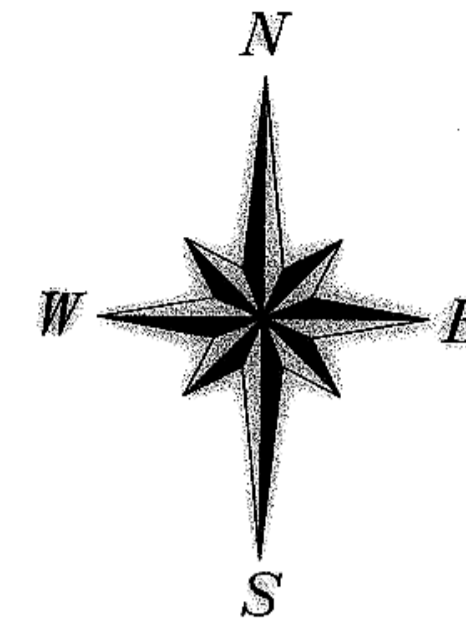


**CONSTRUCTION PLANS FOR  
WATER & SEWER  
IMPROVEMENTS IN  
LAKEWOOD HARBOR 3RD ADDITION  
PHASE II  
Mandan, North Dakota**



SCALE 1" = 100'  
Overall Schematic  
NOT FOR CONSTRUCTION

**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. 2005-17, MANDAN, NORTH DAKOTA WERE PREPARED UNDER MY SUPERVISION AND ARE COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.



*Gregory 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. 2005-17, 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.

**SHEET INDEX**

TITLE PAGE	SHEET 1
LAKWOOD DRIVE SE	SHEET 2
LAKWOOD DRIVE SE	SHEET 3
40TH AVENUE SE	SHEET 4
40TH AVENUE SE	SHEET 5
BAYFRONT PLACE SE	SHEET 6
SHOREFRONT PLACE SE	SHEET 7
BEACHFRONT PLACE SE	SHEET 8

Contractor: Cofells Plumbing + Heating, Inc.

Completion Date: July 2005

Materials: C900 Watermain  
SDR 35 Sewer

**WARRANTY / DISCLAIMER**

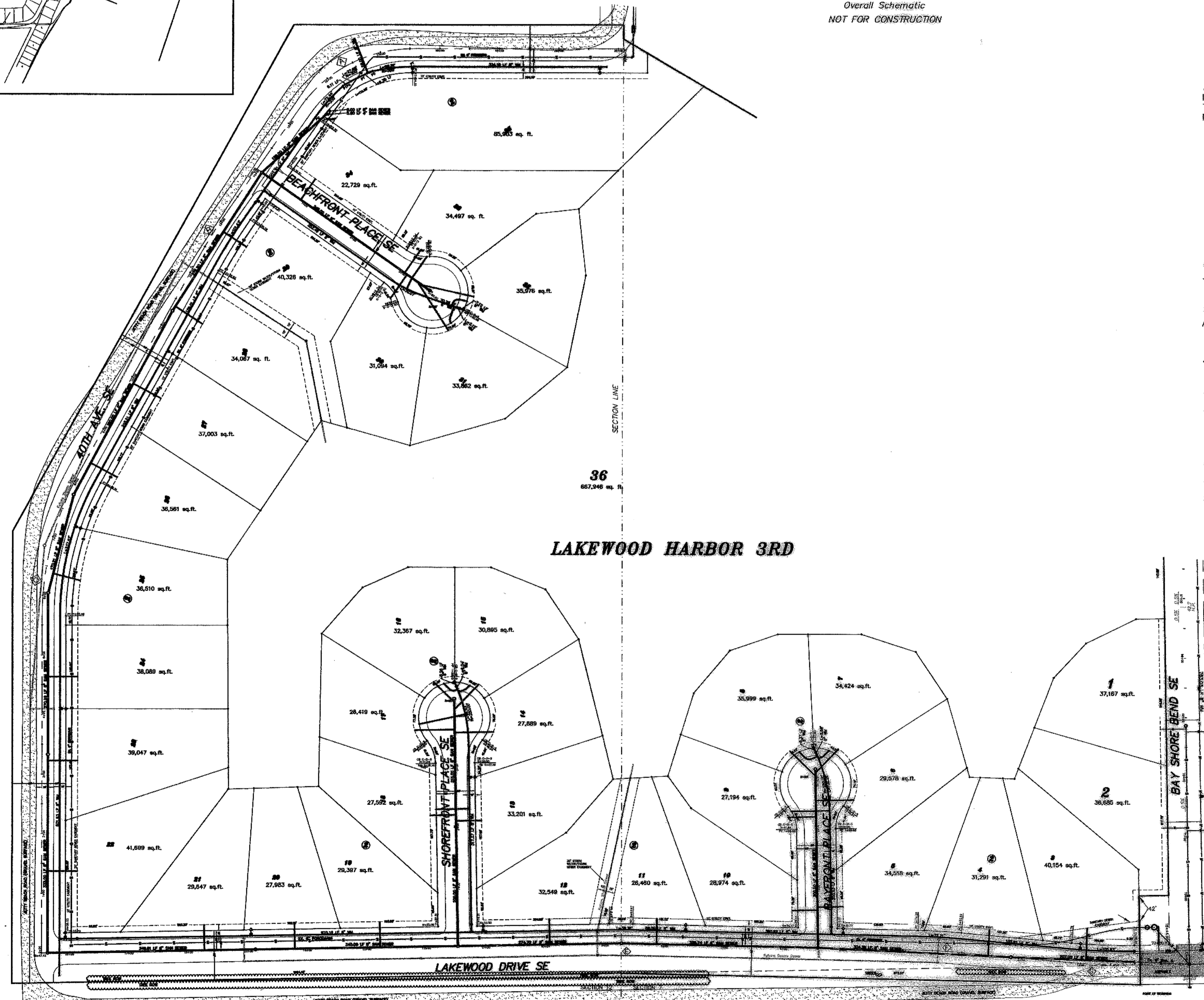
The designs represented in these plans are in accordance with established practices of civil engineering. However, neither Swenson, Hagen & Co. nor its personnel can or do warrant these plans as constructed except in the specific cases where Swenson, Hagen & Co personnel inspect and control the physical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



**WATER & SANITARY SEWER  
IMPROVEMENT PROJECT NO. 2005-17**

**SWENSON, HAGEN & COMPANY P.C.**  
900 Main Avenue P.O. Box 1135  
Mandan, ND 58542  
Phone: (701) 233-2800  
Fax: (701) 233-2806



DRAWN BY: WPH  
CHECK BY: GJF  
DATE: 4-22-05  
FILE DESC:

COMPUTER FILE:  
SURVEY FILE:

**SHEET  
1 OF 8**

Record Drawing

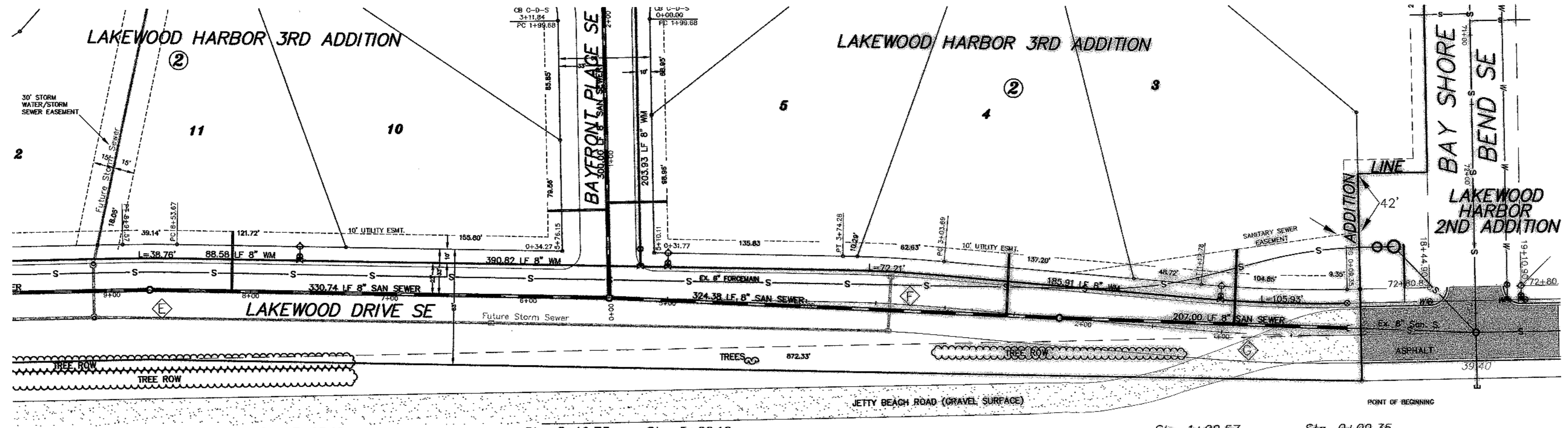
SCALE - 1"=50'

Sta. 8+72.62 0.18' Rt.  
=San. Sewer Sta. 3+30.74 Bk.  
=San. Manhole No. 3

Sta. 5+41.88 CL  
=San. Sewer Sta. 3+24.38 Bk.  
=San. Manhole No. 2

Sta. 2+17.33 CL  
=San. Sewer Sta. 2+07.00 Bk.  
=San. Manhole No. 1

Sta. 0+09.86 5.16' Rt.  
=San. Sewer Sta. 0+00.00 Ahd.  
=Cap



Sta. 7+65.10  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 5+19.73  
8" x 8" Tee

Sta. 5+00.10  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 1+02.57  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 0+09.35  
Remove & Salvage  
6" Hydrant  
1 LF 6" WM  
8" x 6" Reducer  
Connect 8" Gate Valve & Box

End Watermain Quantities  
Sta. 7+65.10

End San. Sewer Quantities  
Sta. 8+72.62 0.18' Rt.

Begin Watermain Quantities  
Sta. 0+09.35

Begin San. Sewer Quantities  
Sta. 0+09.86 5.16' Rt.

**CONSTRUCTION NOTES (THIS SHEET)**

- BACKFILL SHALL BE CLASS 'A'.
- THE PROFILE SHOWS THE EXISTING GROUND CENTERLINE OF THE STREETS. THE PLAN VIEW SHOWS THE EXISTING GROUND CONTOURS. THIS WILL BE THE CONDITION AT THE TIME OF CONSTRUCTION. UPON COMPLETION OF THE CONSTRUCTION OF THE WATER/SEWER THE EARTHWORK CONTRACTOR WILL BUILD THE STREETS UP TO THE PROPOSED CURB GRADES.
- 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. IT IS EXPECTED THAT DEWATERING WILL BE REQUIRED TO STABILIZE THE TRENCH FOR THE CONSTRUCTION OF THE DEEPER PORTIONS OF THE SEWERMAINS.
- THE STORM SEWER IS NOT PART OF THIS CONTRACT.
- PROTECT ALL SURVEY MONUMENTS. MONUMENTS DISTURBED OR DESTROYED SHALL BE REPLACED BY THE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR SHALL PROVIDE ALL SIGNAGE AND TRAFFIC CONTROL AS NECESSARY TO CONSTRUCT THE SANITARY SEWER AND WATERMAIN. THE CONTRACTOR SHALL PROVIDE ACCESS FOR THE RESIDENCE SOUTHWEST OF THE PROJECT AT ALL TIMES. REMOVE, SALVAGE AND REPLACE THE GRAVEL SURFACING AT THE END OF THE PAVEMENT ON LAKEWOOD DRIVE AFTER THE CONNECTIONS TO THE WATER AND SEWER ARE MADE AT THIS LOCATION. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO OTHER BID ITEMS.
- ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.
- THERE ARE A NUMBER OF CROSSINGS OF THE EXISTING 6" SANITARY SEWER FORCEMAIN. PROVIDE ADDITIONAL CAUTION NOT TO DAMAGE THIS LINE.
- REMOVE THE CAP ON THE EXISTING 8" SANITARY SEWER LINE. VERIFY LOCATION AND ELEVATION AND CONNECT THE NEW SEWER LINE.
- REMOVE AND SALVAGE THE EXISTING HYDRANT, 1 LF OF 6" PVC WATERMAIN AND THE 8" X 6" REDUCER. VERIFY ELEVATION AND CONNECT WITH A NEW 8" GATE VALVE.
- PROTECT THE EXISTING PAVING, CURB AND CUTTER WHEN MAKING CONNECTIONS. SHOULD A PORTION OF PAVING NEED TO BE REMOVED, SAW CUT THE PAVEMENT AND REMOVE AND DISPOSE OFFSITE. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO THE UNIT PRICE BID FOR "8" SANITARY SEWER".
- SEE SHEET 2 FOR THE DROP MANHOLE DETAIL FOR MANHOLE NO. 2.

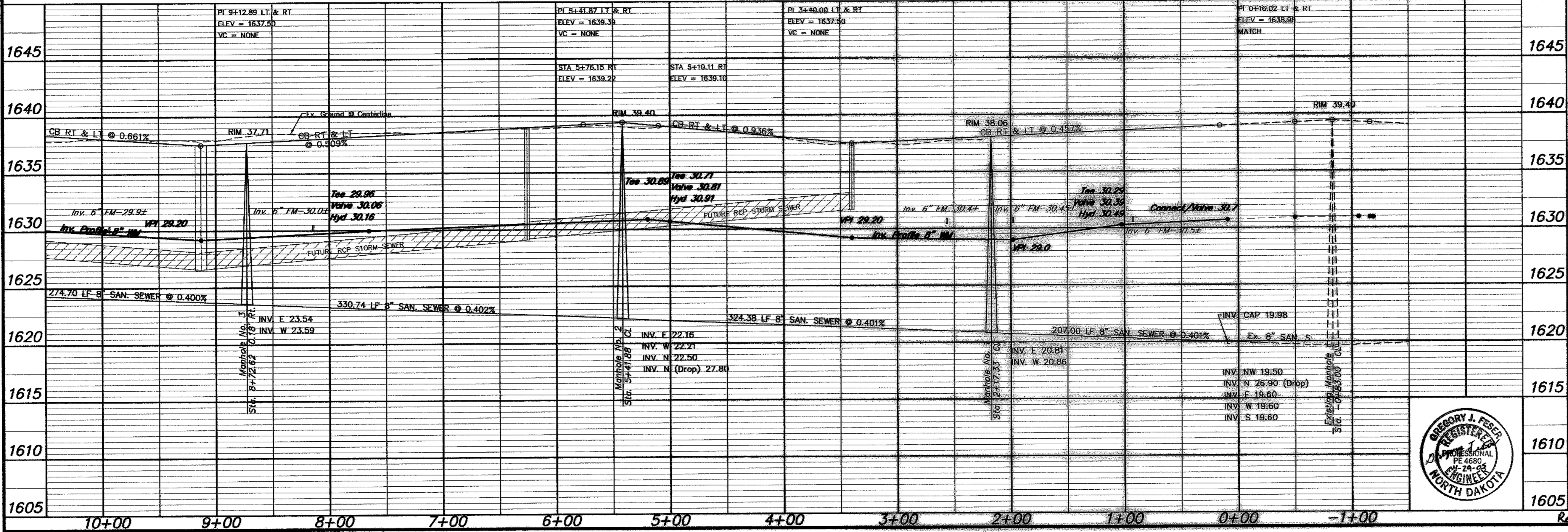
Lot	Block	4" Sewer Service	4" 45° Bend	8" x 4" Wye Branch	8" x 4" Tee	6" Cap	6" Water Service Pipe	6" Drop Manhole	6" x 4" Tee	6" x 4" Tee
3	2	53.9	1	1	1	28.00				
4	2	44.7	1	1	1	28.00				
11	2	43.0	1	1	1	28.00				
<b>TOTAL</b>		<b>141.6</b>	<b>3</b>	<b>3</b>	<b>3</b>					

**APPROXIMATE WYE LOCATIONS**

STATION	DIRECTION	LOT	BLOCK
FROM EX. PLUG TO MANHOLE NO. 1	N	3	2
FROM MANHOLE NO. 1 TO MANHOLE NO. 2	N	4	2
FROM MANHOLE NO. 2 TO MANHOLE NO. 3	N	11	2

Manhole Number	1	2	3
Casting Elev.	38.06	39.40	37.71
Top P.C. Section	37.02	38.36	36.67
Invert Elev. (a)	20.81	22.16	23.54
Invert Elev. (b)	20.86	22.21	23.59
Invert Elev. (c)	---	22.50	---
Invert Elev. (drop)	16.21	16.20	---
Length P.C. Section	16.21	16.20	13.13

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



**CURVE DATA**

CURVE	RADIUS	LENGTH	TANGENT	DELTA
E	1000.00'	37.89'	18.95'	02°10'16"
F	1000.00'	70.59'	35.31'	04°02'40"
G	1000.00'	108.43'	54.27'	06°12'45"

**APPROXIMATE QUANTITIES**

San. Sewer Items	Quantity
8" Sanitary Sewer	862 LF
8" x 4" Wye Branch	3 EA
Subcut Gravel	500 TON
Concrete Manhole	2 EA
4" Sewer Service Pipe	142 LF
4" 45° Bend	3 EA
Concrete Drop Manhole	1 EA
Watermain Items	Quantity
6" PVC Watermain	30 LF
8" PVC Watermain	755 LF
6" Hydrant	3 EA
6" Gate Valve & Box	3 EA
8" Gate Valve & Box	1 EA
Ductile Iron Fittings	(incidental)

**SWENSON, HAGEN & COMPANY P.C.**  
 900 Basin Avenue P.O. Box 1185  
 Bismarck, North Dakota 58504  
 Phone (701) 298-2600  
 Fax (701) 298-2606  
 Surveying, Hydrology, Land Planning, Civil Engineering, Landscape & Site Design, Construction Management



**LAKWOOD DRIVE SE**  
 FROM THE INTERSECTION OF BAY SHORE BEND SE  
 WEST TO 330' WEST OF BAYFRONT PLACE SE

WATER AND SEWER IMPROVEMENT PROJECT 2005-17  
 SHEET NO. 2 OF 8  
 MANDAN, ND APRIL 22, 2005  
 Record Drawing COPYRIGHT 2005 SWENSON, HAGEN & CO.

SCALE - 1"=50'

**CONSTRUCTION NOTES (THIS SHEET)**

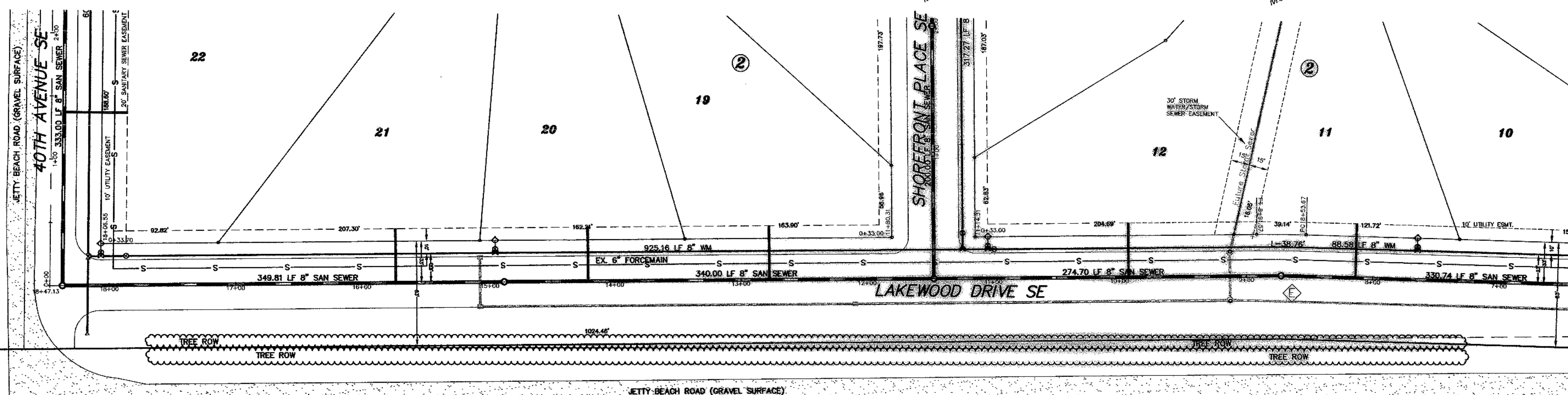
- BACKFILL SHALL BE CLASS 'A'.
- THE PROFILE SHOWS THE EXISTING GROUND CENTERLINE OF THE STREETS. THE PLAN VIEW SHOWS THE EXISTING GROUND CONTOURS. THIS WILL BE THE CONDITION AT THE TIME OF CONSTRUCTION. UPON COMPLETION OF THE CONSTRUCTION OF THE WATER/SEWER THE EARTHWORK CONTRACTOR WILL BUILD THE STREETS UP TO THE PROPOSED CURB GRADES.
- 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. IT IS EXPECTED THAT DEWATERING WILL BE REQUIRED TO STABILIZE THE TRENCH FOR THE CONSTRUCTION OF THE DEEPER PORTIONS OF THE SEWERMAINS.
- THE STORM SEWER IS NOT PART OF THIS CONTRACT.
- PROTECT ALL SURVEY MONUMENTS. MONUMENTS DISTURBED OR DESTROYED SHALL BE REPLACED BY THE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR SHALL PROVIDE ALL SIGNAGE AND TRAFFIC CONTROL AS NECESSARY TO CONSTRUCT THE SANITARY SEWER AND WATERMAIN. THE CONTRACTOR SHALL PROVIDE ACCESS FOR THE RESIDENCE SOUTHWEST OF THE PROJECT AT ALL TIMES. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO OTHER BID ITEMS.
- ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.
- THERE ARE A NUMBER OF CROSSINGS OF THE EXISTING 6" SANITARY SEWER FORCEMAIN. PROVIDE ADDITIONAL CAUTION NOT TO DAMAGE THIS LINE.
- MOVE SOME OF THE EXCESS DIRT BETWEEN STA. 14+00 AND 17+00 TO PROVIDE A MINIMUM 6' OF COVER OVER THE WATERMAIN AND SANITARY SEWER AT THE INTERSECTION OF LAKEWOOD DRIVE SE AND 40TH AVENUE SE. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO THE "8" SANITARY SEWER" AND "8" PVC WATERMAIN" BID ITEMS.

Sta. 18+37.13 Cl. = San. Sewer Sta. 3+49.81 Bk. = San. Sewer Sta. 0+00.00 Ahd. Manhole No. 6

Sta. 14+87.31 Cl. = San. Sewer Sta. 3+40.00 Bk. = San. Sewer Sta. 0+00.00 Ahd. Manhole No. 5

Sta. 11+47.31 Cl. = San. Sewer Sta. 2+74.70 Bk. = San. Sewer Sta. 0+00.00 Ahd. Manhole No. 4

Sta. 8+72.62 Cl. = San. Sewer Sta. 3+30.74 Bk. = San. Sewer Sta. 0+00.00 Ahd. Manhole No. 3



Lot	Block	# Sewer Service	# 22 1/2" Bend	# 45" Bend	# 8" x 4" Wye Branch	# Sewer Service Invert	# Copper Water Service Pipe	# Water Service Connection	# Ball Valve	# 1 1/2" Box
12	2	43.0	1	1	29.00					
19	2	43.0	1	1	29.00					
20	2	43.0	1	1	29.00					
21	2	43.0	1	1	29.00					
<b>TOTAL</b>		<b>172.0</b>	<b>4</b>	<b>4</b>						

**APPROXIMATE WYE LOCATIONS**

STATION	DIRECTION	LOT	BLOCK
FROM MANHOLE 3 TO MANHOLE NO. 4	N	12	2
FROM MANHOLE NO. 4 TO MANHOLE NO. 5	N	19	2
FROM MANHOLE NO. 5 TO MANHOLE NO. 6	N	21	2

Manhole Number	4	5	6
Casting Elev.	39.05	37.58	39.25
Top P.C. Section	39.01	36.54	38.71
Invert Elev. (a)	24.89	26.10	27.55
Invert Elev. (b)	24.94	26.15	27.60
Invert Elev. (c)	25.00		
Length P.C. Section	13.32	10.44	10.66

Sta. 18+06.55  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 18+16.72  
8" x 8" Tee

Sta. 17+86.72  
8" Gate Valve & Box

End Watermain Quantities  
Sta. 18+16.72

End San. Sewer Quantities  
Sta. 18+37.13

Sta. 14+94.31  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 11+04.31  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 11+24.31  
8" x 8" Tee

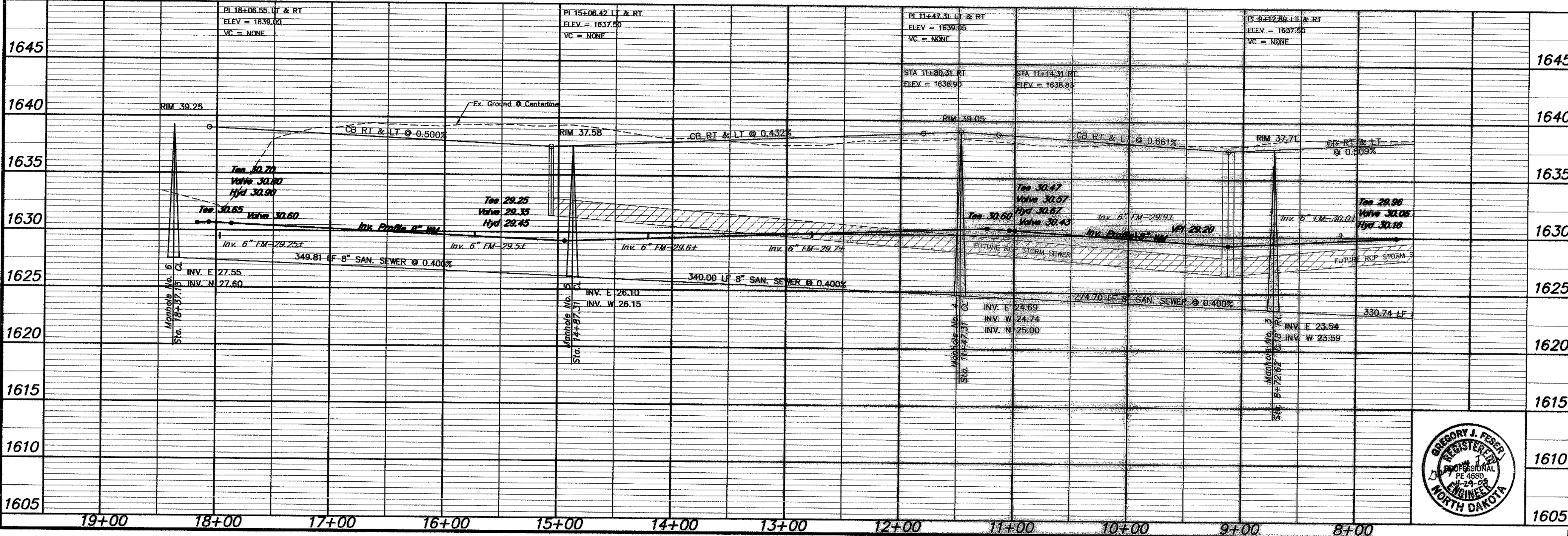
Sta. 10+99.31  
8" Gate Valve & Box

Sta. 7+65.10  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Begin Watermain Quantities  
Sta. 7+65.10

Begin San. Sewer Quantities  
Sta. 8+72.62 0.18' Rt.

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



**CURVE DATA**

CURVE	RADIUS	LENGTH	TANGENT	DELTA
E	1000.00'	37.89'	18.95'	02°10'18"

**APPROXIMATE QUANTITIES**

San. Sewer Items	Quantity
8" Sanitary Sewer	965 LF
8" x 4" Wye Branch	4 EA
Subcut Gravel	200 TON
Concrete Manhole	3 EA
4" Sewer Service Pipe	172 LF
4" 45" Bend	4 EA
Watermain Items	Quantity
6" PVC Watermain	30 LF
8" PVC Watermain	1053 LF
6" Hydrant	3 EA
6" Gate Valve & Box	3 EA
8" Gate Valve & Box	2 EA
Ductile Iron Fittings	(incidental)

**SWENSON, HAGEN & COMPANY P.C.**

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sheng@swensonhagen.com  
Phone (701) 223-2600  
Fax (701) 223-2606

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



**LAKWOOD DRIVE SE**  
FROM 330' WEST OF BAYFRONT PLACE SE  
WEST TO 40TH AVENUE SE

1610 WATER AND SEWER IMPROVEMENT PROJECT 2005-17  
SHEET NO. 3 OF 8

1605 MANDAN, ND APRIL 22, 2005

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SCALE - 1"=50'

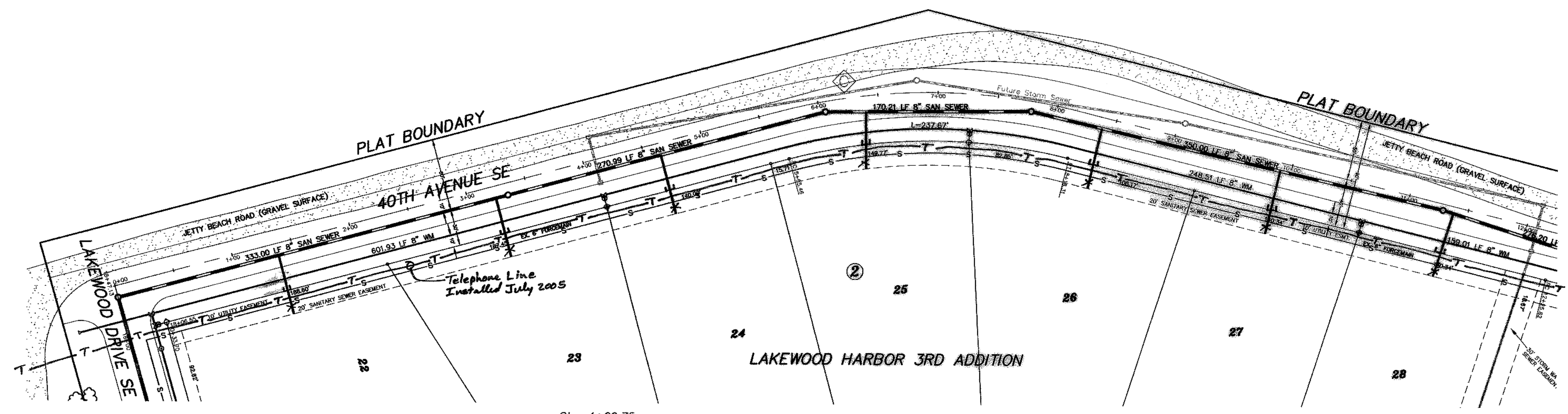
Sta. 0+00.17 10.00' Rt.  
=San. Sewer Sta. 3+49.51 Bk.  
=San. Sewer Sta. 0+00.00 Ahd.  
Manhole No. 6

Sta. 3+33.17 10.00' Rt.  
=San. Sewer Sta. 3+33.00 Bk.  
=San. Sewer Sta. 0+00.00 Ahd.  
Manhole No. 7

Sta. 6+04.87 8.47' Rt.  
=San. Sewer Sta. 2+70.99 Bk.  
=San. Sewer Sta. 0+00.00 Ahd.  
Manhole No. 8

Sta. 7+78.90 8.47' Rt.  
=San. Sewer Sta. 1+70.21 Bk.  
=San. Sewer Sta. 0+00.00 Ahd.  
Manhole No. 9

Sta. 11+29.57 5.00' Rt.  
=San. Sewer Sta. 3+50.00 Bk.  
=San. Sewer Sta. 0+00.00 Ahd.  
Manhole No. 10



Sta. -0+36.47  
8" Plug

Sta. 0+23.53  
8" x 8" Tee

Begin Watermain Quantities  
Sta. -0+36.47  
Begin San. Sewer Quantities  
Sta. 0+00.17 10.00' Rt.

Sta. 4+09.75  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 7+28.26  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 10+66.81  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Manhole Number	7	8	9	10*
Costing Elev.	37.82	38.16	38.97	38.11
Top P.C. Section	36.98	37.12	37.93	36.57
Invert Elev. (D)	28.94	30.08	30.82	32.27
Invert Elev. (E)	28.99	30.13	30.87	32.32
Length P.C. Section	7.64	7.04	7.11	4.30

End Watermain Quantities  
Sta. 10+66.81  
End San. Sewer Quantities  
Sta. 11+29.57 5.00' Rt.

**CONSTRUCTION NOTES (THIS SHEET)**

- BACKFILL SHALL BE CLASS 'A'.
- THE PROFILE SHOWS THE EXISTING GROUND CENTERLINE OF THE STREETS. THE PLAN VIEW SHOWS THE EXISTING GROUND CONTOURS. THIS WILL BE THE CONDITION AT THE TIME OF CONSTRUCTION. UPON COMPLETION OF THE CONSTRUCTION OF THE WATER/SEWER THE EARTHWORK CONTRACTOR WILL BUILD THE STREETS UP TO THE PROPOSED CURB GRADES.
- 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. IT IS EXPECTED THAT DEWATERING WILL BE REQUIRED TO STABILIZE THE TRENCH FOR THE CONSTRUCTION OF THE DEEPER PORTIONS OF THE SEWERMAINS.
- THE STORM SEWER IS NOT PART OF THIS CONTRACT.
- PROTECT ALL SURVEY MONUMENTS. MONUMENTS DISTURBED OR DESTROYED SHALL BE REPLACED BY THE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR SHALL PROVIDE ALL SIGNAGE AND TRAFFIC CONTROL AS NECESSARY TO CONSTRUCT THE SANITARY SEWER AND WATERMAIN. THE CONTRACTOR SHALL PROVIDE ACCESS FOR THE RESIDENCE SOUTHWEST OF THE PROJECT AT ALL TIMES. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO OTHER BID ITEMS.
- ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.
- THERE ARE APPROXIMATELY 10 TREES ALONG THE NORTHWEST SIDE OF THE PROJECT. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF THEM OFFSITE. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO THE LUMP SUM BID FOR "TREE REMOVAL".
- THE SPEED LIMIT SIGN ON THE EAST SIDE OF 40TH AVENUE SE SHALL BE REMOVED, SALVAGED AND RELOCATED AS DIRECTED BY THE ENGINEER.
- THERE ARE A NUMBER OF CROSSINGS OF THE EXISTING 6" SANITARY SEWER FORCEMAIN. PROVIDE ADDITIONAL CAUTION NOT TO DAMAGE THIS LINE.

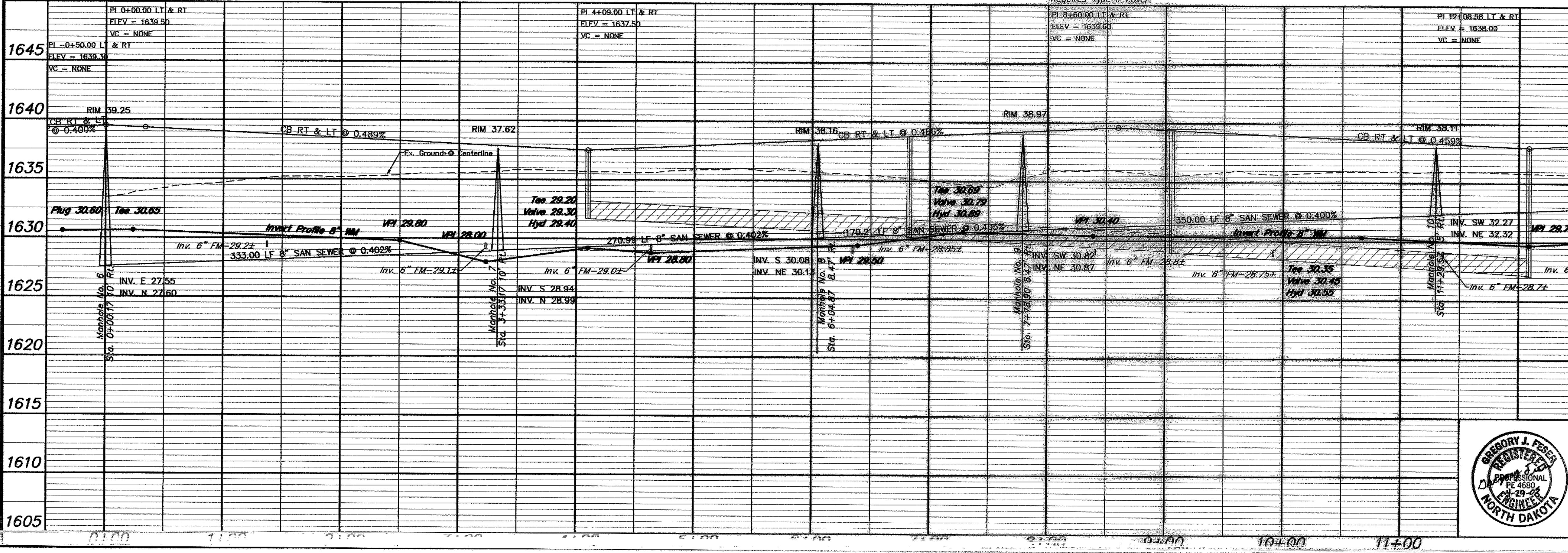
Lot	Block	4" Sewer Service	4" x 22 1/2" Bend	4" x 45" Bend	8" x 4" Wye Branch	Sewer Service Invert	1" Copper Tee Cap	1" Copper Tee	1" Water Service Pipe	1" Water Service Valve	Curb Stop & 1 1/2" Box
22	2	50.0	1	1	28.95						
23	2	50.0	1	1	30.10						
24	2	50.0	1	1	30.31						
25	2	47.1	1	1	31.04						
26	2	50.9	1	1	31.82						
27	2	53.0	1	1	32.54						
TOTAL		301.0	6	6							

Note: Sewer Services Shorten by 20' each. Cap is at the property line.

**APPROXIMATE WYE LOCATIONS**

STATION	DIRECTION	LOT	BLOCK
FROM MANHOLE 6 TO MANHOLE NO. 7		7	
1+37	E	23	2
3+23	E	23	2
FROM MANHOLE NO. 7 TO MANHOLE NO. 8			
1+30	E	24	2
FROM MANHOLE NO. 8 TO MANHOLE NO. 9			
0+34	SE	25	2
FROM MANHOLE 9 TO MANHOLE NO. 10			
0+60	SE	26	2
2+11	SE	27	2

NOTE:  
ALL WATER MAIN IS 30.00' RIGHT OF CENTERLINE UNLESS OTHERWISE STATED



**CURVE DATA**

CURVE	RADIUS	LENGTH	TANGENT	DELTA
C	500.00'	252.84'	129.19'	28°58'26"

**APPROXIMATE QUANTITIES**

San. Sewer Items	Quantity
8" Sanitary Sewer	1124 LF
8" x 4" Wye Branch	6 EA
Concrete Manhole	4 EA
4" Sewer Service Pipe	301 LF
4" x 45" Bend	6 EA
Tree Removal	1 LS

Watermain Items	Quantity
6" PVC Watermain	30 LF
8" PVC Watermain	1088 LF
6" Hydrant	3 EA
6" Gate Valve & Box	3 EA
Ductile Iron Fittings	(incidental)



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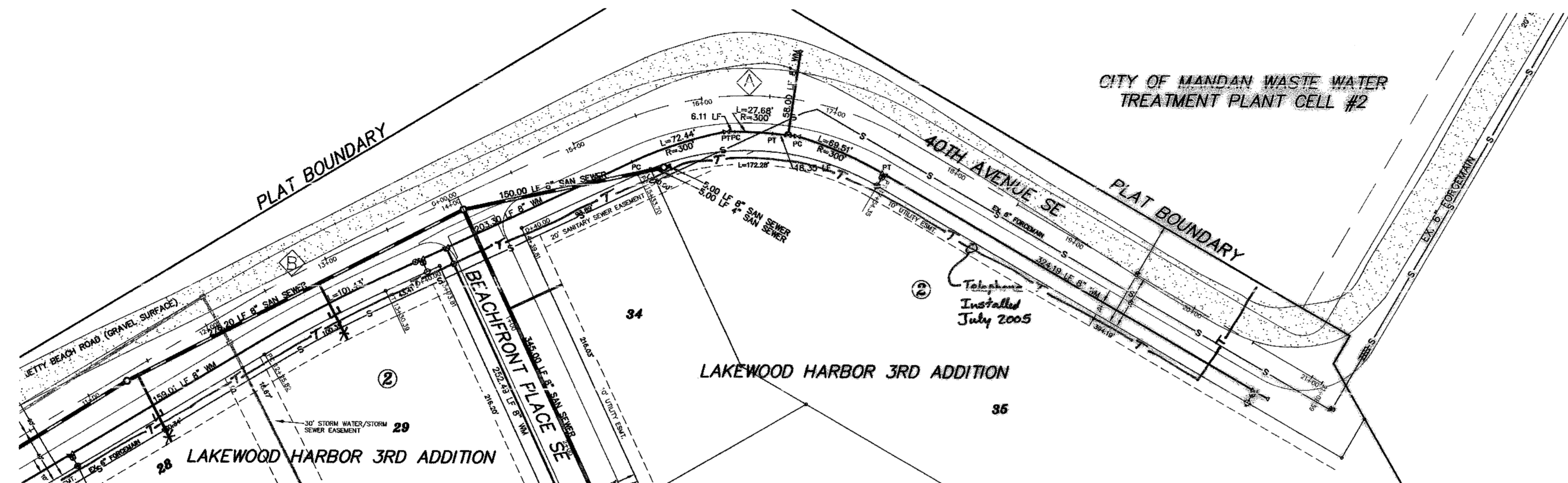
**40TH AVENUE SE**  
 FROM THE INTERSECTION OF LAKEWOOD DRIVE SE  
 NORTH TO 280' SW OF BEACHFRONT PLACE SE

WATER AND SEWER IMPROVEMENT PROJECT 2005-17  
 SHEET NO. 4 OF 8  
 MANDAN, ND APRIL 22, 2005

Record Drawing COPYRIGHT 2005 SWENSON, HAGEN & CO.

SCALE - 1"=50'

Sta. 11+29.57 5.00' Rt. =San. Sewer Sta. 31-50.00 Bk. =Manhole No. 10  
 Sta. 14+06.81 10.00' Rt. =San. Sewer Sta. 2+76.20 Bk. =Manhole No. 11  
 Sta. 15+57.44 42.49' Rt. =San. Sewer Sta. 1+50.00 Bk. =Manhole No. 12  
 Sta. 15+63.55 43.03' Rt. =San. Sewer Sta. 0+05.00 Bk. =8" Cap



CITY OF MANDAN WASTE WATER TREATMENT PLANT CELL #2

LAKWOOD HARBOR 3RD ADDITION

Sta. 10+66.81 8" x 6" Tee 3.00 LF 6" WM 6" Gate Valve & Box 7.00 LF 6" WM 6" Hydrant  
 Sta. 13+63.81 8" x 6" Tee 3.00 LF 6" WM 6" Gate Valve & Box 7.00 LF 6" WM 6" Hydrant  
 Sta. 13+83.81 8" Gate Valve & Box 8" x 8" Tee  
 Sta. 16+16.21 25.69' Rt. 8" 11 1/4" Bend  
 Sta. 16+67.41 26.58' Rt. 8" x 8" Tee 58.00 LF 8" WM 8" Plug Inv. 26.2  
 Sta. 16+75.09 26.12' Rt. 8" 11 1/4" Bend  
 Sta. 17+54.35 8" x 6" Tee 3.00 LF 6" WM 6" Gate Valve & Box 7.00 LF 6" WM 6" Hydrant  
 Sta. 20+68.54 8" x 6" Tee 3.00 LF 6" WM 6" Gate Valve & Box 7.00 LF 6" WM 6" Hydrant  
 Sta. 20+78.54 8" Plug  
 End Watermain Quantities Sta. 20+78.54  
 End San. Sewer Quantities Sta. 15+57.44 42.49' Rt.

CONSTRUCTION NOTES (THIS SHEET)

- BACKFILL SHALL BE CLASS 'A'.
- THE PROFILE SHOWS THE EXISTING GROUND CENTERLINE OF THE STREETS. THE PLAN VIEW SHOWS THE EXISTING GROUND CONTOURS. THIS WILL BE THE CONDITION AT THE TIME OF CONSTRUCTION. UPON COMPLETION OF THE CONSTRUCTION OF THE WATER/SEWER THE EARTHWORK CONTRACTOR WILL BUILD THE STREETS UP TO THE PROPOSED CURB GRADES.
- 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. IT IS EXPECTED THAT DEWATERING WILL BE REQUIRED TO STABILIZE THE TRENCH FOR THE CONSTRUCTION OF THE DEEPER PORTIONS OF THE SEWERMAINS.
- THE STORM SEWER IS NOT PART OF THIS CONTRACT.
- PROTECT ALL SURVEY MONUMENTS. MONUMENTS DISTURBED OR DESTROYED SHALL BE REPLACED BY THE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR SHALL PROVIDE ALL SIGNAGE AND TRAFFIC CONTROL AS NECESSARY TO CONSTRUCT THE SANITARY SEWER AND WATERMAIN. THE CONTRACTOR SHALL PROVIDE ACCESS FOR THE RESIDENCE SOUTHWEST OF THE PROJECT AT ALL TIMES. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO OTHER BID ITEMS.
- ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.
- THERE ARE APPROXIMATELY 10 TREES ALONG THE NORTHWEST SIDE OF THE PROJECT. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF THEM OFFSITE. SAID WORK SHALL BE CONSIDERED INCIDENTAL TO THE LUMP SUM BID FOR "TREE REMOVAL".
- THE SPEED LIMIT SIGN ON THE EAST SIDE OF 40TH AVENUE SE SHALL BE REMOVED, SALVAGED AND RELOCATED AS DIRECTED BY THE ENGINEER.
- THERE ARE A NUMBER OF CROSSINGS OF THE EXISTING 6" SANITARY SEWER FORCEMAIN. PROVIDE ADDITIONAL CAUTION NOT TO DAMAGE THIS LINE.
- THERE IS A LEAF/GRASS CLIPPING RECYCLING CONTAINER LOCATED AT APPROXIMATELY STA. 20+00 ON THE SOUTH SIDE OF THE GRAVEL ROAD. COORDINATE WITH THE CITY OF MANDAN PUBLIC WORKS DEPARTMENT TO HAVE THE CONTAINER RELOCATED ALONG WITH THE SIGN AND GRAVEL SURFACING

Lot	Block	6" Sewer Service	4" 1/2" Bend	4" 45" Bend	8" x 4" Wye Branch	6" Gate Valve & Box	7" Water Service Invert	6" Water Service Pipe	8" Plug	1 1/2" Box
28	2	54.3	1	1	33.21					
29	2	46.7	1	1	33.72					
35	2	5.0			34.43					
<b>TOTAL</b>		<b>105.9</b>	<b>2</b>	<b>2</b>						

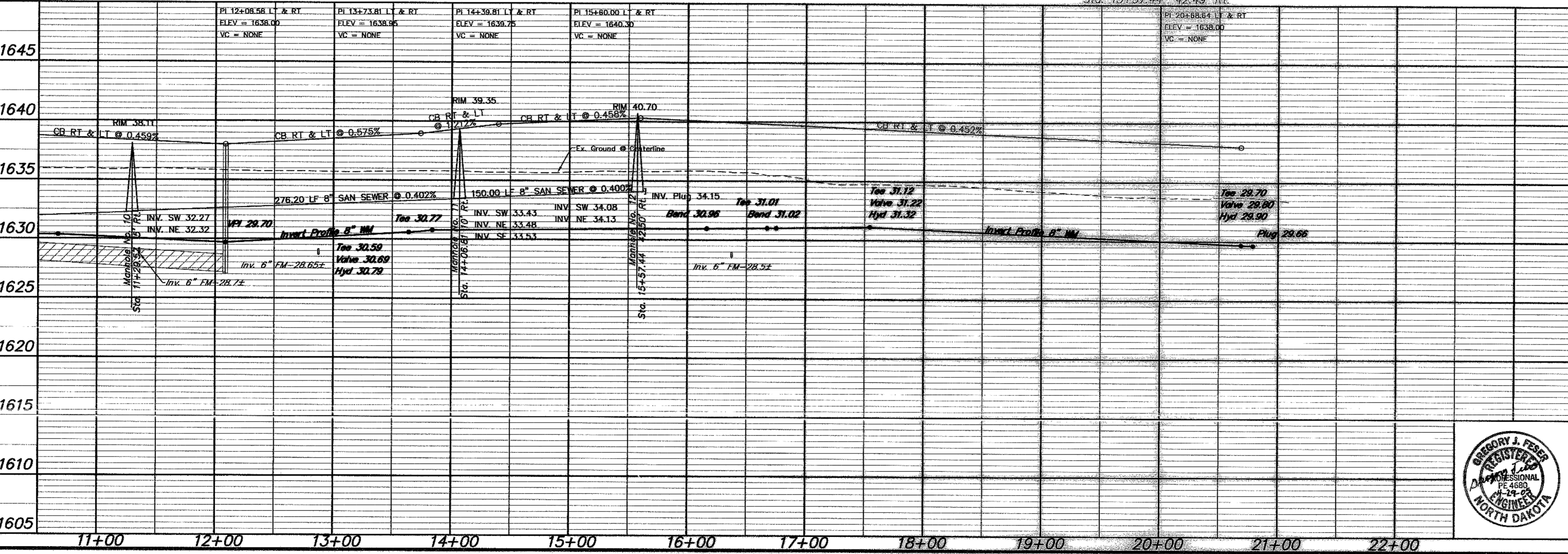
APPROXIMATE WYE LOCATIONS

STATION	DIRECTION	LOT	BLOCK
FROM MANHOLE 10 TO MANHOLE NO. 11			
0+05	SE	28	2
1+58	SE	29	2
FROM MANHOLE 11 TO MANHOLE NO. 12			
1+45	E	35	2

Manhole Number	11"	12"
Castling Elev.	39.35	40.70
Top P.C. Section	37.81	39.66
Invert Elev. (a)	33.43	34.08
Invert Elev. (b)	33.48	34.13
Invert Elev. (c)	33.53	
Length P.C. Section	4.38	5.58

NOTE: ALL WATER MAINS TO BE SOLID RIGHT OF CENTERLINE UNLESS OTHERWISE STATED



CURVE DATA

CURVE	RADIUS	LENGTH	TANGENT	DELTA
A	230.00	220.66'	119.65'	54°58'05"
B	1000.00	104.57'	52.33'	05°59'29"

APPROXIMATE QUANTITIES

San. Sewer Items	Quantity
8" Sanitary Sewer	431 LF
8" x 4" Wye Branch	3 EA
Concrete Manhole	2 EA
4" Sewer Service Pipe	106 LF
4" 45" Bend	2 EA
Tree Removal	1 LS

Watermain Items	Quantity
6" PVC Watermain	30 LF
8" PVC Watermain	1040 LF
6" Hydrant	3 EA
6" Gate Valve & Box	3 EA
8" Gate Valve & Box	1 EA
Ductile Iron Fittings	(incidental)

**SWENSON, HAGEN & COMPANY P.C.**  
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 shc@swensonhagen.com  
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 Fax (701) 223-3606



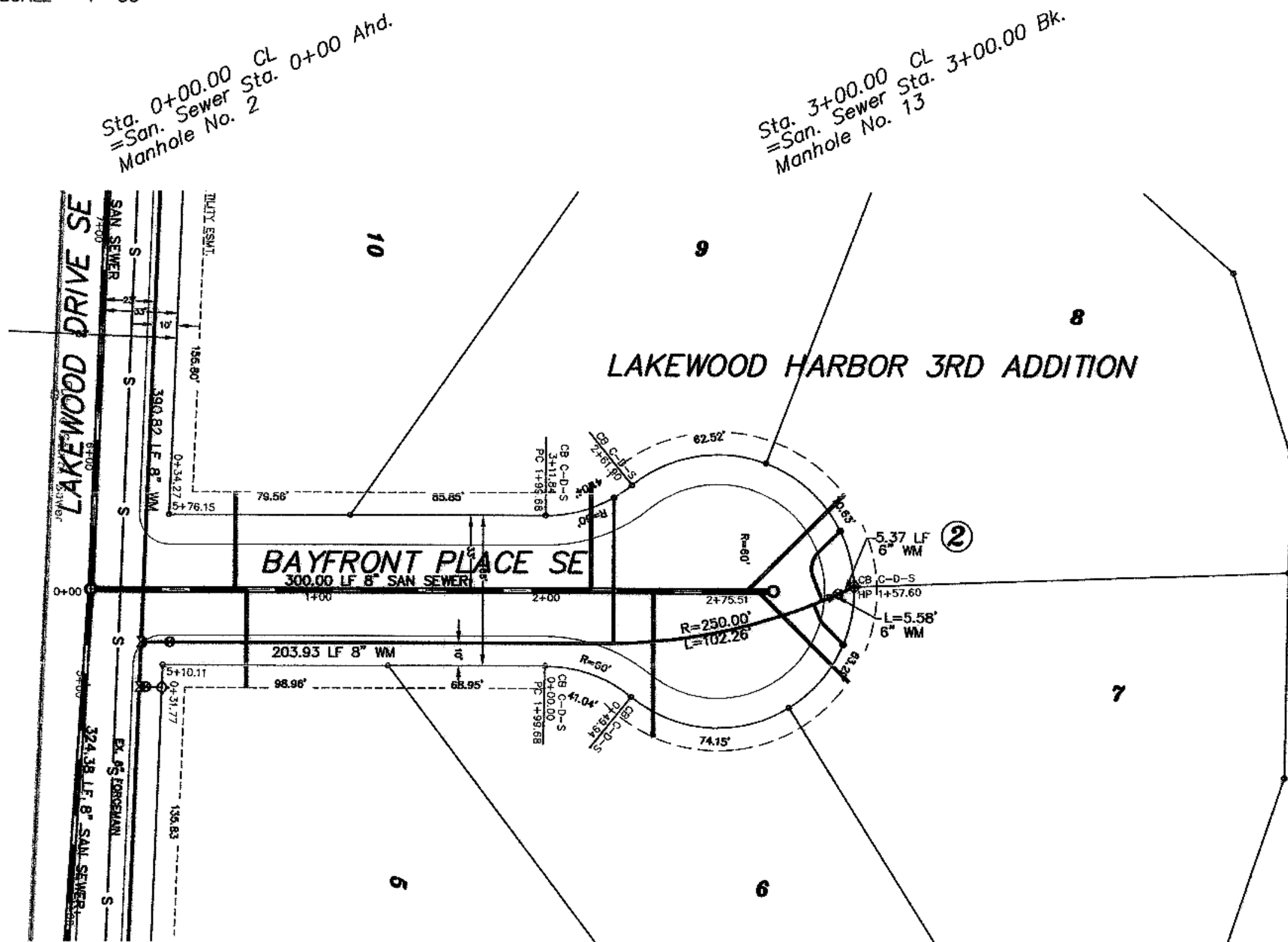
**40TH AVENUE SE**  
 FROM 280' SW OF BEACHFRONT PLACE SE TO THE SE COR. OF MANDAN WASTEWATER TREAT. PLANT

1610 WATER AND SEWER IMPROVEMENT PROJECT 2005-17  
 SHEET NO. 5 OF 8

1605 MANDAN, ND APRIL 22, 2005

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SCALE - 1"=50'



Sta. 0+22.15  
8" x 8" Tee

Sta. 0+34.77  
8" Gate Valve & Box

Begin Watermain Quantities  
Sta. 0+22.15  
Begin San. Sewer Quantities  
Sta. 0+00.00

Sta. 3+35.47 2.14' Lt.  
6" Hydrant from Salvage

Sta. 3+28.50 1.05' Rt.  
6" Gate Valve & Box

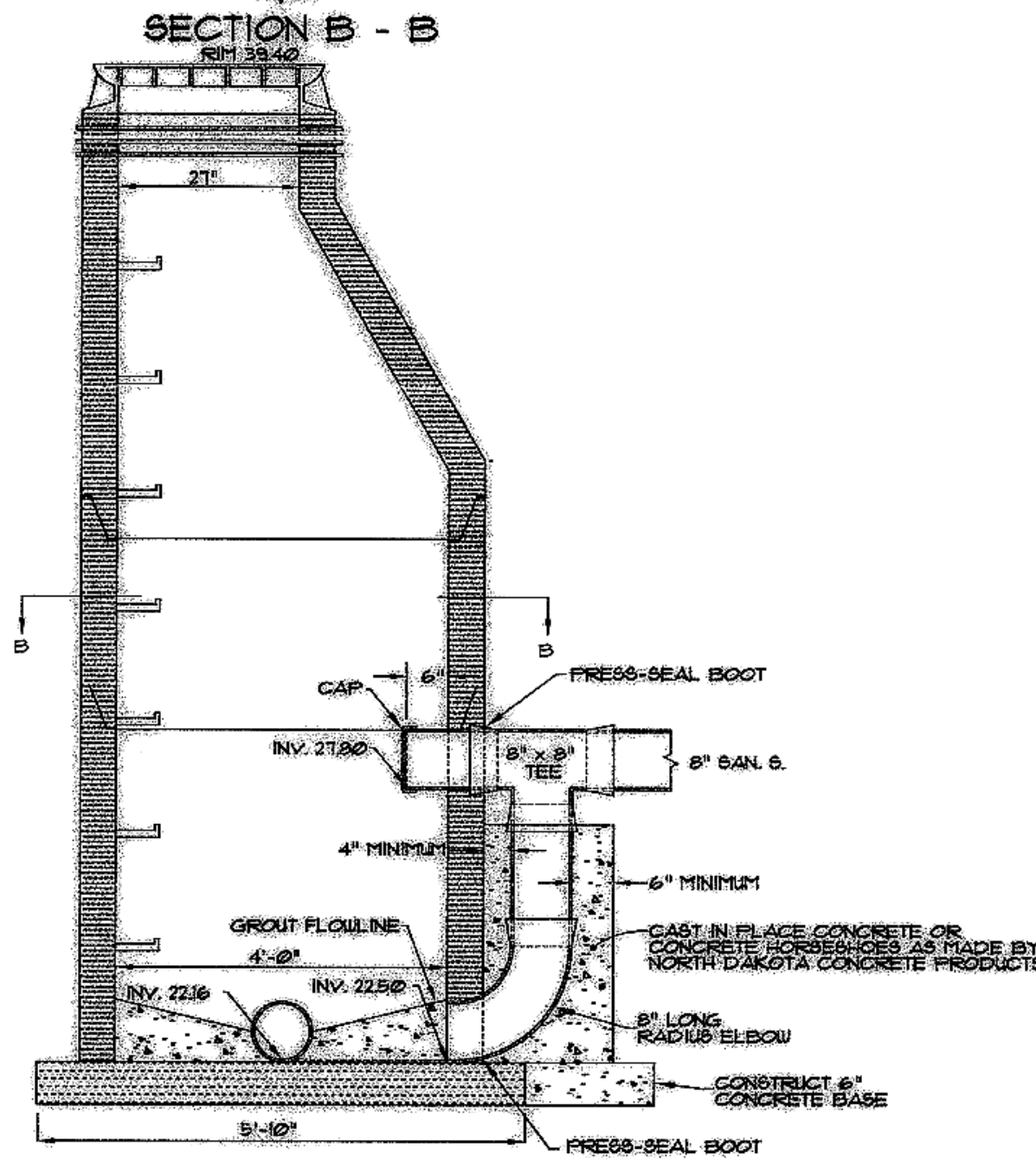
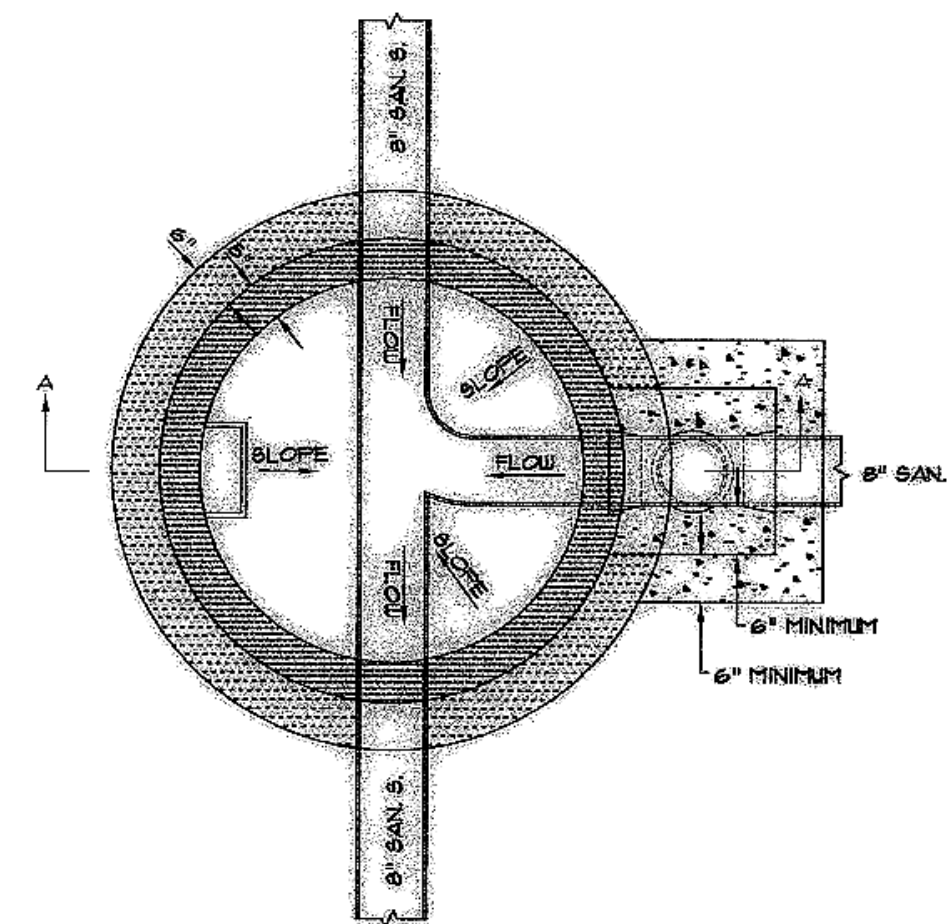
Sta. 3+25.50 2.38' Rt.  
8" x 6" Reducer from Salvage

End Watermain Quantities  
Sta. 3+35.47  
End San. Sewer Quantities  
Sta. 3+00.00

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

**CONSTRUCTION NOTES (THIS SHEET)**

- BACKFILL SHALL BE CLASS 'A'.
- THE PROFILE SHOWS THE EXISTING GROUND CENTERLINE OF THE STREETS. THE PLAN VIEW SHOWS THE EXISTING GROUND CONTOURS. THIS WILL BE THE CONDITION AT THE TIME OF CONSTRUCTION. UPON COMPLETION OF THE CONSTRUCTION OF THE WATER/SEWER THE EARTHWORK CONTRACTOR WILL BUILD THE STREETS UP TO THE PROPOSED CURB GRADES.
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- ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.
- THERE ARE A NUMBER OF CROSSINGS OF THE EXISTING 6" SANITARY SEWER FORCEMAIN. PROVIDE ADDITIONAL CAUTION NOT TO DAMAGE THIS LINE.

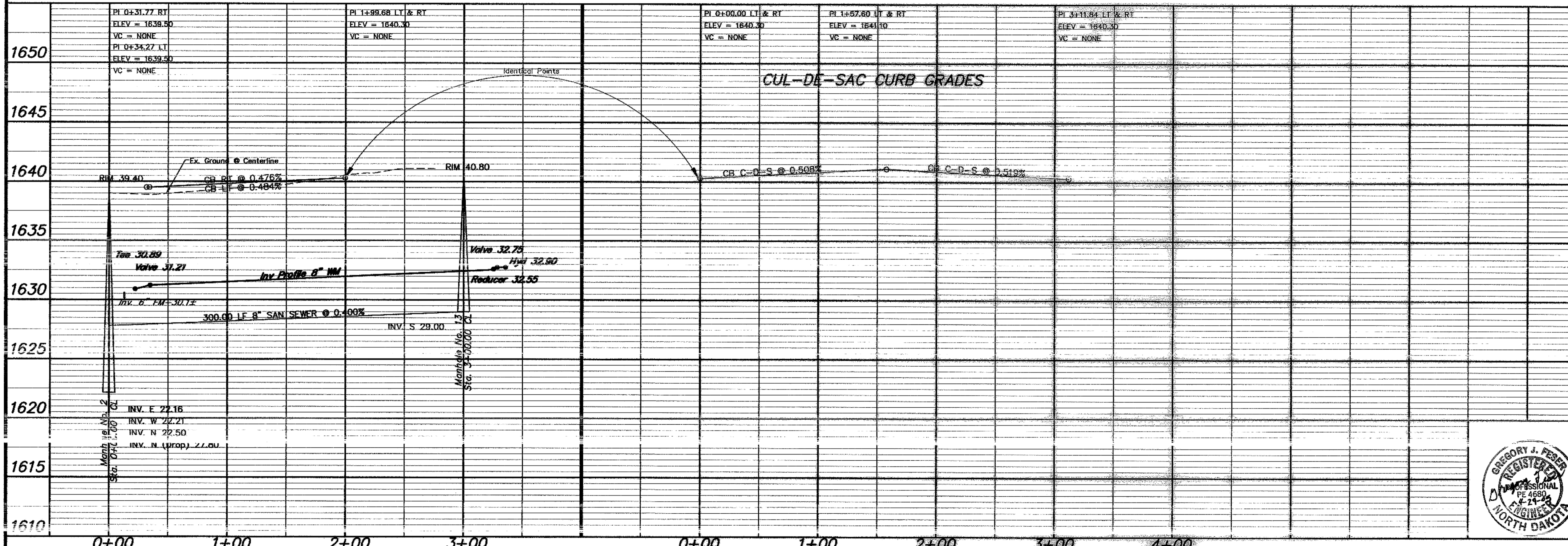


SECTION A - A  
CONCRETE DROP MANHOLE  
MANHOLE NO. 2  
NOT TO SCALE

Manhole Number	13
Casting Elev.	40.80
Top P.C. Section	33.76
Invert Elev.	(a) 29.00
Length P.C. Section	10.76

APPROXIMATE WYE LOCATIONS				
STATION	DIRECTION	LOT	BLOCK	
FROM MANHOLE 2 TO MANHOLE NO. 13				
0+6.3	W	10	2	
0+68	E	9	2	
2+20	W	9	2	
2+47	E	8	2	
2+88	NW	8	2	
2+93	NE	7	2	

Lot	Block	8" Sewer Service	4" x 4" Wye Branch	4" x 4" Wye Branch	4" x 4" Wye Branch	4" x 4" Wye Branch	4" x 4" Wye Branch	4" x 4" Wye Branch	4" x 4" Wye Branch	4" x 4" Wye Branch
10	2	43.0	1	1	28.80					
5	2	43.0	1	1	28.81					
9	2	47.2	1	1	28.46	64.0	1			33.00
6	2	64.0	1	1	28.73					
8	2	60.4	1	1	28.86	36.5	1	1		33.40
7	2	56.3	1	1	28.84	22.3	1	1		33.40
TOTAL		313.9	4	6	122.8	3	3			



**APPROXIMATE QUANTITIES**

San. Sewer Items	Quantity
8" Sanitary Sewer	300 LF
8" x 4" Wye Branch	6 EA
Concrete Manhole	1 EA
4" Sewer Service Pipe	314 LF
4" 45' Bend	4 EA

**Watermain Items**

Watermain Items	Quantity
8" PVC Watermain	306 LF
6" PVC Watermain	11 LF
6" Hydrant From Salvage	1 EA
6" Gate Valve & Box	2 EA
Ductile Iron Fittings	(incidental)
1" Water Copper Serv. Pipe	123 LF
1" Water Serv. Connection	3 EA
1" Ball Valve Curb Stop	3 EA
And 1 1/2" Box	

**SWENSON, HAGEN & COMPANY P.C.**  
 Surveying  
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 369 Basiss Avenue P.O. Box 1153  
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 Fax (701) 293-9606



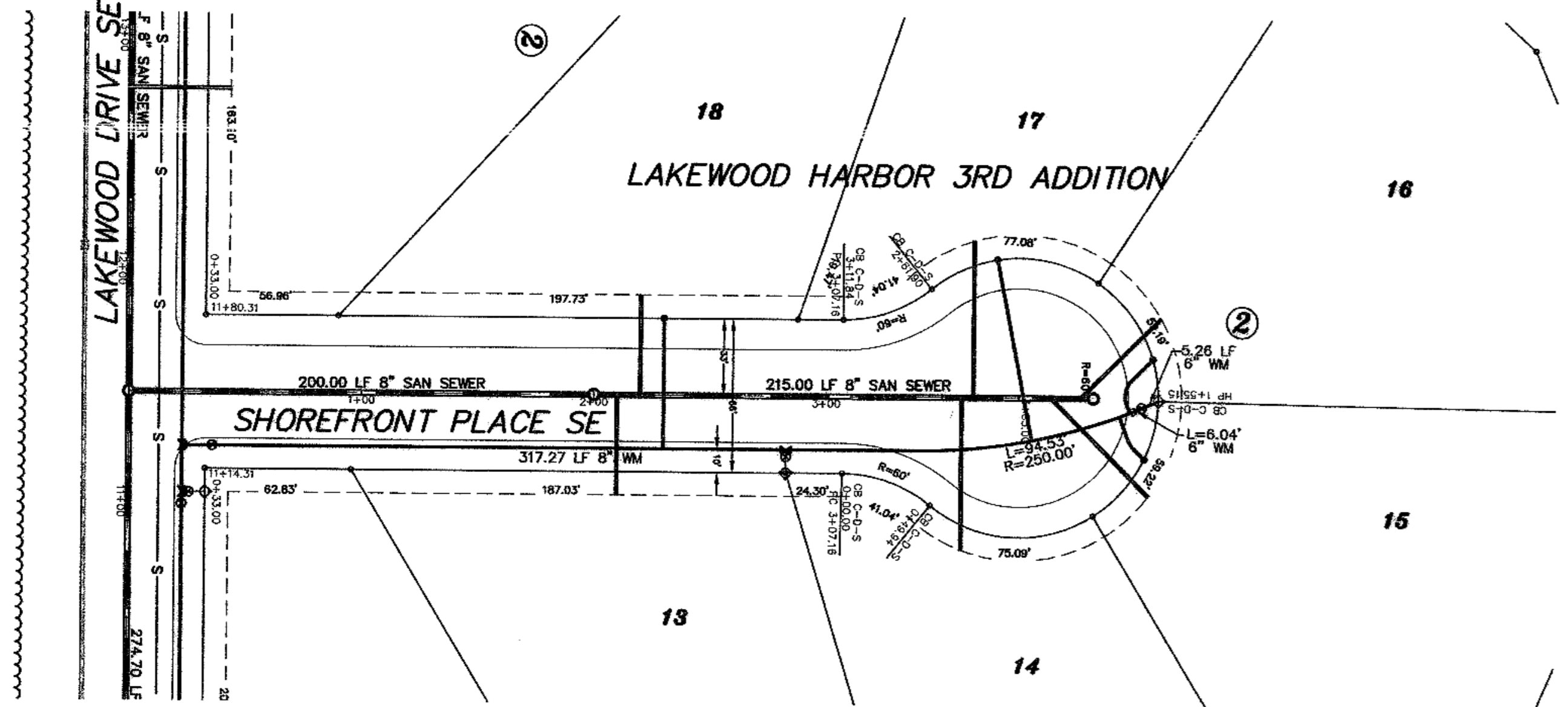
**BAYFRONT PLACE SE**  
 FROM THE INTERSECTION OF LAKEWOOD DRIVE SE  
 NORTH TO THE CUL-DE-SAC  
 WATER AND SEWER IMPROVEMENT PROJECT 2005-17  
 SHEET NO. 6 OF 8  
 MANDAN, ND APRIL 22, 2005

SCALE - 1"=50'

Sta. 0+00.00 CL  
=San. Sewer Manhole No. 4 Sta. 0+00.00 Ahd.

Sta. 2+00.00 CL  
=San. Sewer Manhole No. 14 Sta. 2+00.00 CL  
=San. Sewer Sta. 0+00.00 Bk.

Sta. 4+15.00 CL  
=San. Sewer Manhole No. 15 Sta. 2+15.00 Bk.



**APPROXIMATE WYE LOCATIONS**

STATION	DIRECTION	LOT	BLOCK
FROM MANHOLE NO. 14 TO MANHOLE NO. 15			
0+10	E	13	2
0+20	W	18	2
1+58	E	14	2
1+63	W	17	2
1+97	NE	15	2
2+09	NW	16	2

Lot	Block	4" Sewer Service	4" 22 1/2" Bend	4" 45" Bend	8" x 4" Wye Branch At The Curb	Water Service Invert	Water Service Pipe Connection	1" Ball Valve Curb Stop	Water Service Invert At The Curb Stop
13	2	43.0	1	1	29.22				
14	2	43.0	1	1	29.26	56.0	1	1	32.40
15	2	67.2	1	1	30.05				
16	2	67.2	1	1	30.08	79.0	1	1	33.10
17	2	59.6	1	1	30.14	27.7	1	4	33.40
18	2	48.7	1	1	30.09	27.8	1	1	33.50
<b>TOTAL</b>		<b>327.0</b>	<b>4</b>	<b>6</b>	<b>184.5</b>	<b>4</b>	<b>4</b>		

Manhole Number	14	15
Casting Elev.	39.83	40.70
Top P.C. Section	38.79	39.66
Invert Elev. (0)	28.40	29.31
Invert Elev. (2)	28.45	
Length P.C. Section	10.39	10.35

Sta. 0+23.00  
8" x 8" Tee

Sta. 0+36.00  
8" Gate Valve & Box

Sta. 2+82.86  
8" x 6" Tee  
3.00 LF 6" WM  
6" Gate Valve & Box  
7.00 LF 6" WM  
6" Hydrant

Sta. 4+43.00 0.98' Rt.  
6" Hydrant

Sta. 4+35.85 4.05' Rt.  
6" Gate Valve & Box

Sta. 4+42.85 5.34' Rt.  
8" x 6" Reducer

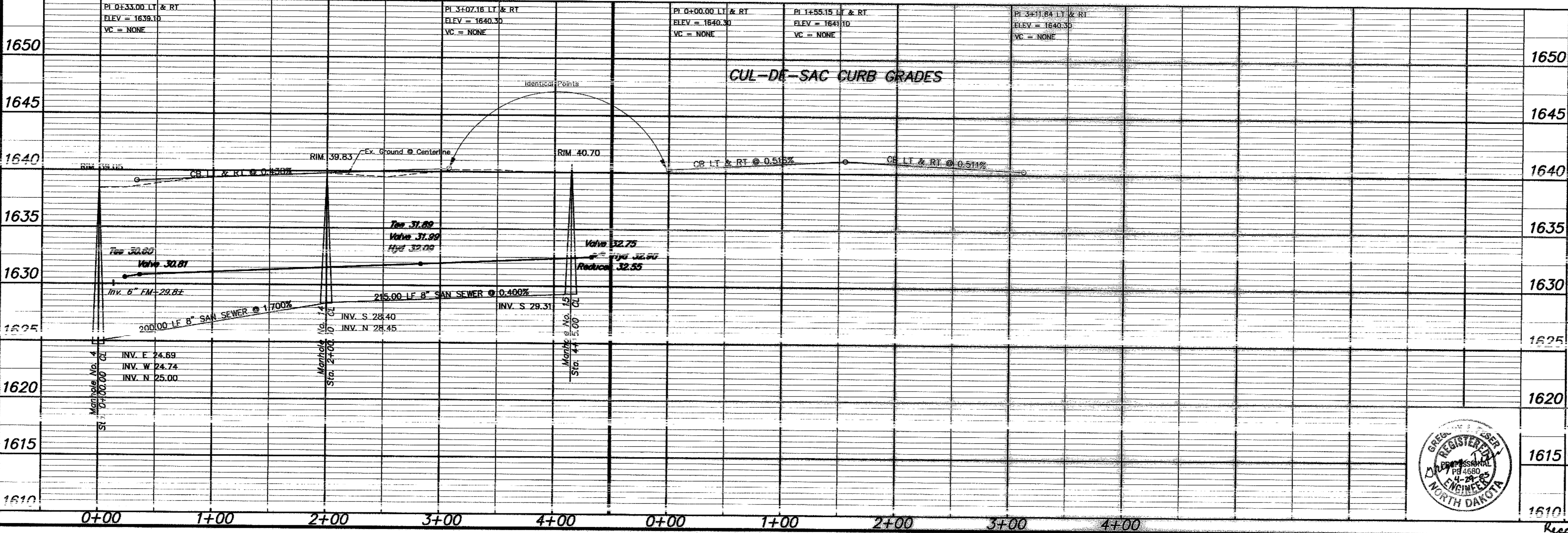
End Watermain Quantities  
Sta. 4+43.00 0.98' Rt.

End San. Sewer Quantities  
Sta. 4+15.00

Begin Watermain Quantities  
Sta. 0+23.00

Begin San. Sewer Quantities  
Sta. 0+00.00

NOTE:  
ALL WATER MAINS  
5' 23.00' RIGHT  
OF CENTERLINE  
UNLESS OTHERWISE  
STATED



**APPROXIMATE QUANTITIES**

San. Sewer Items	Quantity
8" Sanitary Sewer	415 LF
8" x 4" Wye Branch	6 EA
Concrete Manhole	2 EA
4" Sewer Service Pipe	327 LF
4" 45" Bend	4 EA

**Watermain Items**

Watermain Items	Quantity
6" PVC Watermain	21 LF
8" PVC Watermain	412 LF
6" Hydrant	2 EA
6" Gate Valve & Box	2 EA
8" Gate Valve & Box	1 EA
Ductile Iron Fittings	(incidental)
1" Water Copper Serv. Pipe	185 LF
1" Water Serv. Connection	4 EA
1" Ball Valve Curb Stop And 1 1/2" Box	4 EA

**SWENSON, HAGEN & COMPANY P.C.**

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Surveying  
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Landscape & Site Design  
Construction Management



**SHOREFRONT PLACE SE**  
FROM THE INTERSECTION OF LAKEWOOD DRIVE SE  
NORTH TO THE CUL-DE-SAC

1615 WATER AND SEWER IMPROVEMENT PROJECT 2005-17  
SHEET NO. 7 OF 8  
1610 MANDAN, ND APRIL 22, 2005

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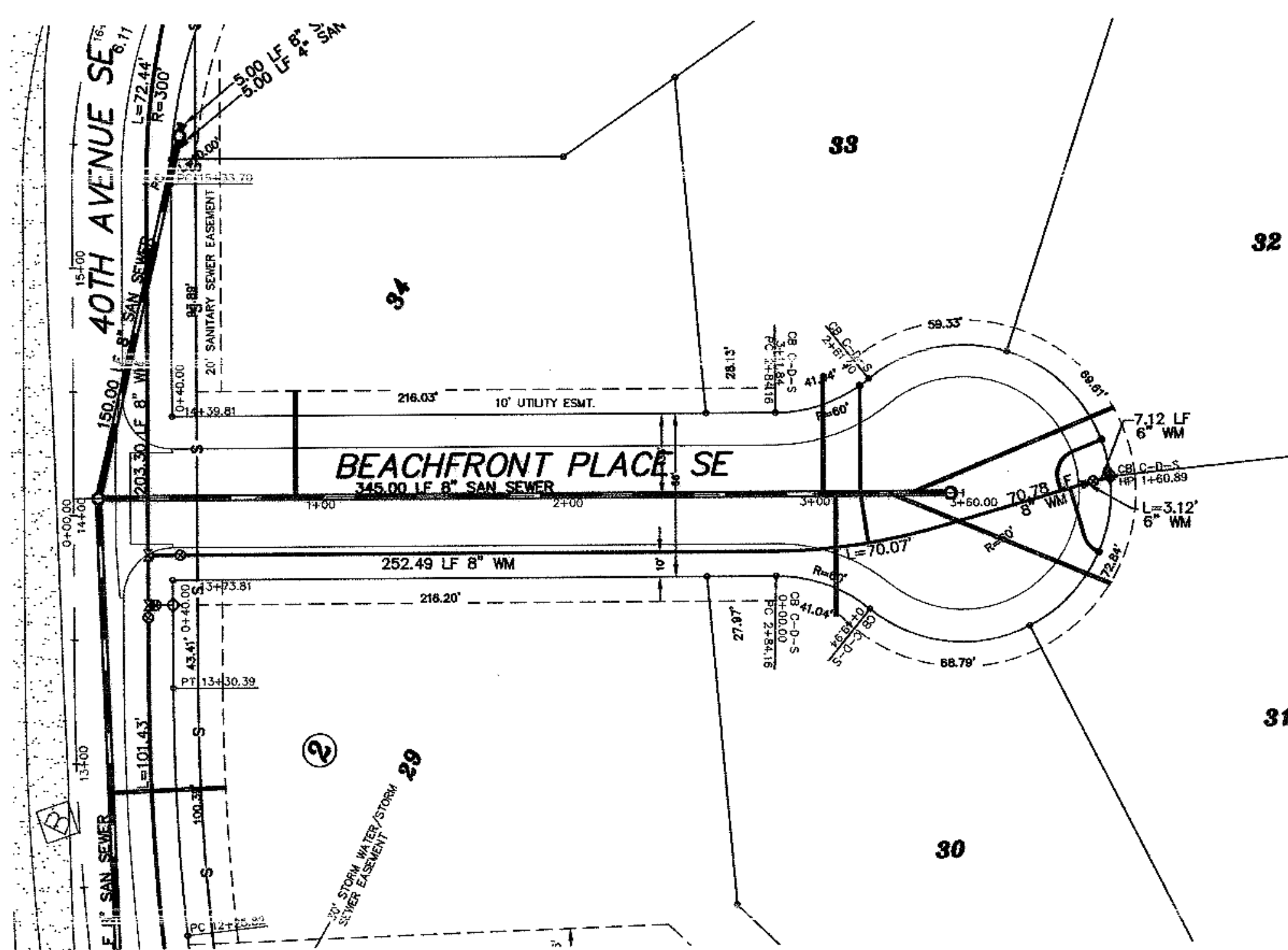
CONSTRUCTION NOTES (THIS SHEET)

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- ALL HYDRANTS SHALL HAVE 8.5' BURY DEPTH AND THE HYDRANT NOZZLE SHALL BE 18" ABOVE THE FINAL PLAN GROUND ELEVATION.
- THERE ARE A NUMBER OF CROSSINGS OF THE EXISTING 6" SANITARY SEWER FORCEMAIN. PROVIDE ADDITIONAL CAUTION NOT TO DAMAGE THIS LINE.

SCALE - 1"=50'

Sta. 0+10.00 CL  
San. Sewer Sta. 0+00 Ahd  
Manhole No. 11

Sta. 3+55.00 CL  
San. Sewer Sta. 3+45.00 Bk.  
Manhole No. 16



APPROXIMATE WYE LOCATIONS

STATION	DIRECTION	LOT	BLOCK
FROM MANHOLE NO. 6 TO MANHOLE NO. 7			
0+80	NE	34	2
2+93	SW	30	2
3+20	SE	31	2
3+29	SE	32	2

Manhole Number	16
Casting Elev.	42.00
Top P.C. Section	40.96
Invert Elev. (a)	34.91
Invert Elev. (b)	
Length P.C. Section	6.05

Lot	Block	8" Sewer Service	4" 22 1/2" Bend	4" 45" Bend	8" x 4" Wye Branch	6" Sewer Service Invert	At The Curb	Water Connection	Water Service Invert	At The Curb
34	2	43.0	1	1	34.58					
32	2	42.7	1	1	35.49	63.9	1	1	33.80	
30	2	42.3	1	1	35.50					
31	2	46.3	1	1	35.90	29.3	1	1	34.30	
32	2	49.3	1	1	36.20	31.3	1	1	34.40	
TOTAL		325.6	2	3	5	224.5	3	3		

Sta. 0+30.00  
8" x 8" Tee

Sta. 0+43.00  
8" Gate Valve  
& Box

Sta. 4+19.66 6.33' Lt.  
6" Hydrant

Sta. 4+12.82 4.36' Lt.  
6" Gate Valve  
& Box

Sta. 4+09.82 3.50' Lt.  
8" x 6" Reducer

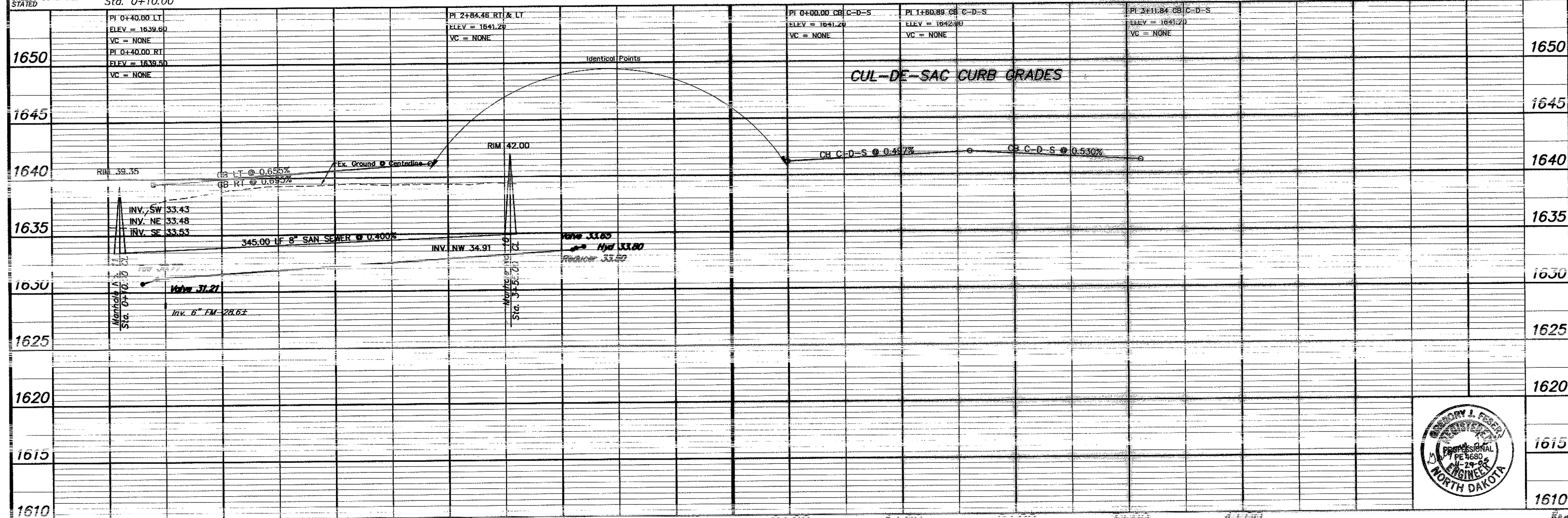
Begin Watermain Quantities  
Sta. 0+30.00

Begin San. Sewer Quantities  
Sta. 0+10.00

End Watermain Quantities  
Sta. 4+19.66 6.33' Lt.

End San. Sewer Quantities  
Sta. 3+55.00

NOTE:  
ALL WATER MAINS  
IS 24"00" RIGHT  
OF CENTERLINE  
UNLESS OTHERWISE  
STATED



APPROXIMATE QUANTITIES

San. Sewer Items	Quantity
8" Sanitary Sewer	345 LF
8" x 4" Wye Branch	5 EA
Concrete Manhole	1 EA
4" Sewer Service Pipe	326 LF
4" 45" Bend	3 EA
4" 22 1/2" Bend	2 EA

Watermain Items	Quantity
8" PVC Watermain	383 LF
6" PVC Watermain	10 LF
6" Hydrant	1 EA
6" Gate Valve & Box	1 EA
8" Gate Valve & Box	1 EA
Ductile Iron Fittings	(incidental)
1" Water Copper Serv. Pipe	125 LF
1" Water Serv. Connection	3 EA
1" Ball Valve Curb Stop And 1 1/2" Box	3 EA

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**BEACHFRONT PLACE SE**  
FROM THE INTERSECTION OF 40TH AVE SE  
EAST TO THE CUL-DE-SAC

WATER AND SEWER IMPROVEMENT PROJECT 2005-17  
SHEET NO. 8 OF 8  
MANDAN, ND APRIL 22, 2005