	1	1	29.00							
4	3	38.9	1	1	29.50	56.0	1	1				
21	2	44.9	1	1	28.23							
TOTAL		703.8	18	17	448.0	8	8					

APPROXIMATE WYE LOCATIONS

STATION	DIRECTION	LOT	BLOCK
FROM 8" CAP TO MANHOLE NO. 1			
1+10	SE	6	4
FROM MANHOLE NO. 1 TO MANHOLE NO. 2			
0+64	NW	7	2
0+69	SE	1	4
FROM MANHOLE NO. 2 TO MANHOLE NO. 3			
1+62	NW	10	3
FROM MANHOLE NO. 3 TO MANHOLE NO. 4			
0+43	SE	8	3
1+22	SE	8	3
2+54+13.75	NW	18	2
FROM MANHOLE NO. 4 TO MANHOLE NO. 5			
0+55	SE	17	2
0+78	NW	18	2
1+46	NW	18	2
1+51+11.5	SE	6	4
FROM MANHOLE NO. 5 TO MANHOLE NO. 6			
0+60	E	5	3
0+65	W	20	2
1+33	E	4	3
1+52	W	21	2

CURVE DATA

CURVE	RADIUS	LENGTH	TANGENT	DELTA
B	300.00'	235.62'	124.26'	45°00'00"
C	200.00'	129.60'	67.16'	37°07'35"
D	355.00'	280.43'	147.99'	45°15'38"

Manhole Number	1	2	3	4	5	6
Castng Elev.	38.13	37.40	37.64	37.49	38.50	39.27
Top P.C. Section	37.09	36.36	36.60	36.45	37.46	38.23
Invert Elev. (a)	23.75	25.40	26.46	27.27	28.26	29.06
Invert Elev. (b)	23.85	25.60	26.56	27.37	28.36	29.16
Invert Elev. (c)	---	25.34	26.60	---	---	---
Length P.C. Section	13.34	10.96	10.14	9.18	9.20	9.23

Sta. 45+71.47
Remove Plug
Connect
8" Gate Valve & Box

Sta. 1+08.82
3.00 LF 8" WM
6" Gate Valve & Box
7.00 LF 6" WM
6" Hydrant

Sta. 3+47.72
8" x 8" Tee

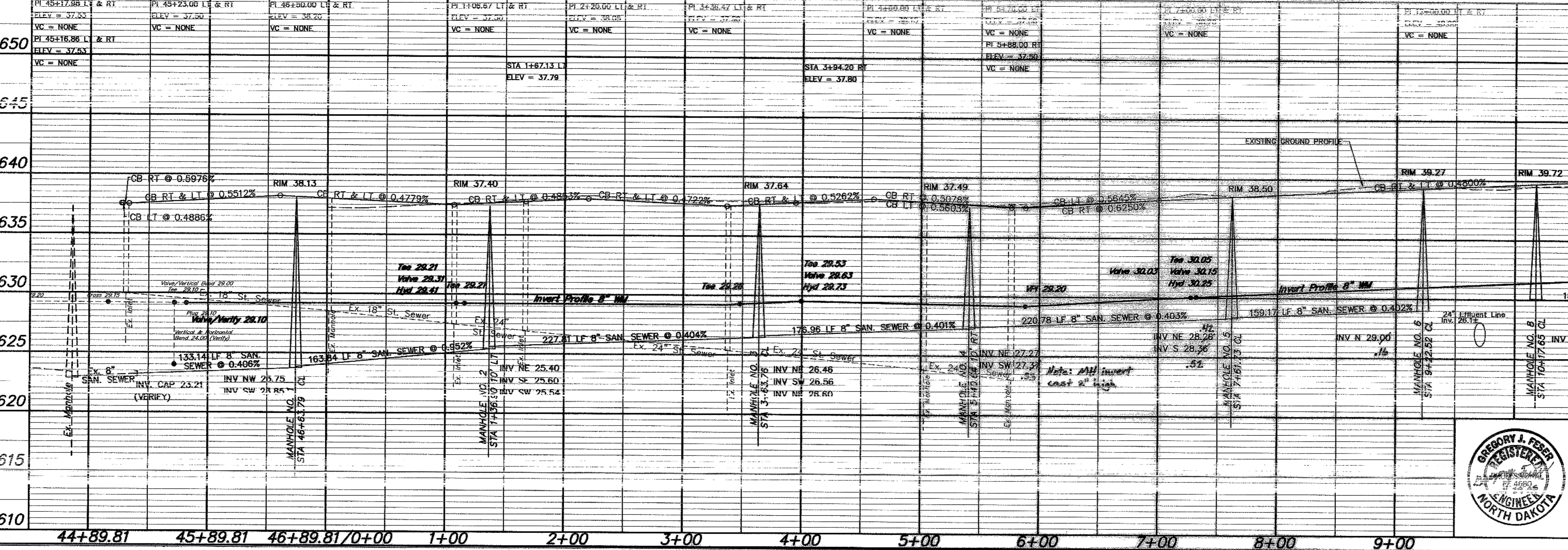
Sta. 3+99.41
8" x 6" Tee
3.00 LF 6" WM
6" Gate Valve & Box
7.00 LF 6" WM
6" Hydrant

Sta. 7+31.79
8" x 6" Tee
3.00 LF 6" WM
6" Gate Valve & Box
7.00 LF 6" WM
6" Hydrant

Sta. 7+27.15
8" Gate Valve & Box

End Watermain Quantities
Sta. 8+92.80

End San. Sewer Quantities
Sta. 9+22.52



APPROXIMATE QUANTITIES

San. Sewer Items	Quantity
8" Sanitary Sewer	1107 LF
8" x 4" Wye Branch	17 EA
Subcut Gravel	170 TON
Concrete Manhole	6 EA
4" Sewer Service Pipe	704 LF
4" x 45' Bend	18 EA
Move Trees	1 LS

Watermain Items

Watermain Items	Quantity
6" PVC Watermain	30 LF
8" PVC Watermain	1022 LF
6" Hydrant	3 EA
6" Gate Valve & Box	3 EA
8" Gate Valve & Box	2 EA
Ductile Iron Fittings	(incidental)
1" Water Copper Serv. Pipe	448 LF
1" Water Serv. Connection	8 EA
1" Ball Valve Curb Stop	8 EA
And 1 1/2" Box	

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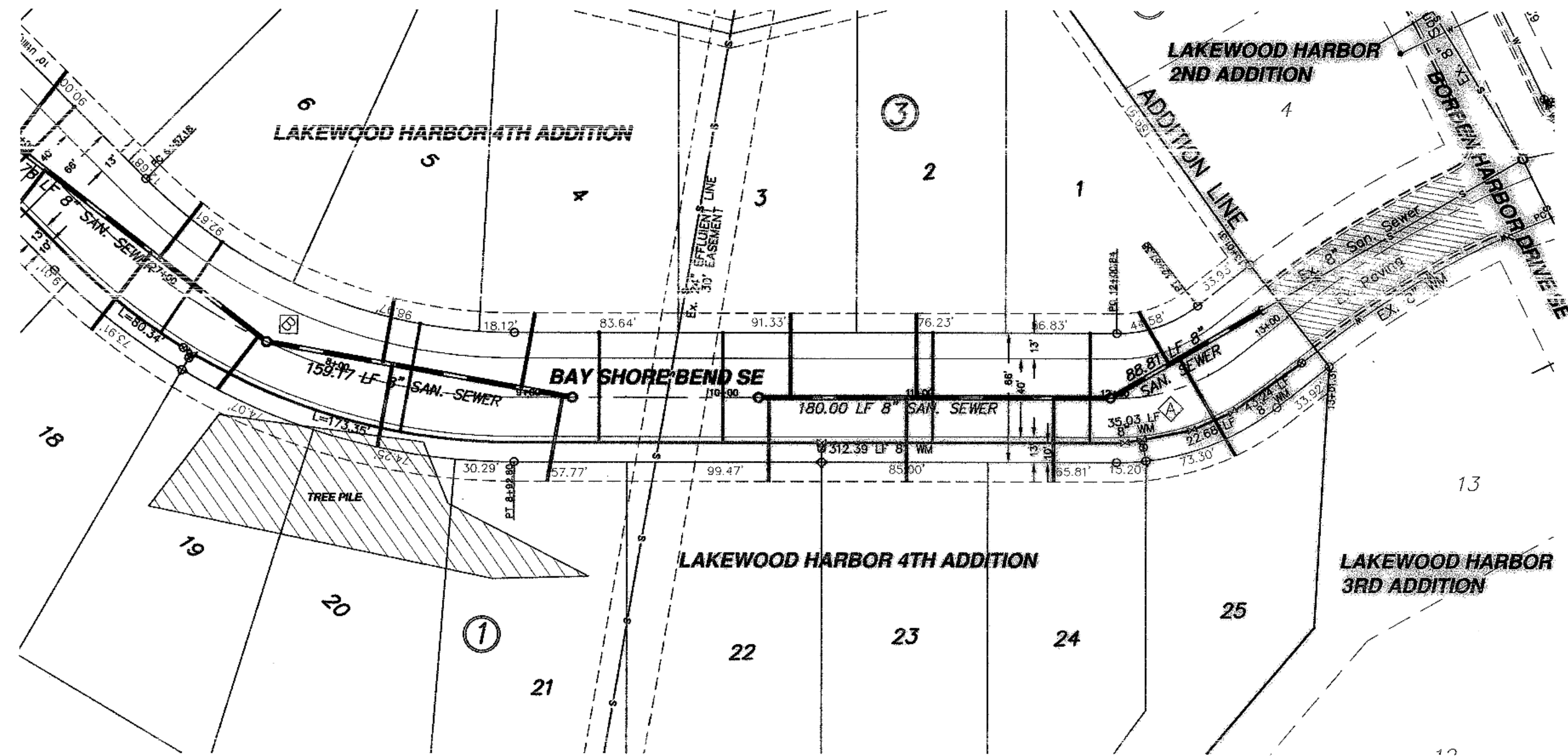


BAY SHORE BEND SE
FROM SOUTH BAY DRIVE SE SOUTH TO
550' NORTH OF BORDEN HARBOR DRIVE SE

WATER AND SEWER IMPROVEMENT PROJECT 2005 19
SHEET NO. 2 OF 5
MANDAN, ND APRIL 28, 2005
Record Drawing COPYRIGHT 2005 SWENSON, HAGEN & CO.

SCALE - 1"=50'

Sta. 7+61.73 Cl. 0+00 Ahd. =San. Sewer Sta. 2+20.78 Bk. Manhole No. 5
 Sta. 9+22.52 Cl. 0+00 Ahd. =San. Sewer Sta. 1+59.17 Bk. Manhole No. 6
 Sta. 10+17.65 Cl. 0+00 Ahd. =San. Sewer Sta. 1+80.00 Bk. Manhole No. 8
 Sta. 11+97.65 Cl. 0+00 Ahd. =San. Sewer Sta. 0+88.81 Bk. Manhole No. 7
 Sta. 12+91.09 Cl. 0+00.00 Ahd. =San. Sewer Sta. 0+00.00 Bk. Cap/Connect



- CONSTRUCTION NOTES (THIS SHEET)**
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 - PROTECT ALL SURVEY MONUMENTS. MONUMENTS DISTURBED OR DESTROYED SHALL BE REPLACED BY THE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
 - THE CONTRACTOR SHALL VERIFY ALL SIGNAGE AND TRAFFIC CONTROL AS NECESSARY TO CONSTRUCT THE SANITARY SEWER. REMOVE AND DISPOSE OF OFFSITE PAVEMENT AS REQUIRED TO MAKE THE CONNECTION TO THE EXISTING SANITARY SEWER. MINIMIZE THE AMOUNT OF PAVEMENT REMOVED. PATCH THE AREA BACK IN WITH CLASS V GRAVEL. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO THE "B" SANITARY SEWER BID ITEM.
 - THE WATER SERVICE QUANTITY FOR LOT 4 BLOCK 3 IS SHOWN ON SHEET 2.
 - ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.

Lot	Block	4" Sewer Service	4" 22 1/2' Bend	4" 45' Bend	8" x 4" Wye Branch	Sewer Service Invert At The Cap	1" Copper Water Service Pipe	1" Water Service Connection	1" Ball Valve Curb Stop	1 1/2" Box
25	2	57.4	1	1	30.05					
1	3	30.9	1	1	28.81	56.0	1	1		
24	2	43.0	1	1	30.29					
2	3	43.0	1	1	30.57	56.0	1	1		
23	2	43.0	1	1	30.59					
3	3	43.0	1	1	30.83	56.0	1	1		
22	2	43.0	1	1	30.87					
TOTAL		303.3	7	7	168.0	3	3			

APPROXIMATE WYE LOCATIONS

STATION	DIRECTION	LOT	BLOCK
FROM EXISTING 8" CAP TO MANHOLE NO. 7			
0+48	SW	25	2
0+54	NE	1	3
FROM MANHOLE NO. 7 TO MANHOLE NO. 8			
0+29	SW	24	2
0+99	NE	2	3
1+04	SW	23	2
1+64	NE	3	3
1+75	SW	22	2

Manhole Number	7	8
Cast Elev.	40.59	39.72
Top P.C. Section	39.55	38.68
Invert Elev. (a)	28.34	30.16
Invert Elev. (b)	28.44	
Length P.C. Section	10.21	R 60

CURVE DATA

CURVE	RADIUS	LENGTH	TANGENT	DELTA
A	100.00'	66.54'	34.55'	38°07'28"

NOTE:
ALL WATER MAIN IS 24.00' RIGHT OF CENTERLINE UNLESS OTHERWISE STATED

Begin Watermain Quantities
Sta. 8+22.50
Begin San. Sewer Quantities
Sta. 9+22.52

Sta. 10+50.04
8" x 6" Tee
3.00 LF 6" WM
6" Gate Valve & Box
7.00 LF 6" WM
6" Hydrant

Sta. 12+11.54 21.97' Rt.
8" x 6" Tee
4.00 LF 6" WM
6" Gate Valve & Box
7.00 LF 6" WM
6" Hydrant From Salvage

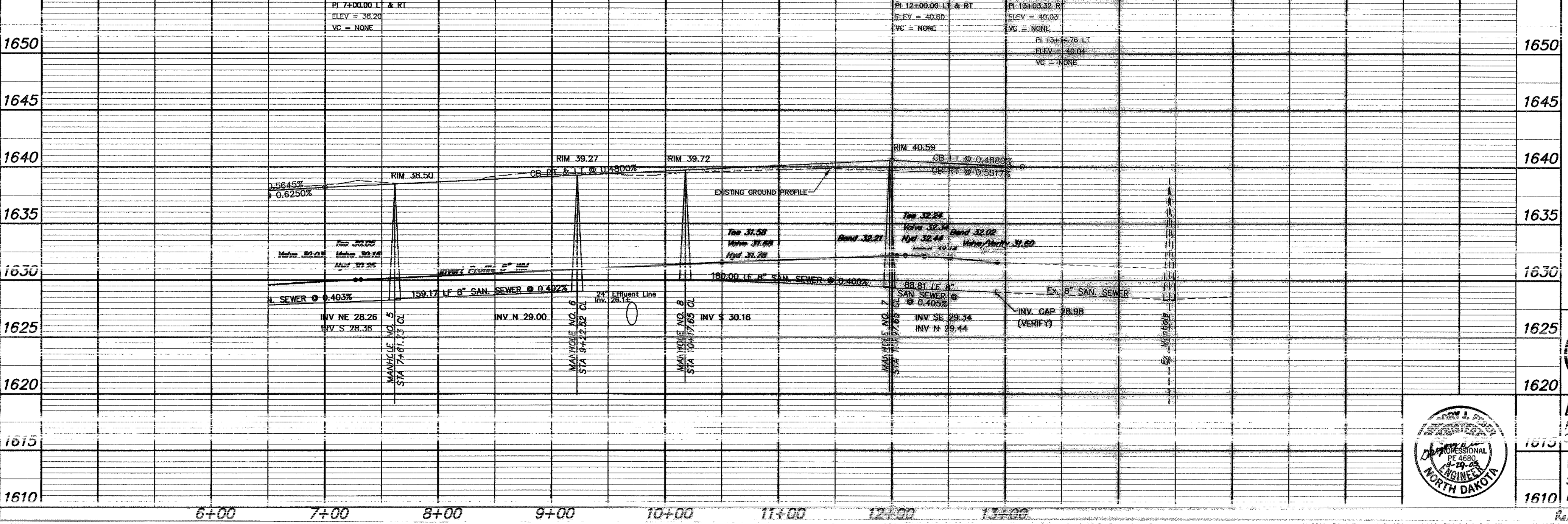
Sta. 12+91.31
Remove & Salvage
8" x 6" Reducer
1 LF 6" WM
6" Hydrant
Sta. 12+91.31
8" Gate Valve & Box

Sta. 12+04.37 23.08' Rt.
8" 11 1/4' Bend

Sta. 12+51.56 22.27' Rt.
8" 11 1/4' Bend

Sta. 12+28.40 22.44' Rt.
8" 11 1/4' Bend

End Watermain Quantities
Sta. 12+91.31
End San. Sewer Quantities
Sta. 12+91.09



APPROXIMATE QUANTITIES

San. Sewer Items	Quantity
8" Sanitary Sewer	269 LF
8" x 4" Wye Branch	7 EA
Concrete Manhole	2 EA
4" Sewer Service Pipe	303 LF
4" 45' Bend	7 EA

Watermain Items	Quantity
6" PVC Watermain	21 LF
8" PVC Watermain	413 LF
6" Hydrant	1 EA
6" Hydrant From Salvage	1 EA
6" Gate Valve & Box	2 EA
8" Gate Valve & Box	1 EA
Ductile Iron Fittings	(incidental)
1" Water Copper Serv. Pipe	168 LF
1" Water Serv. Connection	3 EA
1" Ball Valve Curb Stop	3 EA
And 1 1/2" Box	

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 Mandan, North Dakota 58544
 Surveying
 Land Planning
 Civil Engineering
 Landscape & Site Design
 Construction Management
 Phone (701) 923-2600
 Fax (701) 923-2606



BAY SHORE BEND SE
 FROM 550 NORTH OF BURDEN HARBOR DRIVE SE
 SOUTH TO THE ADDITION LINE

WATER AND SEWER IMPROVEMENT PROJECT 2005-19
 SHEET NO. 3 OF 5
 MANDAN, ND APRIL 28, 2005

SCALE - 1"=50'

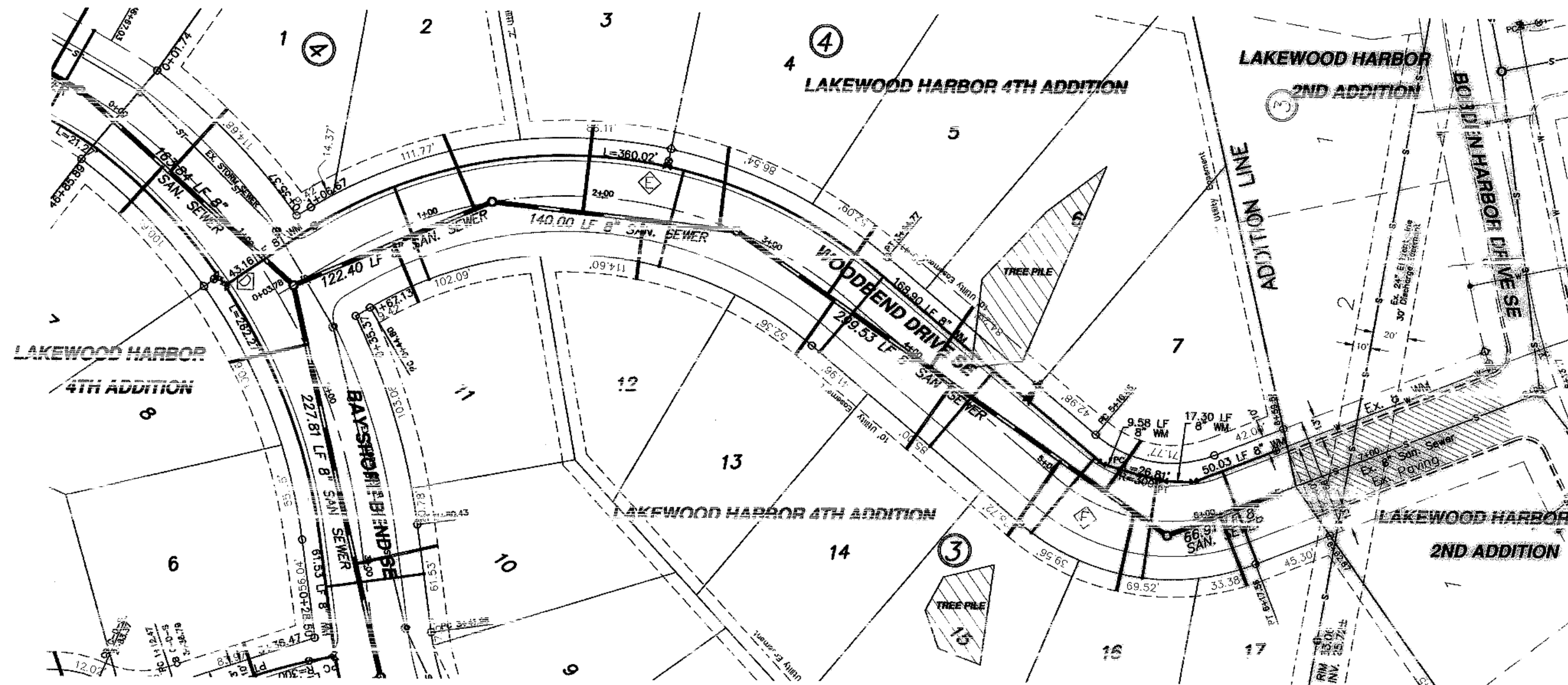
Sta. 0+13.78 CL 0+00 Ahd.
=San. Sewer Sta. 0+60 Ahd.
Manhole No. 2

Sta. 1+37.09 CL 0+00 Ahd.
=San. Sewer Sta. 1+22.40 Bk.
Manhole No. 9

Sta. 2+78.99 CL 0+00 Ahd.
=San. Sewer Sta. 1+40.00 Bk.
Manhole No. 10

Sta. 5+78.39 CL 8.19' Rt.
=San. Sewer Sta. 2+39.53 Bk. NE
=San. Sewer Sta. 0+66.51 Bk. SE
Manhole No. 11

Sta. 6+43.17 CL 0+00 Ahd.
=San. Sewer Sta. 0+00 Ahd.
Ex. 8" Cap



Lot	Block	4" Sewer Service	4" 22 1/2" Bend	4" 45" Bend	8" x 4" Wye Branch At The Cap	1" Water Serv. Connection	1" Ball Valve Curb Stop	1 1/2" Box
11	3	36.7	1	1	29.00	56.0	1	1
2	4	45.9	1	1	29.00			
3	4	52.4	1	1	29.00			
12	3	33.8	1	1	29.00	56.0	1	1
7	1	45.7	1	1	29.00			
13	3	39.0	1	1	29.00	56.0	1	1
8	4	42.4	1	1	29.00			
14	3	45.4	1	1	29.16	56.0	1	1
15	3	52.3	1	1	29.52	55.8	1	1
7	4	35.5	1	1	29.48			
16	3	45.6	1	1	29.68	56.2	1	1
17	3	27.4	1	1	29.30	56.0	1	1
TOTAL		565.6	1	12	13	392.0	7	7

APPROXIMATE WYE LOCATIONS

STATION	DIRECTION	LOT	BLUCK
FROM MANHOLE NO. 2 TO MANHOLE NO. 9			
0+62	SW	11	3
1+12	NE	2	4
FROM MANHOLE NO. 9 TO MANHOLE NO. 10			
0+52	NE	3	4
0+87	SW	12	3
1+30	NE	4	4
FROM MANHOLE 10 TO MANHOLE 11			
0+63	SE	5	4
0+66	NW	13	3
1+34	SE	6	4
1+50	NW	14	3
2+25	NW	15	3
2+56	SE	7	4
2+77	W	16	3
FROM EXISTING 8" CAP TO MANHOLE NO. 11			
0+35	SW	17	3

Manhole Number	9	10	11
Casting Elev.	38.60	39.35	38.94
Top P.C. Section	37.56	38.31	37.90
Invert Elev. (6)	27.04	27.70	28.01
Invert Elev. (12)	27.14	27.80	29.00
Invert Elev. (2)			
Length P.C. Section	10.52	10.61	8.99

CURVE DATA

CURVE	RADIUS	LENGTH	TANGENT	DELTA
E	250.00'	309.97'	178.45'	71°02'22"
F	100.00'	107.11'	59.34'	61°22'15"

Sta. 0+41.11 22.98' Lt.
8" Gate Valve & Box

Sta. -0+23.58 19.65' Lt.
8" x 6" Tee

Sta. 2+32.39
8" x 6" Tee
3.00 LF 6" WM
6" Gate Valve & Box
7.00 LF 6" WM
6" Hydrant

Sta. 4+67.47
8" x 6" Tee
3.00 LF 6" WM
6" Gate Valve & Box
7.00 LF 6" WM
6" Hydrant From Valve

Sta. 5+27.45 21.87' Lt
8" 22 1/2" Bend

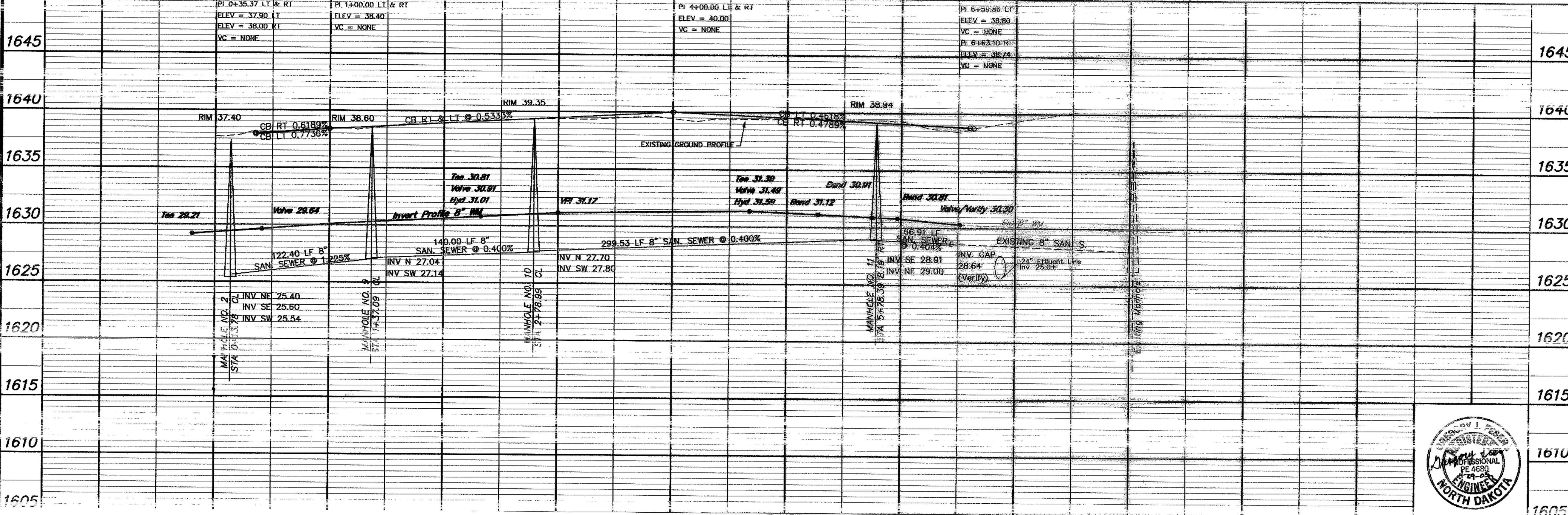
Sta. 5+74.66 22.61' Lt
8" 11 1/4" Bend

Sta. 6+51.37
Remove & Salvage
8" x 6" Reducer
1 LF 6" WM
6" Hydrant

Sta. 6+51.37
8" Gate Valve & Box

End Watermain Quantities
Sta. 6+51.37

End San. Sewer Quantities
Sta. 6+43.17



APPROXIMATE QUANTITIES

San. Sewer Items	Quantity
8" Sanitary Sewer	629 LF
8" x 4" Wye Branch	3 EA
Concrete Manhole	3 EA
4" Sewer Service Pipe	566 LF
4" 45" Bend	12 EA
4" 22 1/2" Bend	1 EA
Move Trees	1 LS

Watermain Items

Watermain Items	Quantity
6" PVC Watermain	20 LF
8" PVC Watermain	676 LF
6" Hydrant	1 EA
6" Hydrant From Salvage	1 EA
6" Gate Valve & Box	2 EA
8" Gate Valve & Box	2 EA
Ductile Iron Fittings	(incidental)
1" Water Copper Serv. Pipe	392 LF
1" Water Serv. Connection	7 EA
1" Ball Valve Curb Stop	7 EA
And 1 1/2" Box	

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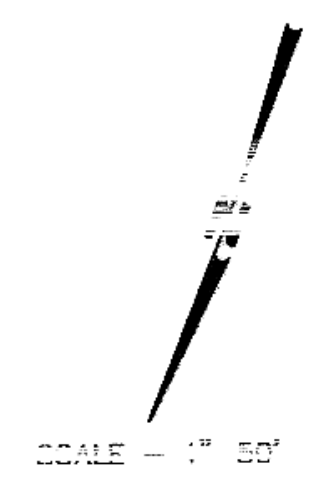
WOODBEND DRIVE SE
FROM BAY SHORE BEND SE SOUTH TO
130' NORTH OF BORDEN HARBOR DRIVE SE

1610 WATER AND SEWER IMPROVEMENT PROJECT 2005-19
SHEET NO. 4 OF 5

1605 MANDAN, ND APRIL 28, 2005

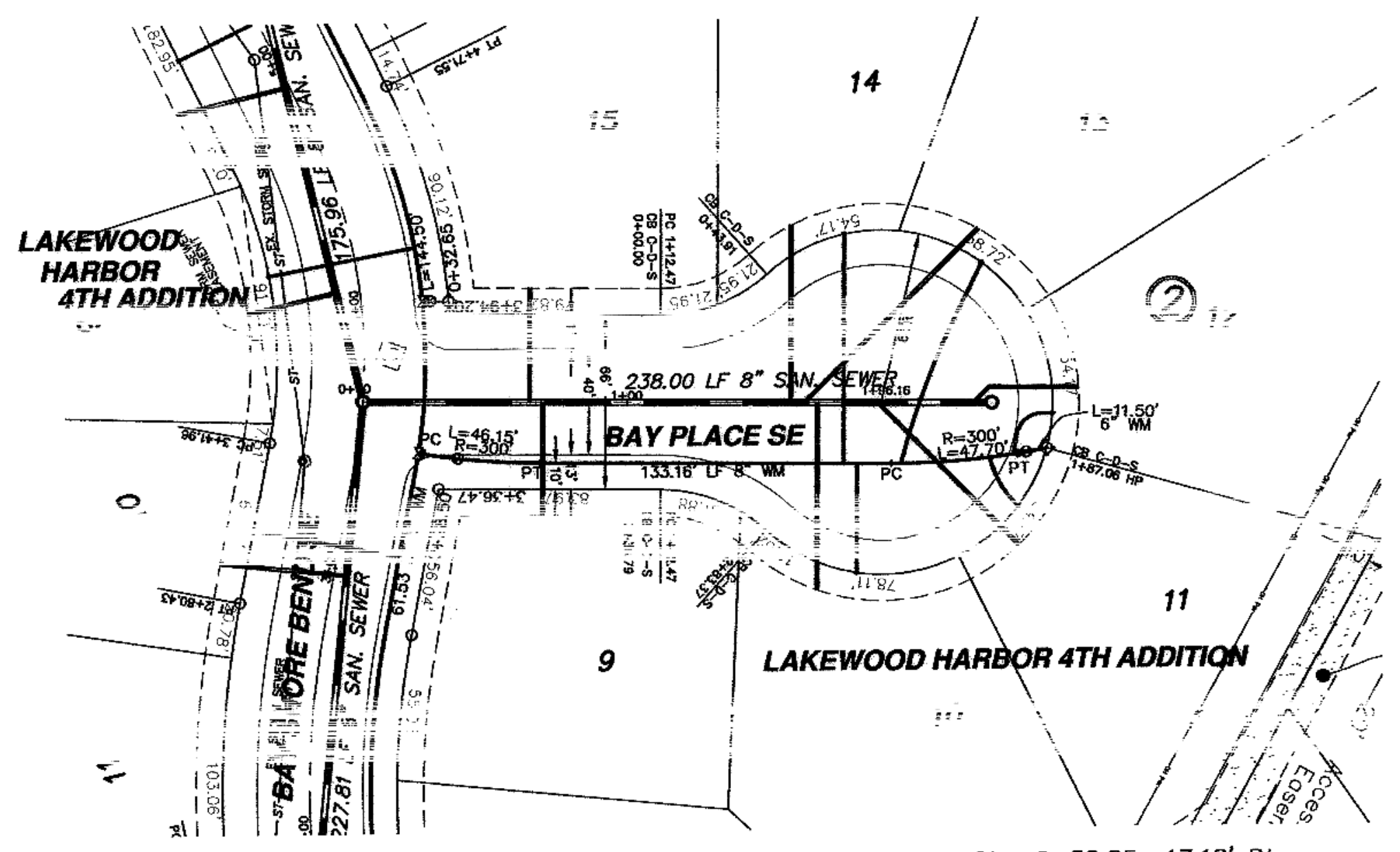
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4. PROTECT ALL SURVEY MONUMENTS. MONUMENTS DISTURBED OR DESTROYED SHALL BE REPLACED BY THE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
5. ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL FINISHED GROUND ELEVATION.



Sta. 0+00.00 Cl. 0+00
=San. Sewer Sta. 0+00
Manhole No. 3

Sta. 2+38.00 Cl. 2+38.00
=San. Sewer Sta. 2+38.00
Manhole No. 12



Sta. 0+20.91 19.46 Rt. Sta. 0+35.89 21.40 Rt.
6" Gate Valve & Box

Sta. 2+58.85 17.18' Rt.
6" Gate Valve & Box

Sta. 2+48.15 20.12' Rt.
8" x 6" Reducer

Sta. 2+38.00
Manhole No. 12

Begin Watermain Quantities
Sta. 0+20.91

End Watermain Quantities
Sta. 2+58.85

Begin San. Sewer Quantities
Sta. 0+00.00

End San. Sewer Quantities
Sta. 2+38.00

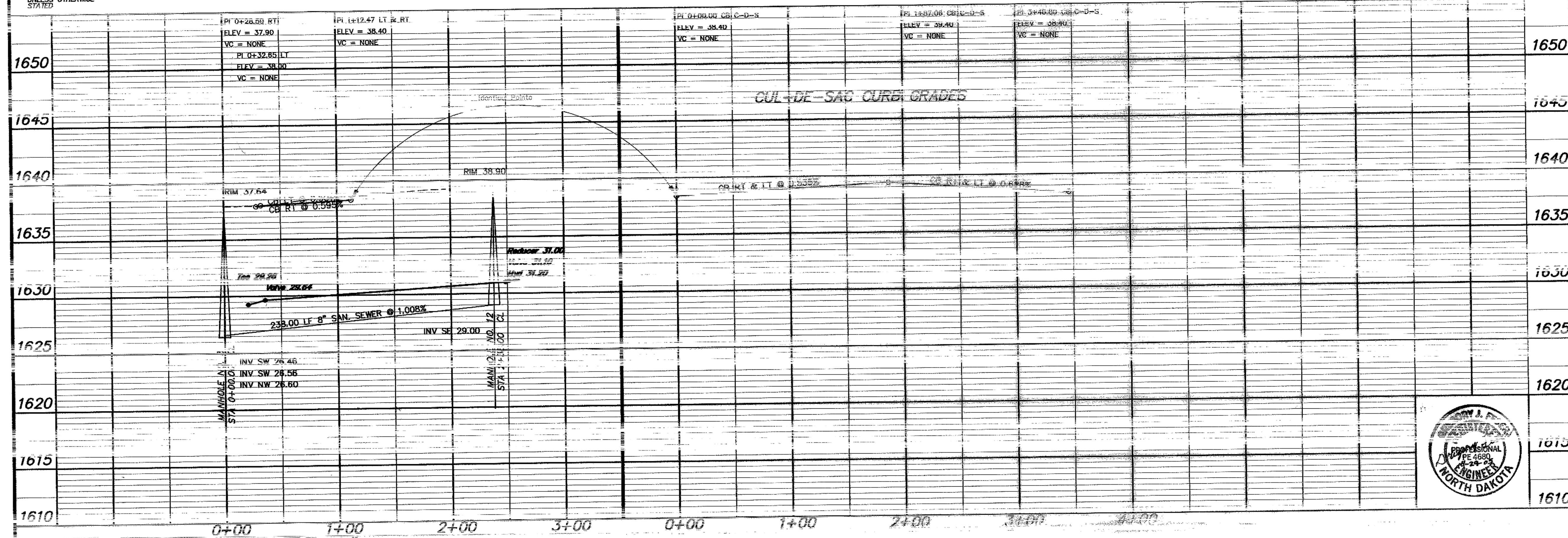
Station	Direction	Lot	Block
15	2	43.0	---
9	2	43.0	---
14	2	66.7	---
13	2	92.8	---
10	2	174.0	---
11	2	174.0	---

APPROXIMATE WYE LOCATIONS

Station	Direction	Lot	Block
15	2	43.0	---
9	2	43.0	---
14	2	66.7	---
13	2	92.8	---
10	2	174.0	---
11	2	174.0	---

Manhole Number	12
Top P.C. Section	37.86
Invert Elev. (a)	29.00
Length P.C. Section	8.86

NOTE:
ALL WATER MAIN IS 2'100' RIGHT OF CENTERLINE UNLESS OTHERWISE STATED



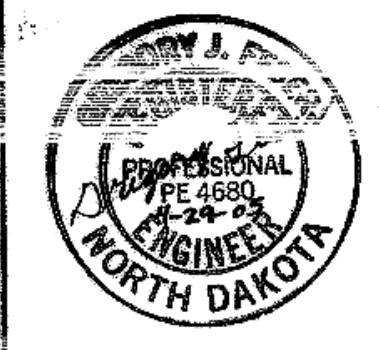
APPROXIMATE QUANTITIES

San. Sewer Items	Quantity
8" Sanitary Sewer	238 LF
4" Sewer Service Pipe	435 LF
4" 45° Bend	5 EA
6" Gate Valve & Box	1 EA
8" Gate Valve & Box	1 EA
Ductile Iron Fittings (incidental)	---
1" Water Copper Serv. Pipe	250 LF
1" Water Serv. Connection	5 EA
1" Ball Valve Curb Stop And 1 1/2" Box	5 EA

SWENSON, HAGEN & COMPANY P.C.

Surveying
Engineering
Land Planning
Civil Engineering
Landscape & Site Design
Construction Management

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Fax (701) 223-3606



BAY PLACE SE
FROM BAY SHORE BEND SE NORTHWEST TO THE CUL-DE-SAC

WATER AND SEWER IMPROVEMENT PROJECT 2005-19
SHEET NO. 5 OF 5
MANDAN, ND APRIL 28, 2005